

# 2013 West Virginia Statewide Standard Hazard Mitigation Plan Update

Division of Homeland Security and Emergency Management

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## CHAPTER 1: INTRODUCTION

### DISASTER MITIGATION ACT OF 2000

#### 44 Code of Federal Regulations

*§201.4(c)(6): The plan must be formally adopted by the State prior to submittal to [FEMA] for final review and approval.*

*§201.4(c)(7): 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, in compliance with 44 CFR 13.11(c). The State will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).*

### 1.1 PURPOSE OF THE STATE HAZARD MITIGATION PLAN

The West Virginia Statewide Standard Hazard Mitigation Plan provides statewide guidance to reduce loss and prevent injury from natural hazards. It reflects an amalgamation of goals, objectives, and strategies developed by the West Virginia Division of Homeland Security and Emergency Management (DHSEM), with input from the general citizenry and representatives from all levels of government. The process of mitigation planning is integrated with parts of other planning activities, such as continuity of operations plans, community strategic plans, and the Emergency Operations Plan (EOP) for the State of West Virginia. This encourages a holistic effort to reduce risk and better respond to disasters throughout the State.

### 1.2 FEDERAL AUTHORITIES

In October 2000, the United State Congress recognized that the Nation as a whole was ill-prepared to handle the risks and damages associated with natural hazards by adopting the Disaster Mitigation Act of 2000 (DMA 2000; Public Law (PL) 106-390). The law amended the existing 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act, defining language for 44 Code of Federal Regulations (CFR) Section 201.4. DMA 2000 reinforced the importance of mitigation planning, emphasizing planning before disasters occur. It set an initial standard for a State Hazard Mitigation Plan (HMP). The standard was further defined by the Federal Emergency Management Agency (FEMA) on February 26, 2002. FEMA published an Interim Rule that modified §201 and §206 in the *Federal Register*; the Final Rule was published in October 2009. The Guidance and Standard Plan Crosswalk were revised on November



4, 2006 and further updated to include requirements for 90-10 Federal funding for the Severe Repetitive Loss (SRL) and Flood Mitigation Assistance (FMA) grant programs in January 2009. Most recently, the *Biggert-Waters Flood Insurance Reform Act of 2012* restructured many of the HMA grant programs, including the consolidation of SRL and Repetitive Flood Claims Programs into the Flood Mitigation Assistance program. For more detail on these changes, refer to the portion of Section 1.2.2 that addresses the *Biggert-Waters Flood Insurance Reform Act of 2012*. These changes were reflected in the *2013 Hazard Mitigation Assistance Unified Guidance*.

Mitigation planning is specifically addressed at the State and local levels under the Stafford Act, Section 322 (42 USC 5165). Adherence to the requirements and criteria set forth in Section 322 of the Act qualifies West Virginia to utilize disaster-related assistance, including Categories C through G of the Public Assistance Program, an essential component of disaster recovery.

Since 2004, West Virginia has been eligible to receive non-emergency Stafford Act assistance and Federal mitigation pre-disaster assistance by maintaining an approved Standard State HMP compliant with 44 CFR §201.4 and related FEMA mitigation planning guidance.

The following identifies and describes Federal regulations that have an impact on mitigation and mitigation planning in the United States.

### 1.2.1 DISASTER MITIGATION ACT OF 2000 AND IMPLEMENTING REGULATIONS

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 USC 5165) was enacted under Section 104 of the Disaster Mitigation Act of 2000 (DMA 2000), PL 106-390. It was signed into law on October 10, 2000. The intent of DMA 2000 was to facilitate cooperation between State and local authorities. It encourages and rewards local and State disaster planning in advance of disasters in order to promote sustainability of communities and services as a strategy to improve disaster resistance. This enhanced pre-disaster planning effort is intended to support State and local governments' efforts to articulate accurate, targeted, and prioritized needs for hazard mitigation that will reduce exposure to natural hazards. This effort is intended to support timely funding allocation to encourage effective risk reduction strategies and projects.

### 1.2.2 THE CODE OF FEDERAL REGULATIONS AND THE STAFFORD ACT

#### 44 CFR PART 201

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On February 26, 2002, FEMA promulgated 44 CFR § 201.1 *et seq.* in order to implement DMA 2000. The Interim Final Rule was amended several times to address standard and enhanced State plans during 2007. Guidance for local plans was



published on March 28, 2012. In addition, guidance for the FMA Program (44 CFR § 201.4 *et seq.*) requires amendment of State plans per a new crosswalk for these programs issued on January 14, 2008. The rule addresses State mitigation planning, and specifically in 44 CFR § 201.3 (c) identifies the States' mitigation planning responsibilities, which include:

1. Prepare and submit to FEMA a Standard Hazard Mitigation Plan following criteria established in 44 CFR § 201.4 as a condition of receiving Stafford Act assistance (except emergency assistance).
2. For consideration for 20% Hazard Mitigation Grant Program funding, prepare and submit an Enhanced State Mitigation Plan in accordance with 44 CFR § 201.5, which must be reviewed and updated, if necessary, every three years from the date of the approval of the previous plan.
3. Review and if necessary, update the Standard State Mitigation Plan by November 1, 2004, and every three years from the date of approval of the previous plan in order to continue program eligibility.
4. Make available the use of up to the seven percent of HMGP funding for planning in accordance with 44 CFR § 206.434. See 44 CFR § 201.3 (c).

44 CFR § 201.4, Standard State Mitigation Plans, lists the required elements of State HMPs. Under 44 CFR § 201.4 (a), by November 1, 2004, States were required to have an approved Standard State HMP that met the requirements of the regulation to receive Stafford Act assistance. The planning process, detailed in 44 CFR § 201.4 (b), includes coordination with other State agencies, appropriate Federal agencies, and interested groups. Guidance for State standard and enhanced plans and local and multi-jurisdictional plans has been updated several times to incorporate changes from the Katrina Reform Act, new Unified Hazard Mitigation Assistance Grant Programs, and "lessons learned" through the first cycle of State and local mitigation planning. Current State standard plan guidance and the State plan crosswalk were used in preparing the 2013 West Virginia HMP update.

44 § 201.4 (c), Plan Content, identifies the following elements that must be included in a State HMP:

1. A description of the planning process used to develop the plan;
2. Risk assessments that provide the factual basis for activities proposed in the strategy portion of the mitigation plan;
3. A Mitigation Strategy that provides the state's blueprint for reducing losses identified in the risk assessment;
4. A section describing Coordination of Local Mitigation Planning;



5. A Plan Maintenance Process, including a method and schedule for monitoring, evaluating and revising the plan; a system for monitoring implementation of mitigation strategies and projects; and a system for reviewing progress in achieving goals, objectives and strategies as well as project implementation;
6. A Plan Adoption Process for formal adoption by the State prior to submittal to FEMA for final review and approval; and
7. Assurances that the State will comply with all applicable Federal statutes and regulations in effect with respect to grant funding periods, in compliance with 44 CFR 13.11(c). The state must amend its plan whenever needed to reflect changes in state or federal laws and statutes as required by 44 CFR 13.11(d).
8. Revisions to plans per guidance issued January 14, 2008 must include a program strategy for state eligibility for 90% federal funding for the Severe Repetitive Loss Program for FY 2008 and the Flood Mitigation Assistance Program for FY2009. Plan revisions must in compliance with 44CFR201.4.

#### **44 CFR PART 206**

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On February 26, 2002, FEMA also changed 44 CFR Part 206 in order to implement DMA 2000 (See 67 *Federal Register* 8844 [February 26, 2002]). Changes to 44 CFR Part 206 authorize hazard mitigation grant program funds for planning activities and increase the amount of Hazard Mitigation Grant Program (HMGP) funds available to States that develop an Enhanced Mitigation Plan. FEMA amended Part 206 in 2006 following the passage of the Katrina Reform Act, which restored HMGP funding to 15 percent of eligible disaster recovery costs for States with approved Standard Mitigation Plans (SMPs).

#### **44 CFR PART 206.400**

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(a) As a condition of the receipt of any disaster assistance under the Stafford Act, the applicant shall carry out any repair or construction to be financed with the disaster assistance in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications and standards.

(b) Applicable codes, specifications, and standards shall include any disaster resistant building code that meets the minimum requirements of the National Flood Insurance Program (NFIP) as well as being substantially equivalent to the recommended provisions of the National Earthquake Hazards Reduction Program (NEHRP). In addition, the applicant shall comply with any requirements necessary in regards to Executive Order 11988, Floodplain Management, Executive Order 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, and any other applicable Executive orders.



(c) In situations where there are no locally applicable standards of safety, decency and sanitation, or where there are no applicable local codes, specifications and standards governing repair or construction activities, or where the Regional Administrator determines that otherwise applicable codes, specifications, and standards are inadequate, then the Regional Administrator may, after consultation with appropriate State and local officials, require the use of nationally applicable codes, specifications, and standards, as well as safe land use and construction practices in the course of repair or construction activities.

(d) The mitigation planning process that is mandated by section 322 of the Stafford Act and 44 CFR part 201 can assist State and local governments in determining where codes, specifications, and standards are inadequate, and may need to be upgraded.

### 1.2.3 POST-2010 FEDERAL POLICY UPDATES

#### **BIGGERT-WATER FLOOD INSURANCE REFORM AND MODERNIZATION ACT OF 2012**

On July 6, 2012, the Biggert-Waters Flood Insurance Reform and Modernization Act of 2012 (BW12), was signed into law. It represents significant changes to fundamental operation and management of the National Flood Insurance Program (NFIP). Many policyholders will see revised flood insurance rates that more accurately reflect the actuarial rate, or true flood risk, of their insured property. These measures were inserted into the law to help financially stabilize the NFIP. Furthermore, these provisions change how Flood Insurance Rate Maps (FIRM) updates impact policyholders through increased premiums resulting from more accurate predictions of risk. The legislation also eliminated RFC, and SRL programs, while incorporating elements of these programs into FMA. These changes were reflected in the *2013 Hazard Mitigation Assistance Unified Guidance*.

#### **SANDY RECOVERY IMPROVEMENT ACT OF 2013**

On January 29, President Obama signed the Sandy Recovery Improvement Act of 2013. The Act sets out certain reconstruction and grant administrative standards that apply to the States that received the Sandy Presidential Declaration of Disaster. Some implications of the Act could be seen in general revised FEMA Hazard Mitigation Assistance Guidance, scheduled for release during summer 2013, and other Federal recovery funds. For example, requirements to complete HMGP and Community Development Block Grant (CDBG) projects funded by the Sandy Act could eventually extend to the programs at large through issuance of new guidance, which would impact West Virginia.

The Federal Hurricane Sandy Rebuilding Task Force has also announced that all Sandy-related rebuilding projects funded by the supplemental spending bill must meet



a single uniform flood risk reduction standard. The standard is informed by the best science and best practices, including assessments taken following Hurricane Sandy. It brings the Federal standard into alignment with many existing State and local standards and takes into account the increased risks in the Sandy-affected region caused by extreme weather events, sea level rise, and other impacts of climate change. The standard applies to the rebuilding of structures that were substantially damaged during the storm and will be repaired or rebuilt with Federal funding. As a result, the new standard will require owners of residential, commercial, or infrastructure projects who are applying for Federal dollars to plan for increased flood risk.

Requirements derived from the Sandy Recovery Act do not retroactively affect Federal aid that was previously given to property owners and communities in Sandy-impacted areas. Moving forward, the Federal standard applies to substantial rebuilding projects (i.e., when damage exceeds 50 percent of the value of the structure) that will rely on Federal funding.

The programs which received funding in the supplemental bill and will be impacted by this standard include:

- U.S. Department of Housing and Urban Development (HUD): Community Development Block Grant Disaster Recovery program
- Department of Health and Human Services (HHS): Construction and reconstruction projects funded by Social Services Block Grants and Head Start
- FEMA: HMGP and Public Assistance Program
- U.S. Environmental Protection Agency (EPA): The State Revolving Fund (SRF) programs
- U.S. Department of Transportation (DOT): Federal Transit Administration's Emergency Relief Program, as well as some Federal Railroad Administration and Federal Highway Administration projects

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#### **FEMA MEMORANDUM: COST EFFECTIVENESS DETERMINATIONS FOR ACQUISITIONS AND ELEVATIONS IN SFHA**

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Projects applying for mitigation grant funding under the Hazard Mitigation Assistance (HMA) programs must prove that they are cost effective. The cost-effectiveness determination process traditionally utilizes the FEMA Benefit-Cost Analysis software, and requires assessment of the costs of the project in comparison to the projected reduction in damages due to the project's implementation (benefits). This assessment process can be challenging depending upon the nature of the project and availability of data.





In order to simplify this process, FEMA issued the memorandum titled “Cost Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas”, signed on August 15, 2013 by Roy E. Wright, Deputy Associate Administrator for Mitigation from FEMA’s Risk Reduction Division. This memorandum states that if the cost of an acquisition or elevation project is less than \$276,000 or \$175,000 respectively, then the project is determined to be cost effective. This purpose of this memorandum is to reduce the burden on applicants to develop Benefit Cost Analyses (BCA) as part of the application process.

The cost of elevation and acquisition in West Virginia, however, tends to be lower than the national average. As a result, many projects that have not historically been eligible might now meet this requirement. It also means that there are likely to be more projects that meet all of the eligibility requirements than there are HMA funding opportunities.

In order to address these challenges, DHSEM is reconsidering how it will address prioritization of funding of mitigation projects. While this funding strategy has not been finalized, DHSEM is considering providing Federal mitigation grant funds for elevation and acquisition projects on a first-come, first-serve basis, assuming all other eligibility criteria are met, or potentially still running a BCA on the project and awarding funding based on those that are considered most cost-effective. More information will become available as DHSEM finalizes its prioritization strategy. Contact the State Hazard Mitigation Officer for complete information. See Section 1.2.3 for complete details on the FEMA Memorandum.

### 1.3 MITIGATION PLANNING IN WEST VIRGINIA

During August 2004, the first Standard State Mitigation Plan was approved by FEMA Region III. The first plan focused on the creation of plans for localities. The 2004 plan was developed under the authority of the West Virginia Office of Emergency Services (WVOES), now known as West Virginia Division of Homeland Security and Emergency Management (DHSEM), and the Governor as established in West Virginia Code §§ 15-5-1, *et seq.* and Executive Order No. 18-03.

#### EXECUTIVE ORDER NO. 18-03

On August 18, 2003, former Governor Bob Wise signed Executive Order No. 18-03. This order established the West Virginia Hazard Mitigation Council as well as other actions that aided West Virginia’s goal of compliance with DMA 2000.

*See Appendix B for more information.*



In 2007, the first update to the base plan was adopted. The approach of this update varied from the 2004 plan. Its language discussed the development of a regional approach to mitigation planning throughout the State. In 2010, county plan updates segued to regional updates coordinated through West Virginia’s Planning and Development Councils. The State Standard Mitigation Plan was also updated, featuring a revised vulnerability analysis, comprehensive compilation of mitigated properties into one portfolio, and mitigation project scoping. The plan also included a robust Repetitive and Severe Repetitive Loss property analysis and strategy which resulting in a reduced cost share of 100/0 and 90/10 for grants awarded under the FMA program for mitigation of FEMA-listed severe repetitive loss and repetitive loss properties respectively.

The *2013 State of West Virginia Standard All-Hazard Mitigation Plan* represents the third update. The preparation of the *2013 West Virginia Statewide Standard Hazard Mitigation Plan Update* was overseen by DHSEM. Local planning is nearly all regionalized through State’s 11 PDCs, although Jefferson County continues to maintain their own plan. More information on local planning can be found in Chapter 5.

West Virginia has and continues to maximize Federal assistance. The State participates in the Community Assistance Program, State Support Services Element (CAP-SSSE) program to support its Floodplain Management Program. West Virginia actively pursues grants through FEMA’s Hazard Mitigation Grant (HMA) program when funding is available. Recent changes to the HMA program as a result of the *Biggert Waters Flood Insurance Reform Act of 2012*, as well as the FEMA Memorandum titled “Cost Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas” has made significant changes to the federal mitigation grant programs. As a result, West Virginia has changed how it prioritizes distribution of these monies. For more information see both Section 1.2.2 and More information on WV’s participation in these federal programs can be found in Appendix F – Capability Assessment.

## 1.4 WEST VIRGINIA AUTHORITIES

Both the 2010 and 2013 updates to the State HMP adhere to the West Virginia Code § 15-5 Public Safety. In Code § 15-5, the West Virginia legislature declared that it is necessary to establish and implement comprehensive emergency management plans to ensure the State’s preparedness for disasters. In addition, legislation states that:

*“All emergency services functions of this state be coordinated to the maximum extent with the comparable functions of the federal government including its various departments and agencies, of other states and localities and of private*



*agencies of every type, so that the most effective preparation and use may be made of the every type, so that the most effective preparation and use may be made of the nation's manpower, resources and facilities for dealing with any disaster that may occur." (West Virginia Code § 15-5-1)*

Under West Virginia Code § 15-5-5(2), the Governor is empowered with the authority to prepare, implement, integrate, and coordinate comprehensive plans and programs for the purpose of providing emergency services in West Virginia.

*To prepare and implement a comprehensive plan and program for the provision of emergency services in this state, such plan and program to be integrated into and coordinated with comparable plans of the federal government and of other states to the fullest possible extent, and to coordinate the preparation of such plans and programs by the political subdivisions of this state, such plans to be integrated into and coordinated with the state plan and program to the fullest possible extent. (West Virginia Code § 15-5-1(2))*

This excerpt allows for the development of more streamlined and holistic approach to emergency management and recovery. Beyond planning, the Governor, by the statute of West Virginia Code § 15-5-5(3), can authorize to preparatory steps in advance of events.

*In accordance with such state plan and program, to procure supplies and equipment, to institute training and public information programs, to take all other preparatory steps including the partial or full mobilization of emergency services organizations in advance of actual disaster and to insure the furnishing of adequately trained and equipped emergency services personnel in time of need.(West Virginia Code § 15-5-5(3))*

Furthermore, the Governor is empowered to authorize studies and surveys to verify the capabilities of the State to provide emergency services and to plan as seen in *West Virginia Code § 15-5-5(4)*, cited below:

*To make such studies and surveys of industries, resources and facilities in this state as may be necessary to ascertain the capabilities of the state for providing emergency services and to plan for the most efficient emergency use thereof. (West Virginia Code § 15-5-5(4)).*

The studies contained in this hazard mitigation plan have been undertaken pursuant to this authority and to Executive Order 18-03. Many of the recommendations contained in this plan are made in concert with the West Virginia Code § 15-5-20(a), which states:



*In addition to disaster prevention measures as included in the state, local, regional and inter-jurisdictional disaster plans, the Governor shall consider on a continuing basis steps that could be taken to prevent or reduce the harmful consequences of disasters. At his or her direction, and pursuant to any other authority and competence they have, state agencies, including, but not limited to, those charged with responsibilities in connection with floodplain management, stream encroachment and flow regulation, weather modification, fire prevention and control, air quality, public works, land use and land-use planning and construction standards, shall make studies of disaster prevention-related matters. The Governor, from time to time, shall make such recommendation to the Legislature, political subdivisions and other appropriate public and private entities as may facilitate measures for prevention or reduction of the harmful consequences of disasters. (West Virginia Code § 15-5-20(a))*

This alignment of the plan with West Virginia Code allows the hazard mitigation planning process to aid in reaching State goals.

The West Virginia Code, Chapter 15 Public Safety, §53, creates the DHSEM, which supersedes the Office of Emergency Services. This law establishes that emergency services organizations and operations will be structured around the existing constitutional government. The Governor retains control of and provides “general direction” to “the office of emergency services” for the State. West Virginia Code §15-5-3(a) authorizes the Governor to appoint, with Senate approval, a Director of the DHSEM within the Department of Military Affairs and Public Safety (DMAPS).

The State organization for emergency operations includes<sup>1</sup>:

1. The Governor and his immediate staff.
2. The Secretary of DMAPS and his staff.
3. The West Virginia Office of Emergency Services (WVOES) and State Emergency Operations Center (EOC) located in Charleston.
4. State departments and agencies assigned emergency responsibilities or having the capability to provide needed assistance in an emergency situation.
5. The State Legislature by concurrent resolution of the Senate and House of Delegates to declare a State of Emergency to exist or to be terminated.

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<sup>1</sup> State of West Virginia Emergency Operation Plan: Base Plan



6. Personnel from selected Federal agencies and participating public/private organizations.
7. Local governments. Each political subdivision is required to have an emergency services organization. Locally available manpower, materials, equipment, and facilities are to be identified in each local Emergency Operations Plan (EOP). Non-affected localities can be expected to provide assistance when requested.
8. Federal agencies upon request within their statutory authority.
9. Non-governmental organizations.

## 1.5 ASSURANCES & ADOPTION

As a condition of approval of a State hazard mitigation plan by the FEMA Regional Administrator, 44 CFR § 201.4(c)(7) requires that the plan contain certain assurances. The State must assure that it will comply with Federal statutes and regulations that pertain to grant funding, and will amend the plan to reflect changes in pertinent State or Federal laws. Accordingly, under the authorities provided to West Virginia Division of Homeland Security and Emergency Management in W.Va. Code Sections 15-5-1, *et seq*, and Executive Order No. 18-03, the West Virginia Division of Homeland Security and Emergency Management 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 CFR 13.11(c); and

Amend this plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

Below are the signed resolution of adoption, and assurances.



### Resolution of Plan Adoption

I, Earl Ray Tomblin, Governor of the State of West Virginia, am responsible for the preservation of lives and property of the people of this state. In compliance with and under the authorities provided to West Virginia Division of Homeland Security and Emergency Management in West Virginia Code §15-5-1, et seq., and Executive Order No. 18-03, I pledge that the State of West Virginia will continue to comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding. I have directed the West Virginia Division of Homeland Security and Emergency Management to develop the 2013 West Virginia Statewide Standard Hazard Mitigation Plan Update. This Plan has also been developed in accordance with Executive Order No. 18-03.

This Plan implements hazard mitigation measures intended to eliminate or reduce the effects of future disasters throughout the state, and was developed in a joint and cooperative venture by the Division of Homeland Security and Emergency Management, members of the State Hazard Mitigation Council, and stakeholders from various agencies representing the diverse interests within the State of West Virginia.

Pursuant to this Plan, responsibilities for hazard mitigation activities are assigned to appropriate state agencies. In addition, the Plan's mitigation actions extend to federal agencies and non-governmental organizations. In accordance with Executive Order No. 18-03, these entities are requested to become familiar with this Plan and prepare to discharge their responsibilities under the coordination of the Division of Homeland Security and Emergency Management.

Finally, by my signature, I approve and promulgate the triennial update to the 2013 West Virginia Statewide Standard Hazard Mitigation Plan. This Plan is hereby approved for distribution and implementation.

Earl Ray Tomblin  
Governor, State of West Virginia

Date: Oct. 9, 2013



### Assurances & Adoption

As a condition of approval of a state hazard mitigation plan by the FEMA Regional Administrator, 44 CFR Part 201.4(c)(7) requires that the plan contain certain assurances. The state must assure that it will comply with federal statutes and regulations that pertain to grant funding, and will amend the plan to reflect changes in pertinent state or federal laws. Accordingly, under the authorities provided to West Virginia Division of Homeland Security and Emergency Management in West Virginia Code sections 15-5-1, et seq., and Executive Order No. 18-03, West Virginia Division of Homeland Security and Emergency Management pledges that it will continue to:

1. Comply with all applicable federal statutes and regulations in effect with respect to periods for which it receives grant funding, in compliance with 44 CFR 13.11(c); and
2. Amend this plan whenever necessary to reflect changes in state or federal laws and statutes as required in 44 CFR 13.11(d).

Earl Ray Tomblin  
Governor, State of West Virginia

Date: Oct. 9, 2013



## 1.6 OVERVIEW OF PLAN

Each chapter begins with the appropriate requirements from DMA2000 to provide reference and context to the issues discussed within the chapter. A brief introduction to the section is followed by relevant information, charts, tables, and maps, which fulfill regulatory requirements. The main chapters of the plan follow primary requirements of the federal hazard mitigation planning law.

**CHAPTER 1: INTRODUCTION** reviews the State’s authority to implement the mitigation plan, presents the official letter of adoption, and describes the overall purpose and approach to the development of this plan. It also provides insight on the development and history of State HMPs.

**CHAPTER 2: PLANNING PROCESS** describes the activities and work of the State HMC, DHSEM, and the contractor. It describes the plan participants, planning process, planning products, and relevance to other related plans or State functions.

**CHAPTER 3: HAZARD IDENTIFICATION AND RISK ASSESSMENT** provides a substantive analysis of the hazards facing West Virginia. It provides a historical and scientific evaluation of previous disaster occurrences in the State in order to inform the development of the mitigation strategy and ensure that its decisions are made based on actual conditions. The 2013 risks addressed in this plan are as follows: dam and levee failure, drought and extreme heat, earthquake, flooding, hazardous materials, high wind and severe storm, land subsidence, landslides, natural resource extraction, nuclear accidents, wildfires, levees, and winter weather. Each hazard is evaluated using three primary components: hazard identification, risk assessment, and vulnerability analysis. The impact of climate change is discussed where appropriate.

**CHAPTER 4: HAZARD MITIGATION STRATEGY** lays out the specific goals and actions that were developed in order to mitigate the effects of the hazards that were profiled in Chapter 3. This chapter includes a description of the process followed to develop the mitigation strategy, how the goals were prioritized, as well as a brief summary of West Virginia’s ability to implement them. Appendix I includes the strategies in an Excel spreadsheet and will serve as a tool for when the Council provides its annual update.

**CHAPTER 5: COORDINATION WITH LOCAL MITIGATION PLANNING EFFORTS** describes a comprehensive three-year process to engage all West Virginia communities in hazard mitigation planning. Initially, 55 individual plans were approved and adopted, representing each of West Virginia’s counties. Since that time, mitigation planning was regionalized, and is led by the regional Planning District Commissions that have updated, approved, and adopted regional HMPs. One jurisdiction, Jefferson County, opted out of the regional planning effort and maintains its own local mitigation plan.





**CHAPTER 6: PLAN MAINTENANCE, IMPLEMENTATION AND ADOPTION** outlines implementation of the plan and development of next plan update. Processes used to maintain and update data and information contained in the hazard identification and vulnerability assessment databases are described. Plan adoption and revision are also described, augmented with a timeline. This chapter has been expanded to detail an annual progress review.

**APPENDIXES** may be found immediately following the plan. These provide additional details, including planning process documentation, Hazard Identification and Risk Assessment (HIRA) technical documentation and other relevant documents supporting the plan or its production. Table 1-1 details each appendix of this plan.

TABLE 1-1. PLAN APPENDIXES

APPENDIX	NAME	DESCRIPTION
<i>Appendix A</i>	Federal Hazard Mitigation Planning Regulation	Presents the Federal regulation directing the planning process.
<i>Appendix B</i>	Executive Order Creating Mitigation Council	Showcases the August 16, 2003, Executive Order creating the West Virginia Hazard Mitigation Council.
<i>Appendix C</i>	Glossary	Provides a glossary of definitions for terms used in the West Virginia Hazard Mitigation Plan.
<i>Appendix D</i>	Agency profiles	Contain profiles of major State and Federal agencies and private nonprofit organizations that participated in the planning process
<i>Appendix E</i>	Planning Process Documents	Contains the planning process documents along with relevant conference calls and WebEx presentations.
<i>Appendix F</i>	Capability Assessment	Presentation of the capability assessment of programs and agency technical assistance available to support implementation of the goals, objectives, and strategies of the plan
<i>Appendix G</i>	Local/Regional Plan Upload Workbooks	Contains the local regional planning upload workbooks.
<i>Appendix H</i>	2010 Mitigation Actions Progress Reports and 2013 Strategies Tracker	Includes status updates for the 2010 mitigation actions and provides a tracking mechanism for the newly developed 2013 actions
<i>Appendix I</i>	Project Scoping Sheets	Priority project scoping profiles
<i>Appendix J</i>	Hazard Mitigation Council and Plan Contributors	Contains the Hazard Mitigation Council and Plan contributors
<i>Appendix K</i>	Plan Review Tool	Contains the Plan Review Tools
<i>Appendix L</i>	WV Hazard Mitigation Administrative Plan	The Hazard Mitigation Grant Program Administration Plan undergoes an annual revision; the most recently updated copy is provided here for documentation purposes
<i>Appendix M</i>	Resolution of Adoption	Contains the Resolution of Adoption signed by the Governor
<i>Appendix N</i>	Statewide Building Code Regulations	Statewide Building Code Regulations
<i>Appendix O</i>	RL and SRL Files	Repetitive and Severe Repetitive Loss MS Excel Trackers (redacted)
<i>Appendix P</i>	HMA Program Datasets	Hazard Mitigation Assistance Program Data Tracking Workbooks
<i>Appendix Q</i>	Public Outreach	Details efforts made to include West Virginia stakeholders and the public





## CHAPTER 2: PLANNING PROCESS

### DISASTER MITIGATION ACT OF 2000

#### 44 Code of Federal Regulations

**Requirement §201.4(c)(1):** *The State plan must include a description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated.*

Does the plan provide a narrative description of how the new or updated plan was prepared?

1. Does the new or updated plan indicate who was involved in the current planning process?
2. Does the new or updated plan indicate how other agencies participated in the current planning process?
3. Does the updated plan document how the planning team reviewed and analyzed each section of the plan?
4. Does the updated plan indicate for each section whether or not it was revised as part of the update process?

**Requirement §201.4(b):** *The [State] mitigation planning process should include coordination with other State agencies, appropriate Federal agencies, interested groups, and ...*

Does the new or updated plan describe how Federal and State agencies were involved in the current planning process?

- A. Does the new or updated plan describe how interested groups (e.g., businesses, non-profit organizations, and other interested parties) were involved in the current planning process?
- B. Does the updated plan discuss how coordination among Federal and State agencies changed since approval of the previous plan?

**Requirement §201.4(b):** *[The State mitigation planning process should] be integrated to the extent possible with other ongoing State planning efforts as well as other FEMA mitigation programs and initiatives.*

Does the new or updated plan describe how the State mitigation planning process is integrated with other ongoing State planning efforts?

5. Does the new or updated plan describe how the State mitigation planning process is integrated with FEMA mitigation programs and initiatives?



## 2.1 INTRODUCTION

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This chapter details the process for the 2013 Update. The process spanned nearly a year prior to plan adoption. It included meetings between representatives of various Federal, State, and local agencies and involved the review of existing programs, plans, policies, statutes, and historical hazard data. The planning team reviewed this information in the early stages of plan development and remained supportive throughout the planning process in order to better inform decisions on potential mitigation actions.

To facilitate statewide collaboration, the update process used the West Virginia Hazard Mitigation Council (HMC), which was established by Executive Order 18-03 during 2003. The HMC includes representatives from a wide array of State agencies, departments, and offices, whose participation is an important part of the planning process. Contributions from each of these agencies, departments, and offices not only ensures that a wide variety of perspectives and interests are represented in the plan, but also allows for mitigation actions to be developed, adopted, and enacted by agencies with a wide variety of skill sets and resources. This ensures that the many resources available throughout West Virginia are fully used. Documentation of each meeting can be found in Appendix E.

In this chapter, an abbreviated history of previous planning efforts, as well as details of the process followed as part of the 2013 update process, are presented.

## 2.2 HISTORY OF THE WEST VIRGINIA HAZARD MITIGATION PLANNING PROCESS

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Traditionally, mitigation planning has been directed by requirements of the Stafford Act for inclusion in State emergency management plans. The Disaster Mitigation Act of 2000 (DMA 2000) revised the Stafford Act and created a requirement for “all-hazard” planning. Final guidance on actual implementation of this requirement was delayed following the September 11, 2001, tragedy and the creation of the U.S. Department of Homeland Security. An approval deadline for Standard State All-hazard Mitigation Plans was eventually set for November 1, 2004.

The short deadline required the use of an expedited methodology for assessing hazards. The 2004 approved, final West Virginia Standard State Hazard Mitigation Plan used the short 35-year history of West Virginia presidentially declared disasters for hazard ranking. Additionally, the plan did not attempt to fully integrate ongoing State and local programs into the mitigation goals, objectives, strategies, and projects.



Between 2004 and 2007, only flooding disasters were declared, so the same hazard ranking method that was used for the 2004 update was used for the 2007 plan update. As a result, the HIRA was not updated or expanded. The 2004 mitigation strategies were reviewed and updated to include supportive tasks and actions, but the 2004 mitigation strategies remained within the structure of the 2007 mitigation strategies section.

Since many of West Virginia's Federal, State and local programs, policies, and statutes address natural hazards, they are listed in this plan in Appendix F – Capability Assessment. A thorough review of these programs provides important background on the State's existing approaches to natural hazard mitigation. Most of these programs have been in effect prior to the 2000 Stafford Act revision. They are relevant and contribute significantly to reduced impacts from natural hazards. Perhaps most importantly, these are the programs that will provide the West Virginia hazard mitigation community with the capability and capacity to implement the priority mitigation actions developed collaboratively during the 2013 update process. Significantly more detail on Federal, State, local, and Non-Government Organization (NGO) programs was provided in the 2010 and 2013 plan Update.

The 2010 and 2013 Updates include a HIRA that better reflects local and regional HIRAs. Local and regional plans were reviewed during the 2010 plan update process, but most local plans from the 2004-05 era used either the original State HIRA or a qualitative ranking by the local mitigation community that ranked hazards High, Medium, or Low based on anecdotal information. Recently revised local plans were significantly underfunded, so HIRA information was not substantially improved.

During the 2010 State Plan Update it was decided to regionalize local mitigation planning around the State's Planning District Councils (PDCs). It was envisioned that if the plans were developed on a regional basis, stronger HIRAs that used the revised 2010 State HIRA as a basis would be incorporated into regional plans. That concept has been realized. There are now 11 federally approved and locally adopted regional plans throughout the State. Jefferson County retains responsibility for maintenance of its own plan.

As part of both the 2010 and the 2013 Updates, the HIRA, local hazard rankings, capabilities, and mitigation strategies influenced where the State should focus its resources. An Excel spreadsheet details this evaluation. It identifies each of the local jurisdictions' hazard rankings and local mitigation actions. This data was used in local plan updates and may be found in Appendix G. This spreadsheet is a valuable tool that DHSEM can use to track local plan implementation as well as to provide technical assistance to local communities in mitigation goal achievement. In development of the



2013 plan Update, a more comprehensive analysis of Federal, State, and local program statutes, plans, and policies was conducted to determine programs relevant to the State hazard mitigation planning process.

## 2.3 MITIGATION SUCCESSES

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West Virginia is a progressive State that invests heavily in mitigation. While complete details on the plans, programs, policies, and projects can be found in Appendix F: Capability Assessment, special mention of specific programs and successes deserves mention here.

### IMPLEMENTATION OF MITIGATION STRATEGIES

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West Virginia has traditionally funded the entire 25 percent match required for pre- and post-disaster FEMA mitigation grant projects. Typically, in other states, the local community is required to contribute between five and ten percent of the state's share. However, this is difficult if not impossible for most of West Virginia's impoverished communities. By picking up the local share of the match, the state has demonstrated the state's commitment to its citizens.

To date, 211 mitigation projects totaling \$86.4 million dollars in federal and state monies have been implemented in West Virginia. Most of these projects have been implemented with FEMA-HMGP (Hazard Mitigation Grant Program) that became available following natural disasters within the State. Details on projects initiated since the 2010 plan update are in Appendix H and P (redacted).

### IMPLEMENTATION OF THE 2010 WEST VIRGINIA STATE ALL-HAZARDS PLAN

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The 2010 Plan included a Mitigation Strategy consisting of four mitigation goals and 80 mitigation strategies. The majority of the 2010 mitigation strategies were successfully implemented or are currently being implemented. These mitigation strategies addressed issues concerning:

- Planning, Policy and Programs;
- Education and Outreach;
- Risk Assessment; and
- Mitigation of High Hazard Structures.

The mitigation strategies affected development of available funding for project implementation, studying and mapping geological hazards, communicating with the public, planning, and structural mitigation related projects. They addressed all natural hazards that affect WV, and involved the close coordination of representatives from a



wide variety of State, local, and non-governmental organizations. Complete details regarding these strategies are available in Appendix H.

## MITIGATED STRUCTURES

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West Virginia has worked to provide mitigation of RL properties since the inception of FEMA HMA grant programs during the past two decades. Since 2008, emphasis has been placed on delivering mitigation to the RL properties. The 205 mitigated RL properties experienced a total of 509 flood related events resulting in \$7,983,156 claims paid.

The DHSEM administers DHS/FEMA flood mitigation grants. Funding has been used to mitigate flooding through acquiring and converting the properties into open space; elevating structures above the base flood elevation level; or building infrastructure that improved local drainage problems. DHSEM has completed mitigation of more than 938 structures<sup>2</sup>. Most of these projects have been funded through post-disaster Hazard Mitigation Grant Program (HMGP) funds available from 2001 to the present. Most projects involved acquiring and demolishing floodprone residences.

In addition to Executive Order 18-03 and WV Code § 15-5-4, other legislative initiatives have been promulgated to fulfill the goals and strategies of the State Mitigation Plan, including flood loss prevention. An example of flood-related legislation that has passed includes Senate Bill 635 (2006), which requires county BOEs to carry flood insurance on certain buildings and their contents.

This information can also be found in Section 3.7.5 of the this plan, as well as in Appendix F: Capability Assessment.

## FLOODPLAIN MANAGEMENT IN WEST VIRGINIA

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Provisions for development within the regulated floodplain have typically been addressed by stand-alone ordinances adopted for voluntary participation in the NFIP, established in 1968. Revised floodplain ordinance provisions were recently incorporated into comprehensive zoning ordinances when localities adopt, revise, or re-codify zoning ordinances.

The West Virginia General Assembly enacted the West Virginia Flood Damage Reduction Act of 1989 to comply with the NFIP. This legislation was motivated by the damages incurred by several floods and storm events between 1969 and 1985. In 1987,

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<sup>2</sup> WVDHSEM Deedbook 1/15/2013



to improve West Virginia's flood protection programs and consolidate similar programs in one agency, coordination of all State floodplain programs was transferred from the Water Control Board to the DHSEM.

According to FEMA's NFIP Community Status Book, as of September, 2013, 277 of WV's 282 communities participate in the NFIP. This means that they have voluntarily adopted and are enforcing local floodplain management ordinances. There are only 5 communities that do not participate.

The DHSEM Floodplain Management Section has made significant strides in assisting communities' adoption of floodplain management ordinances and encouraging them to adopt more stringent ordinances. DHSEM supports communities in floodplain management through the provision of model floodplain management regulations. Of the 277 communities that participate in the NFIP, the majority of these adopted the State model floodplain ordinance. This ordinance has been available to communities since February 14, 2011 and exceeds the minimum requirements laid out by the NFIP. For example, the WV model floodplain ordinance includes 2' of freeboard as an additional measure of flood protection. Complete details on how this model ordinance exceeds NFIP minimums can be found in Appendix F: Capability Assessment. The majority of communities who have adopted this model ordinance have done so without modification.

West Virginia supports local floodplain management activities in many other ways as well. Through the 2012 1<sup>st</sup> Special Session, §15-5-20a of the WV Code was updated by the WV Congress. §15-5-20a: Floodplain Manager Training requires all local floodplain managers within the state to annually complete six hours of training in floodplain management and to maintain good standing with DHSEM. Failure to meet this requirement results in suspension of the floodplain manager from their responsibilities until the training requirement is met. Communities with floodplain managers who are suspended of their duties are then required to transfer floodplain management responsibilities and fees to another jurisdiction with floodplain managers in good standing. DHSEM has been working with communities to develop cooperative agreements that would help facilitate transfer of responsibilities should such an event occur. This requirement became effective July 1, 2012.

In order to assist communities meet this training requirement and to help local floodplain managers further augment their skill sets, DHSEM's Floodplain Management Section annually offers a multitude of training opportunities. These are offered throughout the year and throughout the State. Appendix F contains a complete listing of floodplain management related trainings provided since 2010.





DHSEM also supports community participation in the NFIP's Community Rating System (CRS). CRS is a voluntary incentive programs that encourages community floodplain activities that exceed the minimum NFIP floodplain management regulations. West Virginia has five communities (Berkeley County, City of Buckhannon, City of Charleston, Jefferson County, and City of Philippi) that have qualified for CRS benefits, which includes lower flood insurance premium rates.<sup>3</sup>

Finally, the success of the Certified Floodplain Manager (CFM) program in West Virginia deserves special mention. Due to the efforts of the State NFIP Coordinator and his team that comprise DHSEM's Floodplain Management Section, the number of CFMs increased from approximately 5 in 2004, to 36 in 2007, to 45 in 2010, to 72 in 2013.<sup>4</sup> Several new CFMs are local community floodplain managers. This demonstrates that flood hazard awareness among community officials is growing which in turn will influence decision making at the local level and translate to better floodplain management choices for those communities. The increase in the number of CFMs is a notable success in terms of pre-disaster mitigation. Additionally, the West Virginia Floodplain Management Association (WVFMA) offers free membership.<sup>5</sup>

As part of DHSEMs responsibilities under the NFIP, regular visits and presentations to local community offices are helping them become better informed and better prepared. More information on community participation in the NFIP and State support of local hazard mitigation can be found in Section 3.7.5 and Chapter 5 of the base plan.

## **WV GEOLOGICAL AND ECONOMIC SURVEY**

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The WV GES supports mitigation of geological hazards in several ways, ranging from dam and coal mine mapping and mitigation related activities, to geological research and monitoring. The WVGES conducts Environmental and Geochemical studies that provide technical expertise on environmental geology issues regarding the state's geologic hazards, water resources, and geochemistry. Work at WVGES deals primarily with the evaluation of geologic site characteristics for UIC permits under West Virginia State Code §22-11-11; the assembly of a database of selected metals content of the

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3 Federal Emergency Management Agency (FEMA). Community Rating System (CRS) Communities and their Classes. Retrieved June 25, 2013 from <http://www.fema.gov/library/viewRecord.do?id=3629>

4 Association of State Floodplain Managers. Madison, WI. Retrieved June 2013 from: <http://www.floods.org/Certification/certlist.asp#WV>

5 West Virginia Floodplain Managers Association (WVFMA). Retrieved January 2013 from: <http://wvfma.org/Membership.php>



State's rock formations; and answering inquiries regarding geology, geologic hazards, surface water, groundwater, and bedrock chemistry.

The Coal Section's *Coal Bed Mapping Program* develops various products that depicts known parameters concerning the coal beds of the State. Several of these parameters can be used by other agencies to mitigate potential hazards, including mine subsidence, mine explosions, location of abandoned coal mines, and possible landslides associated with valley fills and surface mine reclamation. Data about all known mines in West Virginia can be searched through the Survey's Mine Information Database System (MIDS), which contains records of every mine map, is publicly available and contains more than 45,000 documents depicting more than 71,000 mines.

This on-line resource is constantly updated as new mine maps become available. The various mined area maps are routinely used to determine whether a site has been undermined and could be subject to subsidence damage. Oil and gas well drillers use this information to prevent accidental explosions caused by unknowingly drilling into methane-filled abandoned mines; coal mining companies use it to check on the possibility of nearby coal mines to prevent inadvertent mining into long-closed mines filled with methane or water.

In addition to publication of coal mapping and documentation, the WVGES conducts geologic mapping, geotechnical and geochemical studies, and evaluation of various geologic hazards. These services further mitigation through science based decision making, policy development and identification of targeted mitigation strategies. WVGES mapping services consist of two major components: the direct acquisition of new geological information through field reconnaissance and the digital conversion of existing geological information from hard copy (paper, mylar, etc.) This program creates new, detailed geologic maps used for resource assessment, environmental studies, and land use determinations. Geologic maps at a scale of 1:24,000 have been produced for approximately 122 quadrangles in the state; work is currently underway on 9 additional quadrangles.

## READY WV

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Through funding from the DHSEM and coordination with Volunteer West Virginia, ReadyWV is a communications campaign and an online tool that helps West Virginians know what to do before, during, and after an emergency. They provide personal preparedness information, business continuity information, volunteer opportunities, training opportunities, preparedness checklists, kids' activities, etc. through their website. The ReadyWV provides families, neighborhoods and local communities in West Virginia with easy access to basic information on how to prepare for emergencies. The ReadyWV website serves as a communications campaign and online tool that helps



West Virginians know what to do before, during, and after an emergency. Some of these services include:

- ReadyWV Family Emergency Guide booklet
- ReadyWV bookmarks
- Relevant trainings from around the state
- News updates
- Contact information for local CERT/Citizen Corps programs
- Supports State VOAD

ReadyWV serves as the statewide coordinator for the WV Citizen Corps (CC). In this capacity, ReadyWV manages the distribution of grant funding to localities, public training announcements, and maintains a State CC Council. The State CC Council is composed of state and local government representatives, private and non-profit organization representatives. They meet three times per year to discuss priorities and funding streams. Federal funding for the CC programs in FY2014 is being eliminated, and as a result the CC Council has been pursuing alternative funding streams.

CC trainings managed and facilitated at the local level. Ready WV works with locals to provide them with training materials and to publicize the events. On average, there are approximately 12 CC training courses per year throughout the State. This includes both the basic training and the Train-The-Trainer courses. Between January 1, 2013 and September 2013, fourteen CC courses have been offered statewide.

Ready WV also publicizes course offerings being held by other State agencies such as DHSEM and the WV Department of Military Affairs and Public Safety (DMAPS). These courses vary year to year but often include courses focused on all aspects of Emergency Management, including the Incident Command System (ICS) and Emergency Operations Center (EOC) operations.

Finally, ReadyWV and the CC often hold public outreach events. Most of these are held at the local level, but ReadyWV offered outreach and preparedness events at two events in 2013, including the Emergency Preparedness Conference for Deaf and Hard of Hearing on June 8, 2013 in Charleston, WV, and the WV State Emergency Response Commission (SERC) Conference in Charleston, WV on August 26, 2013.

## **WV FLOOD TOOL**

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Geographic Information System (GIS) funding from FEMA led to a comprehensive map modernization program that continued through 2008. The program then transitioned into the Risk Mapping Assessment and Planning program (Risk MAP). The WV Floodplain Management Program (FMP) partnered with WVU to develop a system to enable easier access to current flood maps online. The project worked to overcome the

limited number of flood studies in West Virginia through implementation of the State’s Map Modernization Business Plan. This tool incorporates data such as: Hazus risk assessment outputs, NFIP flood maps, locations of mitigated structures, etc., which required digitization of revised FIRMs. In July 2011, this online tool launched. It is currently maintained by the West Virginia GIS Technical Center (WVGISTC), housed in the Department of Geology and Geography at WVU. Figure F-1 provides a sample depiction of the tool’s output.

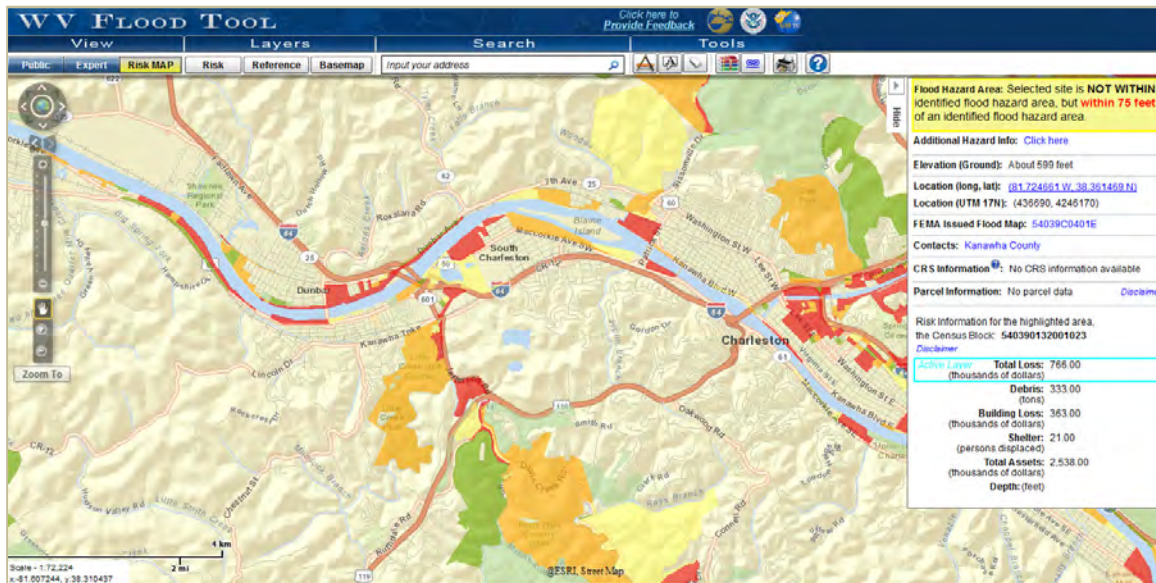


FIGURE F-1. WEST VIRGINIA FLOOD TOOL<sup>6</sup>

The WVGISTC supports digital data conversion, data development, and coordination with Federal geospatial data initiatives, statewide mapping programs, and local (county, municipal) data producers. The center collaborates with the Statewide Addressing and Mapping Board, U.S. Geological Survey, and other partners to create high-resolution digital maps for West Virginia.

The West Virginia FMP continues to work with partners to improve the map tool, including the development of LiDAR data, bridge and culvert data, and information that will enhance the analysis of approximate Zone A flood elevations. As noted in the section above on floodplain management, it the Map Modernization program has nearly completed its updating of the WV flood maps. As of September 2013, only two jurisdictions were left to be completed. As each new map is completed and adopted, the Flood Tool incorporates the new data.

<sup>6</sup> West Virginia University, WV Flood Tool. [www.mapwv.gov](http://www.mapwv.gov)



## 2.4 OVERVIEW OF THE 2013 PLANNING PROCESS

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The planning process for the 2013 West Virginia plan Update was initiated by a Request for Proposals (RFP) issued by the West Virginia DHSEM for contractual assistance for the plan update in Hazus-MH riverine flood hazard analysis, and a separate RFP for contractual assistance to update the mitigation plan. Dewberry Consultants, LLC, the project contractor, was selected to support the plan Update.

A plan update schedule was developed to accommodate the revision period as well as the current disaster grant workload demands upon the DHSEM mitigation staff. The contractor, State Hazard Mitigation Officer (SHMO), State Mitigation Planner, and FEMA Region III staff developed and concurred upon a strategy to review and update the plan.

Below is a summary of the planning process tasks as established by the planning team.

1. DHSEM & HMC Kick-off Meeting
2. Data Collection
3. Public Outreach through delivery of a monthly newsletter
4. Local/Regional Plan upload and evaluation
5. Threat and Hazard Identification and Risk Assessment (THIRA)
6. HIRA
7. THIRA review by DHSEM & the HMC
8. THIRA delivery and submittal
9. HIRA review and development of goals, strategies, and projects
10. Capability assessment update
11. Statewide regional outreach meetings
12. Repetitive Loss (RL) and Severe Repetitive Loss (SRL) Plan Update
13. Draft Final Plan
14. Draft Plan Sections submitted for review
15. Project Scoping
16. Final Plan Submittal and Review
17. Plan Adoption Support
18. Plan Distribution and Grant Closeout

Detailed information about each of the planning process meetings is provided later in this chapter. Many tasks were performed concurrently and delivered ahead of schedule.

At the Kick-off meeting, DHSEM and the HMC discussed priorities and objectives for the mitigation plan update process. It also served as an opportunity for the first data call and work group collaboration.



A major addition to the 2013 update process was the development of the THIRA. In March 2011, the Administration released Presidential Policy Directive 8(PPD-8). The Directive established the framework for the National Preparedness Goal, which was then outlined in more detail by the Department of Homeland Security (DHS) in September 2011. PPD-8 “describes the Nation’s approach to preparing for threats and hazards that pose the greatest risk to the security of the United States.”<sup>7</sup>

While the addition of the THIRA does not directly impact the development of the mitigation plan, it did create the need for additional meetings and hazard assessment in order to comply with PPD-8. This change is reflected in the project schedule. Its development included two meetings of the HMC to establish priorities and collect data, as well as to conduct the final review prior to submittal. The THIRA was developed in compliance with applicable Federal guidance (Comprehensive Preparedness Guide – 201 (CPG-201)).

The local plan upload focused on the adopted and approved local and regional plans only. A tool was initially developed for the assessment and upload of the plans for the 2010 plan Update. Following the 2010 update process, it was intended to provide DHSEM staff with a means of continuing to track local plans as they are updated and mitigation actions are completed. It was decided that this same tool would be used for the 2013 plan Update.

Overhaul of the HIRA and Vulnerability Analysis was a priority. All available data sets, including those from the National Climatic Data Center (NCDC), would be used, and members of the HMC would provide additional data and details where available. The HIRA review meeting and the mitigation strategies development meeting were combined for the 2013 Update to maximize participants’ time. This also focused mitigation strategies toward resolution of vulnerabilities identified in the assessment. At this meeting, the 2010 plan goals were reviewed by the HMC and reassessed.

A State Plan Mitigation Plan Tracking Tool is populated with the Standard State Hazard Mitigation Plan 2010 mitigation actions, facilitating annual tracking of plan implementation. The highest ranked projects will be “scoped” for further development to facilitate funding through HMA grants or other sources.

The 2013 risks addressed are: dam and levee failure, drought and extreme heat, earthquake, flooding, hazardous materials, high wind and severe storm, land

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<sup>7</sup> Department of Homeland Security. National Preparedness Goal: First Edition. September 2011. Retrieved on May 14, 2013 from <http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=5689>



subsidence, landslides, natural resource extraction, nuclear accidents, wildfires and winter weather.

Meeting documentation can be found in Appendix E.

## 2.5 PLANNING TEAM

Funding assistance for the preparation and printing of this plan was provided by FEMA through an HMA grant and is prepared in accordance with appropriate regulations and guidance provided by FEMA. It was completed with planning assistance and support by the hazard mitigation and Floodplain Management Program (FMP) staff at the West Virginia DHSEM, and Dewberry Consultants, LLC. Michael Baker, Inc., under a separate effort, provided Hazus-MH Module 2.1 Riverine Level I analysis that is incorporated into the plan update. Additional technical assistance and plan review was provided by FEMA Region III staff.

Critical to the development of the plan was the participation and contributions of more than two dozen representatives of State and Federal agencies, nonprofit organizations and West Virginian colleges and universities. These Council participants will continue to serve on ongoing hazard mitigation subcommittees that will guide and direct implementation of this plan. In addition, their support will determine continued data and information required for future plans that must integrate human-caused hazards into the current hazard identification and vulnerability assessment. Table 2-2 provides a list of organizations that provided valuable input to the plan. A full description of the planning process follows in Chapter 2: Planning Process, and a listing of the members of the Hazard Mitigation Council may be found in Appendix J.

### 2.5.1 PLAN COORDINATION

The 2013 Update of the West Virginia HMP was developed through the collaboration of numerous representatives from a wide variety of State and Federal agencies. Table 2-1 includes a list of those primarily responsible for providing input and data, plan writing, assessment, review, and planning coordination. This list, however, does not reflect all personnel or agencies that participated in the planning process. As noted above, the HMC consisted of nearly 50 representatives, from agencies at all levels of government. For complete information on membership within the HMC, please refer to Section 2.5.2 and Appendix J.



TABLE 2-1. LIST OF ORGANIZATIONS AND PERSONNEL WHO COORDINATED THE 2013 UPDATE

ORGANIZATION	NAME
<i>DHSEM State Hazard Mitigation Officer</i>	Brian Penix, State Acting Hazard Mitigation Officer
<i>DHSEM Program Staff</i>	Lirerose Beach, Mitigation Planner
<i>DHSEM Program Staff</i>	Al Lisko, Director of Mitigation and Recovery
<i>DHSEM State National Flood Insurance Program Coordinator</i>	Kevin Sneed, State NFIP Coordinator
<i>FEMA Region III, Community Mitigation Division</i>	Therese Grubb
<i>FEMA Region III, Community Mitigation Division</i>	Matthew McCullough
<i>Dewberry Consultants, LLC</i>	Deborah Mills, CFM
<i>Dewberry Consultants, LLC</i>	Corinne Bartshire
<i>Dewberry Consultants, LLC</i>	Rachael Heltz-Herman, CFM
<i>Dewberry Consultants, LLC</i>	Jake Jarosz, CFM
<i>Dewberry Consultants, LLC</i>	Jane Sibley Frantz, CFM, AICP
<i>Dewberry Consultants, LLC</i>	Carrie Speranza, CFM
<i>Dewberry Consultants, LLC</i>	Ryan Towell
<i>Dewberry Consultants, LLC</i>	John Squerciati, PE, CFM

The importance of mitigation planning is the process itself. It involves the collaboration of groups, individuals, perceptions, perspectives and priorities. By including these planning process results in meaningful mitigation strategies that effectively reduce the impact of hazards. Below is a description of the groups that participated.

### 2.5.2 HAZARD MITIGATION COUNCIL

Since 2004, the Governor-appointed State HMC has guided West Virginia mitigation planning. Members include representatives of State and Federal agencies, colleges and universities, and private nonprofit organizations. The purpose of the HMC is to bring together the vast expertise of those agencies whose programs and expertise can encourage and support statewide hazard mitigation. The HMC guides the planning process through decision making, providing data, information, and strategy prioritization.

The HMC collaborated on the development of the 2013 plan update through participation in two facilitated meetings along with meetings conducted specifically for THIRA planning. The HMC met at project initiation and to review the HIRA and kick-start mitigation strategy development. These meetings guided plan development through group collaboration. Specific information regarding these meetings can be found in Section 2.6 and Appendix E.





Additional communication among the HMC members was facilitated via email, phone calls, and WebEx. Agencies represented in the HMC for the 2013 update are listed in Table 2-2.

TABLE 2-2. ORGANIZATIONS REPRESENTED WITHIN THE HAZARD MITIGATION COUNCIL

ORGANIZATION/ AFFILIATION
Cabell County Emergency Medical Services / Office of Emergency Services (CCEMS/CCOES)
National Oceanic and Atmospheric Administration /National Weather Service (NOAA/NWS)
US Army Corps of Engineers (USACE)
WV Development Office (WVDO)
WV Department of Environmental Protection (WVDEP)
WV Conservation Agency (WVCA)
WV Citizens Corps (WVCC)
WV Department of Agriculture (WVDA)
WV Division of Homeland Security and Emergency Management (DHSEM)
WV Department of Military Affairs and Public Safety (WVDMAPS)
WV Department of Natural Resources (WVDNR)
WV Development Office (WVDO)
WV Division of Forestry (WVDOF)
WV Geological and Economic Survey (WVGES)
WV Public Broadcasting Service (WVPBS)
WV Planning and Development Council (WVPDC Regions)
WV State Police (WVSP)

### 2.5.3 STAKEHOLDER INVOLVEMENT

The purpose of mitigation planning is to protect the people and their property from harm. Public involvement in the planning process is vital to the success of a mitigation plan. Inclusion of representatives from local government, businesses and nonprofit organizations, and the public is an important part of the process. Their input provides realistic perspectives of how they are impacted by various hazards, as well as how the actions developed by West Virginia impact them. Furthermore, outreach to stakeholders ideally engenders both confidence in the ability of the government to make meaningful decisions, as well as consideration of the risks facing each person and community. Holistic participation is necessary for the plan to develop the ongoing mitigation movement across the State.

Other State, regional, local, business, non-profit, and other interested stakeholders were encouraged to participate in the planning process through a series of regional outreach meetings. The meetings outlined the objectives of the mitigation plan, current analysis results, and draft mitigation strategies. Stakeholders provided comments relevant to their individual communities that were then integrated into the plan where appropriate. Additional information can be found in Section 2.7 and in Appendix Q.



#### 2.5.4 AGENCY CONTACTS

Throughout the planning process additional resources were identified for information to support development of the HIRA and agencies responsible for strategy implementation. This includes other Federal and State agencies. For the 2013 update, telephone interviews and email correspondence were conducted with agency officials contributing information and data to the process to supplement data gathered during HMC meetings.

In addition, agency profiles were developed through agency contacts and research. Profiles were completed by agency stakeholders and characterized their agency's role in mitigation planning.

### 2.6 SUMMARY OF WORK GROUP MEETINGS

Federal regulations require that planning process participants represent a cross-section of relevant State and Federal agencies as well as organizations. The West Virginia HMP 2013 Update meets this requirement through the engagement of the HMC. A diverse group of stakeholders invited initially provided a representative cross-section of State and Federal agencies. They remained active throughout the planning process by providing data and expertise and making decisions. Agency staff contributed expertise in natural resources, weather forecasting, data and GIS development, hydrology, emergency services, transportation, health, public safety, and higher education.

Before the first HMC meeting, DHSEM staff contacted specific agencies and organizations to solicit data sharing and to invite participation. State, Federal and local agencies were invited to the HMC Kick-off Meeting to diversify the knowledge base. The broad geographic and technical expertise represented by participants allowed the State to develop a representative and collaborative mitigation plan. HMC members provided data, participated in subcommittees, developed mitigation strategies, or provided technical review of the draft plan. More than 40 representatives attended one or both HMC meetings. Table 2-3 summarizes the meetings held as part of the plan update process.

TABLE 2-3. SUMMARY OF MITIGATION PLANNING MEETINGS

MEETING	DATE
Mitigation Project Kick-off Meeting	August 22, 2012
HIRA / Mitigation Strategies Development Meeting	March 22, 2013

#### 2.6.1 PROJECT KICK-OFF MEETING

On August 22, 2012, the first HMC 2013 update meeting was conducted at the West Virginia State Police Academy. The meeting established ground rules for the plan

update process, identified key players and points of contacts, identified priorities, and defined desired outcomes.

This meeting was attended by 37 representatives from 18 State and Federal agencies.

### 2.6.2 MARCH 22, 2013, DRAFT HIRA AND STRATEGIES PRESENTATION AND GOALS AND STRATEGIES DEVELOPMENT MEETING

On March 22, 2013, the second HMC meeting was held at the West Virginia State Police Academy. At this meeting, the results of the HIRA were presented, the 2010 mitigation goals and strategies were reviewed, and 2013 mitigation goals and strategies were developed. The HIRA results and the mitigation goals were reviewed in the morning as a group, while the individual strategies were reviewed and developed in smaller groups. The groups were divided according by topic area as follows:

- Planning, Policy & Funding
- Education and Outreach
- Risk Assessment
- Mitigation of High Hazard Structures

This was attended by 26 representatives from 13 State and Federal agencies.

## 2.7 OUTREACH INITIATIVES

### 2.7.1 WEST VIRGINIA REGIONAL OUTREACH WORKSHOPS

During the week of April 8, 2013, five public outreach workshops were held statewide to solicit the input of local governments and the general public. The intent was to provide participants with the results of the planning process to date, as well as current State efforts toward development and funding of mitigation projects. These workshops provided participants with a forum to respond and provide additional input.

The workshop included a questionnaire, presentation of the HIRA results and the hazard ranking maps, and the draft mitigation strategies. The hazard ranking maps can be found in Chapter 3, while the presentation and the results from the questionnaire can be found in Appendix Q. The Acting State Hazard Mitigation Officer participated in these



FIGURE 2-2. OUTREACH WORKSHOP AT  
CACAPON RESORT STATE PARK



meetings with other DHSEM staff. Workshop participation ranged from five to 13 participants.

Table 2-4 details the dates, locations, and number of attendees at each workshop. Sign-in sheets can be found in Appendix Q. Table 2-5 includes the agenda used for each workshop.

TABLE 2-4. PUBLIC OUTREACH WORKSHOPS DATES AND LOCATIONS

LOCATION	DATE	ATTENDEES
Cacapon Resort State Park	4/8/2013	13
Tygart State Park	4/9/2013	7
Pipestem State Park	4/10/2013	12
Parkersburg City Council Chamber	4/11/2013	5
WV State Police Academy (Charleston)	4/12/2013	6

TABLE 2-5. PUBLIC OUTREACH WORKSHOPS AGENDA

DESCRIPTION	TIME
<b>Welcome, Introductions and Today's Agenda</b> <ul style="list-style-type: none"><li>• What is Hazard Mitigation?</li><li>• Why Plan?</li></ul>	-
<b>Questionnaire</b>	5 Minutes
<b>Hazards of Concern (HIRA)</b>	20 Minutes
<b>Mitigation Strategies</b>	25 Minutes
<b>Local Mitigation Success Stories</b>	20 Minutes
<b>Next Steps</b>	10 Minutes

## WORKSHOP RESULTS

The following is a summary of the feedback received from workshop participants. Questionnaire results can be found in Appendix Q.

1. Concerns regarding flooding, landslides, and winter storms were frequently expressed at each workshop. Dams were also a major concern.
2. Generator procurement for critical facilities to mitigate their loss of function during a hazard event was regularly discussed. Because of recent policy changes following Hurricane Sandy, grant funding through FEMA's Hazard Mitigation Grant Program (HMGP) is now available for generator purchase and installation. The Acting SHMO spoke to this topic, as well as policies developed by the State regarding eligible applicants and State priorities.



3. Demolition and acquisition of properties located in floodplains has been a very successful strategy in West Virginia; however, the State is attempting to look at alternative projects as recourse to flooding events. Although this process has proven effective in West Virginia, some communities have become resistant to this process because of fears of reduced tax base and perception that acquisition projects are anti-development.

#### 2.7.2 DRAFT HIRA COMMENTARY PROCESS

The draft plan was posted on the Sharepoint site for HMC and DHSEM review. Several council members and participating agencies provided critical input into the HIRA, particularly related to wildfire, winter weather, land subsidence, landslides, resource extraction, earthquake, and dam and levee failure hazards that was integrated into this update. After the plan is submitted to the DHSEM for review and to FEMA Region III for conditional approval, the plan draft will be posted on several websites for agency and public review. These will include the DHSEM, West Virginia University WVU Cooperative Extension Service, and Canaan Valley Institute sites. HMC members will be asked to comment via the project's SharePoint site and to post links to the public access posting on their organizations' websites. Comments will be tracked and addressed in the final plan or logged for inclusion in the 2013 plan Update as appropriate.





## CHAPTER 3: HAZARD IDENTIFICATION, RISK ASSESSMENT AND VULNERABILITY ANALYSIS

### DISASTER MITIGATION ACT OF 2000

#### 44 Code of Federal Regulations

*§201.4(c)(2): Risk assessments that provide the factual basis for activities proposed in the strategy portion of the mitigation plan. Statewide risk assessments must characterize and analyze natural hazards and risks to provide a statewide overview. This overview will allow the State to compare potential losses throughout the State and to determine their priorities for implementing mitigation measures under the strategy, and to prioritize jurisdictions for receiving technical and financial support in developing more detailed local risk and vulnerability assessments.*

*The risk assessment shall include the following:*

*§201.4(c)(2)(i): An overview of the type and location of all natural hazards that can affect the State, including information on previous occurrences of hazard events, as well as the probability of future hazard events, using maps where appropriate;*

*§201.4(c)(2)(ii): An overview and analysis of the State's vulnerability to the hazards described in this paragraph (c)(2), based on estimates provided in local risk assessments as well as the State risk assessment. The State shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events. State owned critical or operated facilities located in the identified hazard areas shall also be addressed;*

*§201.4(c)(2)(iii): An overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in local risk assessments as well as the State risk assessment. The State shall estimate the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas.*

*§201.4(d): Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities...*

### HIRA SECTION OUTLINE

The following subsections include the results of the hazard identification and risk assessment (HIRA) process. The process used to identify the hazards that impact West Virginia and available data sources were reviewed and endorsed by the Hazard Mitigation Council on March 22, 2013.

Sections 3.1 through 3.6 provide background information about the data sources utilized, local mitigation plans, and the ranking methodology employed. Section 3.3 summarizes the hazards discussed in the plan update. The individual hazard sections



(3.7 – 3.18) include identifying and profiling the hazards, assessing risk, providing vulnerability analysis, and estimating potential losses.

The HIRA chapter has been structured in the following way:

1. Overview of HIRA – Describes the overall process that was used to revise the HIRA.
2. Introduction to West Virginia – Describes the political, demographic, and physiographic boundaries of the state. Local and statewide land use and development patterns are addressed.
3. Federally Declared Disasters and National Climatic Data Center (NCDC) Events: Describes past declared disasters and hazard events that have occurred in West Virginia. Datasets used for this analysis are discussed.
4. State and Critical Facilities: Describes the available datasets for State and critical facilities and the limitations of this data.
5. Hazard Assessment and Ranking Methodology: Standardizes terminology, describes the development of the ranking methodology and parameters used.
6. Local Plan Incorporation: Review of the State’s local hazard mitigation plans and comparison of local hazard rankings. Issues of standardization of risk assessment and loss estimates are discussed.
7. Flooding: Impacts are described including discussion of repetitive loss structures and FEMA map modernization efforts; analysis of critical and State facilities, jurisdictional risk, and annualized loss estimates.
8. Wind: Analysis of critical and State facilities, jurisdictional risk, and annualized loss estimates.
9. Winter Weather: Includes discussion of various types of winter weather and its impact on the State.
10. Drought: Textual description of drought impacts only.
11. Wildfire: Analysis of risk to critical and State facilities, jurisdictional risk, and annualized loss estimates.
12. Landslide: Analysis of risk to critical and State facilities, jurisdictional risk, and annualized loss estimates.
13. Earthquake: Analysis of risk to critical and State facilities, jurisdictional risk, and annualized loss estimates.
14. Land Subsidence (Karst): Analysis of risk to critical and State facilities, jurisdictional risk, and annualized loss estimates.
15. Natural Resource Extraction Process: Textual description of the hazards only.
16. Dam and Levee Failure (weather-related): Textual description with limited analysis of vulnerability to State facilities.
17. Hazardous Materials: Textual description of the hazard only.





18. Nuclear Accidents: textual description of the hazard only.
19. Composite Hazard Results: Provides a summarization of the individual hazard sections. Includes overall conclusions regarding risk areas and mitigation projects.

For the purposes of compliance with the Disaster Mitigation Act as further specified by Final Rule 44 CFR Section 206.401(c)(2)(i), this Plan addresses the hazards in the above hazard identification subsection. Additional hazards may be added or more comprehensively addressed during future Plan updates as their respective significance emerges. Additional information is available in Sections 3.6 Local Plan Incorporation and 3.19 Composite Hazard Results (Composite Results) of this chapter.

### 3.1 OVERVIEW OF THE HAZARD IDENTIFICATION & RISK ASSESSMENT PROCESS

In developing a comprehensive State All-Hazards Mitigation Plan, the first step is to determine what hazards threaten the State and the extent of the risk they pose to lives and property. Once identified and analyzed, the hazards are ranked (Sections 3.7 – 3.18) to determine the highest risks to the State. Finally, based on the history of occurrences and property values, the vulnerability assessment and loss estimates elaborate on the potential impacts of hazards that pose the highest risks. Maps throughout Chapter 3 address the distribution of hazard events by county, as depicted in Figure 3-15.

Significant hazards have been evaluated for their impact on the State on a comparative basis using Geographic Information Systems (GIS) and separately for each hazard. This allows for comparison among counties of the relative exposures to hazards and sets the groundwork for local hazard mitigation plan updates. It should be noted that the ranking and analysis in this plan is in terms of relative risk to other jurisdictions in the State. All the hazards addressed in this plan are relative only to the jurisdictions in West Virginia.

While flooding is the most prevalent hazard, a variety of both natural and technological hazards threaten the State. To ensure a comprehensive risk assessment, the State decided not to disqualify a hazard without conducting a preliminary hazard identification and risk assessment. Hazards were classified as being related to weather, geological in nature or other types of hazards. Local plans were evaluated to make sure that the hazards they addressed were also included as part of this revision. Section 3.6 of this chapter describes these hazards and how they are incorporated into the State mitigation plan. This plan examines:



- Hydrologic hazards, including floods and drought;
- Atmospheric hazards, including windstorms, thunderstorms (including lightning and hail), severe winter weather, tornadoes, hurricanes, extreme cold, and extreme heat;
- Geologic hazards, including landslides, karst-related land subsidence, and earthquakes; and
- Other hazards primarily caused by human activities, including wildfires, land subsidence, mining hazards, dam failures, hazardous materials, and nuclear accidents.

Each of these hazards is summarized in the following sections. The *2007 State All-Hazards Mitigation Plan Update* removed three hazards: tsunamis, volcanoes, and terrorism. The preliminary risk assessment documented in 2004 found the State to be not at risk for tsunamis or volcanoes; this observation remains valid and those hazards have not been included in this update.

The terrorism hazard was removed during the 2010 update for several reasons. Principally, mitigation for terrorist attacks is addressed thoroughly in the West Virginia Emergency Operations Plan (EOP)<sup>8</sup>. Additionally, hazard mitigation stakeholders have not prioritized developing strategies to mitigate for this hazard; and, through discussion of dams and nuclear facilities, the *State All-Hazards Mitigation Plan* and *Threat and Hazard Identification and Risk Assessment (THIRA)* addresses many potential targets for terrorism. Additionally, the Mining Hazard section has been renamed Natural Resource Extraction to reflect the expansion of information on all mining-related hazards, including mining accidents and risks posed by extraction associated with Marcellus shale.

### 3.1.1 CHANGES AND UPDATES IN THE 2013 STATE OF WEST VIRGINIA ALL-HAZARDS MITIGATION PLAN

Chapter 3 – Hazard Identification, Risk Assessment and Vulnerability Analysis consolidates, updates, and streamlines content from the 2007 and 2010 plan updates. In 2010 the chapter content was restructured to address a broad range of emerging hazards, vulnerabilities, and risk issues. Significant changes in 2010 included:

- standardizing terminology;
- use of a new, GIS-based ranking methodology that assesses hazard risk by jurisdiction;

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<sup>8</sup> West Virginia Emergency Operations Plan. [http://www.wvdhsem.gov/wveop\\_1.htm](http://www.wvdhsem.gov/wveop_1.htm).



- new analysis for all major hazards;
- development of annualized loss by jurisdiction; and
- review of local risk assessments, land use planning, and development.

The 2013 update includes a revised hazard ranking methodology that incorporates local hazard mitigation plan rankings and geographic areas of impact. Each hazard section includes revised ranking maps that factor in local plan ranking and updated historical events. Hazard event maps were condensed into multi-panel maps for comparison. In addition, hazard profiles were freshened, and new analyses were performed using updated NCDC Storm Events data as well as other data sources to capture hazard events that have occurred since 2010.

Social vulnerability was described using updated population characteristics data from the U.S. Census.

### 3.1.2 THREAT AND HAZARD IDENTIFICATION AND RISK ASSESSMENT

West Virginia also completed its first ever Threat and Hazard Identification and Risk Assessment (THIRA) during the 2013 plan update. The West Virginia Department of Homeland Security and Emergency Management (WVDHSEM) developed its THIRA in compliance with the U.S. Department of Homeland Security (DHS) Comprehensive Preparedness Guide (CPG) 201 released in April 2012. The THIRA presents a series of natural, technological, and human-caused hazards that the State has identified as top planning priorities. While many of these hazards are included in the mitigation plan's HIRA, the THIRA process provides an opportunity for States to focus on all types of hazards when determining planning priorities and capability shortfalls.

While Federal guidance and funding for THIRA differ from a traditional HIRA, the information contained in each analysis should be integrated into the other where appropriate. WVDHSEM engaged with the Homeland Security State Administrative Agency and the Hazard Mitigation Council (HMC) throughout the development of the THIRA report. These stakeholders provided subject matter expertise and reviewed and commented on the draft report.

The natural hazards in the 2010 hazard mitigation plan were reviewed and referenced during the creation of the THIRA. In order to conduct an all-hazards risk assessment and comprehensive capability assessment per CPG 201, WVDHSEM, in coordination with the Hazard Mitigation Committee (HMC), identified non-natural hazards/threats that pose a risk to the State of West Virginia. These include intentional acts of terrorism and technological hazards. Table 3-1 includes the list of hazards identified by the HMC and addressed in the 2012 THIRA.



TABLE 3-1. HAZARDS ADDRESSED IN THE 2012 THIRA

Human Caused	Technological Hazards	Natural Hazards
Metal Theft	Natural Resources Extraction Processes	Flood
Civil Disturbances	Hazardous Materials Release	High Wind
CBRNE/WMD/Hazardous Materials	Power Failure/Fuel Shortage	Winter Storm
	Levee Failure/Dam Failure	

In compliance with the DHS CPG 201 guidelines, WVDHSEM followed these steps.

1. Identify the Threats and Hazards of Concern
2. Give Threats and Hazards Context
3. Examine the Core Capabilities Using the Threats and Hazards
4. Set Capability Targets
5. Apply the Results

Additional information regarding the THIRA submittal may be obtained from WVDHSEM.

## 3.2 INTRODUCTION TO WEST VIRGINIA

The mountainous topography of West Virginia contributes greatly to the hazards threatening the State. A review of its early history shows that development in West Virginia occurred primarily along the railroad lines and rivers that connected a web of mining towns throughout the State. 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, it is not surprising that flooding is the most frequent and devastating disaster threatening West Virginia.

West Virginia is situated in the Appalachian mountain range and much of the State has a mountainous terrain (Figure 3-1). Charleston, its largest city, also serves as the State’s capital. Figure 3-2 shows the State’s 55 counties.

Long before the arrival of European settlers, West Virginia served as fertile farmland and hunting ground for Native Americans. The State was part of the British Virginia Colony and was a part of the Commonwealth of Virginia prior to secession from Virginia and the Confederacy during the Civil War. West Virginia was formally admitted into the Union as a new State in 1863.

West Virginia has a diverse climate that ranges from Humid Continental (generally hot, humid summers and cool/colder winters) in the west to Humid Subtropical (generally hot, humid summer and milder winters) in the southwest and parts of the



Eastern Panhandle. West Virginia has experienced weather extremes ranging from tropical storms and tornadoes to crippling winter storms; from blazing heat to extreme cold.

West Virginia is blessed with rich natural resources resultant from its underlying geology, which is evidenced in its steep topography and deep stream and river valleys. The very nature of its geologic profile as an Appalachian province State characterizes its natural hazards and the risks they pose. The topography is shown on the following Shaded Relief map, followed by counties and municipalities. The State has several watersheds, which are shown on Figure 3-3. 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 in the Mississippi River. Major watersheds include the Shenandoah, Cheat, James, Kanawha, Monongahela, New, Ohio, Potomac, Shenandoah, and Youghiogheny. The map shows eight-digit watershed basin codes known as United States Geological Society (USGS) Hydrologic Unit Codes are depicted in white on the map.

### 3.2.1 DATA COLLECTION

To complete the State's risk assessment, data was collected from a variety of sources. The assessment began with a thorough review of all the local and regional hazard mitigation plans available in the State. The 55 county plans have been updated by the Regional Planning and Development Councils and contain varying levels of detail, often rendering their data incomparable from one county to another. Section 3.6 describes the local plan integration into the State plan. While the local plans were a valuable source for qualitative data, WVDHSEM sought additional quantitative data sources in order to determine the jurisdictions most threatened by each hazard. Sources included national databases, published materials, expert interviews, and raw data from a number of State and Federal agencies.

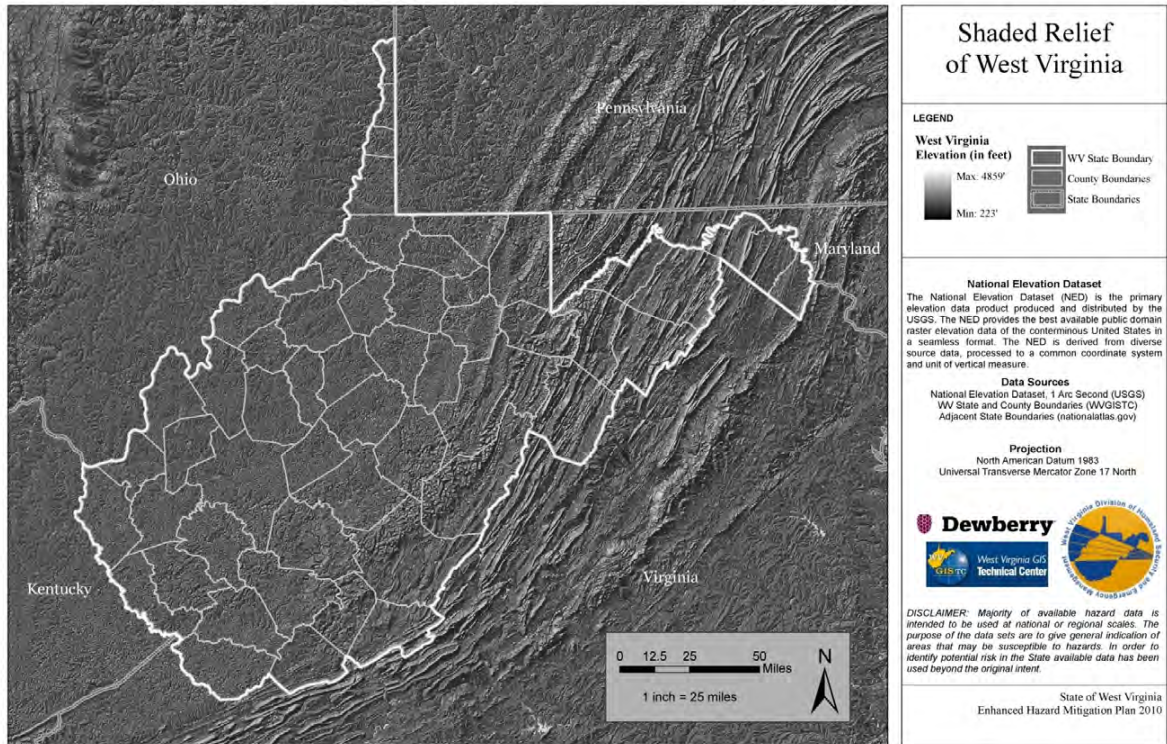


FIGURE 3-1. WEST VIRGINIA SHADED RELIEF

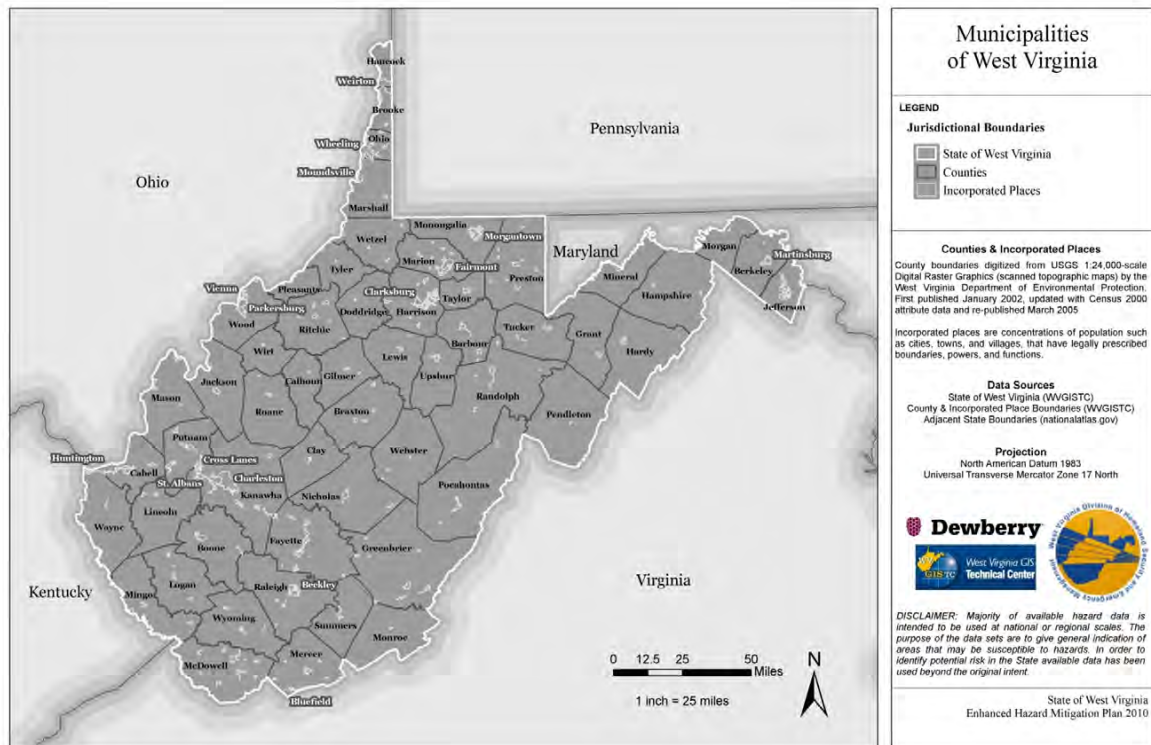


FIGURE 3-2. WEST VIRGINIA MUNICIPALITIES

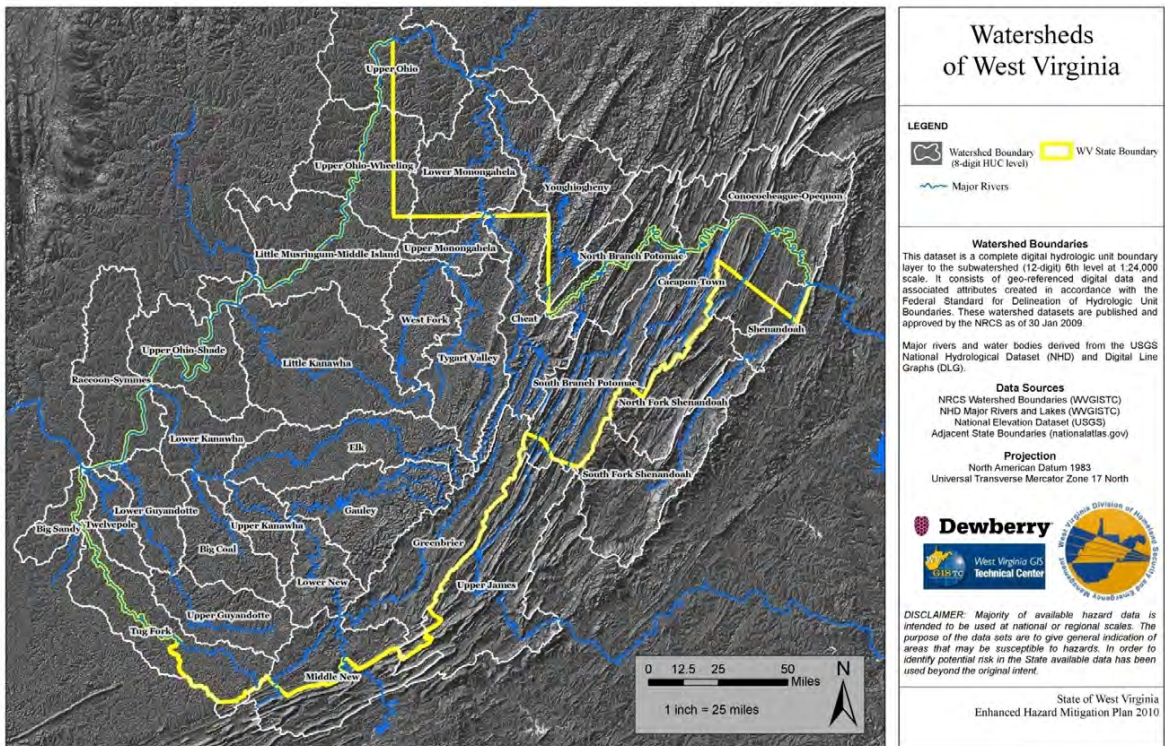


FIGURE 3-3. WEST VIRGINIA WATERSHEDS

In order to assess the vulnerability of different jurisdictions to the hazards, data on past occurrences of damaging hazard events was gathered. To compare the distribution of events between different hazards, the same data sources were used when possible to create hazard profile maps. Generally, the main source of information used to analyze past hazard events and to rank hazards was the NCDC Storm Events database. Hazard data was supplemented with sources such as the West Virginia Division of Forestry (WVDOF) and West Virginia Geological Survey (WVGS).

### 3.2.2 DEMOGRAPHICS

West Virginia's demographics are a major factor in the risk posed by natural hazards. The 2010 U.S. Census Bureau population of West Virginia was 1,852,994, the 2012 estimate is 1,855,413. The State's population is most dense in three population clusters: one cluster centered on the Charleston metropolitan area; another in the Panhandle, an outgrowth of the Washington, DC, metropolitan area; and a third in the area near the Pennsylvania border, near the southern extent of the Pittsburgh metropolitan area. Table 3-2 shows counties with population growth and projected growth over 10%. The Census Bureau projects a reversal of the recent trend of population growth and a gradual decline in the State's population to near 1.7 million by 2030 (Table 3-3).



Figure 3-4 shows the total population, population density, population change from 1980 through 2010, and 2030 population projections. Berkeley County has seen its population double in the past 30 years. McDowell County has experienced the largest decline in population since 1980 compared to other counties in the State.

Historically known for its logging and mining industries, West Virginia’s top three industries include Health Care / Social Assistance, Manufacturing, and Retail. Median household income for the period 2007-2011 was \$39,550, compared to the United States median household income of \$52,762. During that same period of time, approximately 17.5% of the State’s population was living in poverty. The estimated 2012 poverty threshold for a family unit of one is \$11,722, and \$14,960 for a two person family, and \$18,287 for a three person family unit. The Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using Consumer Price Index.<sup>9</sup>

The recent economic downturn has had a significant impact on West Virginia. The December 2012 seasonally adjusted rate of unemployment in West Virginia stood at 7.4% compared to the U.S. unemployment rate of 7.8%.

TABLE 3-2. COUNTIES WITH POPULATION GROWTH RATES OVER 10%.BASED ON U.S. CENSUS DECENNIAL POPULATION DATA

County	1980	2000	2010	2020	2030	% Change (1980 - 2010)	% Change (2000 - 2020)	% Change (2010- 2030)
Berkeley	46,775	75,905	104,169	132,433	161,563	55.10	42.68	55.10
Jefferson	30,302	42,190	53,498	64,806	76,694	43.36	34.90	43.36
Morgan	10,711	14,943	17,541	20,139	24,371	38.94	25.80	38.94
Hampshire	14,867	20,203	23,964	27,725	33,061	37.96	27.13	37.96
Putnam	38,181	51,589	55,486	59,383	72,791	31.19	13.12	31.19
Hardy	10,030	12,669	14,025	15,381	18,020	28.48	17.63	28.48
Monongalia	75,024	81,866	96,189	110,512	117,354	22.00	25.92	22.00
Grant	10,210	11,299	11,937	12,575	13,664	14.47	10.15	14.47
Wirt	4,922	5,873	5,717	5,561	6,512	13.91	-5.61	13.91
Jackson	25,794	28,000	29,211	30,422	32,628	11.70	7.96	11.70

<sup>9</sup> US Census Bureau Poverty Thresholds and Quickfacts <http://www.census.gov/hhes/www/poverty/data/threshld/> 2/28/2013





TABLE 3-3: COUNTIES WITH POPULATION DECLINE OVER 25% BASED ON U.S. CENSUS DECENNIAL POPULATION DATA.

County	1980	2000	2010	2020	2030	% Change (1980 - 2010)	% Change (2000 - 2020)	% Change (2010-2030)
McDowell	49,899	27,329	22,113	16,897	(5,673)	-125.65	-61.74	-125.65
Wyoming	35,993	25,708	23,796	21,884	11,599	-51.26	-17.47	-51.26
Mingo	37,336	28,253	26,839	25,425	16,342	-39.11	-11.12	-39.11
Ohio	61,389	47,427	44,443	41,459	27,497	-38.13	-14.39	-38.13
Logan	50,679	37,710	36,743	35,776	22,807	-37.93	-5.41	-37.93
Webster	12,245	9,719	9,154	8,589	6,063	-33.77	-13.16	-33.77
Wetzel	21,874	17,693	16,583	15,473	11,292	-31.91	-14.35	-31.91
Hancock	40,418	32,667	30,676	28,685	20,934	-31.76	-13.88	-31.76
Brooke	31,117	25,447	24,069	22,691	17,021	-29.28	-12.15	-29.28
Fayette	57,863	47,579	46,039	44,499	34,215	-25.68	-6.92	-25.68
Marshall	41,608	35,519	33,107	30,695	24,606	-25.68	-15.72	-25.68

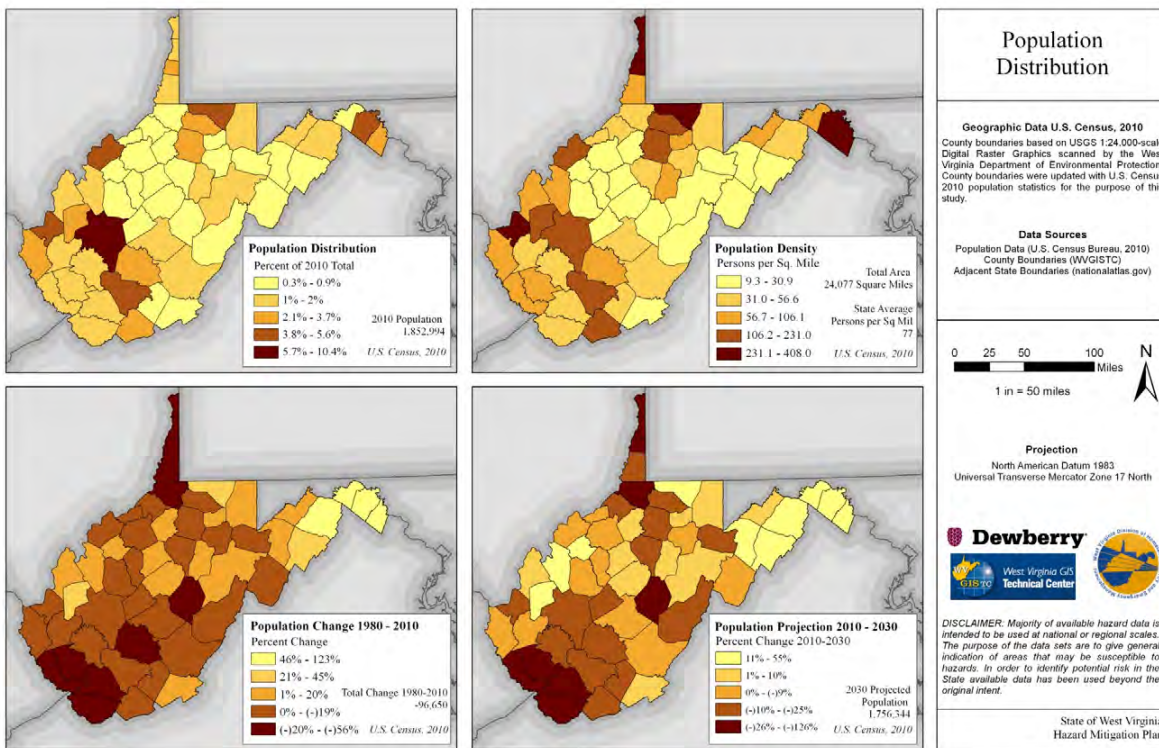


FIGURE 3-4. COMPARISON OF POPULATION DISTRIBUTION, DENSITY, 30-YEAR POPULATION CHANGE, AND 20-YEAR PROJECTIONS.



### 3.2.3 SOCIAL VULNERABILITY

Vulnerability is broadly defined as the potential for loss. It not only applies to landscapes and buildings, but to people as well. The vulnerability of people is termed “social vulnerability” and describes the vulnerability of populations before an event occurs. This pre-existing condition is based on the characteristics of the population and where they live. By determining the most vulnerable populations and identifying what characteristics make them vulnerable, preparedness and recovery programs for hazards may be designed to minimize the impacts on these vulnerable populations. There is no broad consensus as to exactly which characteristics determine vulnerability. For the purposes of this plan, discussion is limited to factors such as income, employment status, age, housing occupancy, and race. Persons with one or more of the following characteristics are generally considered to be less able to recover from a disaster should one occur than the general population: limited financial resources; those under 5 or over 65 years of age; non-white; or those living in renter occupied housing.

Table 3-4 summarizes various population characteristics by county. Figure 3-5 through Figure 3-7 illustrate this information graphically. According to U.S. Census data, unemployment is highest in Pocahontas County. Marion County has the State’s lowest median household income and the highest percentage of population living below the poverty line. Pendleton County has the highest percentage of elderly persons (greater than 65 years of age), while Berkeley County has the highest percentage of children under 5 years of age. Approximately 17.49% of the population of Gilmer County is reported as being non-white, the highest percentage for that characteristic of any county in the State. Over 36% of the population in Monongalia County lives in renter occupied housing.



TABLE 3-4. VULNERABLE POPULATION CHARACTERISTICS. (US CENSUS 2010 AND MAY 2012)

County	Median Household Income	Unemployment %	Average Below Poverty	Percent Elderly	Percent Disabled	% Under 5	% Non-White	% in Renter Occupied Housing
Barbour County	\$31,212	7.50%	18.40%	16.80%	35.80%	5.72%	3.19%	22.01%
Berkeley County	\$52,857	7.30%	10.10%	11.70%	22.50%	6.95%	12.16%	23.97%
Boone County	\$39,783	12.50%	19.30%	14.30%	31.90%	6.20%	1.45%	20.41%
Braxton County	\$32,158	9.50%	21.00%	17.70%	29.10%	5.45%	1.82%	23.35%
Brooke County	\$39,475	9.40%	11.00%	19.00%	18.40%	4.67%	2.95%	20.40%
Cabell County	\$34,492	6.60%	20.60%	15.90%	23.50%	5.76%	8.44%	32.72%
Calhoun County	\$26,922	9.80%	20.50%	18.50%	30.90%	5.41%	1.61%	21.63%
Clay County	\$30,789	10.50%	23.70%	16.10%	32.80%	6.05%	1.23%	18.78%
Doddridge County	\$30,019	6.30%	25.10%	15.80%	23.90%	4.77%	3.01%	17.52%
Fayette County	\$31,912	7.80%	21.30%	16.80%	28.60%	5.72%	6.54%	21.62%
Gilmer County	\$29,706	6.90%	30.30%	14.00%	23.10%	4.20%	17.49%	19.29%
Grant County	\$35,593	9.50%	12.90%	19.00%	16.90%	5.31%	2.35%	20.11%
Greenbrier County	\$33,732	7.30%	19.40%	19.40%	24.00%	5.20%	5.40%	24.11%
Hampshire County	\$31,792	6.60%	16.40%	16.90%	23.90%	5.35%	2.77%	18.64%
Hancock County	\$38,565	9.60%	14.80%	18.90%	16.90%	5.00%	4.27%	24.70%
Hardy County	\$31,347	8.50%	14.90%	17.20%	22.60%	5.65%	6.16%	24.02%
Harrison County	\$39,191	6.40%	18.90%	16.70%	22.00%	5.83%	4.04%	23.40%
Jackson County	\$41,406	9.00%	18.10%	17.70%	21.50%	5.78%	1.84%	21.20%
Jefferson County	\$65,603	5.30%	8.40%	12.20%	17.20%	6.31%	12.38%	21.05%
Kanawha County	\$42,696	6.40%	13.70%	16.80%	21.90%	5.59%	10.89%	28.57%



County	Median Household Income	Unemployment %	Average Below Poverty	Percent Elderly	Percent Disabled	% Under 5	% Non-White	% in Renter Occupied Housing
Lewis County	\$33,293	6.10%	19.60%	18.30%	28.10%	5.75%	2.10%	25.54%
Lincoln County	\$30,868	10.70%	26.60%	15.30%	37.50%	6.03%	0.99%	19.96%
Logan County	\$35,465	9.20%	21.80%	15.50%	32.60%	5.06%	3.45%	22.89%
Marion County	\$22,154	6.50%	32.60%	16.60%	20.10%	5.54%	5.66%	23.57%
Marshall County	\$38,115	7.90%	16.80%	17.00%	20.10%	5.26%	2.05%	21.80%
Mason County	\$34,419	11.10%	18.00%	17.50%	25.00%	5.75%	2.27%	18.90%
McDowell County	\$36,027	9.30%	18.90%	17.30%	43.10%	5.43%	10.87%	19.71%
Mercer County	\$32,131	7.30%	22.80%	18.00%	28.40%	5.72%	8.44%	25.27%
Mineral County	\$36,571	7.10%	16.10%	17.70%	19.90%	5.39%	4.69%	20.56%
Mingo County	\$32,902	9.20%	21.60%	13.80%	35.80%	6.01%	2.95%	21.61%
Monongalia County	\$39,167	5.00%	21.00%	10.20%	15.00%	4.64%	9.05%	36.60%
Monroe County	\$39,574	6.20%	13.30%	20.10%	24.00%	5.59%	2.52%	17.34%
Morgan County	\$37,281	7.30%	15.80%	19.00%	23.00%	4.81%	2.73%	17.30%
Nicholas County	\$38,457	8.70%	18.70%	17.50%	28.50%	6.00%	1.63%	18.03%
Ohio County	\$39,669	6.70%	15.90%	18.40%	18.50%	5.05%	6.81%	26.26%
Pendleton County	\$33,323	6.20%	15.10%	22.50%	21.60%	4.98%	3.81%	18.88%
Pleasants County	\$38,882	8.60%	13.70%	16.40%	16.80%	4.71%	2.68%	16.58%
Pocahontas County	\$32,161	14.40%	15.30%	19.60%	25.50%	4.52%	2.19%	18.59%
Preston County	\$40,753	6.30%	13.90%	16.20%	22.70%	5.36%	2.37%	15.79%
Putnam County	\$52,618	5.80%	10.40%	14.70%	16.70%	5.97%	3.25%	16.03%
Raleigh County	\$38,036	7.00%	17.50%	16.10%	26.20%	6.04%	11.49%	23.22%



County	Median Household Income	Unemployment %	Average Below Poverty	Percent Elderly	Percent Disabled	% Under 5	% Non-White	% in Renter Occupied Housing
Randolph County	\$36,176	8.70%	17.10%	18.30%	24.10%	5.13%	2.69%	22.75%
Ritchie County	\$32,619	7.10%	18.90%	17.90%	23.30%	5.46%	1.35%	19.78%
Roane County	\$27,428	10.50%	27.60%	17.80%	25.60%	5.53%	1.63%	20.61%
Summers County	\$27,720	8.30%	21.60%	19.60%	32.60%	4.51%	6.96%	21.07%
Taylor County	\$36,956	6.90%	15.80%	16.10%	24.40%	5.74%	2.45%	19.54%
Tucker County	\$32,712	9.10%	17.70%	20.90%	24.10%	4.64%	1.26%	18.08%
Tyler County	\$33,496	9.00%	18.10%	18.70%	23.20%	5.14%	1.04%	17.03%
Upshur County	\$36,114	6.90%	19.30%	16.90%	22.10%	5.85%	2.39%	22.54%
Wayne County	\$35,079	7.40%	20.20%	17.00%	31.30%	5.68%	1.44%	21.50%
Webster County	\$28,025	12.00%	22.90%	17.80%	36.90%	5.93%	1.39%	20.87%
Wetzel County	\$36,636	10.60%	17.50%	19.80%	23.60%	5.11%	1.28%	21.17%
Wirt County	\$36,705	9.10%	19.20%	15.90%	20.50%	5.30%	1.50%	18.44%
Wood County	\$42,146	7.10%	16.40%	17.10%	19.40%	5.80%	3.58%	26.30%
Wyoming County	\$36,343	8.60%	17.30%	15.30%	35.30%	5.59%	1.85%	17.26%

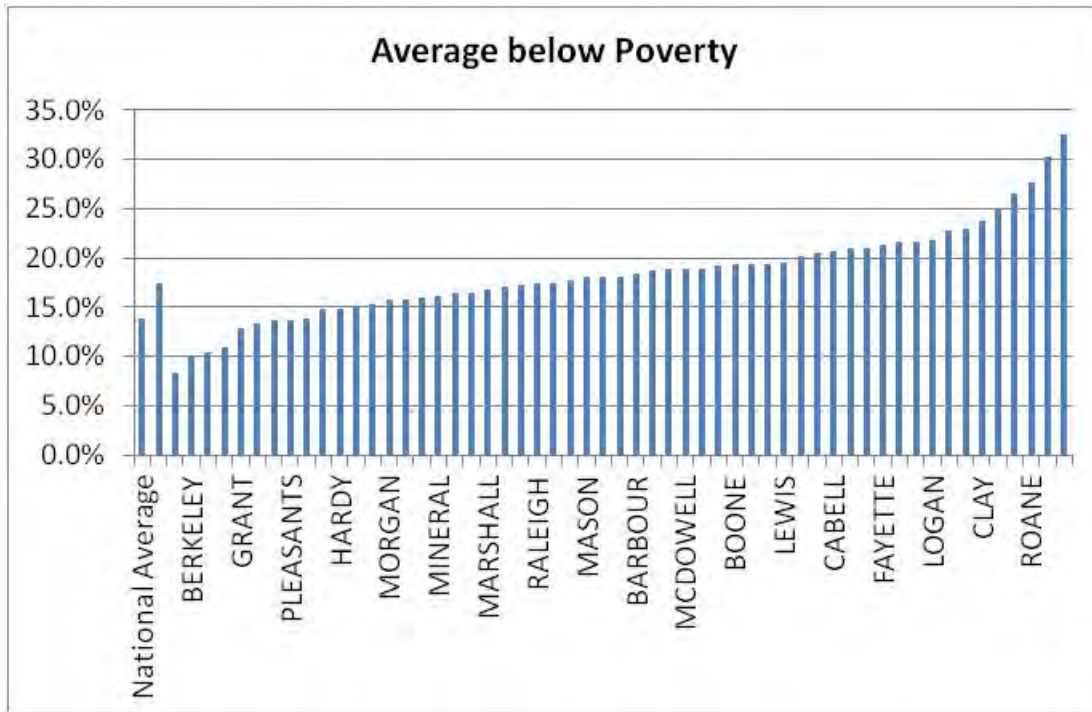


FIGURE 3-5. PERCENT OF POPULATION BELOW POVERTY LINE

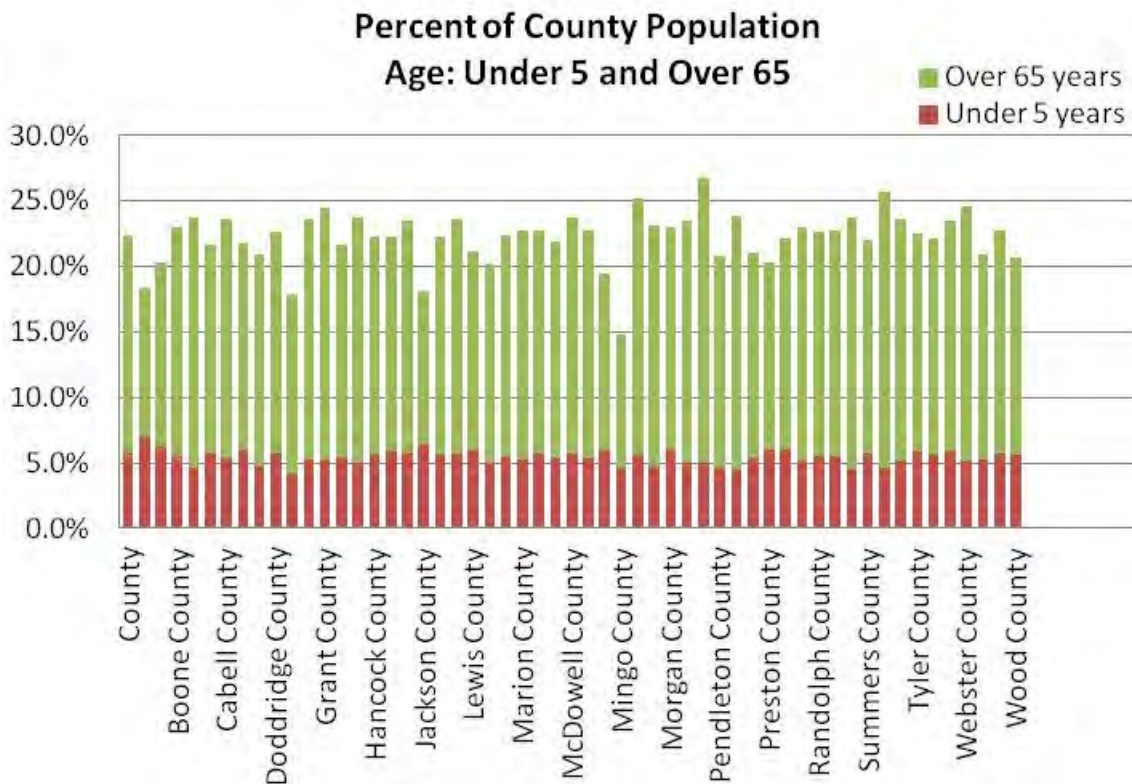


FIGURE 3-6. PERCENT OF COUNTY POPULATION UNDER 5 AND OVER 65 YEARS OF AGE

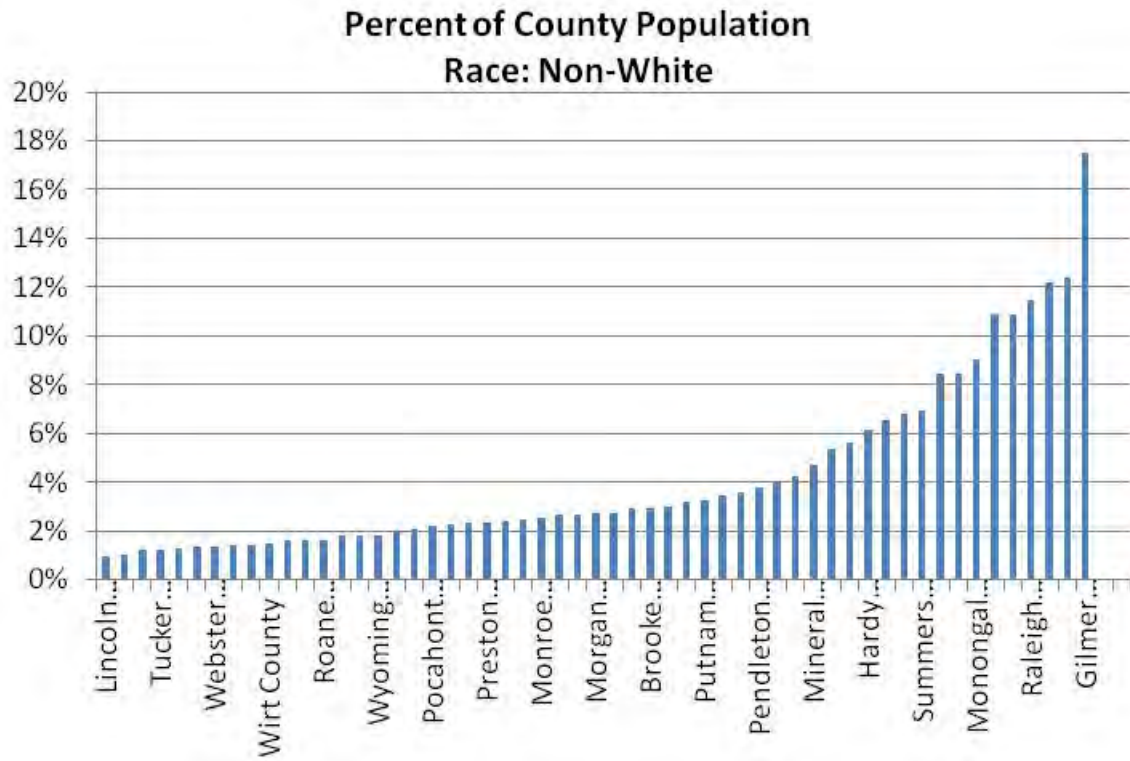


FIGURE 3-7. PERCENT OF NON-WHITE COUNTY POPULATION

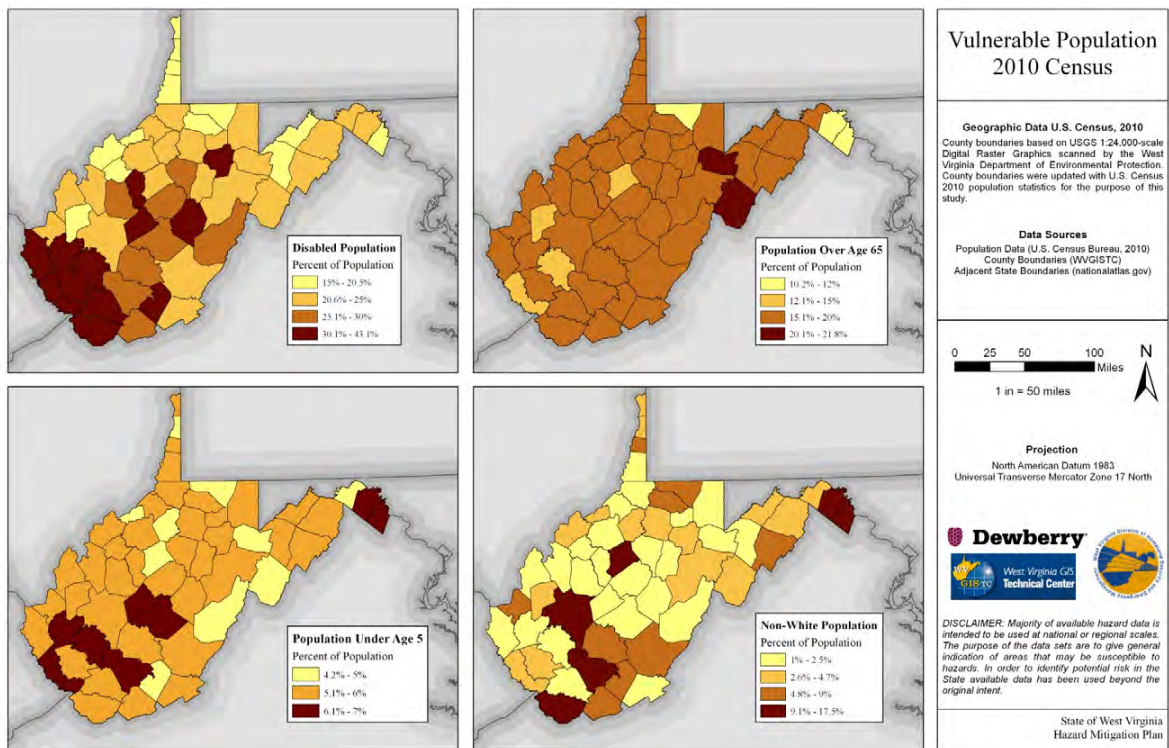


FIGURE 3-8. WEST VIRGINIA VULNERABLE POPULATIONS 1

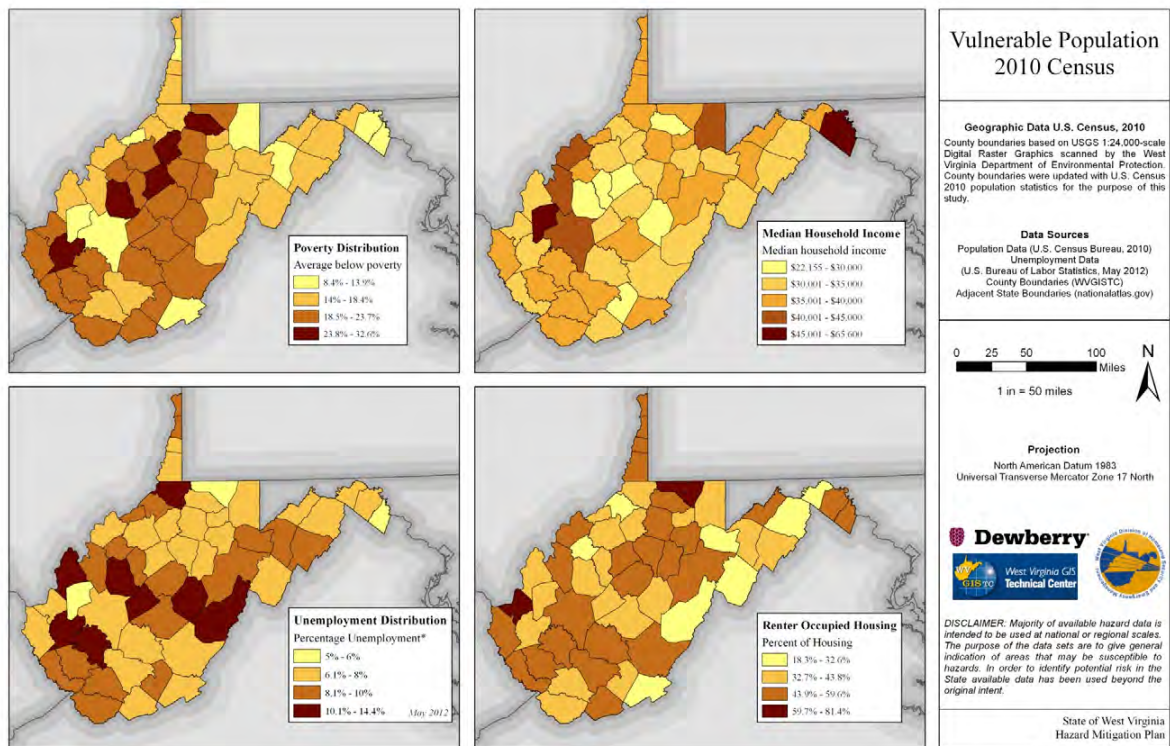


FIGURE 3-9. WEST VIRGINIA VULNERABLE POPULATIONS 2

### 3.2.4 LAND USE AND DEVELOPMENT

Effective land use planning is a central component of any hazard mitigation program. Existing and planned land use patterns greatly influence a community’s hazard vulnerability. Consequently, future land use decisions should be directed toward creating a more disaster-resistant environment. Changes in urban and agricultural land cover highlight areas within the State that should be included in long-term comprehensive plans.

To identify these areas, land cover change was assessed using the National Land Cover Dataset produced by the Multi-Resolution Land Characteristics Consortium (MRLC), a collection of Federal agencies that pool resources to map land cover across the Nation. Using satellite imagery, the MRLC produced datasets for 1992 and 2001 that include 16 land cover classes for various types of urban, agricultural, forested, and other natural areas. Analyzing land cover with these two datasets allowed consistent comparison across the State of West Virginia.

Most change in West Virginia has occurred in urban and agricultural areas. From 1992 through 2001, urban land cover has increased by 851,601 acres statewide, while agricultural land cover has decreased by 554,101 acres. All 55 West Virginia counties





have experienced growth in urbanization, as shown in Figure 3-10. Wirt, Pendleton, and Pocahontas counties have had the most urban growth compared to the other counties in the State, with an expansion in urban land over 35 times their 1992 values. Table 3-5 shows the top 10 counties that have experience the most urban land cover change. Agricultural land cover has declined in most of the counties, as shown in Figure 3-11. However, McDowell and Raleigh Counties have seen the most agricultural growth, 63% and 43%, respectively, as shown in

Table 3-6. Wetzel County decreased in agricultural area by almost 67% during the nine-year period.

TABLE 3-5. TOP TEN COUNTIES WITH THE HIGHEST URBAN LAND COVER CHANGE.

County	1992 Urbanized Area (acres)	2001 Urbanized Area (acres)	Total Area Changed (acres)	% Urbanized Change (Area)
Wirt	205	8,597	8,392	4,088
Pendleton	429	17,568	17,138	3,993
Pocahontas	575	20,799	20,224	3,517
Calhoun	270	8,099	7,829	2,900
Monroe	715	18,202	17,487	2,447
Lincoln	915	19,371	18,457	2,018
Webster	684	13,745	13,061	1,909
Tucker	679	11,958	11,279	1,662
Hardy	904	15,458	14,554	1,611
Gilmer	562	9,080	8,517	1,515

TABLE 3-6. TOP TEN COUNTIES WITH THE HIGHEST AGRICULTURE LAND COVER CHANGE

County	1992 Agri Area (acres)	2001 Agri Area (acres)	Total Area Change (acres)	% Agricultural Change (Area)
McDowell	3,861	6,284	2,423	63
Raleigh	30,755	43,848	13,093	43
Wetzel	22,859	7,553	-15,305	-67
Kanawha	21,625	8,291	-13,333	-62
Doddridge	23,422	10,359	-13,063	-56
Wayne	30,151	13,835	-16,317	-54
Gilmer	21,615	10,993	-10,622	-49
Mingo	4,903	2,579	-2,325	-47
Lincoln	17,046	8,980	-8,066	-47
Marshall	45,611	24,802	-20,809	-46
Putnam	37,852	20,384	-17,468	-46

Pleasants	9,465	5,119	-4,345	-46
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### 3.2.5 LOCAL PLAN LAND USE AND DEVELOPMENT

Most of the local hazard mitigation plans include a general overview of land uses and development trends in the regions they cover. Each local hazard mitigation plan was reviewed for information on local trends. Table 3-7 below shows the main data sources and trends as determined by the local plans for the 2013 plan update. Land use information from previous plans is available in Appendix O. Terrain and transportation corridors are noted in several plans as a potential limiting factor for development.

Local comprehensive plans were also referenced by several local hazard mitigation plans. It is important to combine the comprehensive plan data with hazard mitigation, as future development will influence the degree to which citizens are prone to natural hazards. Future revisions of the local hazard mitigation plans should use the corresponding local comprehensive plan information regarding land use and development.

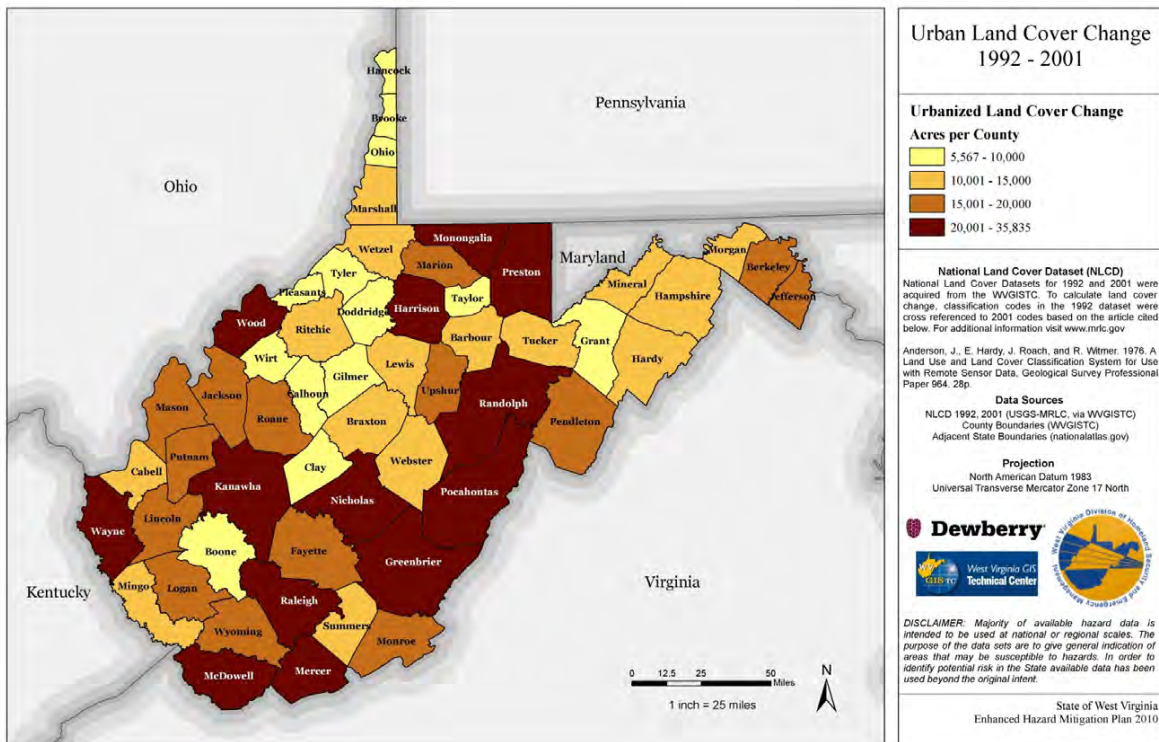


FIGURE 3-10. URBAN LAND COVER CHANGE

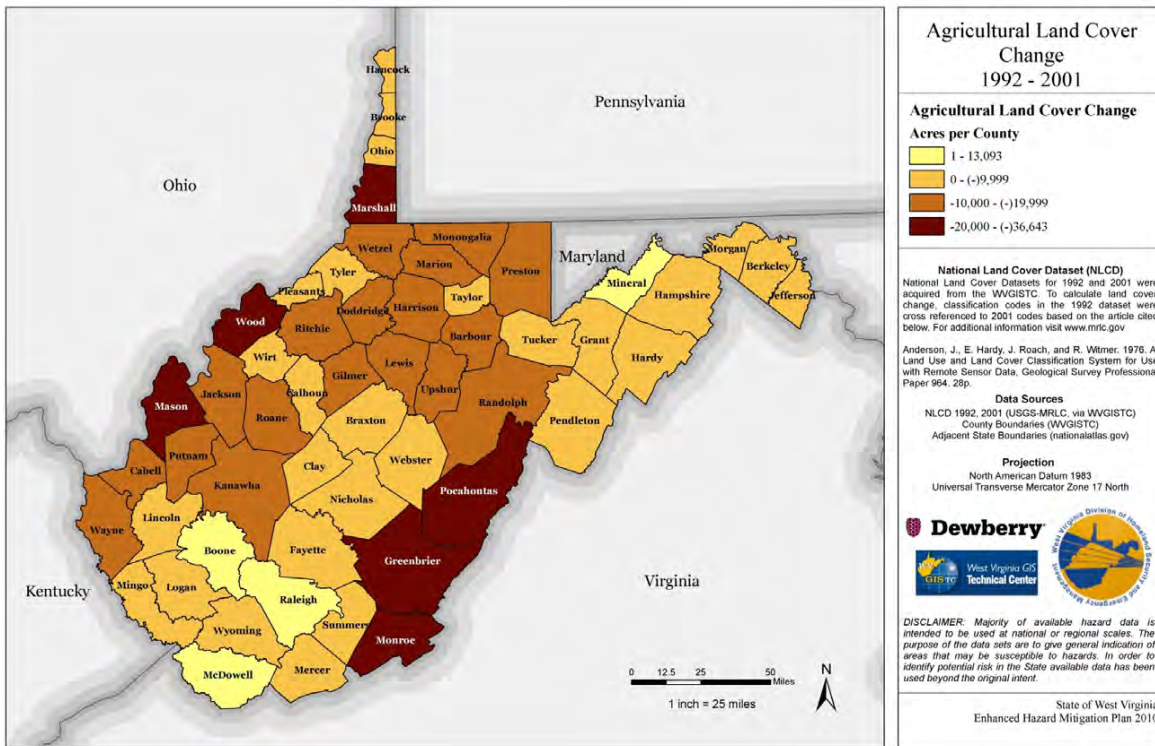


FIGURE 3-11. AGRICULTURAL LAND COVER CHANGE

### 3.2.6 COMPARISON OF STATEWIDE LAND USE AND LOCAL PLAN LAND USE

Population growth and development trends are important factors when considering the risk or the damage posed by an emergency or natural disaster. Development in hazard-prone areas should be undertaken with full knowledge of potential threats. Overall, the land use information compiled for this plan and in the local plans shows similar trends. Kanawha County is experiencing a large surge in population and development, while most of West Virginia is experiencing relatively low development and population decline.



TABLE 3-7. WEST VIRGINIA LOCAL COUNTY HAZARD MITIGATION PLAN LAND USE

PDC	County	Summary of Population Trends and/or Land Use Changes
Region 1	McDowell County	McDowell County is economically depressed but continues to operate as efficiently as possible given statewide economic setbacks. Undergoing company cutbacks and mine closings. High unemployment rate. Development is nonexistent and all indicators suggest that no development will occur anytime soon.
	Mercer County	Development in Athens and Matoaka is nonexistent. Development in Bluefield is minimal. General land use is comprised of residential and commercial properties, with a very limited amount developed for industrial use. The majority of industrial properties are owned and operated by a major railroad corporation, with a large portion of these sites comprising rail yards and lines that traverse the city. Bramwell officials are seeking to increase development and tourism potential. Unfortunately, such expansion requires tremendous resources and is slow to come to fruition. Oakvale has seen no recent development.
	Monroe County	Largely agricultural and its industries are small-farm or forest-oriented. The nearest major commercial airports in the State are outside the county in Bluefield and Beckley. Scheduled development projects are continued expansion of the Goodrich Plant and the extension of water service into the southeastern quadrant of the county. If existing trends were to continue, then it is expected that the county population would show some increase in the coming decade with growth occurring outside the 100-year floodplain.
	Raleigh County	Largely semi-urban, with I-77 and I-64 forming the growth axes. Light-intensity urban land use is predominant around Beckley. Natural resources such as coal and timber act as linchpin industries. Scheduled development projects include airport industrial park expansion, new housing at Glad Springs. New sewage treatment plant for Crab Orchard PSD. Raleigh County has shown relatively impressive growth in the last couple of years. It is strongly expected that the county population will continue to increase in the coming decade. All of this growth is expected to happen outside the special flood hazard area. Growth is also expected along the proposed Coalfields Expressway.
	Summers County	Summers County and the City of Hinton are viable regions that continue to operate as efficiently as possible given recent statewide economic setbacks. The City of Hinton benefits seasonally from tourists flows coming to the Bluestone Lake and the downriver fishing and whitewater rafting ventures. Hinton is planning to increase tourist potential by developing scenic river walks, mountain bike paths, and new lodging facilities.
	Wyoming County	Largely rural. Very limited road access and very limited developable land. However, the area enjoys low cost of living, abundant recreational opportunities, and good rail infrastructure. Scheduled development projects include John D. Rockefeller IV Industrial Park, Eastern Wyoming Water System, and Mullens Senior Citizen Housing. Construction of the Coalfields Expressway, Shawnee Highway and King Coal Highway is expected to give the biggest boost to growth in the county. However, if existing trends continue, it is expected that the county population would show a slight decline.



PDC	County	Summary of Population Trends and/or Land Use Changes
Region 2	Cabell County	Cabell County is mostly hilly terrain, with low lying areas around rivers and streams, setting the stage for both headwater and backwater flooding, as well as storm run-off and flash floods.
	Lincoln County	No details provided.
	Logan County	Dense residential development is centered in or near the Logan County municipalities due to the availability of developable land. Other residential properties are sparsely located throughout the balance of the county. Commercial development in Logan County is concentrated primarily along US 119. Other commercial development exists in the Town of Chapmanville and the City of Logan. The Logan County Development Authority lists three sites targeted for industrial development: Earl Ray Tomblin Industrial Park (Holden) Three Mile Curve (Dabney), and McDonald Airfield (Taplin).
	Mason County	Mason County enjoys a diversified land use. Areas along the Ohio River are largely industrial. Several commercial and "light industrial" areas are concentrated in the municipalities of Point Pleasant, Mason, and New Haven. Sparse commercial development also exists throughout the balance of the county, along roadways. The southern portions of the county contain several agricultural areas, especially along the Kanawha River and US 35. Newer residential development is taking place along the WV 62 corridor near Point Pleasant, Mason, and New Haven. Residential, commercial, and agricultural trends are expected to remain the same, as are industrial trends. Several sites for new industrial development have been targeted. Most are located just north of Point Pleasant along WV 62. Another is located south of Gallipolis Ferry along WV 2, and another is located along US 33 in the northern portion of the county near Letart.
	Mingo County	Mingo County has a number of sites available for commercial and light industrial development. The Air Transportation Park, Belo Industrial Park, and the Wood Products Industrial Park are large, fully supported developments within the county. The King Coal Highway Project should help meet the growing demand for adequate transportation routes.
	Wayne County	No details provided.
Region 3	Boone County	Boone has several coal related employers, and the largest employers in the county are coal producers/transporters. Over 90 percent of the land area in the county is woodland. The timber industry has been growing in the county for the past several years, bringing along with it those businesses that service is such as trucking and sawmills. Because much of the county's development is occurring in the municipalities along the major roadways, land use decisions and building codes may have to be amended when considering the potential for flooding in these areas. Many grants have been secured to develop water and sewer lines throughout the county.
	Clay County	Specialized Land Use Designation: Wallback Wildlife Management Area
	Kanawha County	There are five locations of industrial and business development in the Charleston-Kanawha County area. These locations provide room for various companies who seek to expand their market in WV and surrounding States. Water and sewer development continues around Kanawha County. Charleston is experiencing growth in the technical and medical fields. Several new businesses have opened in these fields.
	Putnam County	Several industrial parks and many retail shopping centers. Largely residential, serving Charleston and Huntington commuters. Putnam County has seen an increase in employment in its industrial parks.



PDC	County	Summary of Population Trends and/or Land Use Changes
Region 4	Fayette County	<p>The economy of all five counties is driven by government and the hospitality industry. Education and retail trade industries are consistently strong in all counties. All five counties have space available for development, primarily commercial/business but also some space for industrial development. In Fayette County, much of this land is available along I-64. All counties have Economic Development Authorities that work to bring development and jobs to the counties. In many instances, the premier developable areas in Nicholas County are located in or near flood hazard areas. As part of the mitigation planning process, local leaders are continuing to look at flood mitigation options to guide not only commercial and industrial development, but also residential development. All counties are largely rural and are located in a mountainous region. Thus, potential for development is somewhat limited. The topography drives development to flatter areas that are often in or near floodplains. Local floodplain development regulations carefully balance the needs for economic development and growth in the employment sector with a basic responsibility to buffer potential and existing businesses from the effects of hazards. The I-64 corridor through southern Fayette County and Greenbrier County is seeing more commercial and industrial development. Denser residential development is likely to continue near municipalities and along roadways. Primary sites for development are the business parks. Targeted development areas include: government and industrial development near the new National Guard Armory in Glen Jean, Wolf Creek Business Park in Oak Hill, and commercial development south of Fayetteville on US 19.</p>
	Greenbrier County	
	Nicholas County	
	Pocahontas County	
	Webster County	
Region 5	Calhoun County	<p>The terrain is largely responsible for differences in development between counties that are adjacent to the Ohio River (Jackson, Pleasants, Tyler, and Wood) and those that lie in the more rugged interior (Calhoun, Ritchie, Roane, and Wirt). Elevation varies from 570 feet along the Ohio River to 1,300 feet in the eastern portion of the region. Much of the interior is above 1,000 feet with few areas for development. The region is also close to several major national metropolitan centers that are experiencing a period of positive growth and redevelopment, such as Columbus, Cleveland, and Cincinnati, Ohio, and Pittsburgh, Pennsylvania. With over half of the U.S. population within a day's drive of the Ohio Valley, the region is well positioned to attract, retain, and grow businesses.</p>
	Jackson County	
	Pleasants County	
	Ritchie County	
	Roane County	
	Tyler County	
	Wirt County	
Wood County		
Region 6	Doddridge County	<p>Most of the region could be considered rural even though the I-79 corridor is rapidly developing. All counties indicate that most the commercial and industrial development in their counties is located in or near municipalities. The oil and gas industry is expanding and its development in Region 6 has been more rapid than in any other area of the State. Significant changes in land use are not expected. The residential areas in the county have experienced a slight population increase as indicated by Census 2005 estimates. Doddridge County, is working hard to spur economic development, as are many counties in West Virginia. However, some of this developable land lies within the floodplain. The county and municipal governments may have to consider revising building codes and creating zoning ordinances to control floodplain development. Doddridge County continues to explore possibilities for development along U.S. Route 50, a four-lane divided highway. Agricultural land makes up a large portion of the total land cover in Preston County. Small-to medium-size farms are prominent in the northern and southern portion of the county. Generally, commercial and industrial development is expected to continue along major transportation routes. The White Oaks and Charles Pointe area in Bridgeport at Exit 124 off I-79 is continuing to grow rapidly now that the new United Hospital Center is complete. Targeted development areas include the Doddridge County Industrial Park.</p>
	Harrison County	
	Marion County	
	Monongalia County	
	Preston County	
	Taylor County	



PDC	County	Summary of Population Trends and/or Land Use Changes
Region 7	Barbour County	In many instances, the premier developable areas in Barbour County are located in or near flood hazard areas. As a result, Philippi has adopted a floodplain management ordinance that allows it to meet minimum standards for the National Flood Insurance Program (NFIP).
	Braxton County	Though development in the Special Flood Hazard Area (SFHA) is acceptable in meeting the minimum standard for their NFIP local Floodplain Management Ordinance, the county has expressed interest in developing a comprehensive program on floodplain management. They will be developing better mapping and enter Braxton County Hazard Mitigation Plan Risk Assessment into a Cooperating Technical Partnership (CTP) with FEMA to help create a Digital Flood Insurance Rate Map (DFIRM). This will be the basis for better land use and development to better protect property owners and lessen the chance of property loss due to future flood disasters.
	Gilmer County	New development is occurring in corridors along four-lane highways in Region 7. Recent development on Rte, 92 near Davis. New residential/second home construction and development is occurring and is projected to boom once Corridor H is complete. This project should also boost the development of Parsons, Thomas, and Davis at some point in the future.
	Lewis County	
	Randolph County	
	Tucker County	
	Upshur County	
Region 8	Grant County	All five counties are largely rural and located in a mountainous region, leaving limited potential for development. Most commercial and industrial development is located in or near the municipalities. Significant changes in land use are not expected. Pendleton County will receive a Shelter trailer with equipment with the capability to shelter 100 people, a Pet Sheltering trailer with equipment to care for 75 pets, and a Comfort Station Trailer. All five counties have available space for development, primarily commercial/business but also some industrial development. Several development sites have been established along the primary roadways throughout the region. Most recent development has been infrastructure projects such as the City of Romney's wastewater improvement project, the City of Keyser's water treatment plan, and the Town of Franklin's wastewater improvement project. Denser residential development is likely to occur near municipalities and along roadways. A number of educational projects are planned for the entire region, including the Potomac Highland Early Childhood Center and the Potomac State College Lab Science Building. The PDC has indicated that the primary sites for development are the business parks. Specific sites targeted for development by the county are provided in the Region 8 plan.
	Hampshire County	
	Hardy County	
	Mineral County	
	Pendleton County	
Region 9	Berkeley County	Currently, the sewer and water systems within the region are at or nearing capacities. The current rate of residential growth throughout the region and the general deterioration of some of the system results in a constant demand upon the service providers to find financial resources for upgrades, extensions, and additional capacity. Furthermore, the environmental issues regulating the Shenandoah watershed basin and discharge issues on the Potomac River will require improved water treatment throughout the region. Industrial land is mostly owned by the US Silica Company. The region has seen significant development in recent years as a part of the National Capital Region. Potential for development is likely to continue. Proximity to I-81 and I-70 has helped to drive this development. All counties indicate that most the commercial and industrial development in their counties is located in or near the municipalities. Berkeley and Morgan Counties have available space for development, primarily commercial/business but also some industrial development. Infrastructure projects occurring in the region include widening of I-81 and Route 9. These two projects, once completed, will improve the safety of travel and enhance the region's economic development potential. Berkeley and Morgan Counties have available space for development, primarily commercial/business but also some industrial. Newly approved growth is and will continue to be concentrated in the southern area of the region, especially in the Timer Ridge and Rock Gap districts. Detailed description of land use and population trends is included in Appendix III of the Regional Plan.
	Morgan County	



PDC	County	Summary of Population Trends and/or Land Use Changes
Region 10	Marshall County	<p>Most of the development in the planning area is located along the Ohio River. All of the municipalities can be said to have a regular trend of development (commercial and industrial) along SR 2 and the Ohio River. All three counties have available space for development, primarily commercial/business, but also some space for industrial development. The Highlands commercial area surrounding Cabelas continues to grow at a rapid pace. Denser residential development is likely to continue to occur near municipalities and along roadways. The plan includes a list of areas targeted for development in the planning region. All three counties are seeing growth in the oil and natural gas industry.</p>
	Ohio County	
	Wetzel County	
Region 11	Brooke County	<p>Both counties are largely rural but contain significant industrial areas. Most commercial and industrial development is located in or near the municipalities. Several development sites have been established along primary roadways. Significant changes in land use are not expected. The City of Weirton is developing land use for new homes out of the hazard areas. Browns Island is being developed for industrial use (currently it is a hazardous area). A number of development projects are occurring in the region, ranging from infrastructure upgrades to commercial developments. A list of targeted development areas can be found in the regional plan. Both Brooke and Hancock Counties have seen an increase in oil and natural gas exploration activities. Much of this development is occurring in rural areas.</p>
	Hancock County	



### 3.2.7 AMPLIFIERS WHICH IMPACT NATURAL HAZARDS AND DISASTERS

#### A CHANGING CLIMATE

Climate change is both a present threat and a slow-onset disaster. It acts as an amplifier of existing natural hazards. Extreme weather events have become more frequent over the past 40 to 50 years, and this trend is projected to continue<sup>10</sup>. Climate change is expected to have a significant impact on communities, including those in West Virginia. For instance, more frequent intense precipitation events may translate into more frequent flash flooding episodes. More intense heat waves may mean more heat-related illnesses, droughts, and wildfires. Positive benefits of a changing climate might include fewer automobile accidents and damage as more winter precipitation falls in the form of rain rather than snow or ice. As climate science evolves and improves, future updates to this plan might consider including climate change as a parameter in the ranking or scoring of natural hazards.

#### DEER – VEHICLE COLLISIONS

Animals entering roadways, and the collisions with humans that sometimes result, are not an insignificant consideration in West Virginia. A 2008 study by the Highway Loss Data Institute (HLDI), an affiliate of the Insurance Institute for Highway Safety, examined insurance claims and police reports and found that between 1993 and 2007 West Virginians experienced 36 fatalities in crashes with animals.



The Office of the West Virginia Insurance Commissioner released its 2008 calendar year study on October 13, 2009. The study examined information from automobile insurers that do business in the State whose market shares by premium volume made up 60% of the West Virginia's automobile physical damage insurance market. The

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<sup>10</sup> Gutowski, W.J., G.C. Hegerl, G.J. Holland, T.R. Knutson, L.O. Mearns, R.J. Stouffer, P.J. Webster, M.F. Wehner, and F.W. Zwiers, 2008: Causes of observed changes in extremes and projections of future changes. In: *Weather and Climate Extremes in a Changing Climate: Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands* [Karl, T.R., G.A. Meehl, C.D. Miller, S.J. Hassol, A.M. Waple, and W.L. Murray (eds.)]. Synthesis and Assessment Product 3.3. U.S. Climate Change Science Program, Washington, DC, pp. 81-116.



study found that in 2008, the statewide losses for deer-vehicle claims was \$56.2 million, making it the highest loss year of the previous 7 years. The average amount per claim in 2008 was \$2,140. That figure was the highest it had been in 7 years. These figures do not tell the whole story, as they only include losses paid by insurance companies under the comprehensive coverage portion of insurance policies. Not included in these estimates are losses such as cost of deductibles, costs paid under collision or other insurance coverage, cost for lost wages, or uninsured damages.

TABLE 3-8. DEER-VEHICLE COLLISION LOSSES

Year	2002	2003	2004	2005	2006	2007	2008
Number of deer-vehicle claims	28,037	21,624	18,890	20,097	21,144	24,590	26,265
Average amount per claim	\$1,626	\$1,681	\$1,757	\$1,838	\$1,899	\$1,927	\$2,140
Statewide losses	\$44.8M	\$36.3M	\$33.2M	\$36.4M	\$40.2M	\$47.4M	\$56.2M

\*Amounts paid by insurance companies and limited to amounts paid under Comprehensive portion of coverage. Source: Offices of the West Virginia Insurance Commissioner

State Farm released a study in October 2012 that showed that West Virginia led a list of States where collisions with deer are most likely. Using claims data along with State motor vehicle registrations, State Farm calculated that the odds of a West Virginia vehicle striking a deer over the 12month period (ending June 30, 2012) after the study’s release were 1 in 39.9.

Nationally, HLDI’s examination of records from January 2005 to April 2008 revealed that insurance claims during the month of November were nearly 3 times higher than a typical month in the year. This coincides with deer breeding season. Animal-human collisions may also be the result of hazards that drive animals out of their habitat. For example, in West Virginia these might include flooding, drought, and winter storm events.

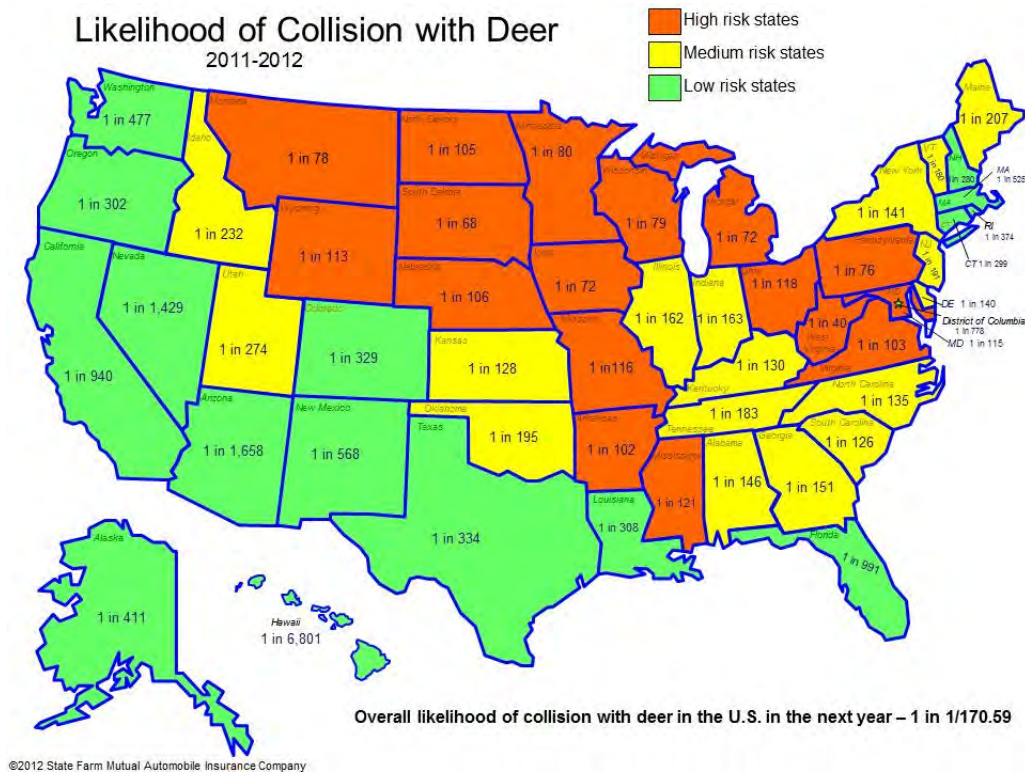


FIGURE 3-12. DEER - VEHICLE COLLISION LIKELIHOOD

\*Source: 2012, State Farm Mutual Automobile Insurance Company

### 3.3 DECLARED DISASTERS AND NCDC EVENTS

West Virginians face some unique challenges by virtue of the State’s natural environment and its effect on economic and social development. The state's beautiful mountains, forests, and rivers are both a blessing and a burden; they are pleasing to view, to live in, and to explore, but they have channeled residential, commercial, and industrial development into valleys where risks abound, including risks from flooding, wildfires, and winter storms.

Table 3-9 and Figure 3-13 show how many federally declared disasters and emergencies have occurred from 1954 to July 2013. Historically, flooding has caused the most damage to the State and its citizens, along with recent wind and winter storm disaster events. Many figures throughout this plan address the distribution of hazard events and other data by county. (See the county map in Section 3.2).

Recent disasters have focused the attention of West Virginia's citizens and government officials on the resultant human, economic, and environmental impacts. During the



past decade, West Virginia has experienced 22 events warranting Presidential Disaster Declarations.

These disasters had significant impacts as West Virginia, and its residents were forced to bear the majority of the costs of clean up and restoration of services. Disasters impact the State through death and injury; loss of residences, property, and possessions; lost wages and business revenue; and the immeasurable psychological and sociological costs to disaster victims and their families. In considering the economic costs of disasters in West Virginia, it is important to recognize that small- to medium-sized businesses, which provide nearly 80 percent of the jobs in an average community, are at high risk for failure after a disaster. According to the Contractors' Association of West Virginia, highway contractors were especially hard hit in 2003 when the West Virginia Division of Highways had to divert millions of dollars from construction programs to repair roads and bridges damaged by devastating floods and winter storms. Building and utility contractors also faced a downturn in construction, which was only intensified by the wet weather and flooding, requiring layoffs of qualified staff and ultimately affecting revenue<sup>11</sup>.

Disasters also challenge community sustainability of basic services. A study conducted for the Disaster Recovery Board found that many communities in southern West Virginia that tend to be particularly hard hit by flooding may not be able to sustain themselves financially when the recurring need for flood recovery is taken into account<sup>12</sup>. Additionally, families who own homes severely damaged by disasters often choose to move out of the community or out of the State where conditions may be safer.

### 3.3.1 DISASTER DECLARATIONS BACKGROUND

Local and State governments share the responsibility for protecting their citizens and for helping them recover when a disaster strikes. In some cases, a disaster is beyond the capabilities of State and local government to respond. In 1988, the Robert T. Stafford Disaster Relief and Emergency Assistance Act was enacted to support State and local governments and their citizens when disasters overwhelm them and exhaust their resources. This law, as amended, established a process for requesting and obtaining a Presidential Disaster Declaration, defines the type and scope of assistance available from the Federal Government, and sets the conditions for obtaining that assistance.<sup>13</sup>

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<sup>11</sup> WVSHARE, 2003

<sup>12</sup> McGarrity and Rowan, 2005

<sup>13</sup> *A Guide to the Disaster Declaration Process and Federal Disaster Assistance*. FEMA March 4, 2008.



Federal disasters and emergencies are defined as follows (FEMA, 2006):

A **Major Disaster** could result from a hurricane, earthquake, flood, tornado or major fire which the President determines warrants supplemental federal aid. The event must be clearly more than State or local governments can handle alone. If declared, funding comes from the President's Disaster Relief Fund, which is managed by FEMA, and disaster aid programs of other participating federal agencies.

An **Emergency Declaration** is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring.

A **Presidential disaster declaration** could result from a hurricane, earthquake, flood, tornado, major fire or other event which the President determines warrants supplemental Federal aid. The event must be undoubtedly more than the state or local governments can handle alone. If declared, funding comes from the President's Disaster Relief Fund, which is managed by FEMA, and disaster aid programs of other participating federal agencies.

The steps to a Presidential Disaster Declaration are as follows:

- Local governments respond, supplemented by neighboring communities through mutual aid agreements and volunteer agencies. If overwhelmed, the local government requests aid from the State;
- The State responds with state resources, such as its response team, the National Guard and other state agencies;
- A Rapid Needs Assessment (RNA) which focuses on lifesaving needs, immanent hazards, and critical lifelines is performed, usually within the first 24 hours of an event;
- An Initial Damage Assessment (IDA) is performed by the local government, which evaluates damages to residences, businesses, and public infrastructure (i.e., roads, bridges, public utilities, etc.);
- IDAs determine if there is sufficient damage to warrant a Joint Preliminary Damage Assessment (PDA) which consists of local, state, and federal staff verifying the IDAs to determine if enough damage exists to warrant federal recovery assistance;



- A Major Disaster Declaration is requested from the Governor to FEMA Region III which evaluates the request and provides recommendations to the President based on the RNA and PDAs and the type of federal assistance requested;
- Depending on the nature of the disaster and the type of assistance being requested, a Presidential declaration could be approved within hours or may take weeks;
- A Presidential Declaration can also be approved prior to an event (i.e. hurricane or significant winter storm) if it anticipated that the damage will be severe in order to pre-position resources; and
- Federal funds for post disaster Hazard Mitigation Grant Program projects based on 15% of the Stafford Act disaster recovery assistance that is provided to the jurisdictions statewide.

### 3.3.2 FEDERALLY DECLARED DISASTERS IN WEST VIRGINIA

An important source for identifying hazards that can affect the State is the record of Federal disaster declarations. According to FEMA, since 1954 there have been 50 major disaster declarations, five emergency declarations, and two fire management assistance declarations, totaling 57 disaster/assistance/emergency declarations for West Virginia. Table 3-12 has been updated to include events since the 2010 plan and expanded to include the incident period of the declared event.

A brief summary of selected declared disasters is highlighted below:

- An emergency declaration for Hurricane Sandy on October 29, 2012, followed by a disaster declaration (DR 4093) on November 27, 2012, included 18 West Virginia counties. This unusual storm brought wind gusts of greater than 50 miles per hour (mph) to much of the eastern half of the State and heavy, wet snowfall to higher elevations. Some of the highest elevations in the eastern portions of the State recorded over 2 feet of snow. The combination of heavy snow and wind brought down trees and power lines, knocking out power to thousands across the State. At least six deaths in the State were attributed to this so-called superstorm.
- On June 29, 2012, storms developed over the Midwest during the late morning hours, strengthening and consolidating into a nearly solid line west of Chicago. The line grew in size, extending a couple of hundred miles long and was oriented from northeast to southwest. The line of storms raced southeastward through the Midwest and into the Ohio Valley during the afternoon at speeds of over 50 mph. The line held together, barreling through West Virginia during the early evening hours. The line produced widespread damage as wind gusts reached over 80 mph in some locations. Trees and



power lines were downed, leaving power and communication outages that impacted millions of people from Illinois to Virginia and that lasted in some cases over a week. The outages occurred during a particularly hot and humid period when daily high temperatures in the State ranged from the upper 90s into the lower 100s. The closure of gas stations and grocery stores led to significant inconvenience and in some instances shortages of fuel and food. Governor Earl Ray Tomblin declared a State of Emergency immediately after the event. (DR 4071)

- West Virginia experienced severe storms, flooding, tornadoes, landslides, and mudslides throughout February and March 2012 (DRs 4059 and 4061). Widespread flooding occurred in Marion, Preston, Taylor, Harrison, Wayne, Logan, Mingo, and Lincoln Counties. An outbreak of tornadoes occurred from the Tennessee and Ohio Valleys and through western portions of West Virginia on March 2, 2012. Eleven counties were declared disasters as a result of the February events and three for the March events.
- Numerous communities in southern West Virginia were hit by severe storms, flash flooding, mudslides and landslides starting on June 12, 2010, and continued for several days. Flooding came in two waves, with the first affecting areas from Dingess to Holden over to Neibert in the late afternoon. The second wave struck in the evening and severely impacted the Man area, where hundreds of structures were damaged. Some of the damage was due to the rapid rise of the Guyandotte River, which crested around 16feet<sup>14</sup>. Logan, McDowell, Mingo and Wyoming Counties were included in this disaster (DR 1918).
- A crippling winter storm that struck West Virginia December 18-20, 2009, produced a heavy, wet snowfall in the southern coal field counties and through the mountains. Totals of 1 to 2 feet were common in these areas. DR 1881 was declared for this event.
- Extensive damage resulted from flooding and landslides in central and southern parts of the State between May 3 and May 15, 2009. Particularly hard hit were Mingo, Wyoming, Raleigh, and McDowell Counties. More than 300 homes sustained major damage. Federal Disaster 1838 was declared.

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<sup>14</sup> WCHS ABC Eyewitness local news. [Widespread Flash Flooding Strikes Southern West Virginia Saturday](#). Bob Aaron. June, 12 &14, 2010.



**TABLE 3-9. FEDERALLY DECLARED MAJOR DISASTER DECLARATIONS (1954-2013)**

Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
21	1954	4-Aug	4-Aug	Flood	Unknown
67	1957	31-Jan	31-Jan	Flood	Unknown
117	1961	23-Jul	23-Jul	Floods	Unknown
125	1962	9-Mar	9-Mar	Severe Storms, High Tides, Flooding	Unknown
147	1963	13-Mar	13-Mar	Severe Storms, Flooding	Unknown
165	1964	20-Mar	20-Mar	Severe Storms, Flooding	Unknown
224	1967	13-Mar	13-Mar	Flooding	36
278	1969	3-Sep	3-Sep	Severe Storms, Flooding	3
279	1969	24-Sep	24-Sep	Severe Storms, Flooding	1
323	1972	27-Feb	27-Feb	Heavy Rains, Flooding	7
344	1972	3-Jul	3-Jul	Tropical Storm Agnes	15
349	1972	23-Aug	23-Aug	Heavy Rains, Flooding	4
416	1974	29-Jan	29-Jan	Severe Storms, Flooding	5
426	1974	11-Apr	11-Apr	Severe Storms, Flooding	4
481	1975	12-Sep	12-Sep	Heavy Rains, Flooding	2
531	1977	7-Apr	7-Apr	Severe Storms, Flooding	11
569	1978	14-Dec	14-Dec	Severe Storms, Flooding	5
628	1980	15-Aug to 22-Aug	15-Aug	Severe Storms, Flooding	14
706	1984	15-May	15-May	Severe Storms, Flooding	4
753	1985	3-Nov to 7-Nov	7-Nov	Severe Storms, Flooding	30
1060	1995	23-Jun to 28-Jun	12-Jul	Severe Storm, Heavy Rains, Flooding, Mudslides	3
1084	1996	6-Jan to 12-Jan	13-Jan	Blizzard	55
1096	1996	19-Jan to 2-Feb	25-Jan	Flooding	28
1115	1996	15-May to 10-Jun	23-May	Flooding	17
1132	1996	18-Jul to 31-Jul	14-Aug	Flooding	10
1137	1996	5-Sep to 8-Sep	11-Sep	Hurricane Fran	10
1168	1997	28-Feb to 15-Mar	7-Mar	Severe Storms/Flooding	16
1229	1998	26-Jun to 27-Jul	1-Jul	Severe Storms, Flooding and Tornadoes	21
1319	2000	18-Feb to 22-Feb	28-Feb	West Virginia Winter Storm	26
1378	2001	15-May to 4-Sep	3-Jun	Severe Storms & Flooding	24
1410	2002	2-May to 20-May	5-May	Severe Storms, Flooding, and Landslides	8
1455	2003	15-Feb to 28-Mar	14-Mar	Severe Winter Storms	50
1474	2003	11-Jun to 15-Jul	21-Jun	Severe Storms, Flooding and Landslides	14
1496	2003	18-Sep to 30-Sep	23-Sep	Hurricane Isabel	10
1500	2003	11-Nov to 30-Nov	21-Nov	Severe Storms, Flooding, and Landslides	34
1522	2004	27-May to 28-Jun	7-Jun	Severe Storms, Flooding, and Landslides	24
1536	2004	22-Jul to 1-Sep	6-Aug	Severe Storms, Flooding, and Landslides	4
1558	2004	16-Sep to 27-Sep	20-Sep	Severe Storms, Flooding, and Landslides	20
1574	2005	4-Jan to 25-Jan	1-Feb	Severe Storms, Flooding, and Landslides	6





Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
1696	2007	14-Apr to 18-Apr	1-May	Severe Storms, Flooding, Landslides, and Mudslides	18
1769	2008	3-Jun to 7-Jun	19-Jun	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	12
1838	2009	3-May to 8-Jun	15-May	Severe Storms, Flooding, Mudslides, and Landslides	11
1881	2010	18-Dec to 20-Dec	2-Mar	Severe Winter Storm and Snowstorm	15
1893	2010	12-Mar to 9-Apr	29-Mar	Severe Storms, Flooding, Mudslides, and Landslides	6
1903	2010	5-Feb to 11-Feb	23-Apr	Severe Winter Storms and Snowstorms	17
1918	2010	12-Jun to 29-Jun	24-Jun	Severe Storms, Flooding, Mudslides, and Landslides	4
4059	2012	2-Feb to 5-Mar	16-Mar	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	11
4061	2012	15-Mar to 31-Mar	22-Mar	Severe Storms, Flooding, Mudslides, and Landslides	3
4071	2012	29-Jun to 8-Jul	23-Jul	Severe Storms and Straight-line Winds	47
4093	2012	29-Oct to 8-Nov	27-Nov	Hurricane Sandy (Winter Impacts)	18
4132	2013	13-Jun to 13-Jun	26-Jul	Severe Storms and Flooding	2

**3-10. FEDERALLY DECLARED EMERGENCY DECLARATIONS (1954-2013)**

Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
3021	1977		19-Jan	Drought	55
3052	1977		24-Aug	Severe Storms, Landslides, and Flooding	55
3051	1977		24-Aug	Drought	55
3109	1993	13-Mar to 17-Mar	17-Mar	Severe Snowfall and Winter Storm	55
3221	2005	29-Aug to 1-Oct	5-Sep	Hurricane Katrina Evacuation	55
3345	2012	2-Jun to 10-Jul	30-Jun	Severe Storms	55
3358	2012	29-Oct to 8-Nov	29-Oct	Superstorm Sandy	55

**3-11. FEDERALLY DECLARED FIRE MANAGEMENT ASSISTANCE DECLARATIONS (1954-2013)**

Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
2392	2001	16-Nov to 30-Nov	16-Nov	Trough and Smoke Hole Fire Complexes	12
2391	2001	16-Nov to 30-Nov	16-Nov	Southwest Complex Fire	55

- The rain began in Mingo and Logan Counties around midnight May 31, 2004, and continued for several days. Wilkinson, Monaville, and other communities along Island Creek south of Logan, as well as Belo along Pigeon Creek, were hit hard on May 31. The storm stalled over the head of Pigeon Creek late on



June 4, resulting in damage in Pie, Musick Bottom and Varney. A storm on June 13 resulted in more damage in North Matewan, and sent rocks streaming out of Warm Hollow above Matewan. Other Mingo and Logan communities were hit hard during the storms as well. Mt. Gay, Holden, Riffe Branch, Duncan Fork, Parsley Bottom, Ragland, Delbarton, Elk Creek, and Chatartroy all sustained serious damage. (DR 1522)

- During November 11-30, 2003, severe storms, flooding, and landslides took place in southern West Virginia. Rains of 1.75 to 2.5 inches fell in about a 12-hour period, causing many small streams to flood and close roads during the morning hours. In Logan County, rains of 2.5 to 4.75 inches fell November 11-12. Repetitive showers formed, as dew points of 60° to 65° fed the system from Kentucky. The heaviest rain rates came toward the end of this prolonged period, with rates peaking around an inch per hour. South of the showers, across Logan and Mingo Counties, the heavy rain was more sudden, the result of the last shot of enhanced rain during the late afternoon. The heaviest rain totals ran west to east, from Wayne County and southern Cabell County, through northern Lincoln County, central Kanawha County, southern Clay County, and into central Nicholas County. Branchland's rain total was 4.7 inches, Hamlin measured 4.4 inches, and Mount Nebo measured 3.8 inches. The 3.66 inches at Charleston was the fifth heaviest 24-hour total on record for any month of the year. In Kanawha County, 44 homes were destroyed, 150 had major damage, and 88 homes had minor damage. Several private bridges were also destroyed. This event initiated a Federal disaster. Rains continued to fall during the month of November, resulting in more damage. The Kanawha River crested in Charleston at its 30-foot flood stage on the 20<sup>th</sup>; the first time since 1955 that flood stage had been reached in Charleston. Twenty-seven counties were declared eligible for Individual Assistance and 33 for Public Assistance during the November storms. (DR 1500)
- Thunderstorm cells developed and intensified on the north side of a large complex of showers on June 11, 2003. Rains of 2.5 to 3.5 inches fell in a narrow corridor from the Fort Hill section of Charleston on the northeast toward Big Chimney, Pinch, and Elkview. Severe flash flooding occurred. Flooding was seen along such waterways as Magazine Branch, Sugar Creek, Woodward Branch, Mink Shoal Run, Coopers Creek, Indian Creek, Pinch Creek, and Blue Creek. This flood was the initial event, that when combined with additional flash flooding in June, prompted a Federal Disaster Declaration. Severe storms, flooding and landslides took place in southern West Virginia during June 11-15, 2003. Fifteen counties were declared



eligible for Individual Assistance and 16 for Public Assistance during the June storms. (DR 1474)

- During November of 2002, there was a State Disaster declaration for tornado damages in Jackson County. For recovery after this event, the State provided over \$200,000 in individual assistance, and approximately \$30,000 in Small Business Administration (SBA) loans was arranged (SBA, 2003).
- On May 2, 2002 devastating flood waters once again passed through portions of southern West Virginia, and surrounding areas. Four counties were designated for Individual Assistance (McDowell, Mercer, Mingo, and Wyoming) and five for Public Assistance (McDowell, Mercer, Mingo, Logan and Wyoming). (DR 1410)
- A series of floods and mudslides during the spring and summer of 2001 resulted in property losses in 24 counties. The disaster-designated counties include Boone, Cabell, Calhoun, Clay, Doddridge, Fayette, Greenbrier, Kanawha, Lincoln, Logan, Marion, Mason, McDowell, Mercer, Mingo, Nicholas, Preston, Putnam, Raleigh, Roane, Summers, Taylor, Wayne, and Wyoming (DR 1378).
- In September 1996, Hurricane/Tropical Storm Fran moved across eastern West Virginia. This resulted in a disaster declaration (DR 1137) for 10 of the State's counties. The effects were heavy, with 6 to 15 inches of rainfall in a brief period along the eastern portion of the State and from 1 to 2 inches of rainfall in the interior. Localized flash flooding was also common because of the storm. West Virginia property damages were estimated at \$40 million. Two deaths were attributed to this storm. A man in Grant County drove a tractor into flood waters and was swept away, as was a young man in an automobile in Pendleton County.
- The April 4-5, 1977, flood in southern West Virginia was the result of a tropical maritime air mass that produced widespread rainfall and intense convective thunderstorms. At the time, it was the most destructive flood in the State's history. Rainfall estimates for the 4-day storm exceeded 15 inches along the West Virginia- Virginia border. The area affected included the Tug Fork and Guyandotte River; communities along the Tug Fork from Welch to Fort Gay were inundated by 20 to 25 feet of water. The small communities of Matewan, Thacker, and Lobata were completely inundated.<sup>15</sup> (DR 3052)

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<sup>15</sup> USGS Water-Supply Paper 2375. National Water Summary 1988-89—Floods and Droughts: West Virginia Floods and Droughts. <http://md.water.usgs.gov/publications/wsp-2375/wv/index.html>



### 3.3.3 FEDERAL DISASTER DATA COMPILATION

Federally declared disaster data from the 2007 and 2010 hazard mitigation plans was used to initiate the disaster record update for 2013. Once the data from the new sources was compiled and all available missing data was added, the data was ready to be processed into HIRA hazard categories. Descriptions of the disasters can vary quite dramatically and as a result, they needed to be grouped into broad hazard-type categories for comparison. Table 3-12 shows how the declared disaster categories were grouped into the HIRA hazard categories.

It should also be noted that since many of these disaster declarations include multiple hazards and cover large areas, it is possible that a municipality has received funding for a hazard that did not occur in that particular municipality. For example, an event that included severe storms, flooding, and tornadoes may have only produced a tornado in one county, while disaster assistance was provided to multiple counties. Without examining disaster data for each specific local government, there is no simple method to separate these events. To visualize the number of different disaster types that have impacted West Virginia, the maps showing individual federally declared disasters may have been double counted (or more) when different hazards occurred during a single event.

For example, the storm in July 1998 (DR 1229WV) was classified by FEMA as Severe Storms, Flooding, and Tornadoes. To depict these as separate events, each designated county was given a score of one for each of the event types for this specific declared disaster. Each declared disaster is represented from the assigned FEMA categories. A result of this may be that some types of categories are not fully represented. The total number of declared disasters (Figure 3-13) does not double-count disaster declaration. The sum of total number of individual hazard events per county exceeds the total number of declared disasters for West Virginia for the reasons discussed above.



TABLE 3-12. FEMA DISASTER DECLARATIONS ALIGNMENT WITH HIRA HAZARD CATEGORIES

HIRA Categories	Federal Disaster Categories Included
Flood	Flood
	Heavy Rains, Flooding
	Hurricane
	Severe Storm, Heavy Rains, Flooding, Mudslides
	Severe Storms & Flooding
	Severe Storms, Flooding and Landslides
	Severe Storms, Flooding and Tornadoes
	Severe Storms, Flooding, Mudslides, and Landslides
	Severe Storms, High Tides, Flooding
	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides
High Wind	Severe Storms/Flooding
	Hurricane
	Severe Storm, Heavy Rains, Flooding, Mudslides
	Severe Storms & Flooding
	Severe Storms, Flooding and Landslides
	Severe Storms, Flooding and Tornadoes
	Severe Storms, Flooding, Mudslides, and Landslides
	Severe Storms, High Tides, Flooding
	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides
Severe Storms/Flooding	
Landslides	Tropical Storm
	Severe Storm, Heavy Rains, Flooding, Mudslides
	Severe Storms, Flooding and Landslides
	Severe Storms, Flooding, Mudslides, and Landslides
Tornado	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides
	Severe Storms, Flooding and Tornadoes
Winter Storm	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides
	Blizzard
	Severe Winter Storms
	Severe Winter Storms and Snowstorms
	Winter Storm

The following counties have experienced 15 or more declared disasters from 1969 through July 2013:

- |  |                            |
|--|----------------------------|
| 1. Mingo County (26)                         | 9. Nicholas County (17)    |
| 2. Lincoln County (22)                       | 10. Boone County (16)      |
| 3. Logan County (21)                         | 11. Greenbrier County (16) |
| 4. Raleigh County (21)                       | 12. Mercer County (16)     |
| 5. Wyoming County (21)                       | 13. Clay County (15)       |
| 6. Kanawha County (20)                       | 14. Gilmer (15)            |
| 7. Wayne County (19)                         | 15. Pocahontas County (15) |
| 8. Cabell County (18)McDowell<br>County (18) | 16. Wetzel County (15)     |

Figure 3-13 shows the number of declared disasters, by county, for the specific HIRA hazard categories. Flood, High Wind, Landslide, Winter Weather, and Tornadoes represent the majority of Federally Declared Disasters in West Virginia. It should be noted that while the hazards on Figure 3-14 are shown together, they are on slightly different scales and should be evaluated as such. For additional hazards that have been considered in this plan, but have not been ranked, see the hazard-specific sections for more information.

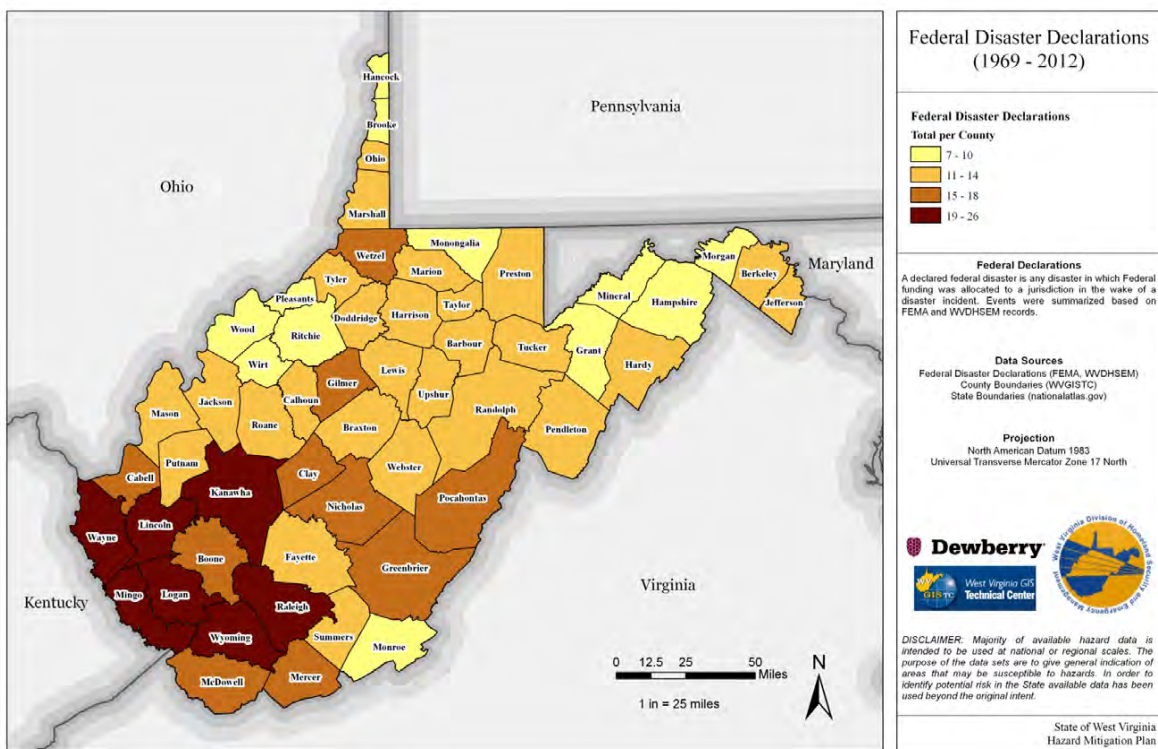


FIGURE 3-13. TOTAL FEDERAL DISASTER DECLARATIONS BY COUNTY (1969 –2012)

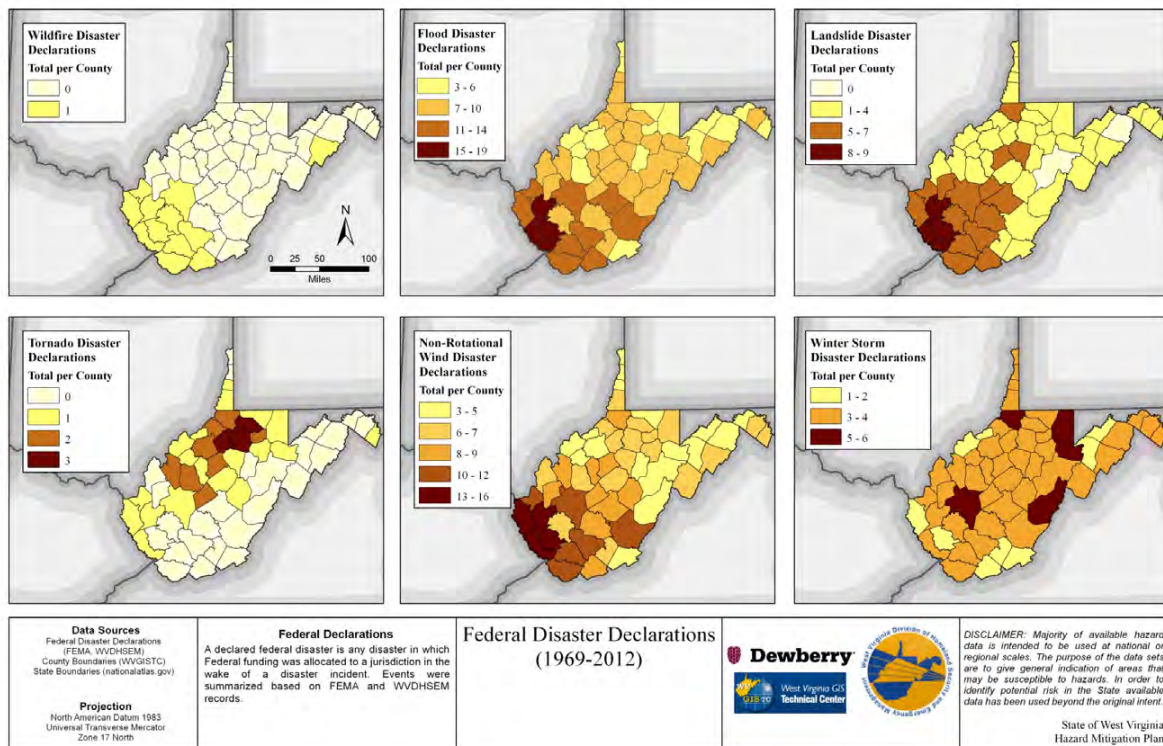


FIGURE 3-14. HAZARD SPECIFIC FEDERAL DISASTER DECLARATIONS BY COUNTY.

### 3.3.4 NATIONAL CLIMATIC DATA CENTER (NCDC)

NCDC *Storm Data* is published by the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, and was used for this update. The storm events database contains information on storms and weather phenomena that have caused loss of life, injuries, significant property damage, and/or disruption to commerce. Efforts are made to collect the best available information, but because of time and resource constraints, information may be unverified by the National Weather Service (NWS). The NWS does not guarantee the accuracy or validity of the information. Although the historical records in the database often vary widely in their level of detail, the NWS does have a set of guidelines for use in the preparation of event descriptions that were followed in preparation of this hazard analysis.<sup>16</sup>

<sup>16</sup> National Weather Service Instruction 10-1605. Operations and Services Performance: Storm Data Preparation Guide. August 17, 2007. Available at: <http://www.nws.noaa.gov/directives/sym/pd01016005curr.pdf>



NOAA's NCDC database provides information about events from 1951 to September 2012. Records for most weather events were reported starting in 1993, with the exception of tornado (reports date to 1950), thunderstorm winds (reports date to 1955), and hail (reports date to 1955). Figure 3-15 shows a graphical breakdown of the number of events reported in the database by year and Figure 3-16 shows a breakdown of the events by month.

For the purposes of this HIRA, the county in which the event occurred was of primary interest, and the NCDC has provided this data in two methods:

1. County Name – Event listed as individual record for each county in which it occurred
2. Zone – Event listed by the zone or multiple zones, which contain multiple counties.

Some individual rows in NCDC data could include every county and city in West Virginia

NCDC is known to have spotty recording of geological hazards (i.e., earthquake, landslide, karst). In the absence of better data it was decided to proceed with the records available in NCDC for these events. In all cases NCDC records for these events are significant under-representations of what has happened in West Virginia's past. Efforts were made to contact the correct State representative for each hazard to see if better data sources of historical accounts were available. To date, comprehensive digital databases do not exist for these hazards.



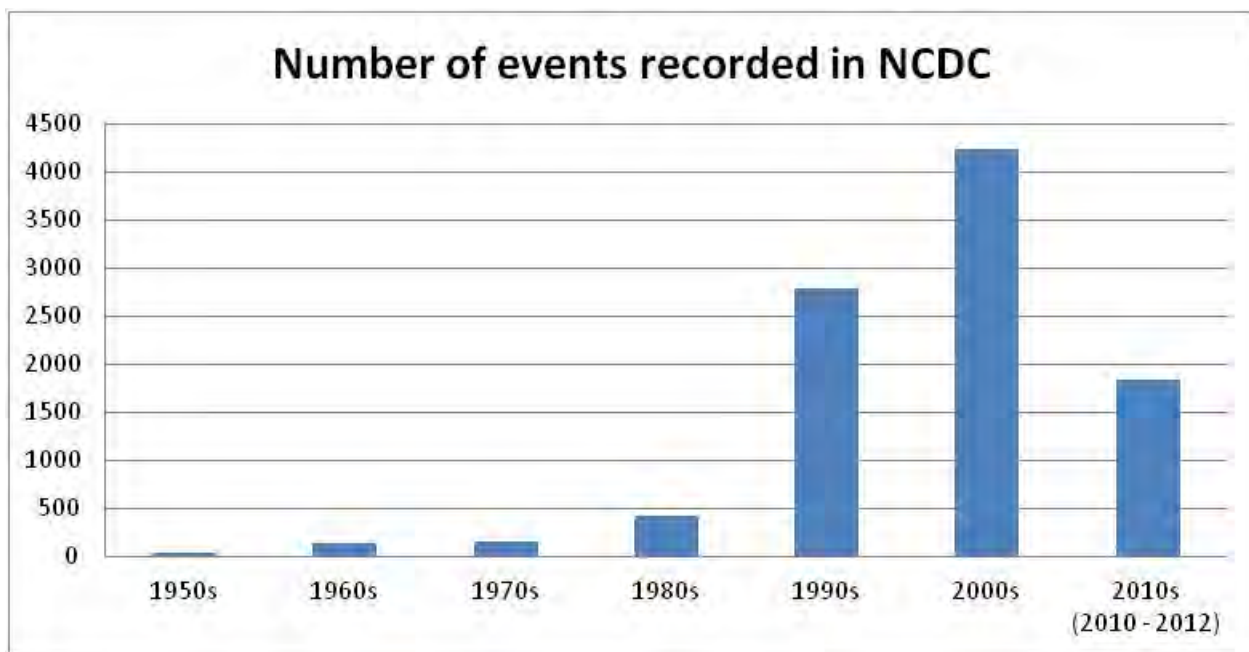


FIGURE 3-15. ANNUAL DISTRIBUTION OF HAZARD EVENTS (1950 – 2012)

\*NOTE: DATA COLLECTION FOR THE MAJORITY OF HAZARDS BEGAN IN 1993; EXCEPTIONS INCLUDE TORNADOES, HAIL AND THUNDERSTORM WINDS WHICH HAVE DATA RECORDS DATING BACK TO THE 1950S.

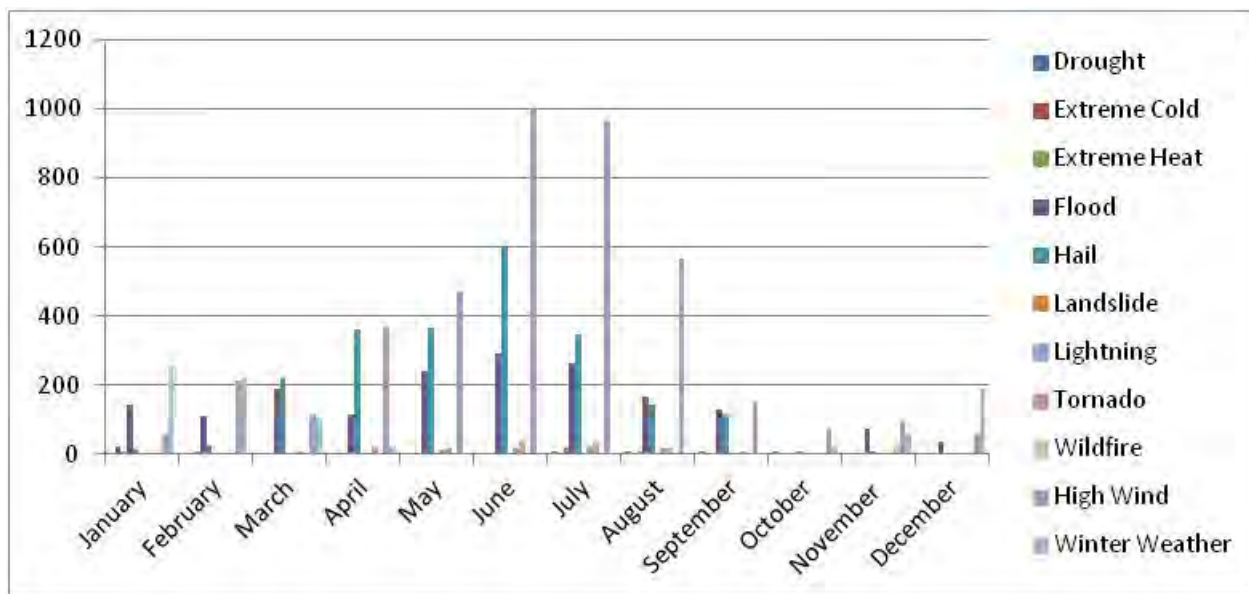


FIGURE 3-16. NCDC EVENTS BY MONTH (1950 – 2012)



**NCDC NORMALIZING DATA**

To accurately count the number of events occurring in a single county, the zonal data records were expanded into a set of individual city/county records, based on NCDC zone definitions. For example, if there were three political jurisdictions in a given zone, a record in the database for a winter storm covering that zone were replaced with three records for that storm, corresponding to each of the political jurisdictions. During this process, the damages, deaths, and injuries associated with a storm event in a certain zone were divided evenly among the political jurisdictions in that zone. Injuries and fatalities, once normalized, were combined into a single number. The amount of effort to properly assign the zonal events with damages, deaths and injuries was beyond the scope of this project.

Table 3-13 shows the normalized sum of all the counties, by hazard, for the NCDC fields of interest. In this table, the damages, injuries, and deaths caused by each hazard type have not been annualized to account for their varying periods of record. Each event in this table represents a storm event affecting a single county. This database includes 9,380 unique events, more than \$1.45 billion in property damage, \$36 million in crop damage, 366 injuries, and 92 fatalities. Since 2010, over 1,970 additional events have been documented in the NCDC database for the hazards included in this plan. Hazard specific analysis has been updated to reflect the events that have taken place since 2010.

TABLE 3-13. TOTAL OF COUNTY ANALYSIS OF NCDC RESULTS.

Hazard Type	Period of Record	Total Events	Total Property Damage*	Crop Damage*	Injuries	Deaths
Drought	1995-2012	45	\$0	\$27,872,148	0	0
Extreme Cold	1993-2012	40	\$7,900,129	\$29,266	5	4
Extreme Heat	1993-2012	54	\$0	\$0	3	1
Flooding	1993-2012	1,757	\$1,033,213,689	\$3,522,533	13	54
Hail	1955- 2012	2,212	\$34,169,000	\$180,495	3	0
High Wind	1955- 2012	4,135	\$105,529,546	\$1,179,178	165	13
Landslide	2007-2012	3	\$142,554	\$0	0	0
Lightning	1993-2012	82	\$4,815,552	\$0	49	6
Tornado	1950-2012	148	\$128,658,072	\$3,242,947	114	3
Wildfire	1995-2012	28	\$30,678	\$0	0	1
Winter Weather	1993-2012	876	\$137,704,356	\$14,085	14	10
<b>Total</b>		<b>9,380</b>	<b>\$1,452,163,576</b>	<b>\$36,040,652</b>	<b>366</b>	<b>92</b>

\*Damages are expressed in 2012 dollars



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## NCDC INFLATION COMPUTATION (“NORMALIZING”)

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Damages entered into the NCDC Storm Events database portray how much damage occurred in the year of the event. Due to inflation and the changing value of money, the values of damages incurred have been adjusted to 2012 dollars. This was accomplished using the U.S. Bureau of Labor Statistics annual Index of Consumer Prices. Each value was multiplied by the index for that year and subsequently divided by the index value in 2012, the target year. The year 2012 was chosen because it was the most recent full year available in the index values list.

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## NCDC ANNUALIZING DATA

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After the data was normalized, inflation accounted for, and summary statistics calculated, the data was annualized so that results were comparable using a common system (i.e., ranking the hazards). The parameter or value of interest was divided by the length of record for each hazard. The annualized value should only be used to estimate what can be expected annually. Property and crop damage and events were annualized per county using this method and are available in each hazard section and in Section 3.19 Composite Results.

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## NCDC EVENTS AND DATA COMPILATION

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The NCDC Storm Events database uses very detailed event categories. The reported storm events were grouped into the major hazard types addressed by this plan.

Table 3-14 shows the NCDC categories as reported in the database and the hazard categories used for the HIRA. Section 3.5 on ranking methodologies also explains how the NCDC data was used in ranking the hazards against each other. Several events did not have a county name or location associated with the record. As a result, these events were omitted from the analysis.

Figure 3-17 shows the number of NCDC hazard events, by county. High wind events make up more than 32% of the events for the jurisdictions listed below, followed by winter storm (23%), hail (15%), and flooding (15%). More than 57% of the deaths recorded in NCDC have been attributed to flooding. The following jurisdictions have 300 or more NCDC recorded events for drought, extreme cold, extreme heat, flood, hail, high wind, landslide, lightning, tornado, wildfire, and winter storm.

- |                      |                     |
|----------------------|---------------------|
| 1. Kanawha County    | 8. Hampshire County |
| 2. Berkeley County   | 9. Wood County      |
| 3. Preston County    | 10. Harrison County |
| 4. Grant County      | 11. Randolph County |
| 5. Jefferson County  | 12. Cabell County   |
| 6. Greenbrier County | 13. Mineral County  |
| 7. Raleigh County    | 14. Wayne County    |



15. Pendleton County

TABLE 3-14. ASSIGNMENT OF NCDC EVENT CATEGORIES TO HAZARD CATEGORIES ADDRESSED IN THE HIRA

HIRA Categories	NCDC Categories Included	
Drought	DROUGHT	
Extreme Cold	EXTREME COLD	EXTREME WINDCHILL
	EXTREME COLD/WIND CHILL	
Extreme Heat	EXCESSIVE HEAT	HEAT
	EXTREME HEAT	
Flooding	FLASH FLOOD	FLOOD/FLASHFLOOD
	FLOOD	FLOODING
	FLOOD/FLASH	RIVER FLOOD
	FLOOD/FLASH FLOOD	RIVER FLOODING
Hail	HAIL	
High Wind	GUSTY WINDS	THUNDERSTORM WINDS
	HIGH WIND	THUNDERSTROM WIND
	HIGH WINDS	TSTM WIND
	STRONG WIND	WIND
	THUNDERSTORM WIND	WINDS
Landslide	LANDSLIDE	
Lightning	LIGHTNING	THUNDERSTORM
Tornado	FUNNEL CLOUD	WATERSPOUT
	TORNADO	
Wildfire	BRUSH FIRES	WILD/FORREST FIRE
Winter Weather	BLIZZARD	SNOW AND COLD
	FREEZING RAIN	SNOW AND ICE
	HEAVY SNOW	SNOW/COLD
	ICE	SNOWFALL RECORD
	ICE STORM	WINTER MIX
	PROLONG COLD/SNOW	WINTER STORM
	RECORD SNOWFALL	WINTER WEATHER
	SNOW	WINTER WEATHER/MIX

Figure 3-18 and Figure 3-19 show the number of NCDC-recorded events, by jurisdiction, for the individual hazard HIRA categories. To be consistent with the NCDC data, only the dominant hazard type is shown, as explained in the previous sections and in

Table 3-14. Most of the events are not associated with a Federal Emergency or Disaster. If the event did occur at the same time as an event that was later determined to be a Federal Emergency or Disaster, it is included with the NCDC data even if it occurred in a county not included with the Federal declaration.

High wind, hail, flood and winter weather represent the majority of the documented weather related events in West Virginia. Land subsidence (karst), earthquake, and dam inundation are hazards that have been considered but at this time, NCDC-designated events do not include them.

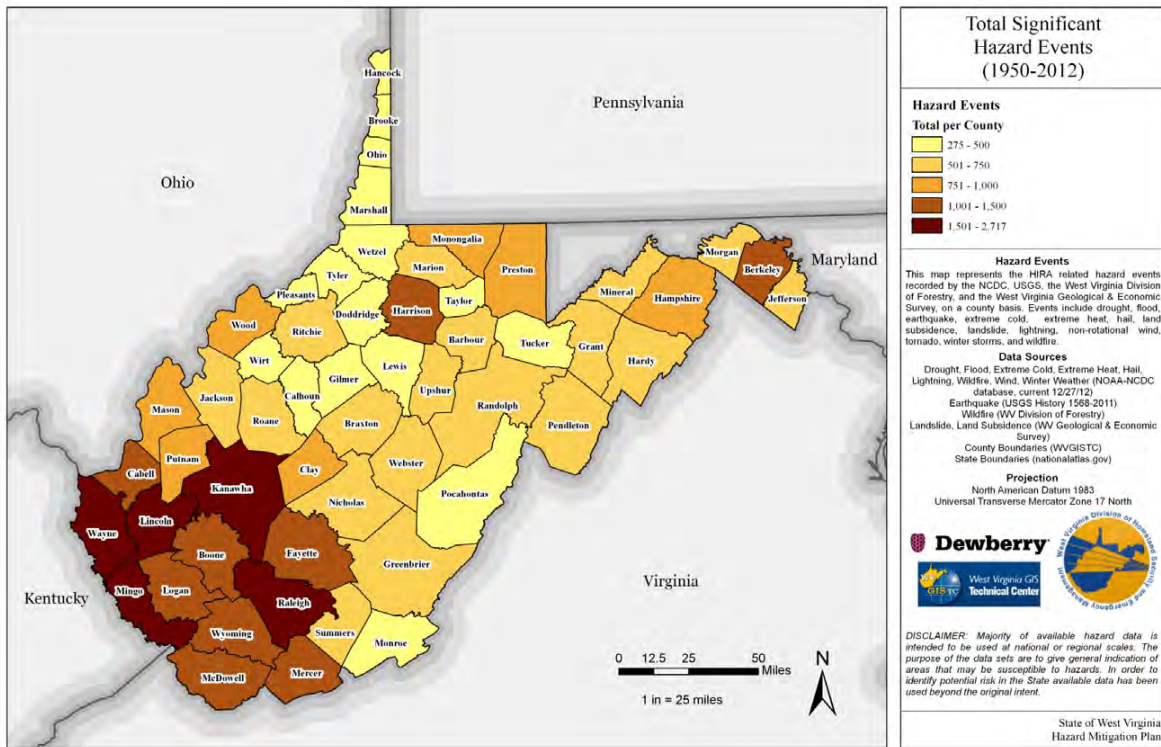


FIGURE 3-17. TOTAL NCDC STORM EVENTS PER COUNTY FOR 1950 THROUGH 2012. INCLUDES ZONAL EVENTS.

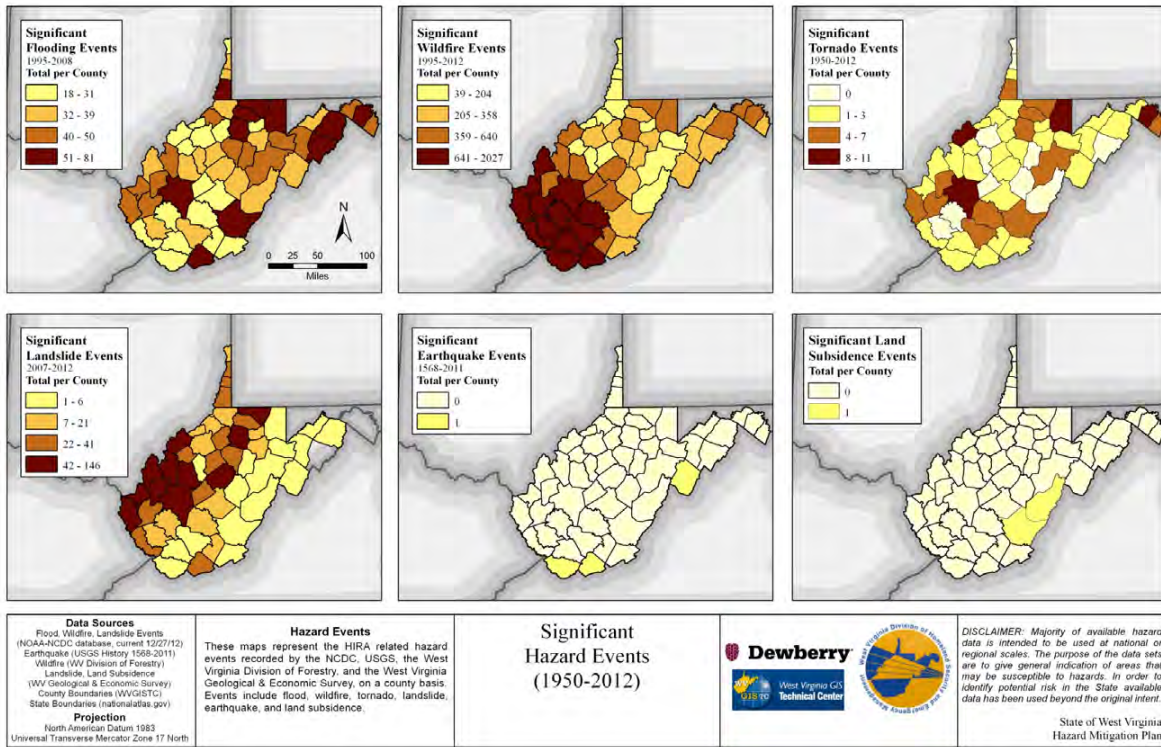


FIGURE 3-18. TOTAL NCDC STORM EVENTS BY HAZARD FOR 1950 THROUGH 2012. INCLUDES ZONAL EVENTS.

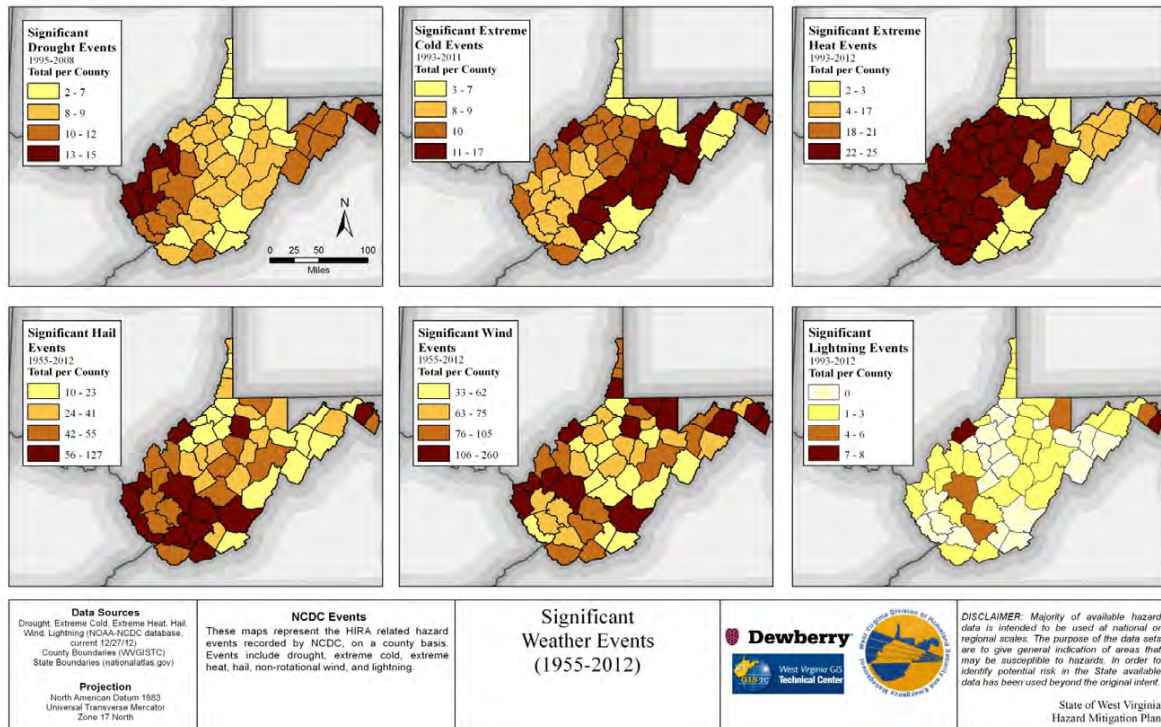


FIGURE 3-19. TOTAL NCDC STORM EVENTS BY HAZARD FOR 1950 THROUGH 2012. INCLUDES ZONAL EVENTS.



### 3.3.5 HAZARDS ADDRESSED IN RISK ASSESSMENT

Based on review of the Federally Declared Disasters, NCDC data, previous versions of this plan, and local plan rankings, the following hazards will be discussed and analyzed in this report.

1. Flooding (Section 3.7)
2. High Wind / Severe Storm (Section 3.8)
3. Thunderstorms
4. Hurricane related wind events
5. Tornado
6. Winter Weather (Section 3.9)
7. Drought and Extreme Heat (Section 3.10)
8. Wildfire (Section 3.11)
9. Landslide (Section 3.12)
10. Earthquake (Section 3.13)
11. Land Subsidence (Karst) (Section 3.14)
12. Natural Resource Extraction (Section 3.15)
13. Dam and Levee Failure (Section 3.16)
14. HazMat (Section 3.17)
15. Nuclear Accidents (Section 3.18)

It should be noted that the above hazards are not a complete listing of hazards that may impact West Virginia. The steering committee agreed that this listing accurately represents those hazards that impact West Virginia most frequently and have the potential to cause fatalities, injuries, property and infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.

Section 3.6 summarizes the hazards that have been included in the local plan risk assessments and provides a comparison with the 2013 West Virginia hazard ranking.

At the kick-off meeting for the 2013 plan update, the decision was made to curtail hazards analyzed to natural hazards along with dams, levees and mining as the latter human activities that can impact natural resources and thus vulnerabilities result. The THIRA focuses on human caused activities, scenarios, and target capabilities for West Virginia.



## 3.4 STATE AND CRITICAL FACILITY ANALYSIS

The analysis of State facility and critical facility vulnerability was completed using two major sources of facility data: (1) West Virginia State Owned and Insured Structures provided by the West Virginia Board of Risk (BOR) and (2) The critical facility database built from datasets provided from various State and national sources. Many of the buildings in the West Virginia State-owned structures dataset are critical to disaster preparedness and response, although not all State-critical facilities are in the BOR database. For example, many privately owned buildings and structures (hospitals, power plants, certain industrial facilities, etc.) are critical to societal function, especially during emergencies and disasters. Thus, critical facilities data collection extended to a broader array of critical facilities than would be available through the BOR. However, assembly of a robust critical facilities database will be an ongoing effort.

### 3.4.1 BOARD OF RISK DATABASE

The most comprehensive source of State facility information is found in the West Virginia BOR database maintained by the West Virginia Board of Risk and Insurance Management (BRIM). This database stores facilities information for 152 West Virginia State agencies, representing 12,736 records. The majority attributes in this database are provided by the submitting agency and have not been verified by BRIM. Building stock is valued at \$12 trillion, with contents valued at \$2.2 trillion (which is likely low). More than 77% of the records are for buildings, accounting for more than 94% of the total known building and contents value in the State.

1. Kanawha County has 1,389 State facility records, 1,097 of which are buildings accounting for \$1,856,127,502 in building value and \$403,495,396 in contents value. The State capitol is located in Kanawha County.
2. The West Virginia State Department of Natural Resources (Parks) represents 1,524 of the records, accounting for \$288,414,958 in property and \$34,063,804 in contents.
3. West Virginia Department of Highways (WVDOH) represents 1,332 of the records, accounting for \$236,127,814 in property and \$54,024,026 in contents.
4. West Virginia University represents the largest number of buildings and contents for the State agencies. The university has 486 records, totaling \$1,156,367,047 in building values and \$389,355,054 in content value.

The BOR database that was provided is maintained as a non-spatial dataset; the majority of the facilities in the dataset were geocoded for this plan update and provided to BRIM for their records. The database does contain some attributes about each building or structure, such as basic structural information, construction type, building value, square footage, year built, and sprinkler systems (Table 3-15). Several of the





database attributes are not used by BRIM for rating purposes, but include information normally requested by private insurers.

The database does not contain any indication if the record is critical. This type of information would help to narrow down the number of records to be considered for analysis. Table 3-16 highlights the 13 building types attributed in the data, number of facilities, and building and contents value. It should be noted that one facility, Horace Mann Middle, is recorded as a dam type in state facilities dataset and not a complete listing of dams in the state; this record is for the state-owned structure at this location. Of the 12,736 State facilities, 12,691 were geo-coded based on the address information provided in the database. However, a complete accuracy assessment of geo-coded locations was not conducted because it was beyond the scope of this study. Figure 3-20 shows the distribution of State facilities within West Virginia. Facility risk and vulnerability is described in the hazard-specific sections that follow.

West Virginia is a self-insured State. BRIM is the insurance provider for all State property. In addition to State property, other governmental agencies (e.g., Boards of Education (BOEs), Public Service Districts, and Cities) as well as some nonprofit organizations are also insured. In order to insure these properties, BRIM purchases a property policy (presently the insurer is National Union Fire); this policy has a \$1,000,000 deductible. BRIM uses charge rates to various types of business (State, BOE, Towns) based on rates established by actuaries. A third-party administrator is contracted to handle all claims; agencies are charged a \$2,500 deductible. If there is a claim that exceeds \$1,000,000, BRIM submits a claim to the property insurer. The deductibles are per-occurrence deductibles; an occurrence can be an event that lasts for longer than a certain period. An example includes the 2009 ice storms. This event occurred over a period of time, but BRIM handled all claims resulting in damage as one occurrence<sup>17</sup>.

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<sup>17</sup> Correspondence with West Virginia BRIM. 5/25/2010 and 8/3/2010



TABLE 3-15. STATE FACILITY DATABASE ATTRIBUTES.

CODE	DESCRIPTION
Cust_type	Code used by BRIM to distinguish State owned (RM) to other insured (SB)
Account	Number used by BRIM to distinguish agencies by account number
Account Name	Name of agency insured through BRIM
Div_num	Code used by BRIM to distinguish structures by agency and location
Loc_num	Code used by BRIM to distinguish structures by agency and location and within agency
Comm_num	Code assigned by BRIM to distinguish location of structure within assigned community number
Loc_type	Coded used by BRIM to determine if building is owned, leased, or owned and uninsured
Structure_name	Name of structure as listed by insured agency
Structure_city	City location of structure
Structure_street	Physical address or street location as listed by insured agency
Structure_zip	Zip code at physical location of structure
Structure_county	County location of physical structure
Structure_in_incorporated	Declaration if structure is located in incorporated area
Type_building	Code used to determine type of structure as indicated by insured. Some examples of structures that are categorized in the "All Other Types" include bleachers, scoreboards, and artificial turf fields. These are mainly from school board properties that are insured.
Sprinkler	Code to determine if structure is sprinklered, partially sprinklered, not sprinklered, or unknown
Year_constructed	Year of construction as determined by insured
Protection_class	National fire protection classes as established by Insurance Services Office (ISO) and determined by insured agency
Const_type	Type of construction ranging from fire resistive to frame; includes unknown and bridge class
Struct_use	The use of the structure as determined by insured agency. There are 25 codes to establish use of a particular structure. These can range from "Office Occupancy" to "Prison or Jail" to "Vacant or Unoccupied." This information is provided by the submitting agency.
Basement	Does structure include basement, as determined by insured agency
Structure_levels	Number of levels (floors) of the structure, including basement, as determined by insured agency
Structure_area	Total square feet of insured structure (if leased, actual square footage of lease agreement)
Alarms	Alarm type as determined by insured agency
Flood_Zone	Flood zone location as determined by insured agency. This is based on location based on the FEMA FIRMs. This is not used by BRIM for rating.
Underground_mine	Location of structure in relation to mine subsidence
Fire_mfl	Maximum Foreseeable Loss - the percentage of structure loss with complete failure of fire prevention measures. In other words, this is the percentage of loss in a worst circumstance with the nonfunctioning of fire prevention equipment. In most cases 100% is recorded, representing the worst-case scenario.
Fire_pml	Probable Maximum Loss - the percentage of structure loss with fire prevention methods fully functioning. This assumes all firefighting equipment is functioning properly. In most cases 100% is recorded, representing the worst-case scenario.
Amount_bldg	Amount of insurance carried on building
Amount_contents	Amount of insurance carried on contents
Amount_time_elements	Amount of time element (business interruption) coverage carried on building (not required, included in policy)

TABLE 3-16. BOARD OF RISK DATABASE BUILDING TYPES AND BUILDING AND CONTENTS VALUE.

Type of Building	Number of Buildings	Total Building Value	Total Contents Value
Building	9,890	\$11,309,047,288	\$2,134,902,845
Highway Bridge	118	\$373,952,320	\$0
All other types	1,027	\$162,103,213	\$37,464,044
Observation Tower	25	\$39,748,246	\$1,340,804
Shelter-Shed-Rack	872	\$39,664,662	\$11,972,705
Communications Tower	213	\$29,554,639	\$45,566,275
Above ground Tank	293	\$27,060,956	\$1,556,770
Lightning Towers	92	\$16,388,742	\$182,910
Unknown	41	\$12,604,652	\$1,349,939
Dam (Horace Man Middle)	1	\$6,088,220	\$953,188
Mobile Home	80	\$2,745,762	\$1,169,485
Wall or Fence	74	\$1,894,329	\$2,000
Farm Silo	10	\$403,083	\$80,000
<b>Total</b>	<b>12,736</b>	<b>\$12,021,256,112</b>	<b>\$2,236,540,965</b>

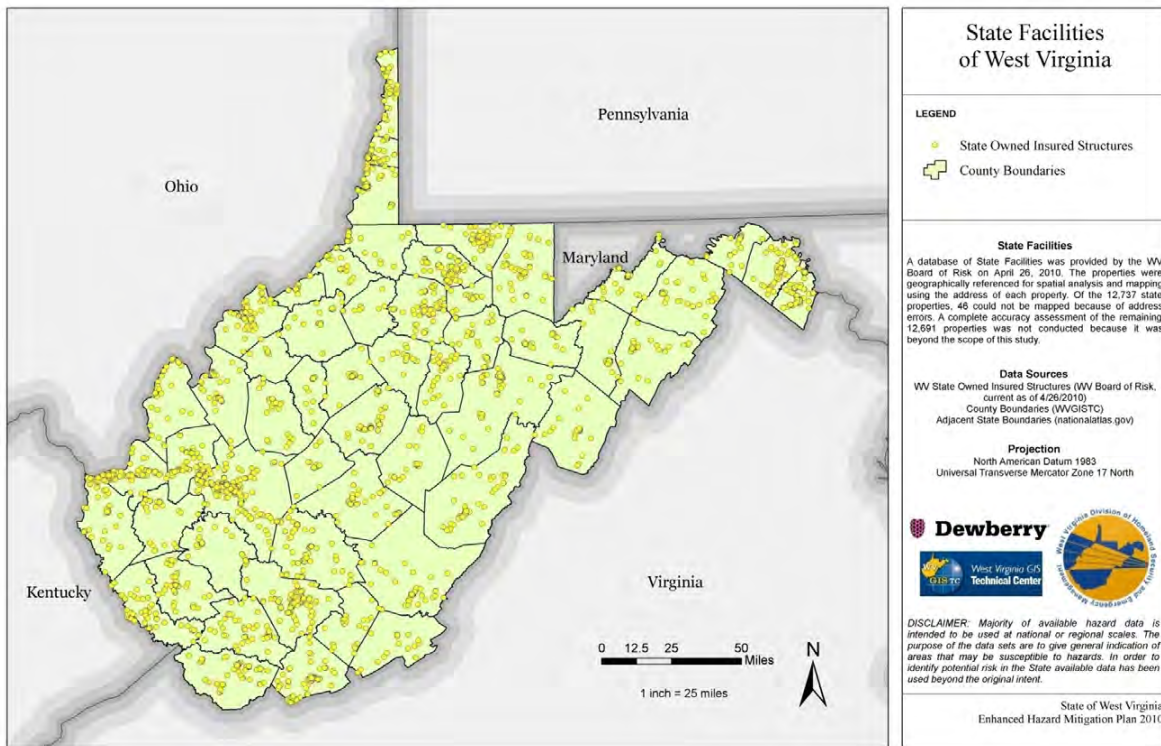


FIGURE 3-20. WEST VIRGINIA BOARD OF RISK STATE FACILITIES – NOTE CONCENTRATION NEAR MORGANTOWN (WVU) AND CHARLESTON (STATE CAPITOL)



### 3.4.2 CRITICAL FACILITIES

There is currently no single, standardized critical facility dataset for West Virginia; various plans have used different datasets, based upon the geographic and subject-matter scope of each plan.

Because of the lack of local data, this plan uses separate sources of data to describe each critical facility. This version of the plan identifies the following broad types of critical facilities::

- Emergency Operation Centers (EOCs)
- Law Enforcement- Federal, State, and Local (includes correctional facilities)
- Fire Departments
- Hospitals

Schools pre-Kidergarten through 12<sup>th</sup> gradeAlthough not a complete representation of all the possible types of critical facilities, this data is a good representation of facility locations in the State. The data from these various sources was combined together in a unified database for analysis and ease of distribution to localities (see below for the summary of datasets and sources). The database contains over 1,900 critical facilities within the five categories. The available critical facility data is not as comprehensive as the BOR database; it only contains the general location of each of the facilities, with no attribute information such as building value, sprinkler systems, etc. In addition, facilities are represented only as geographic points, and so the full spatial extent of larger facilities is not considered. Table 3-17 shows the number of facilities located in each critical facility category and the data source.

Datasets developed as part of the Homeland Security Infrastructure Program (HSIP) Freedom Program identified as critical facilities were downloaded from the West Virginia Geographic Information Systems Technical Center (WVGISTC). The HSIP provides infrastructure data that is critical to the readiness of response and recovery of natural or terrorist-caused disasters. These datasets are described below and summarized in Table 3-17, Figure 3-21 through Figure 3-23 shows the distribution of critical facilities in West Virginia.

**EOCs** - This dataset was derived from information provided by the West Virginia Department of Military Affairs and Public Safety. The National Incident Management System defines an EOC as:

*The physical location at which the coordination of information and resources to support domestic incident management activities normally takes place.*

An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a



jurisdiction. EOCs may be organized by major functional disciplines (e.g., fire, law enforcement, and medical services), by jurisdiction (e.g., Federal, State, regional, county, city, tribal), or some combination thereof.

**Law Enforcement - Federal, State, and Local** - This dataset was derived using several previously published datasets created by several agencies including the WVGISTC and the West Virginia Department of Military Affairs and Public Safety. It includes locations of Federal, State, local, and special jurisdiction law enforcement agencies, including but not limited to, municipal police, county sheriffs, State police, school police, park police, railroad police, Federal law enforcement agencies, departments within non-law enforcement Federal agencies charged with law enforcement (e.g., U.S. Postal Inspectors), and cross-jurisdictional authorities (e.g., Port Authority Police).

**Fire Departments** - This dataset was based from a statewide listing of fire stations published in October 2003 by the WVDOF. Points were compiled from USGS topographic maps and Global Positioning Systems (GPS) (50% of points) by the WV Division of Natural Resources. The WVGISTC revised this dataset and published an updated version in October 2004. The HSIP used this dataset as the source for the current Fire Department dataset made publicly available January 2009. For the purpose of this dataset, the HSIP defined a Fire Department location as:

*Any location where fire fighters are stationed at or based out of, or where equipment that such personnel use in carrying out their jobs is stored for ready use.*

Fire Departments not having a permanent location are included, in which case their location has been depicted at the city/town hall or at the center of their service area if a city/town hall does not exist. This dataset includes those locations primarily engaged in forest or grasslands fire fighting, including fire lookout towers if the towers are in current use for fire protection purposes. This dataset includes both private and governmental entities. Fire fighting training academies are also included.

**Hospitals** - This dataset was last updated in February of 2008 by the West Virginia Health Care Authority. Using the most recent HSIP-Freedom data (1st Quarter, 2007), the WVHCA removed erroneous points and revised the attributes.

**Schools Pre-Kindergarten - 12th Grade** - This dataset contains a complete listing of 885 Pre-Kindergarten through 12<sup>th</sup>-grade schools in West Virginia, divided by school type. There are 720 public schools, 115 private schools, 34 vocational/technical schools, 12 alternative schools, and four early childhood schools. School locations were collected via GPS by the West Virginia National Guard's Counter Drug Task Force. Subsequently, these locations were updated by the WVGISTC and the West Virginia Department of Education.

TABLE 3-17. CRITICAL FACILITIES DATA SOURCE INFORMATION

Facility Type	Data Source	Date Created	Number of Facilities
EOC	WV Dept. of Military Affairs & Public Safety, HSIP	2007	59
Law Enforcement	WVDMAPS, WVGISTC, HSIP	2009	395
Fire Departments	WVDMAPS, HSIP	2007	573
Hospitals	WV Health Care Authority, HSIP	2007, updated 2008	66
Schools, Pre-K thru 12	West Virginia Army National Guard	2005	885

### 3.4.3 FACILITY ANALYSIS

Each individual hazard includes analysis results in the risk assessment section for State-owned and critical facilities. When hazard data was available, facilities were intersected with hazard specific data to determine the building’s risk zone. The analysis methodology is described in full detail in these sections; tables are used to represent the number of facilities in each risk category.

Potential dollar loss and/or exposed building value of State facilities was compiled for some of the hazards. Agencies with a large number of structures or building value in the high-risk hazard areas are noted in each section. These agencies and buildings are an excellent starting point for assessing the need for specific mitigation action items. In-depth analysis could not be completed for the critical facilities because of the lack of building-specific details, as previously discussed.

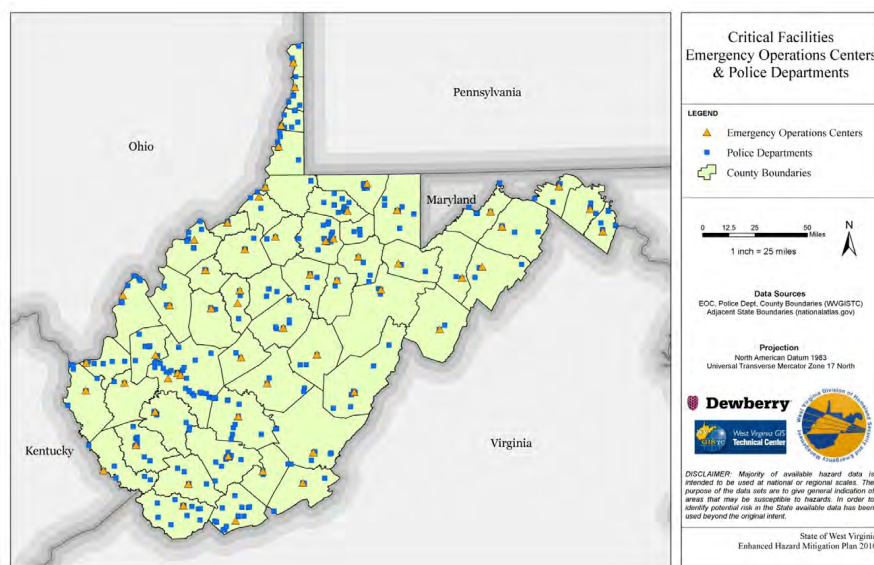


FIGURE 3-21. EMERGENCY OPERATIONS CENTERS AND POLICE DEPARTMENT

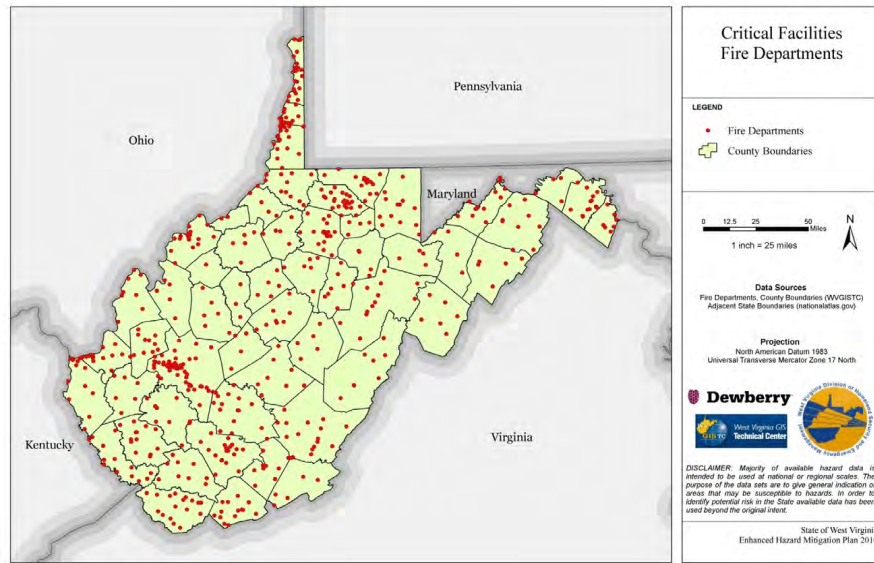


FIGURE 3-22. FIRE DEPARTMENTS

TABLE 3-18. CRITICAL FACILITIES BY COUNTY

County	Emergency Operations Centers	Fire Departments	Hospital	Law Enforcement	School	Total
Barbour	1	4	1	5	11	22
Berkeley	1	13	1	6	33	54
Boone	1	9	1	6	18	35
Braxton	1	8	1	7	8	25
Brooke	1	10	1	6	14	32
Cabell	2	14	6	8	37	67
Calhoun	2	3	1	4	4	14
Clay	1	3		2	8	14
Doddridge	1	5		4	4	14
Fayette	1	16	2	14	28	61
Gilmer		5		5	5	15
Grant	1	4	1	3	6	15
Greenbrier	1	16	1	8	18	44
Hampshire	1	9	1	6	12	29
Hancock	1	11		5	13	30
Hardy	1	5		4	5	15
Harrison	3	20	1	19	34	77
Jackson	1	5	1	4	14	25
Jefferson	1	7	1	8	17	34
Kanawha	3	51	8	37	85	184
Lewis	1	6	2	4	10	23
Lincoln	1	7		4	11	23
Logan	1	13	1	10	19	44
Marion	1	24	2	12	25	64



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County	Emergency Operations Centers	Fire Departments	Hospital	Law Enforcement	School	Total
Marshall	1	18	1	7	20	47
Mason	1	8	1	9	14	33
McDowell	1	17	1	12	21	52
Mercer	1	14	3	15	27	60
Mineral	1	13	1	7	14	36
Mingo	1	14	1	8	17	41
Monongalia	1	15	3	7	29	55
Monroe	1	7		6	7	21
Morgan	1	4	1	5	9	20
Nicholas	1	8	2	7	17	35
Ohio	1	14	3	11	22	51
Pendleton	1	7		2	4	14
Pleasants	1	2		3	6	12
Pocahontas	1	8	1	8	6	24
Ritchie	1	6		4	7	18
Roane	1	7	1	3	6	18
Summers	1	9	1	4	6	21
Taylor		4	1	4	8	17
Tucker	1	4		6	4	15
Tyler	1	4	1	2	4	12
Upshur	1	7	1	3	15	27
Wayne	1	13		8	24	46
Webster	1	5	1	4	5	16
Wetzel	1	12	1	6	8	28
Wirt	1	1		2	3	7
Wood	1	19	3	9	35	67
Wyoming	1	9		5	14	29
<b>Total</b>	<b>59</b>	<b>573</b>	<b>66</b>	<b>395</b>	<b>885</b>	<b>1,978</b>



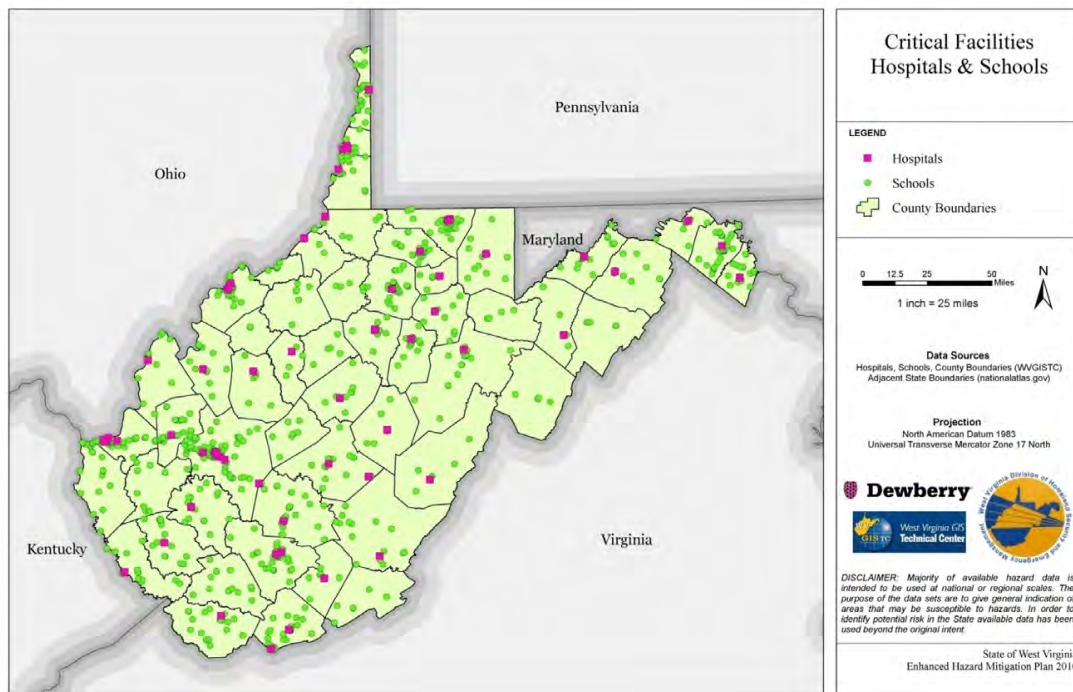


FIGURE 3-23. HOSPITALS AND SCHOOLS

### 3.5 HAZARD ASSESSMENT AND RANKING METHODOLOGY

The hazard identification and risk assessment provides a factual basis for developing mitigation strategies and for prioritizing those jurisdictions that are most threatened and vulnerable to natural hazards. This section details the risk assessment process and the methods used to rank hazard risk. Results from this process and accompanying methods will be presented in hazard-specific sections that follow.

For the purposes of compliance with the Disaster Mitigation Act as further specified by the Final Rule 44 CFR Section 206.401(c)(2)(i), the plan update only fully addresses the hazards identified in Section 3.3. Additional hazards may be more formally addressed during future plan updates as their significance warrants.

#### 3.5.1 RANKING METHODOLOGY

For the purposes of this plan, a standardized methodology was developed to compare different hazards' risk on a county basis. This method prioritizes hazard risk based on a blend of quantitative factors extracted from NCDC and other available data sources. This risk assessment ranking has been structured to identify:

1. Population vulnerability
2. Population density
3. Events



4. Property damage
5. Crop damage
6. Injuries and/or Deaths
7. Local plan ranking (new in 2013)
8. Geographic extent (new in 2013)

Eight ranking parameters were used to determine jurisdiction based hazard rankings. Each parameter was rated on a scale of 1 through 4, with those rated 1 considered low risk and those rated at 4 considered high risk. Population vulnerability and density are each weighted at 0.5 relative to all other parameters. Geographic extent was weighted at 1.5 relative to all other parameters. These scores were summed at a county level for each hazard separately, allowing for easy comparison between counties for each hazard type. A summation of all the scores for all hazards in each county provides a composite, “all-hazards” risk prioritization (Section 3.19).

In order to simply comparison of NCDC data, events and damages were all annualized. This was accomplished by taking the parameter of interest and dividing by the length of record for each hazard. This annualized value provides an estimate of what can be expected in a given year. A summary of the parameters and the period of record used for each hazard can be found in the Section 3.3, where use of NCDC data is further described.

Comparing and prioritizing the risk posed by different hazards requires a system for equalizing the units of analysis. Risk analysis requires reliable estimates of probability and impact data for all comparable hazards. Many of the hazards assessed in this plan did not have quantifiable probability or impact data, so a semi-quantitative scoring system was used to compare hazards. This system allows for greater flexibility and more room for expert judgment. An overview of the eight parameters used in ranking follows. Appendix O includes the storm events data and ranking spreadsheet and scales used for this analysis.

### 3.5.2 POPULATION VULNERABILITY AND DENSITY

Population density and vulnerability are important factors in the risk assigned to a county. A hazard event that occurs in a highly populated area generally has a much higher impact compared to an event that takes place in a very rural, sparsely populated area. Two population parameters were used to account for counties with high populations and counties with densely populated areas. Each of these parameters was given a weight of 0.5 in an effort to avoid biasing the composite ranking with population data. The 2013 plan update includes revised population values based on the 2010 U.S. Census.



Population vulnerability was calculated as the percent of the total population of West Virginia present in each county. The 2010 U.S. Census population projections for each county were divided by the total population for West Virginia and multiplied by 100; a value between one and four was assigned based on a geometric breaks pattern. By ranking counties this way, those counties with significantly larger populations have effectively been given extra weight.

Population density was based on the population per square mile for each county. The 2010 population projections for each county were divided by the total area (sq. mi.) for the county; a value between 1 and 4 was assigned based on geometric intervals. By ranking jurisdictions this way, those counties with densely populated areas have effectively been given extra weight.

### 3.5.3 EVENTS

Although it lacks a comprehensive dataset for all hazards, the NCDC record of historical occurrences of hazards is an important factor in determining where hazards are likely to occur in the future. Annualizing this database provides a rough estimate of the number of times a county might experience a particular hazard event in any given year. This was accomplished using an approach similar to the other methods described above. For each hazard type in each county, the total number of events in the NCDC database was divided by the total years of record for each hazard to calculate an annualized events value. When applicable, events have been supplemented with additional sources such as wildfire and mining events. Earthquake, wildfire, landslide, and mining events were supplemented with information from the WVGS, WVDOF, and the West Virginia Office of Miners' Health Safety and Training (WVMHS&T).

### 3.5.4 PROPERTY AND CROP DAMAGE

Property damage and crop damage were analyzed separately, and each county was assigned a score of 1 to 4 for each damage parameter. This data was obtained from the NCDC storm events database, inflated into 2012 dollars, and annualized according to the period of record for each event category. Wildfire crop damages were supplemented with WVDOF-based loss estimates.

### 3.5.5 DEATHS AND INJURIES

Examination of the historical record for events causing deaths and injuries is an important step in determining risk ranking. NCDC data was supplemented with information on mining injuries and deaths. No data was available for earthquake and karst. Hazards having no reported deaths or injuries were assigned a ranking of 1, and hazards resulting in at least one death or injury were assigned a 4.



### 3.5.6 LOCAL MITIGATION PLAN RANKING

Local mitigation plans were reviewed for ranking methodology, loss estimates, and risk to facilities. The parameter has been added as part of the 2013 plan update as an effort to integrate local planning results into the state plan. Section 3.6 provides information on how the plans were reviewed and summarized for incorporation into the ranking formula.

### 3.5.7 GEOGRAPHIC EXTENT

Most hazards have defined geography where it is more likely the hazard will occur in the future. To be able to include this in the ranking system, each hazard has been assigned individual scores based on the available hazard data. Geographic extent was given a 1.5 weighting relative to the other parameters, as geographic extent was deemed critically important. Data sources for geographic extent are shown in Table 3-19.

TABLE 3-19. SOURCES FOR GEOGRAPHIC EXTENT.

Hazard	Data Source
Flooding	FEMA DFIRM & Q3 Flood Maps percent floodplain
High Wind (and Hail and Lighting)	NOAA NCDC Storm Events per square mile American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures
Tornado	NOAA NCDC Storm Events per square mile
Winter Weather	NOAA NCDC Storm Events per square mile NWS Weather station data mean number of days with snowfall >10"
Drought (and Extreme Heat)	U.S. Department of Agriculture (USDA)-National Agricultural Statistics Service (NASS) Cropland Data percent cropland NOAA NCDC Storm Events per square mile
Wildfire	WDOF Wildfire Priority Areas
Landslide	USGS: Landslide Incidence and Susceptibility in the Conterminous US
Earthquake	FEMA Hazus Earthquake Model Peak Ground Acceleration
Land Subsidence (karst)	USGS: Engineering aspects of karst
Natural Resource Extraction (Mining)	Acreage based on extraction permit boundaries.

### 3.5.8 COMPOSITE HAZARD RANKING

Composite risk for each county was determined by adding the scores for population vulnerability, population density, annualized events, property damage, crop damage, local plan rankings, geographic extent, and injuries and deaths together for each hazard.

The composite or total hazard score for the State was determined by calculating the average hazard risk for each of the counties and using quartiles to assign the ranking. Comparison of the composite or total hazards ranking with local plan rankings can be found in Section 3.6. Ranking results and analyses are available in Section 3.19.



### 3.5.9 LIMITATIONS OF RANKING

The NCDC data, described in Section 3.3, is not a complete data source. It was chosen for use in ranking because of its standardized collection of many of the hazards that impact West Virginia. Unfortunately, the data set is lacking in terms of geological hazards. As a result, the ranking can only characterize the current form of the data with wildfire data for events, deaths, injuries, and damages that was provided by WVDOF with information on earthquake events provided by the WVGS. Future plan updates and mitigation actions should assess the availability of other data sources ensure the parameters are still valid for ranking the hazards.

The NWS does not guarantee the accuracy or validity of the information used for weather-related hazards. Although the historical records in the database often vary widely in their level of detail, the NWS does have a set of guidelines for use in the preparation of event descriptions.<sup>18</sup>

## 3.6 LOCAL PLAN INCORPORATION

### 3.6.1 SUMMARY OF PLANNING EFFORTS

West Virginia has 55 counties with hazard mitigation plans that have been submitted and approved by WVDHSEM and FEMA Region III. Since the 2010 State plan was adopted, most local plans have been updated by the regional planning and development districts. All local plan updates used the approved county plans as a source and starting point

The 1971 West Virginia Regional Planning & Development Act mandated that West Virginia be divided into 11 regions to serve as "development districts" to more effectively use the State's resources and maximize small communities' chances of attracting Federal dollars.

The following section addresses local hazard identification, vulnerability, and potential losses based on estimates provided in local risk assessment. For the 2013 plan update, the results processed from the local plan reviews were used in the statewide hazard ranking. Results of this ranking are located in each of the hazard-specific sections and summarized in Section 3.19, Overall Results.

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<sup>18</sup> National Weather Service Instruction 10-1605. Operations and Services Performance: Storm Data Preparation Guide. August 17, 2007. Available at:  
<http://www.nws.noaa.gov/directives/sym/pd01016005curr.pdf>



### 3.6.2 LOCAL HAZARD IDENTIFICATION

The most significant hazards identified in the local hazard mitigation plans were flood, winter weather, and wind - the same “high” hazards that are identified in the updated statewide analysis. Local plans identified 23 distinct hazards; Table 3-20 classifies these based on the percentage of localities that ranked the hazard as High, Medium-High, Medium, Medium-Low, and Low.

Additional details, specific to each county and region, are available in Appendix G and O and include information on the local plan review, hazards assessed, loss estimation, and tracking information.

TABLE 3-20. SUMMARY OF LOCAL PLAN HAZARD RANKING

High	Medium High	Medium	Medium Low	Low
Flood	Wind	Lightning	Mining	Dam
Winter Weather	Landslide	Wildfire	Karst	Hail
		Drought	Tornado	Earthquake
				Extreme Heat
		Urban Fire Bio, Radio and Epidemic	Terrorism	Civil Disturbance
		HazMat		Disease and Epidemics
		Technological		Hurricane

Counties used a variety of approaches with a range of complexity to rank their identified hazards. Some plans used a blend of various techniques and discussion to determine their final hazard ranking. Several of the ranking/scoring techniques used in the local plans included:

- Quantitative Scoring (based on available historical data, i.e., NCDC)
- Human Judgment/Knowledge of Locality
- Numerical Scoring Worksheets (based on criteria, i.e., FEMA 386-2 worksheets)
- Interactive Activities with Steering Committee Members

FEMA guidance indicates that the jurisdictions at greatest risk from specific hazards should be identified, considering both the characteristics of the hazard and the jurisdictions’ degree of vulnerability. A variety of analysis methods may be sufficient to meet these goals; FEMA does not mandate a specific analysis method. As a result, many local and State plans have developed their own ranking systems. None of the ranking techniques used in the local plans is “incorrect,” as there is no standard way to rank hazards that impact specific jurisdictions. Lack of available data for each hazard is often a driving factor in the ranking method’s degree of subjectivity. The numerical

rankings were frequently calculated by different contractors, and different data processing methodologies were used.

Table 3-20 summarizes the hazard rankings for each of the counties. Figure 3-25 compares the hazard rankings for the significant hazards. As discussed in Section 3.5, local plan rankings have been included as a parameter in the 2013 statewide hazard rankings.

Table 3-21 also compares the average ranking of local plans to the average ranking based on the analysis completed for this revision. Several of the hazard categories that were addressed in the local plans were not considered in the State plan; these have been included as textual descriptions in the major hazard sections. Of the hazards considered in this revision, average rankings in local and State analyses are comparable. Several of the local plans discussed the hazards but did not qualitatively rank them; as a result these hazards were assigned high and low rankings based on whether they were described in detail in the local plans. If they were discussed, a high ranking was assigned. In some cases this may be misleading. For example, Monongalia County received high scores for all the hazards discussed in its plan as a result of the lack of hazard differentiation. The averaging of local plans for the final rank should take this into account.

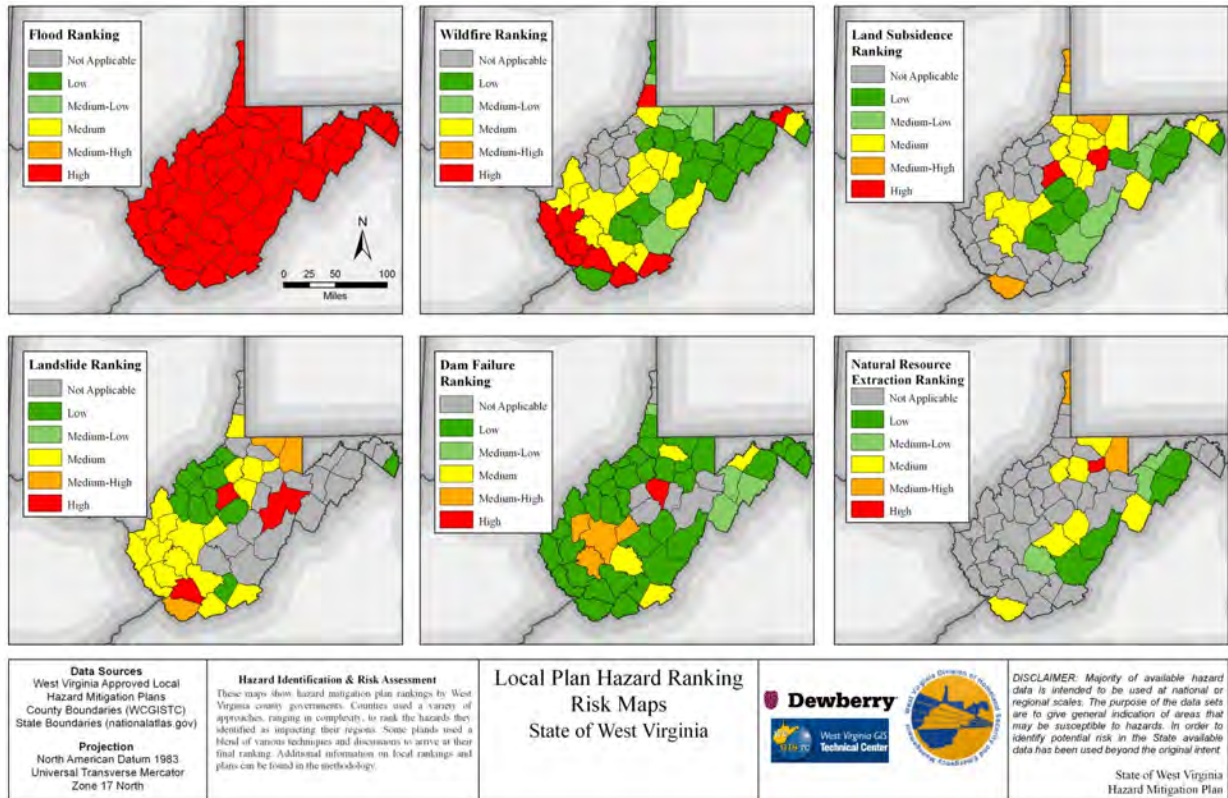


FIGURE 3-24. LOCAL PLAN HAZARD RANKING MAP 1

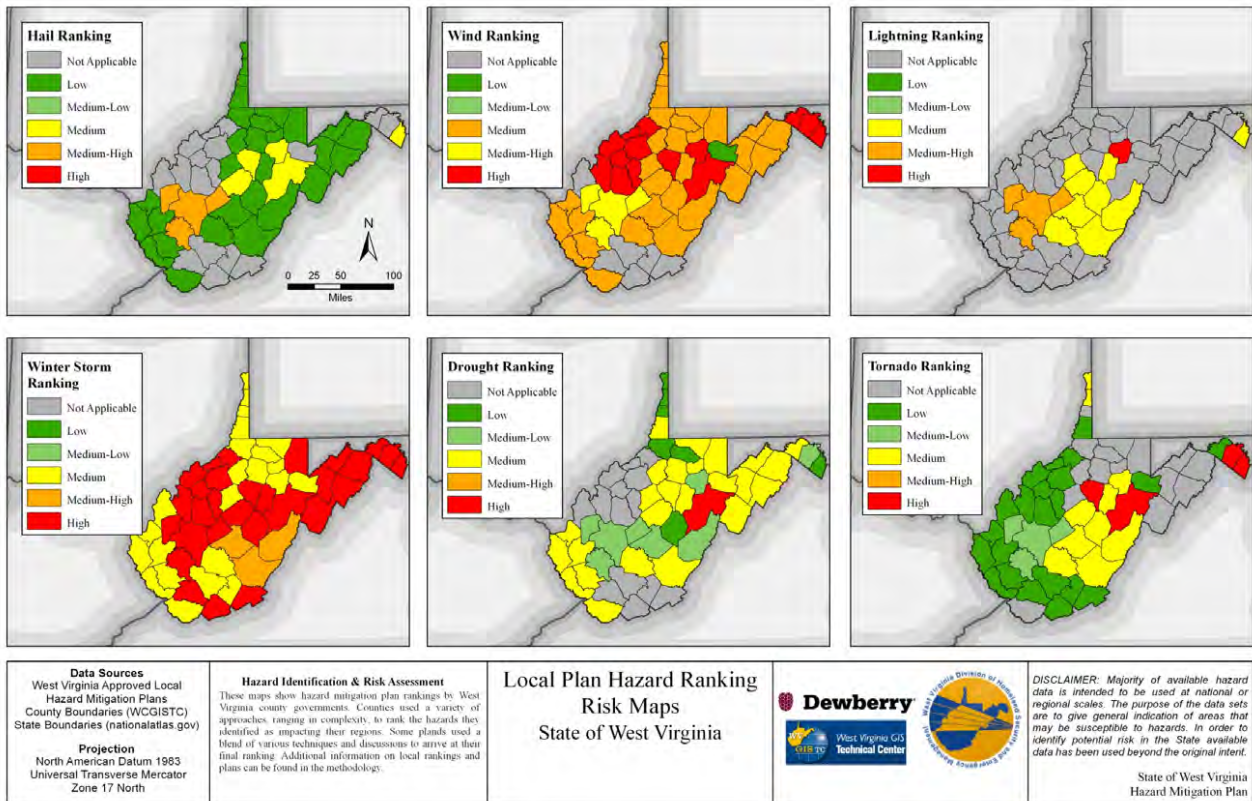


FIGURE 3-25. LOCAL PLAN HAZARD RANKING MAP 2





TABLE 3-21. LOCAL PLAN SUMMARY.

County	Flood	Wind	Hail	Lightning	Tornado	Winter Storm	Drought	Extreme Heat	Wildfire	Landslide	Earthquake	Karst	Mine Subsidence	Dam
Barbour	High	High	Medium	High	Medium	Medium	Medium-Low	N/A	Low	N/A	Low	High	N/A	Low
Berkeley	High	High	N/A	N/A	High	High	Medium-Low	N/A	Medium	N/A	Low	Medium	N/A	Low
Boone	High	Medium-High	Medium-High	Medium-High	Medium-Low	High	Medium-Low	Low	Medium	Medium	Low	Medium	N/A	Medium-High
Braxton	High	Medium	Medium	Medium	Medium	High	Medium	N/A	Medium	Low	Medium	Low	N/A	N/A
Brooke	High	Medium	Low	N/A	Medium	Medium	Low	N/A	Low	N/A	Low	Medium-High	Medium-High	N/A
Cabell	High	Medium	Low	N/A	Low	Medium	Medium	N/A	Medium	Medium	N/A	N/A	N/A	Low
Calhoun	High	High	N/A	N/A	Low	High	N/A	Low	N/A	Low	Low	N/A	N/A	Low
Clay	High	Medium-High	Medium-High	Medium-High	Medium-Low	High	Medium-Low	Low	Medium	Medium	Low	Medium	N/A	Medium-High
Doddridge	High	Medium	Low	N/A	N/A	Medium	Medium	N/A	Low	Medium	Low	Medium	Medium	Low
Fayette	High	Medium	Low	Medium	Medium	Medium	Medium	N/A	Low	N/A	Low	Low	Medium-Low	Medium
Gilmer	High	Medium	Low	Medium	N/A	Medium	Medium	N/A	Medium	High	Low	High	N/A	N/A
Grant	High	Medium	Low	N/A	N/A	High	Medium	N/A	Low	N/A	Low	Medium-Low	Medium-Low	Medium-Low
Greenbrier	High	Medium	Low	Medium	Medium	Medium-High	Medium	N/A	Medium-Low	N/A	Low	Medium-Low	Low	Low
Hampshire	High	Medium	Low	N/A	N/A	High	Medium	N/A	Low	N/A	Low	Low	Low	Low
Hancock	High	Medium	Low	N/A	Medium	Medium	Low	N/A	Low	N/A	Low	Medium-High	Medium-High	N/A
Hardy	High	Medium	Low	N/A	N/A	High	Medium	N/A	Low	N/A	Low	Low	Low	Medium-Low
Harrison	High	Medium	Low	N/A	N/A	Medium	Medium	N/A	Low	Medium	Low	Medium	Medium	Low
Jackson	High	High	N/A	N/A	Low	High	N/A	Low	N/A	Low	Low	N/A	N/A	Low
Jefferson	High	High	Medium	Medium	High	High	Low	N/A	Low	Low	Low	Low	N/A	Low
Kanawha	High	Medium-High	Medium-High	Medium-High	Medium-Low	High	Medium-Low	Low	Medium	Medium	Low	Medium	N/A	Medium-High
Lewis	High	High	Medium	N/A	High	High	Medium	N/A	Medium	Medium	Medium	Medium	N/A	High
Lincoln	High	Medium	Low	N/A	Low	Medium	Medium	N/A	High	Medium	N/A	N/A	N/A	Low
Logan	High	Medium	Low	N/A	Low	Medium	Medium	N/A	High	Medium	N/A	N/A	N/A	Low
Marion	High	Medium	Low	N/A	N/A	Medium	Medium	N/A	Low	Medium-High	Low	Medium-High	Medium	Low
McDowell	High	Medium	Low	N/A	N/A	Medium	Low	N/A	Medium-Low	N/A	Low	Medium	N/A	Medium
Mason	High	Medium	Low	N/A	Low	Medium	Medium	N/A	High	Medium	N/A	N/A	N/A	Low
Marshall	High	N/A	N/A	N/A	Low	Medium	N/A	N/A	Medium	Medium	Low	N/A	N/A	Low



TABLE 3-19. LOCAL PLAN UPLOAD SUMMARY (CONT'D)

County	Flood	Wind	Hail	Light-ning	Tornado	Winter Storm	Drought	Extreme Heat	Wildfire	Land-slide	Earth-quake	Karst	Mine Subs-idence	Dam
Mercer	High	N/A	N/A	N/A	Low	High	N/A	N/A	High	Medium	Low	N/A	N/A	Low
Mineral	High	Medium	Low	N/A	N/A	High	Medium	N/A	Low	N/A	Low	Medium-Low	Medium-Low	Medium
Mingo	High	Medium	Low	N/A	Low	Medium	Medium	N/A	High	Medium	N/A	N/A	N/A	Low
Monongalia	High	Medium	Low	N/A	N/A	Medium	Medium	N/A	Medium-Low	Medium-High	Low	Medium-High	Medium	Low
Monroe	High	N/A	N/A	N/A	Low	High	N/A	N/A	High	Medium	Medium	N/A	N/A	Medium
Morgan	High	High	N/A	N/A	Low	High	Medium	N/A	High	N/A	Low	Medium	N/A	Low
Nicholas	High	Medium	Low	Medium	Medium	Medium-High	Medium-Low	N/A	Low	N/A	Low	Low	Medium	Low
Ohio	High	Medium	Low	N/A	N/A	Medium	Low	N/A	Medium-Low	N/A	Low	Medium	N/A	Medium-Low
Pendleton	High	Medium	Low	N/A	N/A	High	Medium	N/A	Low	N/A	Low	Medium	Medium	Medium-Low
Pleasants	High	High	N/A	N/A	Low	High	N/A	Low	N/A	Low	Low	N/A	N/A	Low
Pocahontas	High	Medium	Low	Medium	Medium	Medium-High	Medium-Low	N/A	Medium	N/A	Low	Medium-Low	Low	Low
Preston	High	Medium	Low	N/A	N/A	High	Medium	N/A	Medium-Low	Medium-High	Low	Medium	Medium-High	Low
Putnam	High	Medium-High	Medium-High	Medium-High	Medium-Low	High	Medium-Low	Low	Medium	Medium	Low	Medium	N/A	Medium-High
Raleigh	High	N/A	N/A	N/A	Low	Medium	N/A	N/A	Medium	Medium	Low	N/A	N/A	Low
Randolph	High	High	Medium	N/A	High	High	High	N/A	Low	High	Low	N/A	N/A	N/A
Ritchie	High	High	N/A	N/A	Low	High	N/A	Low	N/A	Low	Low	N/A	N/A	Low
Roane	High	High	N/A	N/A	Low	High	N/A	Low	N/A	Low	Low	N/A	N/A	Low
Summers	High	N/A	N/A	N/A	Low	Medium	N/A	N/A	Medium	Low	Low	N/A	N/A	Low
Taylor	High	Medium	Low	N/A	N/A	Medium	Medium	N/A	Low	Medium	Low	Medium	High	Low
Tucker	High	Low	N/A	N/A	Low	Medium	Medium	N/A	Low	N/A	Low	Low	N/A	N/A
Tyler	High	High	N/A	N/A	Low	High	N/A	Low	N/A	Low	Low	N/A	N/A	Low
Upshur	High	Medium	Low	Medium	Medium	High	Medium	N/A	Medium	N/A	Low	Medium	N/A	N/A
Wayne	High	Medium	Low	N/A	Low	Medium	Medium	N/A	High	Medium	N/A	N/A	N/A	Low
Webster	High	Medium	Low	Medium	Medium	High	Low	N/A	Medium-Low	N/A	Low	Low	Medium	Low
Wetzel	High	Medium	Low	N/A	N/A	Medium	Low	N/A	Medium	N/A	Low	Medium	N/A	Low
Wirt	High	High	N/A	N/A	Low	High	N/A	Low	N/A	Low	Low	N/A	N/A	Low
Wood	High	High	N/A	N/A	Low	High	N/A	Low	N/A	Low	Low	N/A	N/A	Low
Wyoming	High	N/A	N/A	N/A	Low	High	N/A	N/A	High	High	Low	N/A	N/A	Low
# of Plans Ranked Hazard	55	49	38	14	40	55	41	12	47	35	49	34	18	48
Average Hazard Ranking	HIGH	MEDIUM-HIGH	LOW	MEDIUM	MEDIUM-LOW	HIGH	MEDIUM	LOW	MEDIUM	MEDIUM-HIGH	LOW	MEDIUM-LOW	MEDIUM-LOW	LOW



### 3.6.3 ASSESSMENT OF LOCAL VULNERABILITY AND POTENTIAL LOSSES

Local hazard rankings are highly variable; as a result each one has its own set of criteria to develop monetary loss values. These criteria were not consistent during the 2010 State plan update and this was the case with the 2013 plan update. This variability does not lend itself to comparison of relative loss values for each hazard in the statewide plan. To fully utilize the local plan efforts, West Virginia will need to develop standardized procedures for estimating losses. One continued goal of the State plan update is to standardize the data analysis process so that future State and local plan updates are consistent and utilize comparable methodologies.

Many of the local plans used loss estimates derived from Worksheet #3a of FEMA 386-2, State and Local Mitigation Planning How-To Guide: Understanding Your Risks. This worksheet lists the total number of structures and the total value of structures. For each (the number and the value), a percentage in hazard-prone areas is identified. The values corresponding to the percentage in hazard areas correspond to the loss estimates for each category: residential, commercial, industrial, agricultural, religious/non-profit, government, education, and utilities. Variation can be partially attributed to the methods that the county used to determine a loss-estimate as well as what is being accounted for in the exposure and vulnerability.

Local plans document loss estimation at \$149 billion from the major hazards that could impact West Virginia. Most of this value is building value exposure and not loss estimates due to hazard events. Loss estimates are not calculated using the same methodology for each plan and therefore should not be compared. Loss estimation methodology will need to be standardized in order to compare and use local plan vulnerability results. Nearly 25% of the value represents hazardous materials accidents or losses from acts of terrorism.

For the natural hazards discussed in this plan, approximately 21% of annualized losses come from wildfire, followed by 13% for flooding, and 13% for winter storm. Monongalia County has the highest loss estimates compared to the other counties in West Virginia. The majority (51) of the local plan counties provided flood loss estimates totaling over \$14.7 billion. The results for flooding are further broken down by county in Appendix G. Analysis in local plans has improved during the last update; 18 plans did not include loss estimates in previous versions of the plan. Without proper documentation and data, these values cannot be compared in their current form. Loss estimate totals and methodology summaries are available in Appendix O.

In lieu of a comprehensive local loss estimate, local plan rankings (Table 3-20) can be used as a starting point for determining which hazards are considered the greatest threat to jurisdictions, and therefore inferring the hazards that will result in the most damages. Local hazard rankings have been factored into the statewide hazard ranking



(Section 3.5) and as a result integrate local risk assessment information to the extent possible.

#### 3.6.4 DATA COLLECTION

West Virginia lacks a standardized hazard and critical facility dataset; although the WVGISTC provides a warehouse of available datasets, including facilities. Various local plans have used different datasets, based upon the geographic and subject-matter scope of each plan. County plans did not provide facility or hazard related datasets; thus, none were available for upload into the plan update. Section 3.4, State and Critical Facility Analysis, further discusses data sources that were used for statewide analysis.

#### 3.6.5 FUTURE REVISIONS

As localities begin revisions for the local hazard mitigation plan guidelines proposed in this revision will streamline local efforts and allow for accurate comparisons among jurisdictions. There are numerous statewide mitigation actions that can be adapted for local mitigation plans. These are addressed in Chapter 4, Mitigation Goals, Objectives, and Strategies. Integration of the local plans into the statewide plan will be an ongoing process as local plans are reviewed and standardization issues are addressed.

#### 3.6.6 ADDRESSING UNCERTAINTY IN HAZARD IDENTIFICATION

Future local plan updates will present an opportunity to address some of the ambiguity between hazard naming conventions if WVDHSEM standardizes applicable hazard names or labeling. WVDHSEM will encourage local plan revisions to approach classifying hazards in a similar fashion as used in this revised risk assessment. Table 3-22 below provides an outline of what types of events fall within the designated HIRA hazard categories. For this risk assessment the following hazards were evaluated: Flood, Wind, Tornado, Drought, Wildfire, Earthquake, Land Subsidence (Karst), Landslide, Dam and Levee Inundation, and Natural Resource Extraction.



TABLE 3-22. SUMMARY OF HAZARD EVENTS BY HIRA CATEGORY HAZARDS

Flood	High Wind	Winter Weather	Tornado	Drought	Wild-fire	Earth-quake	Land Subsidence (karst)	Land-slide	Dam and Levee Inundation	Natural Resource Extraction
Riverine	Wind	Snow	Tornado	Drought	Wild-fire	Earth quake	Land Subsidence	Land-slide	Dam Failure	Mining
Coastal	Thunder storm	Ice		Extreme Heat	Light-ning				Levee Failure	
Tsunami	Hurri-cane	Extreme Cold								
Erosion	Hail	Nor' Easter								
Nor' Easter	Light-ning									



## 3.7 FLOOD

### 3.7.1 DESCRIPTION

Floods are the most common and widespread natural disasters in the United States. Of the natural hazards facing West Virginia, floods constitute the greatest threat to property and lives. Some terms that are useful in the discussion of this hazard are defined as follows by FEMA:

**Flood** – A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from overflow of inland or tidal waters, from unusual and rapid accumulation or runoff of surface waters from any source, or from mudflow.

**Flash Flood** – A flood event occurring with little or no warning where water levels rise at an extremely rapid rate.

**Floodplain** – Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.

**Floodway** – The channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the 1-percent-annual-chance flood without cumulatively increasing the water surface elevation by more than a designated height.

Most communities in the United States can experience some kind of flooding after spring rains, heavy thunderstorms, or winter snow melts. The average annual U.S. flood loss in the past 10 years (2002-11) was more than \$2.9 billion.<sup>19</sup>

Dam failures and flash floods can cause significant damage in a short period. A hazard profile addressing coal waste impoundments is located in Section 3.15; the dam failure hazard profile is located in Section 3.16.

### 3.7.2 RIVERINE FLOOD HAZARDS

Riverine flooding is the most common type of flood event. Riverine floodplains range from narrow, confined channels in the steep valleys of hilly and mountainous areas, to wide flat areas in the Plains States and low-lying coastal regions. The volume of water in the floodplain is a function of the size of the contributing watershed and topographic characteristics such as watershed shape and slope, and climatic and land-use characteristics.

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<sup>19</sup> National Flood Insurance Program Flood Facts,  
[http://www.floodsmart.gov/floodsmart/pages/flood\\_facts.jsp](http://www.floodsmart.gov/floodsmart/pages/flood_facts.jsp)

In steep, narrow West Virginia stream valleys flooding usually occurs quickly and for a short duration, with rapid and deep flooding. Flooding in large rivers usually results from large-scale weather systems that generate prolonged rainfall over wide areas. Small rivers and streams are susceptible to these weather systems as are localized systems that cause intense rainfall over small areas.

### 3.7.3 FLASH FLOOD HAZARDS

Flash floods are characterized by a rapid rise in water level, high velocity, and large amounts of debris. They are capable of tearing out trees, undermining buildings and bridges, and scouring new channels. Major factors affecting flash flooding are the intensity and duration of rainfall and the steepness of watershed and stream gradients. The amount of watershed vegetation, the natural and artificial flood storage areas, and the configuration of the stream bed and floodplain are also important.



5/3/2009 – 5/15/2009: Federal Disaster  
1838  
Source: Brian M. Penix, WVDHSEM

West Virginia's topography and development patterns make the State especially vulnerable to flash flooding. Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Antecedent moisture, including saturated or frozen soil conditions, can intensify flash flooding from moderate rainfall events. Flash floods occur with little or no warning and can reach their peak in only a few minutes.

### 3.7.4 HISTORIC OCCURRENCE

Since 1954, flood damages have resulted in 44 of the 50 Federal Disaster Declarations in West Virginia. The distribution of all the Federal declarations by county is shown in Section 3.3. DR 1319 has been addressed as a flood event even though it was caused by a winter storm; damages were mostly due to the consequent flooding.

Two additional declarations were associated with hurricanes that were downgraded to tropical storm status when they reached the West Virginia border. DR 1496 resulted from flooding caused in the wake of Hurricane Isabel in 2003, and DR 1137 resulted from flooding associated with Hurricane Fran in 1996. Although damaging winds were also associated with these tropical storm events, the resultant damages that warranted disaster and emergency declarations came from flooding. The damage resulting from the high winds is addressed in Sections 3.3 and 3.8.



Extensive damage resulted from flooding and landslides in central and southern parts of the State between May 3 and May 15, 2009. Federal Disaster 1838 was declared.

As shown in Section 3.3, the southwestern portion of the State has a greater tendency to experience flooding damages large enough to merit Presidential Disaster Declarations. Every county in the State has been a part of at least two Presidential Disaster declarations, and four counties have experienced 15 or more. Several notable flood events are summarized below.

1. Three consecutive nights of thunderstorms beginning on June 28, 1998, produced serious flash flooding through the northern and western portions of the State. Rainfall totals ranged from 6 to 10 inches across portions of Wood, Jackson, and Kanawha Counties, with up to 5 inches or so further northeast into the Middle Island Creek Basin. A 4-month-old infant was swept from its mother's arms as she was fleeing a flooded mobile home. An elderly blind man was swept off his front porch by floodwaters after rescue attempts to save the man failed. Both fatalities occurred in Kanawha County along Little Sandy Creek in the vicinity of Frame. The flooding destroyed approximately 240 homes with nearly 500 suffering major damage. Federal Disaster 1229 was declared for the area on July 1, 1998.
2. Beginning on February 18, 2000, 2 to 5 inches of rainfall within an 18-hour period produced flash flooding over western and northern portions of the State. At least 35 homes were destroyed and a total of 350 houses, mobile homes, and businesses sustained major damage. A failed rescue attempt resulted in three fatalities along Kanawha Two Mile Creek just outside of Charlestown. Firefighters attempted to rescue five employees of a service station by raft. The raft overturned and three were lost to the flood waters. The body of the female manager was discovered two days later approximately 140 miles away in the Ohio River near Wheelersburg in Scioto County, Ohio. Federal Disaster 1319 was declared for this event on February 28, 2000.
3. Torrential rainfall associated with the remnants of Hurricane Ivan produced flooding across western portions of the State on September 17, 2004. Rainfall totals in this area generally ranged from 3 to 6 inches, with up to 8 inches or so over the northern Panhandle and into southwest Pennsylvania. Rivers, including the Ohio River, and streams were already running high from rain produced in association with Hurricane Frances just 8 days earlier. At least one fatality occurred in association with flooding. Federal Disaster 1558 was declared for this event on September 20, 2004.
4. Widespread flooding throughout February and March 2012 in Marion, Preston, Taylor, Harrison, Wayne, Logan, Mingo, and Lincoln Counties resulted in declarations DR 4059 and 4061. Severe thunderstorms continued during the





afternoon near the Route 50 corridor across northern West Virginia. The heaviest rain rates fell from the late morning into the early afternoon hours. Around 0.75 inch of rain fell in less than 3 hours. By mid afternoon, 8 to 12-hour rain totals of 1 to 1.5 inches were common from near Wood, Pleasants, and Tyler Counties east into Harrison, Taylor, Lewis, and Upshur Counties. Rain totals of 1.5 to 2.5 inches were common in 24 hours.

5. Numerous communities in southern West Virginia were hit by severe storms, flash flooding, mudslides, and landslides starting on June 12, 2010, and continuing for several days. Flooding came in two waves, with the first affecting areas from Dingess to Holden over to Neibert in the late afternoon. The second wave struck in the evening and severely impacted the Man area, where hundreds of structures suffered damage. Some of the damage was due to the rapid rise of the Guyandotte River, which crested around 16.6 feet<sup>20</sup>. Logan, McDowell, Mingo, and Wyoming Counties were included in this disaster (DR 1918). NCDC damages for this event were reported at \$7.5 million.
6. Federally declared disasters dates and selected summaries of events related to flooding are available in Section 3.3. Four flood related disasters (DR-1893, DR-1918, DR-4059, and DR-4061) have been declared since the previous plan, including severe storms during the spring and summer of 2010, and from February through March 2012.

The NCDC has recorded 1,757 flood events in the database from 1993 through 2012, accounting for \$1 billion dollars in property damages and \$3.5 million in crop damages. There have been 13 injuries and 54 deaths associated with these events. Table 3-23 highlights several of the significant events in the NCDC database that resulted in fatalities. Section 3.7.6 Flood Risk Assessment section summarizes the total damages from NCDC and provides an estimate of annualized losses by county based on NCDC, NFIP, and Hazus analysis. Section 3.3 provides additional information on the NCDC storm events. The majority of the events listed were identified as flash flood events.

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<sup>20</sup> WCHS ABC Eyewitness local news. [Widespread Flash Flooding Strikes Southern West Virginia Saturday](#). Bob Aaron. June 12 &14, 2010.



TABLE 3-23. SIGNIFICANT NCDC FLOOD EVENTS WITH ATTRIBUTED FATALITIES.

Date	Location	Deaths	Property Damages	Description
6/28/1998	Western & Central WV	2	\$22.9 Million	Three consecutive nights of thunderstorms left western and northern counties with wind damage and flooding. Total rains were 6 to 10 inches across portions of Wood, Jackson, and northern Kanawha Counties, with 5 inches further northeast, into the Middle Island Creek basin. Serious flash flooding occurred. Two people were killed in Kanawha County along Little Sandy Creek in the Frame vicinity. A Federal disaster declaration for individual and public assistance was declared for 15 counties in West Virginia. Nearly 500 homes had major damage, the most from Kanawha and Ritchie Counties. Around 100 dwelling had minor water damage. These figures included mobile homes, many of which were located in areas most susceptible to stream flooding.
2/18/2000	Western WV	3	\$7.1 Million	A warm front surged north during the morning of the 18th, dropping a half inch to an inch of rain. Low pressure extended from southern Ohio on down the entire length of the Ohio River during that afternoon. Rain amounts of 2 to 4 inches in 18 hours were common from a Huntington-Charleston-Elkins line on the northwest. In West Virginia, 24 counties were under a state of emergency declared by Governor Underwood; 19 of them fell within this region of the State. Later, on the 28th, President Clinton declared a federal disaster declaration for 20 counties, 17 of which are within this section of West Virginia. The 17 counties included Barbour, Braxton, Cabell, Calhoun, Doddridge, Gilmer, Harrison, Jackson, Kanawha, Lewis, Mason, Putnam, Ritchie, Roane, Tyler, Upshur, and Wirt.
7/8/2001	Wyoming, McDowell, Fayette	1	\$190 Million	Repetitive showers and thunderstorms moved rapidly across the southern coal fields, from the late morning hours to the early evening. A few reports of large hail and gusty winds were received, but the major problem was the severe flash flooding in McDowell County. The heaviest rain rates were on the order of 1.5 to 2 inches an hour. A woman and her daughter drowned after escaping their vehicle. The flooding in McDowell County destroyed 197 homes, while 703 homes had major damage. Numerous vehicles were also destroyed. Nine schools and five fire departments sustained damage. The school damage was estimated at over 4 million dollars. About a dozen separate water systems were damaged and shut down. Mingo County was also included in the Federal disaster declaration, with 85 homes destroyed and 44 homes with major damage.
5/2/2002	McDowell, Mingo, Buchanan	2	\$85 M	Repetitive showers and thunderstorms moved rapidly across the southern coal fields. A few reports of large hail and gusty winds were received, but the major problem was the severe flash flooding in McDowell County. The heaviest rains were on the order of 2.5 to 5 inches, in a west-to-east corridor from northern Buchanan County, Virginia, through central McDowell County. As a result, many more streams in McDowell County were flooded Residents around Avondale's Crane Creek and in the hollows around Coalwood were especially hard hit, both from the rising streams and the water flowing off timbered hillsides.



Date	Location	Deaths	Property Damages	Description
5/2/2002	McDowell	2	\$101.3 Million	One death occurred along the Milam Fork in McGraws. Water rose vertically about 12 to 14 feet on this stream. Destruction to homes, bridges, and roads was widespread along the Laurel Fork, including such communities as Ravencliff, Sabine, Glen Fork, Jesse, and Matheny. A vertical rise of 20 to 25 feet occurred around Matheny. At the junction of the Clear Fork and the Laurel Fork, the low sections of Oceana were flooded. Around 200 single-family homes and mobile homes were destroyed in Wyoming County. Approximately, 550 homes and mobile homes had major damage. The State condemned at least 365 structures. Around 230 single family homes and mobile homes were destroyed in McDowell County. Approximately, 700 dwellings had major damage. The State condemned around 280 structures. As many as 14,000 homes lost power, with the most in Fayette and Wyoming Counties. Railroad beds were washed-out or undermined. Vulnerable spots were where railroad tracks crossed small streams running down from adjacent slopes. In a 3- to 6-hour period, rains of 3 to 5.5 inches were common within that band. Maximum rain rates were 1.5 to 2.5 inches per hour.
9/17/2004	Statewide		\$110.2 M	Hurricane Ivan and Tropical Storm Jeanne remnants crossed West Virginia resulting in flooding and large amounts of rain.
12/10/2007	Cabell, Wayne	1	\$35 K	Several periods of rain occurred from the 7th into the 10th. A strong frontal zone with surface dew points in the 55° to 60° range south of the front and embedded heavier showers moved across Wayne, Cabell, and Putnam Counties. Rains over a 12- to 18-hour period were on the order of 1.5 to 2.25 inches. Johns Branch near Milton flooded roads. Some of the flooding was caused by debris and leaves collecting in many of the culverts. A 2- year-old woman stalled her car on the adjacent road, got out of the vehicle, and was later found about a quarter mile away, washed up against a culvert. Other flooding occurred along Fudges Creek around Ona in Cabell County. In Wayne County, Krout Creek flooded Spring Valley Road.
5/4/2009	Braxton, Gilmer, Calhoun, Harrison, Lewis, Monongalia, Marion, Preston	1	\$464 K	A front was stretched out east to west near the southern border of West Virginia. The axis of the heaviest rain fell from southern Wayne County on the northeast, through western Kanawaha County, southern Roane County, southern Calhoun County, then through Gilmer, Lewis, and Harrison Counties. The rain totals in this maximum were mostly 2 to 2.9 inches in a 6- to 12- hour period. Serious stream flooding occurred along the West Fork of the Little Kanawha River in Calhoun County. Schools were canceled in a few counties. River flooding resulted along the Little Kanawha River downstream of Burnsville through Glenville to Grantsville. The West Fork River also flooded as it flowed north through Harrison County. A 34-year-old woman was killed when a 70-foot tree smashed through the middle of her mobile home. Emergency responders were slowed by water over roads.
3/13/2010	Raleigh, Fayette, Kanawha, Boone, Nicholas, Wyoming	2	\$6.3 Million	Flood concerns were high preceding the event, but mainly for the central and northern mountain counties of the State. The deepest snow cover still resided across the high terrain in those counties. Prior to the heavy rain, the snow cover over Fayette and Raleigh Counties had already melted away. A widespread 2 to 4 inches of water resided in the snow pack, with some ridge tops exceeding 6 inches of water in the snow. Major small stream flooding was widespread in Raleigh and Fayette Counties. There were two direct fatalities from Raleigh County. Flooding of less severity occurred in Kanawha, Nicholas, Boone, and Wyoming Counties. A 59-year-old woman was swept away and drowned while attempting to walk through flood waters of Maple Fork. A swift-water rescue boat on Beaver Creek struck something in the water and capsized, throwing three firefighters into the water. A 32-year-old male firefighter was swept away and later found along Piney Creek. Approximately 29 homes were destroyed in Raleigh County and major damage occurred to an additional 34 homes.



Date	Location	Deaths	Property Damages	Description
7/25/2010	Boone, Harrison, Taylor, Barbour, Kanawha	1	\$107 K	Thunderstorms moved through north central counties of West Virginia during the early afternoon. This was south of a cold front with plenty of instability and surface dew points in the lower 70s. New storms formed further to the west and southwest during the afternoon. Repetitive showers and thunderstorms were seen mainly across Wayne, Lincoln, and Boone Counties during the late afternoon and into the early evening. There were two specific rounds of training showers. Rain rates of 1.0 in 30 minutes and 1.5 to 1.75 inches in an hour were measured by a few of the automatic rain gauges. A 41 year old man was clearing debris from a private culvert and was sucked into the culvert drain on Price Branch, his body was later found in Little Coal River near Dansville.
4/16/2011	Jackson, Putnam, Wayne, Lincoln	1	\$50K	Showers and thunderstorms moved north during the overnight hours, ahead of an approaching cold front. Just prior to the frontal passage, training showers affected southern Wayne County on north through parts of Lincoln, Putnam, and Jackson Counties with rain amounts of 1 to 1.5 inches in 3 to 4 hours. Minor flash flooding occurred under the repetitive showers during the morning. One elderly man drove into high water in Jackson County and drowned.



### 3.7.5 NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

Floodplain management begins at the community level with operation of a community program of corrective and preventative measures for reducing flood damage. These measures take a variety of forms; for inclusion in the NFIP, communities adopt their flood hazards maps and the community Flood Insurance Study (FIS). In addition, a FEMA-compliant floodplain management ordinance that regulates activity in the floodplain is adopted and enforced.

A community's agreement to adopt and enforce floodplain management ordinances, including regulation of new construction in the Special Flood Hazard Area (SFHA), is a requirement for making flood insurance available to home and business owners. Currently more than 24,624 communities nationwide voluntarily adopt and enforce local floodplain management ordinances that provide flood loss reduction building standards for new and existing development. To address the threat of flood damage, many communities and residents participate in the NFIP. Homeowner insurance policies do not cover damage from flood. As of February 28, 2013, 261 communities in West Virginia participated in the NFIP. Data on active NFIP policies was obtained from FEMA's BureauNet database and is summarized below.

Table 3-24 shows NFIP flood policy and claim information by county. There are 21,353 policies in-force for WV NFIP communities. West Virginians pay nearly \$17 million annually in premiums for \$2.7 billion in coverage. Kanawha, Ohio, and Logan Counties each have more than 1,000 insurance policies in-force. For active policies through February 28, 2013, there have been 25,145 claims, paying \$289 million. The average claim payment on active policies has been \$11,525. Greenbriar and Mingo Counties have the highest average claims at \$129,970 and \$124,503, respectively. Kanawha County accounts for nearly 17 percent of the policies in-force and coverage value; most of these policies (2,010) are in unincorporated areas of the county and in Charleston (595 policies). Figure 3-26 illustrates the total NFIP payments per county.

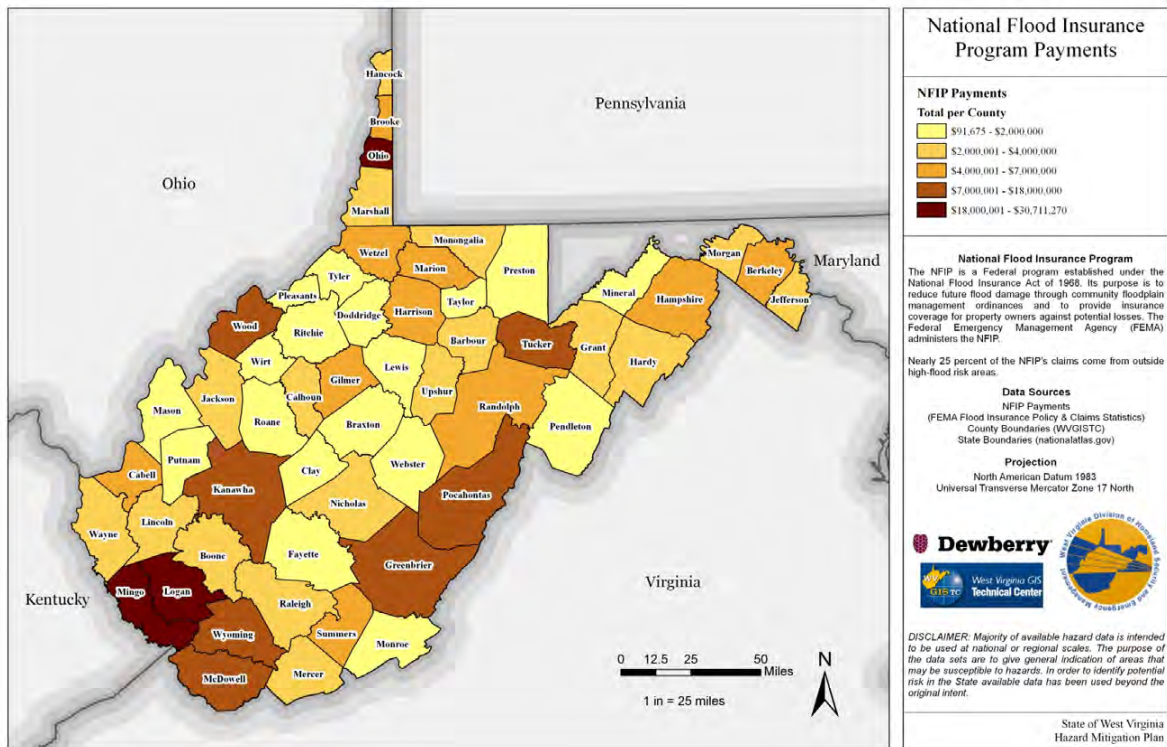


FIGURE 3-26. WEST VIRGINIA NATIONAL FLOOD INSURANCE PROGRAM (NFIP) PAYMENTS MADE PER COUNTY (AS OF FEBRUARY 2013).



TABLE 3-24. NFIP PARTICIPATION BY WEST VIRGINIA COUNTIES (AS OF FEBRUARY 2013).

County	Number of Policies In-Force	Coverage Total \$	Annual Premium	Number of Claims	Claim Total Value	Average Claim Value \$
Barbour County	173	\$18,126,800	\$133,333	364	\$3,528,413	\$32,123
Berkeley County	255	\$47,618,000	\$176,335	385	\$5,547,689	\$26,035
Boone County	650	\$73,795,600	\$563,996	464	\$3,052,331	\$35,822
Braxton County	66	\$10,852,700	\$46,204	36	\$281,215	\$26,511
Brooke County	464	\$42,751,800	\$353,536	585	\$6,599,273	\$45,816
Cabell County	938	\$132,462,200	\$778,786	611	\$5,678,566	\$30,194
Calhoun County	118	\$8,505,700	\$66,084	283	\$2,324,630	\$16,399
Clay County	88	\$11,108,400	\$67,918	22	\$91,675	\$6,712
Doddridge County	67	\$6,314,100	\$36,210	57	\$381,911	\$13,523
Fayette County	324	\$37,885,600	\$226,829	262	\$1,998,802	\$43,256
Gilmer County	192	\$22,893,300	\$174,680	462	\$5,324,231	\$28,427
Grant County	128	\$23,937,000	\$124,258	153	\$3,002,226	\$40,019
Greenbrier County	710	\$80,893,800	\$740,369	702	\$12,642,735	\$129,970
Hampshire County	256	\$33,271,800	\$202,368	322	\$5,220,137	\$55,626
Hancock County	157	\$14,402,600	\$118,624	219	\$2,753,990	\$36,000
Hardy County	164	\$30,532,800	\$133,061	194	\$3,610,587	\$31,433
Harrison County	393	\$47,186,700	\$313,683	762	\$5,361,621	\$77,084
Jackson County	246	\$36,024,900	\$195,561	271	\$3,213,410	\$28,080
Jefferson County	256	\$52,917,200	\$267,408	147	\$2,332,217	\$90,095
Kanawha County	3,599	\$475,140,500	\$2,959,109	1730	\$17,601,015	\$93,849
Lewis County	193	\$23,619,100	\$155,899	294	\$1,761,096	\$20,459
Lincoln County	253	\$30,754,500	\$176,944	280	\$3,538,714	\$20,384
Logan County	1,045	\$113,117,900	\$795,735	2,325	\$30,713,644	\$24,759
Marion County	377	\$43,096,800	\$270,239	316	\$4,141,629	\$62,941
Marshall County	367	\$41,966,500	\$305,205	464	\$3,162,974	\$40,495
Mason County	182	\$20,502,500	\$124,912	169	\$1,124,881	\$25,844
McDowell County	453	\$50,218,200	\$371,993	1031	\$7,139,751	\$73,931
Mercer County	394	\$59,105,800	\$371,009	405	\$3,819,521	\$58,845
Mineral County	267	\$33,973,200	\$208,526	191	\$1,485,950	\$19,924
Mingo County	671	\$94,551,400	\$397,041	1,672	\$29,596,298	\$124,503
Monongalia County	304	\$59,307,000	\$342,988	364	\$2,667,498	\$52,499
Monroe County	45	\$4,323,200	\$36,696	24	\$271,135	\$25,017



**2013 WEST VIRGINIA STATEWIDE STANDARD  
HAZARD MITIGATION PLAN UPDATE**

<b>County</b>	<b>Number of Polices In-Force</b>	<b>Coverage Total \$</b>	<b>Annual Premium</b>	<b>Number of Claims</b>	<b>Claim Total Value</b>	<b>Average Claim Value \$</b>
Morgan County	162	\$29,173,100	\$171,377	219	\$3,173,737	\$43,540
Nicholas County	176	\$20,744,600	\$171,317	139	\$2,869,546	\$39,145
Ohio County	1,370	\$140,057,300	\$1,401,983	2,949	\$26,301,807	\$29,561
Pendleton County	119	\$13,194,800	\$74,913	74	\$404,790	\$12,711
Pleasants County	85	\$10,279,600	\$74,465	59	\$692,632	\$34,707
Pocahontas County	434	\$48,576,100	\$377,833	726	\$15,191,598	\$53,928
Preston County	134	\$18,878,700	\$129,178	106	\$1,139,390	\$35,463
Putnam County	568	\$96,665,100	\$387,915	188	\$1,285,788	\$39,118
Raleigh County	410	\$50,628,900	\$350,603	408	\$3,629,347	\$51,925
Randolph County	335	\$40,500,300	\$209,987	515	\$4,558,896	\$44,768
Ritchie County	72	\$6,798,900	\$43,209	63	\$396,156	\$26,758
Roane County	168	\$19,370,500	\$99,762	121	\$992,164	\$21,830
Summers County	257	\$26,445,000	\$147,575	357	\$5,431,705	\$29,303
Taylor County	68	\$7,546,400	\$45,741	48	\$337,199	\$13,043
Tucker County	227	\$48,111,100	\$386,029	369	\$7,112,107	\$46,748
Tyler County	112	\$10,356,400	\$62,642	58	\$305,568	\$24,120
Upshur County	332	\$37,039,800	\$233,910	369	\$2,471,943	\$13,860
Wayne County	380	\$48,796,000	\$291,003	369	\$2,524,209	\$38,029
Webster County	196	\$18,029,200	\$112,789	151	\$827,846	\$23,482
Wetzel County	470	\$46,941,900	\$438,639	467	\$5,365,854	\$58,502
Wirt County	83	\$7,064,800	\$48,300	83	\$598,738	\$19,714
Wood County	711	\$121,234,700	\$745,290	855	\$10,930,582	\$50,746
Wyoming County	689	\$78,143,100	\$486,315	885	\$13,282,910	\$60,922
<b>Total</b>	<b>21,353</b>	<b>\$2,725,733,900</b>	<b>\$17,726,314</b>	<b>25,144</b>	<b>\$289,794,274</b>	<b>\$11,525</b>





A study conducted by The Rand Corporation<sup>21</sup> found the number of homes with flood insurance is significantly lower in rural communities with 500 or fewer homes in the SFHA, communities where less than 50% of homes are in the SFHA, and communities that do not experience coastal flooding. Results of the study also appear to suggest that the decision of whether or not to buy flood insurance is not particularly sensitive to the price of flood insurance. However, large changes in prices may have greater proportional impacts on market penetration rates than the study results revealed. There does not appear to be a strong relationship between market penetration rates and the enforcement of floodplain management requirements.

### FEMA REPETITIVE FLOOD CLAIMS PROGRAM

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The Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 was signed into law by President George W. Bush on June 30, 2004. The Act (Public Law 108-264) revised the existing Flood Mitigation Assistance (FMA) Program by creating a Pilot Program at \$40 million per year to mitigate Repetitive Loss (RL) properties. The Severe Repetitive Loss (SRL) Program provides funds for local government to address the most egregious floodprone properties with the most flood insurance claims. The program features a reduced non-Federal match (from 25% to 10%) with an approved mitigation plan that specifies the State's strategy to reduce the number of RL and SRL properties. The amendment authorizes scheduled increases in flood insurance premium rates to actuarial rates for those SRL property owners who refuse a formal and complete mitigation grant offer through the SRL grant program to mitigate an SRL structure. It must be noted that the three NFIP-funded flood mitigation programs, SRL, and FMA were combined through the Biggert-Waters National Flood Insurance Reform Act of 2012, signed into law by President Barack Obama on July 6, 2012. Specific program guidance on the newly combined mitigation programs was released by FEMA during mid-July, 2013. It combines the former Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL) programs into one newly merged Flood Mitigation Assistance program.

This program was eliminated by the passing of the *Biggert-Waters Flood Insurance Reform Act of 2012*. Instead, this program was consolidated into the FMA program, which now allows mitigation funding for RL properties at a 90/10 cost-share. For more information, see the description of the *Biggert-Waters Flood Insurance Reform Act of 2012*, in Section 1.2.2, or in the description of the HMA programs in Appendix F.

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<sup>21</sup> The National Flood Insurance Program's Market Penetration Rate Estimates and Policy Implications, 2006; Lloyd Dixon, Noreen Clancy, Seth A. Seabury, Adrian Overton.



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## REPETITIVE LOSS PROPERTIES

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Many flood insured properties have had more than one claim. A property that is currently insured for which two or more NFIP losses (occurring more than ten days apart) of at least \$1,000 each have been paid within any 10-year period since 1978 is defined as a “repetitive loss property” in the NFIP program. As of April 2013, West Virginia has approximately 2,096 single-family residential, 183 multi-family or condominium, 38 other residential, and 485 non-residential non-mitigated RL properties<sup>22</sup>.

More than \$127 million has been paid in RL property claims in West Virginia; more than \$5.8 million is from SRL properties. There are 18 counties in West Virginia which have in excess of 50 Repetitive Loss Properties; Ohio County has 493 properties with 1,267 losses. Figure 3-27 through Figure 3-29 shows the approximate locations of the RL properties and total paid claims. Table 3-25 shows the total RL payments.

Counties with more than \$5 million paid to repetitive loss properties:

- Mingo County (\$5.1 Million)
- Wyoming County (\$6 Million)
- Wood County (\$7.9 Million)
- Pocahontas County (\$8.2 Million)
- Kanawha County (\$8.6 Million)
- Ohio County (\$14.7 Million)
- Logan County (\$19.9 Million)

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<sup>22</sup> WVDHSEM



**TABLE 3-25. NUMBER OF NON-MITIGATED REPETITIVE LOSS PROPERTIES, NUMBER OF CLAIMS, AND  
TOTAL CLAIMS PAID (4/30/2013)**

<b>County</b>	<b>Number of Properties</b>	<b>Number of Losses</b>	<b>Total Contents Paid</b>	<b>Total Building Paid</b>	<b>Total Paid</b>
Barbour	34	77	\$245,378	\$803,771	\$1,049,149
Berkeley	61	166	\$782,896	\$2,667,969	\$3,450,865
Boone	51	139	\$301,001	\$1,062,810	\$1,363,810
Braxton	6	15	\$31,212	\$118,921	\$150,134
Brooke	71	163	\$257,666	\$2,282,913	\$2,540,579
Cabell	67	176	\$578,568	\$2,392,701	\$2,971,270
Calhoun	28	78	\$243,667	\$778,266	\$1,021,933
Clay	1	2	\$-	\$8,631	\$8,631
Doddridge	4	11	\$76,927	\$63,575	\$140,502
Fayette	25	58	\$64,668	\$480,922	\$545,590
Gilmer	55	177	\$1,278,874	\$1,800,159	\$3,079,033
Grant	16	32	\$246,589	\$550,081	\$796,670
Greenbrier	26	61	\$196,960	\$861,441	\$1,058,401
Hampshire	33	73	\$279,297	\$1,143,292	\$1,422,589
Hancock	32	72	\$175,421	\$1,027,855	\$1,203,276
Hardy	4	8	\$46,564	\$67,099	\$113,663
Harrison	81	231	\$816,369	\$1,774,885	\$2,591,254
Jackson	33	85	\$338,514	\$1,155,917	\$1,494,432
Jefferson	15	39	\$199,201	\$562,263	\$761,464
Kanawha	204	530	\$1,091,675	\$7,606,179	\$8,697,853
Lewis	17	36	\$133,279	\$164,540	\$297,819
Lincoln	26	71	\$724,370	\$1,321,394	\$2,045,764
Logan	275	795	\$11,094,243	\$8,863,136	\$19,957,380
Marion	19	71	\$1,301,841	\$767,939	\$2,069,781
Marshall	56	131	\$335,460	\$1,322,276	\$1,657,736
Mason	13	50	\$135,285	\$658,592	\$793,878
McDowell	89	198	\$550,446	\$1,931,878	\$2,482,324
Mercer	59	148	\$213,060	\$1,258,710	\$1,471,770
Mineral	22	61	\$146,146	\$672,829	\$818,975
Mingo	88	212	\$1,759,710	\$3,348,471	\$5,108,181
Monongalia	36	98	\$314,509	\$849,415	\$1,163,925
Monroe	-	-	\$-	\$-	\$-
Morgan	38	84	\$286,046	\$1,385,427	\$1,671,473
Nicholas	11	25	\$171,631	\$435,959	\$607,590
Ohio	493	1,267	\$2,614,259	\$12,138,212	\$14,752,471
Pendleton	6	15	\$5,952	\$35,784	\$41,736
Pleasant	6	17	\$24,822	\$170,867	\$195,689
Pocahontas	82	224	\$3,678,629	\$4,610,489	\$8,289,118
Preston	10	22	\$90,969	\$181,168	\$272,137
Putnam	29	83	\$193,147	\$644,884	\$838,031
Raleigh	48	114	\$562,424	\$1,082,111	\$1,644,535
Randolph	66	187	\$522,537	\$1,618,684	\$2,141,221
Ritchie	4	10	\$20,069	\$35,622	\$55,691
Roane	15	38	\$86,332	\$235,419	\$321,751
Summers	16	40	\$87,610	\$443,551	\$531,161



County	Number of Properties	Number of Losses	Total Contents Paid	Total Building Paid	Total Paid
Taylor	5	12	\$62,309	\$131,782	\$194,091
Tucker	46	107	\$2,899,827	\$1,609,755	\$4,509,582
Tyler	4	8	\$3,751	\$33,917	\$37,667
Upshur	44	113	\$184,540	\$762,800	\$947,340
Wayne	31	81	\$283,126	\$645,181	\$928,307
Webster	17	42	\$99,279	\$348,682	\$447,961
Wetzel County	59	142	\$168,872	\$2,075,466	\$2,244,337
Wirt County	8	17	\$54,032	\$99,149	\$153,181
Wood County	126	404	\$1,522,411	\$6,429,188	\$7,951,599
Wyoming County	92	250	\$1,671,795	\$4,398,870	\$6,070,664
<b>Total</b>	<b>2,803</b>	<b>7,366</b>	<b>\$39,254,164</b>	<b>\$87,921,798</b>	<b>\$127,175,963</b>

### SEVERE REPETITIVE LOSS PROPERTIES

Residential SRL properties have received priority for mitigation funding through the Bunning-Bereuter-Blumenauer Reform Act (Public Law 108-264). The primary goal of the SRL Program has been to reduce excessive flood claim payments and reliance on the National Flood Insurance Fund (NFIF) for flood relief when mitigation is an option. Residential SRL properties are single-family structures consisting of one to four residences that have flood insurance that have:

- incurred flood related damages on four or more separate occasions with the amount of each claim exceeding \$5,000 and the cumulative amount of the total claims paid exceeding \$20,000; or
- cumulative amount of the claims exceeds the value of the property, when at least two separate claim payments have been made.

At least two losses must have occurred within a 10-year time span; claims must be more than 10 days apart.

More than \$5.8 million has been paid in claims for the 59 verified SRL properties in West Virginia. Twenty-two counties in West Virginia have at least one SRL property. Kanawha and Hampshire counties have five SRL properties, Wood County has six SRL properties and Pocahontas County has eight SRL properties. Figure 3-28 and Figure 3-29 shows the approximate locations of the SRL properties and total paid claims.

Similar to the RFC program described above, the SRL program was eliminated by the passing of the *Biggert-Waters Flood Insurance Reform Act of 2012*. Instead, this program was consolidated into the FMA program, which now allows mitigation funding for RL properties at a 90/10 cost-share. For more information, see the description of



the *Biggert-Waters Flood Insurance Reform Act of 2012*, in Section 1.2.2, or in the description of the HMA programs in Appendix F.

## MITIGATED STRUCTURES

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West Virginia has worked to provide mitigation of RL properties since the inception of FEMA HMA grant programs during the past two decades. Since 2008, emphasis has been placed on delivering mitigation to the RL properties. The 205 mitigated RL properties experienced a total of 509 flood related events resulting in \$7,983,156 claims paid.

The WVDHSEM administers DHS/FEMA flood mitigation grants. Funding has been used to mitigate flooding through acquiring and converting the properties into open space; elevating structures above the base flood elevation level; or building infrastructure that improved local drainage problems. Theoretically, these structures will no longer require payments for flood loss claims from the NFIF. WVDHSEM has completed mitigation of more than 938 structures<sup>23</sup>. Most of these projects have been funded through post-disaster Hazard Mitigation Grant Program (HMGP) funds available from 2001 to the present. Most projects involved acquiring and demolishing floodprone residences.

Information on past use of mitigation funds can be used to assess loss avoidance as a result of implementing mitigation projects. To help with this assessment, WVDHSEM has developed a *Mitigation Action Assessment Form*. After a mitigation project is completed, the community that performed the mitigation action will complete and submit this form after a subsequent event occurs that impacted that site. For instance, water depths on each property, provided by the community, will be combined with the appraised value of the property that existed prior to mitigation, to estimate the losses avoided.

In addition to Executive Order 18-03 and WV Code § 15-5-4, other legislative initiatives have been promulgated to fulfill the goals and strategies of the State Mitigation Plan, including flood loss prevention. An example of flood-related legislation that has passed includes Senate Bill 635 (2006), which requires county BOEs to carry flood insurance on certain buildings and their contents.

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<sup>23</sup> WVDHSEM Deedbook 1/15/2013

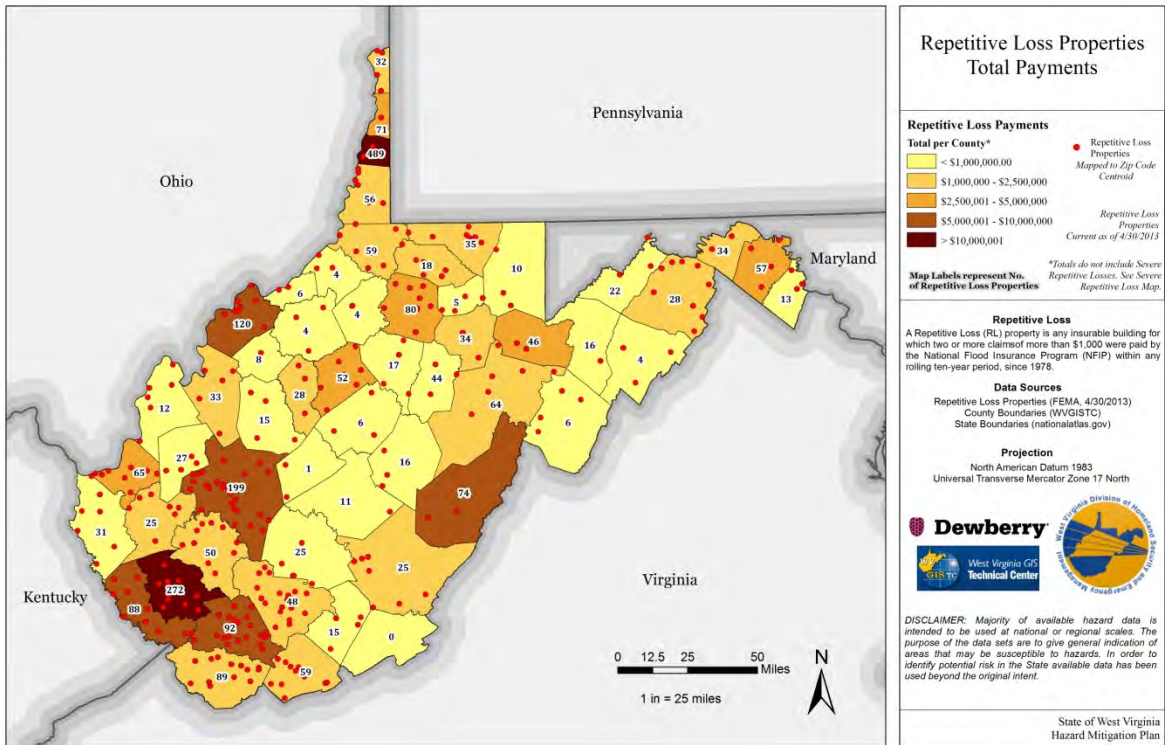


FIGURE 3-27. REPETITIVE LOSS PROPERTIES CLAIMS PAYMENTS PER COUNTY

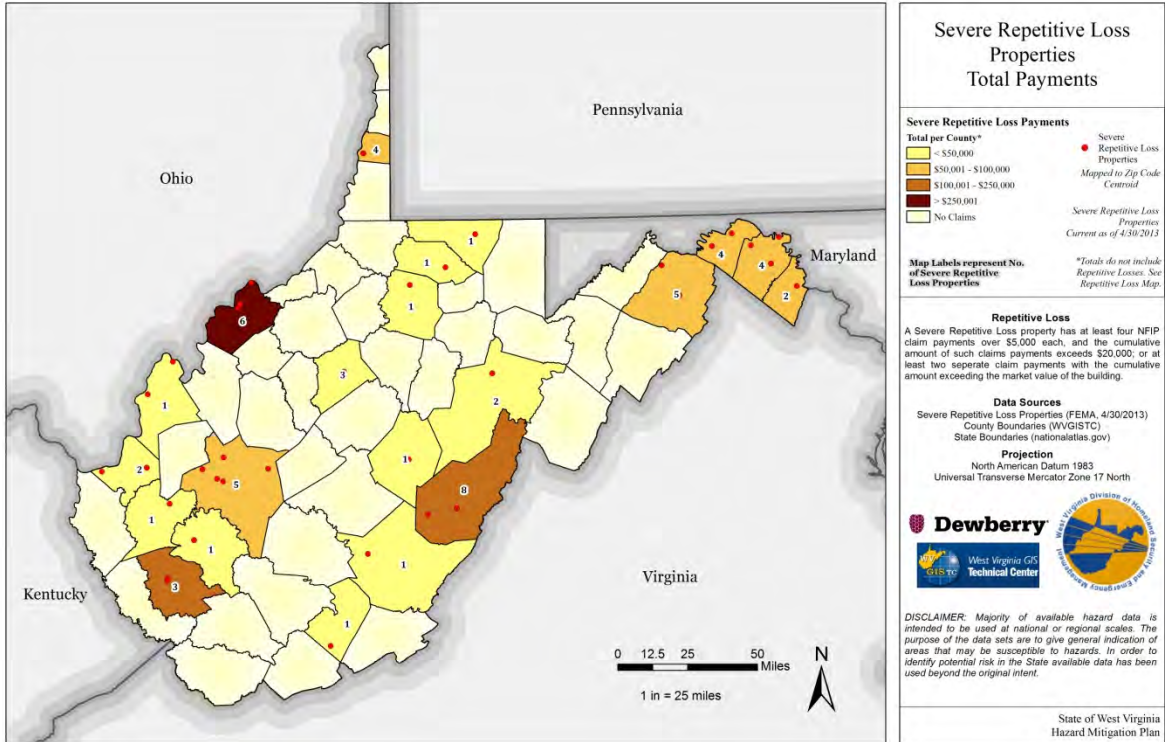


FIGURE 3-28. SEVERE REPETITIVE LOSS PROPERTIES PER COUNTY

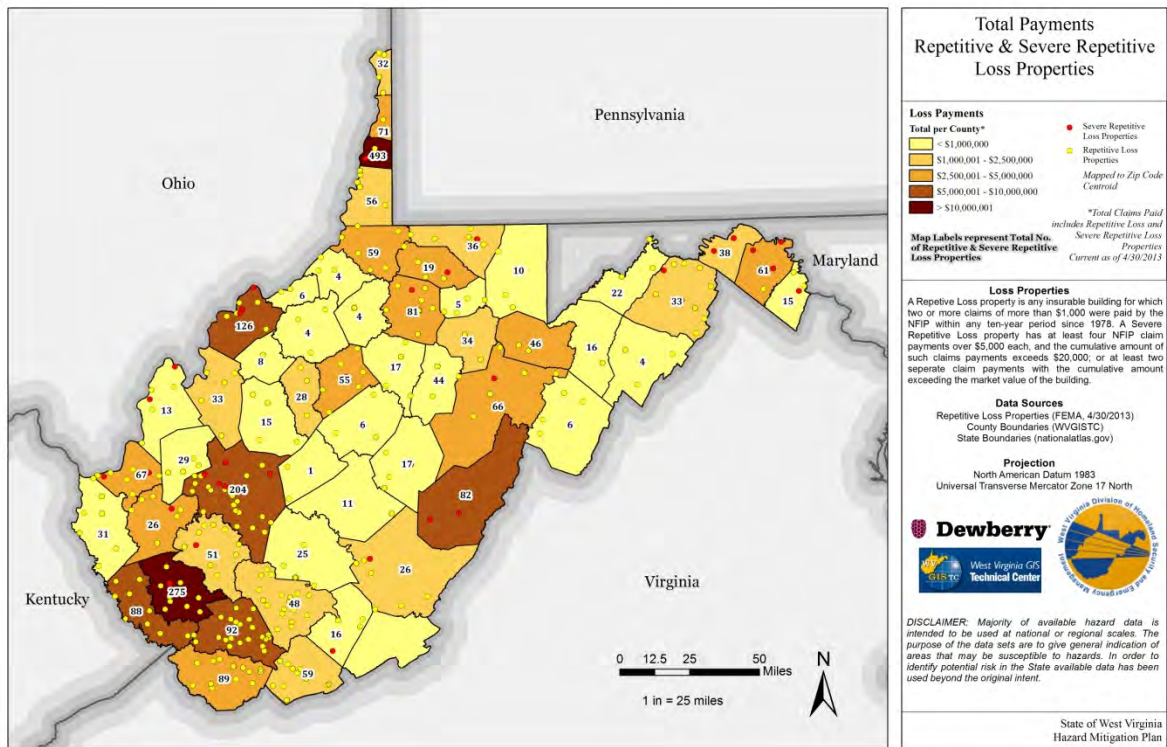


FIGURE 3-29. REPETITIVE AND SEVERE REPETITIVE LOSS PROPERTIES PAYMENTS PER COUNTY

### 3.7.6 RISK ASSESSMENT

#### PROBABILITY

During the past 30 years, the Federal Government has shifted focus from flood “control” to flood “management.” The primary impetus for this shift is continuing flood losses experienced during the latter half of the 20th Century and the first decade of the present century. The goal of flood management is to prevent loss of life and damage to public and private property by reducing the effects of flood damage and forming effective plans for recovery and rehabilitation. The change from flood control to flood management resulted in revisions and improvements to Federal policies. One major impetus was flood hazard mapping. The development of SFHA maps was the first comprehensive attempt to identify flood hazard risk in the Nation’s floodplains.

This effort began in 1968, with the passage of the NFIP Act by Congress. The program’s intent is to reduce future damage and to provide protection for property owners from potential losses. Flood insurance is made available in communities participating in the NFIP. Policyholders pay premiums that are based on the level of flood risk at an identified location in the community. To accurately identify the risk, FEMA produces FIRMs that show areas subject to flooding. The flood risk information



presented on the FIRMs is based on historic, hydrologic, and hydraulic data, as well as open-space conditions, flood-control works, and development.

The first step in preparing FIRMs occurs when FEMA undertakes engineering studies referred to as FISs. Using the information gathered in these studies, FEMA engineers and cartographers delineate SFHAs on flood maps. SFHAs are subject to inundation by a flood that has a 1-percent or greater chance of being equaled or exceeded in any given year. This type of flood is commonly referred to as the 100-year flood or base flood. The main recurrence intervals used on the FIRMs are shown in Table 3-26. Flooding probability is represented by designated zones on the FIRMs and in FISs by hazard descriptions that characterize FEMA flood hazard areas and their probabilities.

A 100-year flood is not a flood that occurs every 100 years. In fact, the 100-year flood has a 26-percent chance of occurring during a 30-year period, the typical length of many mortgages. The 100-year flood is a regulatory standard used by Federal agencies, States, and NFIP-participating communities to administer and enforce floodplain management programs. The 100-year flood is also used by the NFIP as the basis for insurance requirements nationwide<sup>24</sup>.

TABLE 3-26. ANNUAL PROBABILITY BASED ON FLOOD RECURRENCE INTERVALS.

Flood Recurrence Interval	Annual Chance of Occurrence
10-yr	10.0%
50-yr	2.0%
100-yr	1.0%
500-yr	0.2%

The FEMA Map Service Center provides access to the effective FEMA floodplain maps. Table 3-27 and Figure 3-30 show the current flood map status of counties in West Virginia. Most counties in West Virginia have completed DFIRMs; Mineral, Pocahontas, Boone, and Pleasants Counties do not have digital flood data. The DFIRM data allows for comprehensive analysis of flood risk to state and critical facility.

<sup>24</sup> National Flood Insurance Program ([www.fema.gov](http://www.fema.gov))





TABLE 3-27. DIGITAL FLOOD INSURANCE RATE MAP (DFIRM) STATUS FOR WEST VIRGINIA

FEMA Flood Data Status	No. of Counties
DFIRM	46
Paper Maps (No Digital Data)	4
Q3	5
<b>Total</b>	<b>55</b>

Annualized events are one way of using information about previous occurrences to predict the probability that a similar event will take place in the future, with results comparable uniformly across differing hazard types. NCDC and NFIP claims have been annualized and are also shown in Table 3-28. Preston, Marion, Marshall, Monongalia, and Kanawha Counties have each experienced over 60 flood events recorded by NCDC since 1993, and can be expected to experience more than three flood related events annually. NFIP claims are far more numerous; over 25,000 claims have been filed. Ohio, Logan, Kanawha, Mingo, and McDowell Counties have the highest number of NFIP claims on an annualized basis; 30 to 87 claims are expected to be filed annually. Figure 3-26 summarizes NFIP claims through March 2013.

TABLE 3-28. NCDC AND NFIP TOTAL AND ANNUALIZED FLOOD EVENTS.

County	Total NFIP Claims	Annualized NFIP Claims	Total NCDC Events	Annualized NCDC Events
Barbour	364	10.7	33	1.65
Berkeley	385	11.3	52	2.6
Boone	463	13.6	29	1.45
Braxton	36	1.1	33	1.65
Brooke	585	17.2	35	1.75
Cabell	611	18.0	46	2.3
Calhoun	283	8.3	37	1.85
Clay	22	0.6	23	1.15
Doddridge	57	1.7	30	1.5
Fayette	261	7.7	26	1.3
Gilmer	462	13.6	39	1.95
Grant	153	4.5	45	2.25
Greenbrier	702	20.6	57	2.85
Hampshire	322	9.5	54	2.7
Hancock	219	6.4	23	1.15
Hardy	194	5.7	54	2.7
Harrison	762	22.4	53	2.65
Jackson	271	8.0	42	2.1
Jefferson	147	4.3	47	2.35
Kanawha	1,729	50.9	60	3
Lewis	294	8.6	40	2
Lincoln	280	8.2	41	2.05
Logan	2,324	68.4	36	1.8
Marion	316	9.3	68	3.4



County	Total NFIP Claims	Annualized NFIP Claims	Total NCDC Events	Annualized NCDC Events
Marshall	464	13.6	65	3.25
Mason	169	5.0	37	1.85
McDowell	1,031	30.3	31	1.55
Mercer	405	11.9	52	2.6
Mineral	190	5.6	35	1.75
Mingo	1,671	49.1	31	1.55
Monongalia	364	10.7	63	3.15
Monroe	24	0.7	25	1.25
Morgan	219	6.4	40	2
Nicholas	139	4.1	29	1.45
Ohio	2,949	86.7	33	1.65
Pendleton	74	2.2	39	1.95
Pleasants	59	1.7	23	1.15
Pocahontas	726	21.4	35	1.75
Preston	106	3.1	81	4.05
Putnam	188	5.5	40	2
Raleigh	408	12.0	33	1.65
Randolph	515	15.1	50	2.5
Ritchie	63	1.9	25	1.25
Roane	121	3.6	39	1.95
Summers	357	10.5	18	0.9
Taylor	48	1.4	28	1.4
Tucker	369	10.9	50	2.5
Tyler	58	1.7	42	2.1
Upshur	369	10.9	40	2
Wayne	369	10.9	45	2.25
Webster	151	4.4	39	1.95
Wetzel	467	13.7	38	1.9
Wirt	83	2.4	21	1.05
Wood	855	25.1	31	1.55
Wyoming	884	26.0	27	1.35

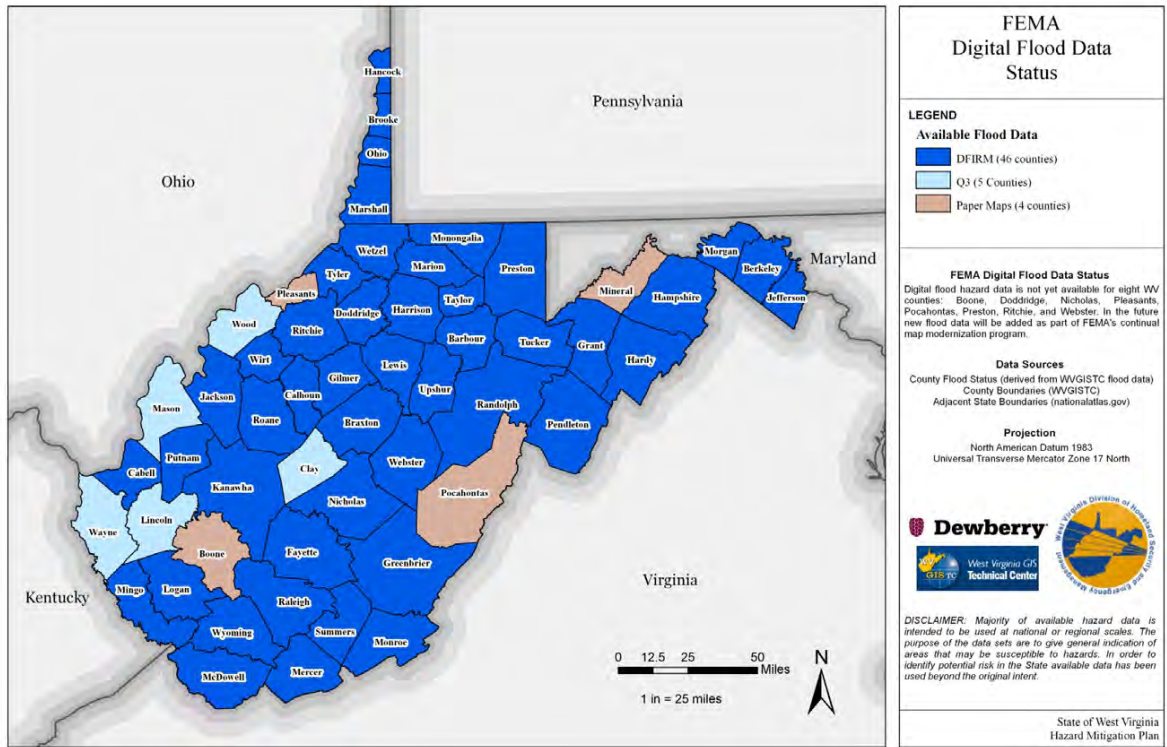


FIGURE 3-30. FEMA DIGITAL FLOOD DATA STATUS BY COUNTY (AS OF FEBRUARY 2013)

**Climate Change.** Climate models project that a warming planet could lead to changes in the distribution of precipitation across the country, including a trend toward more frequent intense-precipitation events.<sup>25</sup> A 2013 study concluded that, with global warming, more atmospheric moisture will be available for storm systems. As a result, rainfall during extreme events is likely to become even heavier than it is now.<sup>26</sup> These changes may translate into greater stormwater run-off in the future, which could exacerbate flooding hazards.

<sup>25</sup> Gutowski, W.J., G.C. Hegerl, G.J. Holland, T.R. Knutson, L.O. Mearns, R.J. Stouffer, P.J. Webster, M.F. Wehner, and F.W. Zwiers, 2008: Causes of observed changes in extremes and projections of future changes. In: *Weather and Climate Extremes in a Changing Climate: Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands* [Karl, T.R., G.A. Meehl, C.D. Miller, S.J. Hassol, A.M. Waple, and W.L. Murray (eds.)]. Synthesis and Assessment Product 3.3. U.S. Climate Change Science Program, Washington, DC, pp. 81-116.

<sup>26</sup> Kunkel, K.E., T.R. Karl, D.R. Easterling, K. Redmond, J. Young, X. Yin, and P. Hennon (2013), Probable maximum precipitation and climate change, *Geophys. Res. Lett.*, 40, 1402–1408, doi:10.1002/grl.50334.



### 3.7.7 IMPACT AND VULNERABILITY

Populations and property are extremely vulnerable to flooding. Homes and business may suffer damage and be susceptible to collapse due to heavy flooding. Floodwaters can carry chemicals, sewage, and toxins from roads, factories, and farms; therefore any property affected by the flood may be contaminated with hazardous materials. Debris from vegetation and man-made structures may also be hazardous following a flood. In addition, floods may threaten water supplies and water quality and initiate power outages. West Virginia NCDC records show that 13 injuries and 54 deaths have occurred since 1993, as a result of flooding, with the most injuries and deaths occurring in Kanawha, Cabell, Raleigh, and Wayne Counties. Injuries and deaths are parameters used in the hazard ranking (Figure 3-36), with counties scoring a 1 if no deaths or injuries have been recorded for flooding and 4 (highest threshold) when an injury or death was recorded. See Section 3.5 for additional ranking details.

### 3.7.8 RISK

For some activities and facilities, even a slight chance of flooding is too great a threat. Typical critical facilities include hospitals, fire stations, police stations, emergency shelters, utilities, and similar facilities. Critical functions should also be broadened to consider activities like storage of critical records in floodprone basements. These facilities require special consideration in regulatory alternatives and floodplain management plans. A critical facility should not be located in a floodplain if at all possible. If a critical facility must be located in a floodplain it should be provided a higher level of protection so that it can continue to function and provide services after the flood. Communities should develop emergency plans to continue to provide these services during the flood.

Through Executive Order 11988, Floodplain Management, Federal agencies funding and/or permitting critical facilities are required to avoid the 0.2% (500-year) floodplain or protect the facilities to the 0.2- chance flood level. In order to assess risks caused by flooding, this plan used the FEMA flood zones to intersect State and critical facility locations to determine which facilities are at risk. Jurisdictional risk has been calculated in terms of annualized loss using NCDC data, NFIP claims, and the Hazus 100-year flood loss estimates.

### 3.7.9 FACILITY RISK

The West Virginia BOR facility database has several fields related to floodplains. Three main types of flood zones, as determined by the insured agency, are the 100-year, 500-year, and minimal nuisance flooding. Approximately 1% of the total State facilities building and contents value are located in the 100-year floodplain, 3% in the 500-year floodplain, and 25% in Zone C. Structures with basements account for 10% of the structures located in the 100-year floodplain, 18% of the 500-year structures, and



14% of the Zone C properties. Table 3-29 summarizes, by flood zone, the total number of structures and value at risk for flooding. Figure 3-31 shows the distribution of State facilities located within the 100-year floodplain.

Of the 125 state facilities in the 100-year floodplain, 120 of the facilities are categorized by the BOR BRIM dataset as “building” with 18 located in Mercer County and 1 in Cabell County (Table 3-30). Four facilities are located in Hampshire County and are classified as “all other types” and one in Wyoming that is classified as “shelter-shed-rack”.

TABLE 3-29. WV BOARD OF RISK FLOOD ZONE DESIGNATIONS AND VALUE AT RISK

Flood Zone	Number of Structures	Total Building Value	Total Contents Value	Total Value at Risk
ZONE-A (100 YR)	125	\$121,922,478	\$24,800,785	\$146,723,263
ZONE-B (500 YR)	382	\$373,342,031	\$75,863,958	\$449,205,989
ZONE-C (MINIMAL)	1,450	\$2,951,067,294	\$575,959,362	\$3,527,026,656
N/A *	10,776	\$8,571,181,868	\$1,559,771,460	\$10,130,953,328

\*Includes flood zone categories: Not Eligible, Not Mapped, or Unknown



TABLE 3-30. STATE FACILITIES, WITH TYPE “BUILDING” IN THE 100-YEAR FLOODPLAIN BY COUNTY

County	Number of “Building” Type	Total Building Value	Total Contents Value	Total Value at Risk
BARBOUR	2	\$140,000	\$370,000	\$510,000
BROOKE	3	\$165,000	\$1,000,000	\$1,165,000
CABELL	15	\$168,000	\$3,688,348	\$3,856,348
HAMPSHIRE	1	\$0	\$693,000	\$693,000
HARDY	3	\$1,568,480	\$5,381,040	\$6,949,520
JACKSON	1	\$60,000	\$0	\$60,000
JEFFERSON	4	\$1,488,133	\$4,920,000	\$6,408,133
KANAWHA	8	\$2,646,156	\$2,448,649	\$5,094,805
LEWIS	6	\$636,463	\$1,192,089	\$1,828,552
LOGAN	3	\$101,300	\$311,921	\$413,221
MARSHALL	2	\$24,500	\$380,000	\$404,500
MASON	1	\$140,000	\$0	\$140,000
MERCER	18	\$3,610,000	\$22,706,009	\$26,316,009
MINERAL	2	\$469,000	\$542,000	\$1,011,000
MINGO	8	\$3,779,859	\$26,039,445	\$29,819,304
MORGAN	7	\$210,300	\$3,748,656	\$3,958,956
NICHOLAS	1	\$32,500	\$213,955	\$246,455
OHIO	2	\$2,003,300	\$18,469,807	\$20,473,107
POCAHONTAS	1	\$2,000,000	\$6,000,000	\$8,000,000
PRESTON	11	\$692,894	\$12,251,316	\$12,944,210
RANDOLPH	1	\$45,000	\$145,000	\$190,000
SUMMERS	1	\$1,750,000	\$1,121,100	\$2,871,100
TUCKER	1	\$55,000	\$0	\$55,000
TYLER	3	\$85,000	\$255,000	\$340,000
UPSHUR	2	\$1,620,000	\$3,580,100	\$5,200,100
WAYNE	1	\$1,500	\$12,000	\$13,500
WETZEL	3	\$1,075,300	\$5,520,253	\$6,595,553
WOOD	8	\$133,500	\$774,490	\$907,990
WYOMING	1	\$34,000	\$0	\$34,000

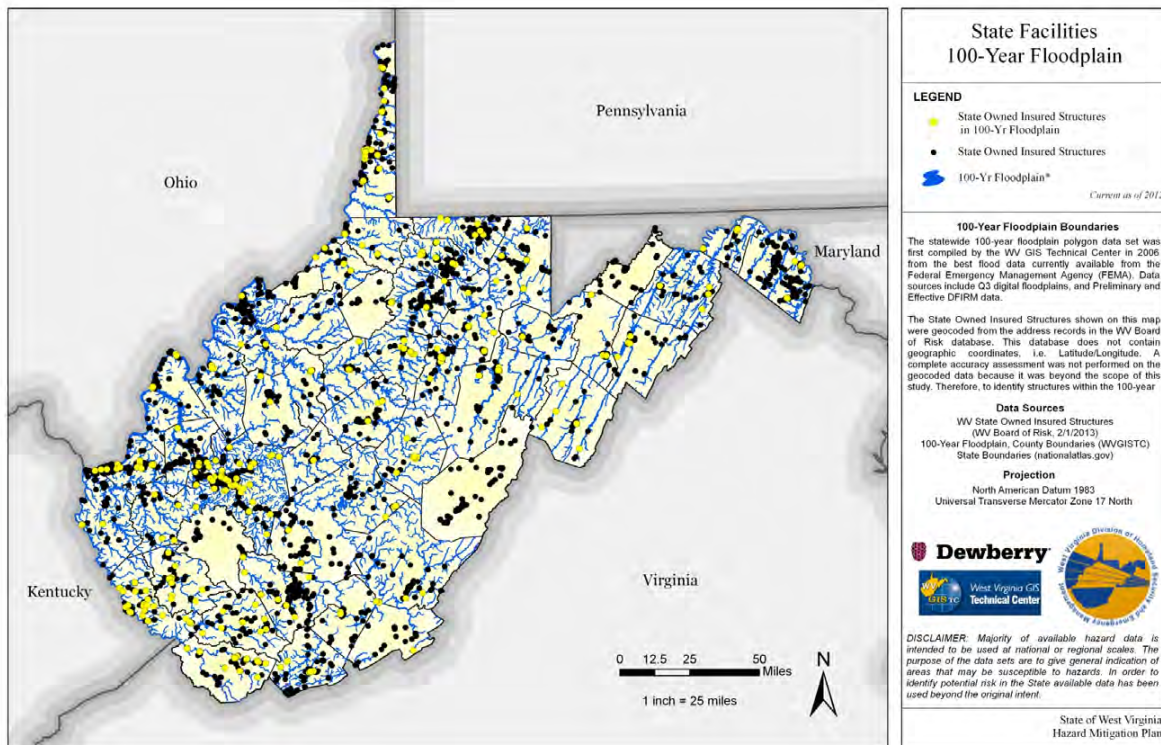


FIGURE 3-31. STATE FACILITIES WITHIN THE 100-YEAR FLOODPLAIN

Critical facility points were intersected with the FEMA FIRMs to determine each facility’s flood zone location. This simplified approach was used due to limited spatial and attribute data for critical facilities. Loss estimations were not calculated for critical facilities; with better location and attribute analysis this could be completed for State and critical facilities.

As shown in Table 3-31 and Table 3-32, there are 228 critical facilities in the FEMA 100-year floodplain. Fire departments have the highest number of facilities in the floodplain, followed by schools and law enforcement facilities. With many schools serving as potential shelters in many Emergency Operation Plans (EOPs), evaluations should be conducted to determine the best mitigation alternatives for these buildings. Kanawha and McDowell Counties have the highest number of critical facilities in the floodplain. Figure 3-32 shows the distribution of critical facilities located within the 100-year floodplain.

TABLE 3-31. CRITICAL FACILITIES IN THE 100-YEAR FLOODPLAIN

Emergency Operations Centers	Fire Departments	Hospital	Law Enforcement	School	Total
4	94	3	54	73	228



TABLE 3-32. CRITICAL FACILITIES IN THE 100-YEAR FLOODPLAIN BY COUNTY

County	EOC	Fire Departments	Hospital	Law Enforcement	School	Total
Barbour	0	2	0	2	1	5
Brooke	0	2	0	4	3	9
Cabell	0	2	0	0	3	5
Calhoun	0	1	0	1	1	3
Clay	1	1	0	0	0	2
Gilmer	0	2	0	1	1	4
Greenbrier	0	0	0	1	2	3
Hampshire	0	1	0	0	0	1
Hancock	0	0	0	0	1	1
Hardy	0	1	0	0	0	1
Harrison	0	4	0	0	3	7
Jackson	0	0	0	0	1	1
Kanawha	0	10	0	5	18	33
Lewis	0	2	1	2	3	8
Lincoln	0	2	0	0	1	3
Logan	0	4	0	2	2	8
Marion	0	3	0	0	0	3
Marshall	0	3	0	1	2	6
Mason	0	1	0	1	0	2
McDowell	1	13	1	9	2	26
Mercer	0	2	0	4	2	8
Mineral	0	3	0	0	3	6
Mingo	0	5	0	2	5	12
Monongalia	0	2	1	0	0	3
Monroe	0	2	0	0	0	2
Morgan	0	1	0	1	1	3
Ohio	0	3	0	1	4	8
Putnam	0	0	0	1	0	1
Raleigh	0	7	0	3	2	12
Randolph	0	1	0	1	1	3
Roane	1	2	0	1	1	5
Taylor	0	0	0	1	0	1
Tucker	0	1	0	3	0	4
Tyler	0	1	0	0	0	1
Upshur	0	2	0	0	1	3
Wayne	0	1	0	2	5	8
Wetzel	1	3	0	3	3	10
Wirt	0	0	0	1	0	1
Wood	0	1	0	0	0	1
Wyoming	0	3	0	1	1	5
<b>Total</b>	<b>4</b>	<b>94</b>	<b>3</b>	<b>54</b>	<b>73</b>	<b>228</b>

The 2013 plan update has replaced the 2007 and 2010 loss estimation methodology with the Hazus analysis completed during 2010-11.



Figure 3-33 shows the Hazus economic losses for the 100-year return period, and Figure 3-34 shows the 100-year floodplain used for the Hazus analysis; default with a 10-square mile drainage threshold. Currently the Hazus 500-year and annualized loss analysis is being completed by WVDHSEM and Michael Baker Engineering. The next mitigation plan update will include the Hazus annualized loss calculations and mapping.

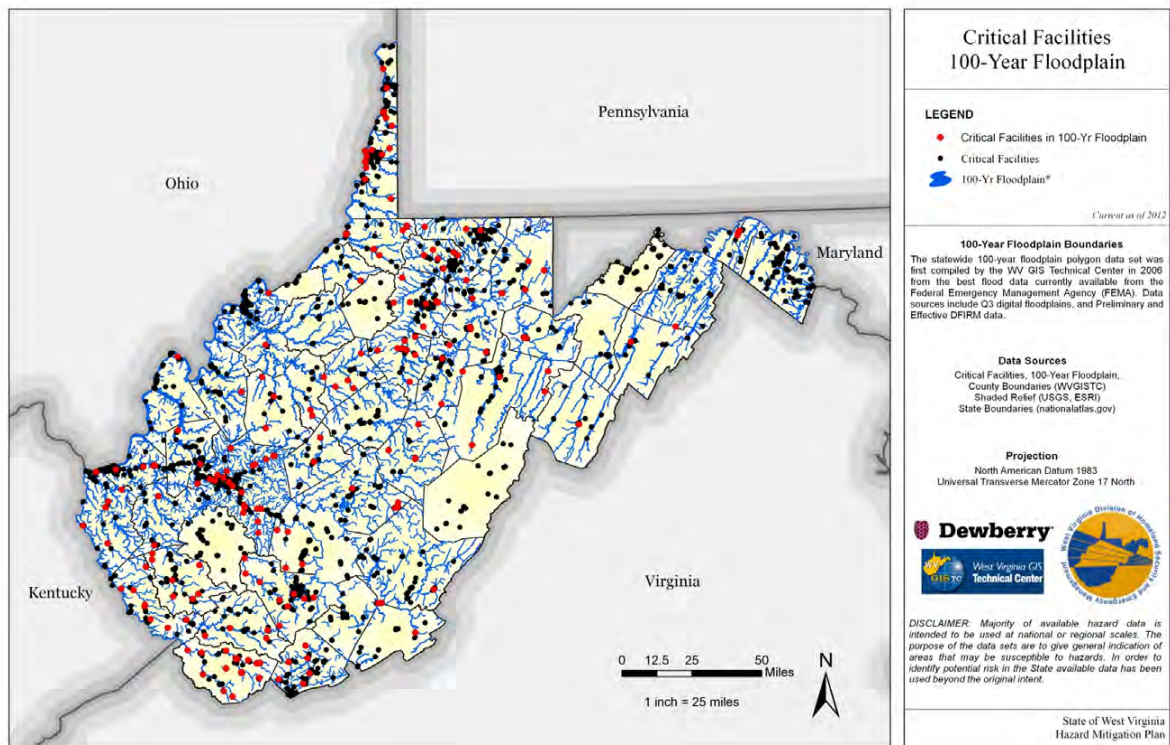


FIGURE 3-32. STATE CRITICAL FACILITIES WITHIN THE 100-YEAR FLOODPLAIN

NCDC and NFIP annualized losses have also been completed for comparison with the 100-year Hazus losses in Table 3-33. The Hazus analysis estimates \$12,973,521 in economic losses due to the 100-year flood event, with the highest losses (over \$500,000) in Wetzel, Kanawha, Putnam, Wood, and Cabell Counties.

West Virginia can expect between \$8,522,491 to \$51,836,811 in damages annually for flood-related events based on NFIP claims and NCDC past events. Annualized damages have been calculated by taking the total damages (property and crop) or claims per jurisdiction and dividing by the period of record. McDowell County has the highest NCDC annualized loss (\$9 million), followed by Wyoming County with more



than \$4.7 million in expected annual damages. NFIP claims indicate Logan County has the highest annualized loss (\$903,273), followed by Mingo County with \$870,095.

The difference between the Hazus, NFIP, and the NCDC estimates can be attributed to a number of factors. NCDC loss values are only based on reported past damages, whether or not the structure is in a designated SFHA. For the time period 1993-2012, NFIP claims span a longer period of record and include all flood events that resulted in a claim, regardless if it was actually a “flood event.” The NCDC database cannot possibly track all instances of flooding, and there is some variability in the reporting. As detailed in Section 3.3, NCDC values may be an over representation or double counting of damages, such as the same damage amounts being used for several county flood event records.

Figure 3-35 utilizes the NFIP claim data for damages and number of events, annualized for use in the ranking methodology. As shown in Figure 3-36, counties with a high annualized loss often have a high composite risk for flooding. All local plans have considered flooding to be a high hazard for their jurisdiction. Section 3.5 of this chapter describes each of the parameters used in the ranking for each hazard.

TABLE 3-33. FLOOD RELATED 100-YEAR AND ANNUALIZED LOSS COMPARISON.

County	Hazus 100-year Flood Loss	NCDC Annualized Flood Loss	NFIP Annualized Flood Loss
Barbour	\$73,247	\$211,296	\$103,777
Berkeley	\$81,563	\$211,471	\$163,167
Boone	\$233,801	\$696,414	\$89,774
Braxton	\$84,108	\$329,179	\$8,271
Brooke	\$350,478	\$1,409,865	\$194,096
Cabell	\$3,395,113	\$521,617	\$167,017
Calhoun	\$26,386	\$257,181	\$68,371
Clay	\$32,609	\$270,936	\$2,696
Doddridge	\$37,952	\$180,768	\$11,233
Fayette	\$247,925	\$3,339,795	\$58,788
Gilmer	\$39,697	\$264,416	\$156,595
Grant	\$46,308	\$469,489	\$88,301
Greenbrier	\$172,053	\$267,142	\$371,845
Hampshire	\$32,206	\$483,460	\$153,533
Hancock	\$248,545	\$2,359,226	\$81,000
Hardy	\$77,512	\$1,227,252	\$106,194
Harrison	\$233,442	\$332,616	\$157,695
Jackson	\$313,870	\$524,776	\$94,512
Jefferson	\$47,260	\$212,214	\$68,595
Kanawha	\$866,904	\$1,795,822	\$517,627
Lewis	\$174,232	\$275,344	\$51,797
Lincoln	\$94,512	\$455,351	\$104,080
Logan	\$418,750	\$2,297,311	\$903,273
Marion	\$154,364	\$537,509	\$121,813



County	Hazus 100-year Flood Loss	NCDC Annualized Flood Loss	NFIP Annualized Flood Loss
Marshall	\$110,231	\$545,996	\$93,029
Mason	\$188,515	\$212,811	\$33,085
McDowell	\$266,756	\$9,155,140	\$209,993
Mercer	\$88,390	\$1,246,601	\$112,339
Mineral	\$166,990	\$612,820	\$43,704
Mingo	\$75,894	\$2,537,519	\$870,095
Monongalia	\$114,808	\$165,177	\$78,456
Monroe	\$29,942	\$153,258	\$7,975
Morgan	\$23,172	\$255,767	\$92,978
Nicholas	\$61,953	\$285,540	\$84,398
Ohio	\$459,305	\$2,906,532	\$773,583
Pendleton	\$20,846	\$1,318,364	\$11,906
Pleasants	\$121,890	\$158,809	\$20,372
Pocahontas	\$77,305	\$182,403	\$446,812
Preston	\$40,599	\$166,541	\$33,511
Putnam	\$895,922	\$342,395	\$37,817
Raleigh	\$97,663	\$3,100,188	\$106,745
Randolph	\$72,924	\$265,190	\$134,085
Ritchie	\$31,684	\$236,084	\$11,652
Roane	\$41,936	\$361,462	\$29,181
Summers	\$61,684	\$150,148	\$159,756
Taylor	\$40,538	\$192,885	\$9,918
Tucker	\$49,491	\$145,087	\$209,180
Tyler	\$188,212	\$237,722	\$8,987
Upshur	\$104,167	\$189,450	\$72,704
Wayne	\$139,939	\$579,418	\$74,241
Webster	\$46,719	\$268,496	\$24,348
Wetzel	\$633,815	\$1,559,047	\$157,819
Wirt	\$28,602	\$204,151	\$17,610
Wood	\$1,010,272	\$401,731	\$321,488
Wyoming	\$200,520	\$4,769,626	\$390,674
<b>Total</b>	<b>\$12,973,521</b>	<b>\$51,836,811</b>	<b>\$8,522,491</b>

As shown in Figure 3-36, most of West Virginia is considered at high risk of flooding. The panhandle of the State has experienced more crop damage due to flooding, while the western part of the State has experienced more flood claims and injuries and deaths related to flooding. Cabell, Kanawha, and Wood Counties have the highest possible risk score due to flooding including events, property and crop damages, population, injuries and deaths, geographic extent, and local plan rankings.

Section 3.19 of this report compares flooding annualized loss and ranking to other hazards. Flooding is considered one of the top hazards that impact all counties in West Virginia. Data for ranking has been annualized so the results can be compared on a common system; this includes deaths and injuries, crop and property damage, and events.

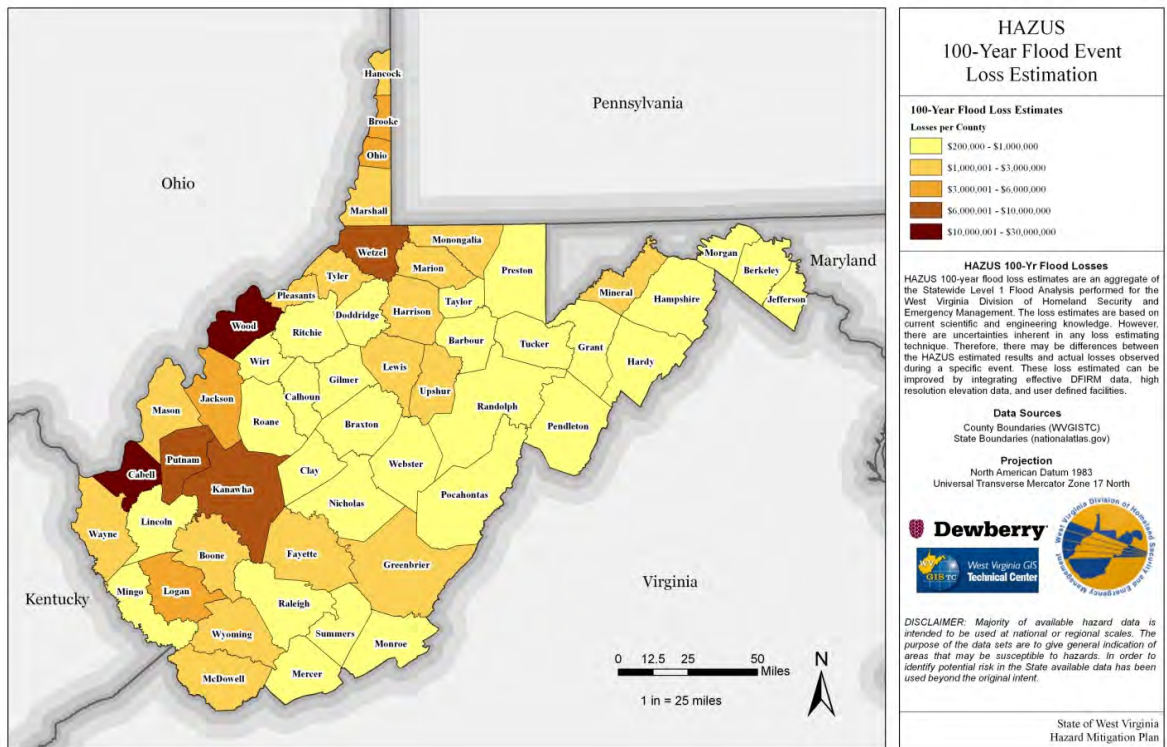


FIGURE 3-33. HAZUS ESTIMATED ECONOMIC LOSSES FOR THE 100-YEAR RETURN PERIOD.

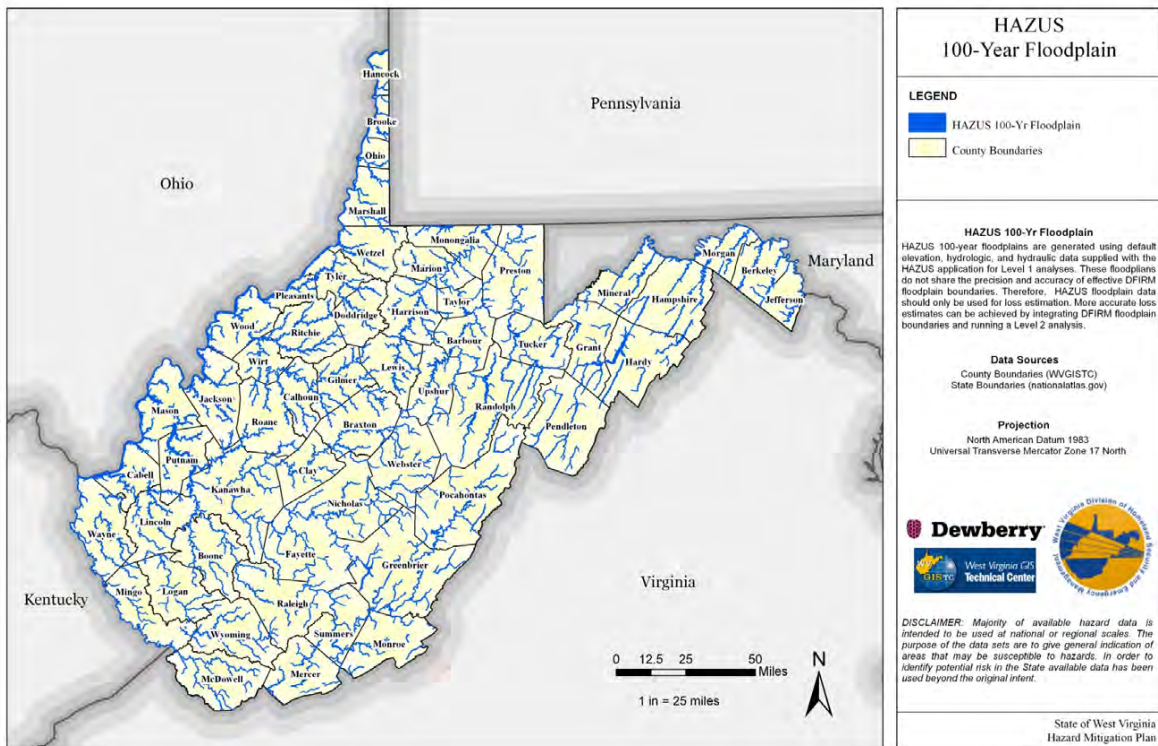


FIGURE 3-34. FLOODPLAINS DELINEATED BY HAZUS USING 10-SQUARE MILE DRAINAGE AREA.

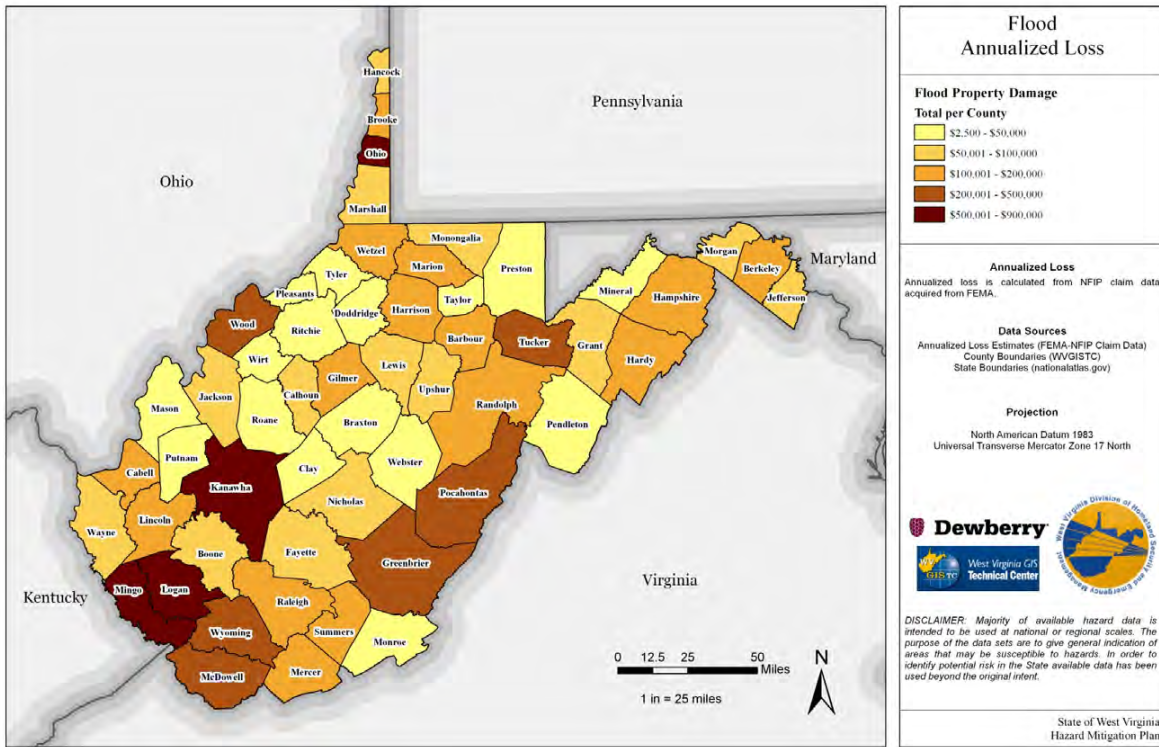


FIGURE 3-35. FLOOD ANNUALIZED LOSS (BASED ON NFIP CLAIM DATA)

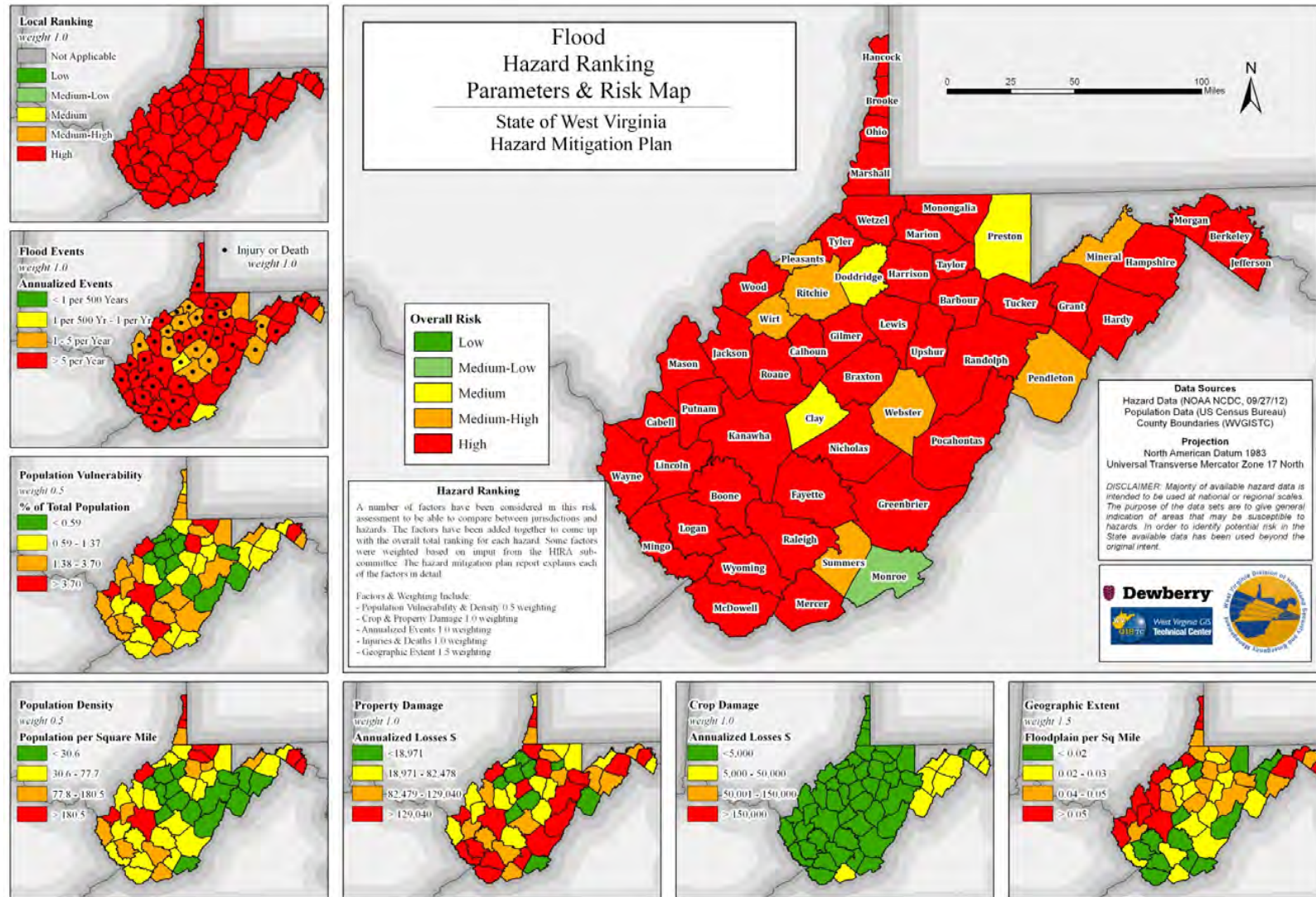


FIGURE 3-36. FLOOD HAZARD RANKING PARAMETERS AND RISK MAP

## 3.8 WIND/SEVERE STORMS (INCLUDING THUNDERSTORMS, TORNADOES, AND HURRICANES)

### 3.8.1 DESCRIPTION

Wind is the movement of air caused by a difference in pressure from one place to another. Local wind systems are created by the immediate geographic features in a given area, such as mountains, valleys, or large bodies of water. Wind poses a risk to West Virginia in several ways, Tornadoes, high winds, downbursts, wind erosion, and wind chill can harm people and damage property and infrastructure. Wind effects can include blowing debris, interruptions in elevated power and communications utilities, and intensification of the effects of other hazards related to winter weather and severe storms.

Based on historical tornado and hurricane data, FEMA has produced a map (Figure 3-37) that depicts maximum wind speeds for design of safe rooms. West Virginia is included in Wind Zone III (200 mph).

West Virginia wind events can produce damage often associated with thunderstorms or tornadoes. In some instances, these events have been associated with weakening tropical weather systems, including downgraded tropical and sub-tropical storm systems. This section examines the risks associated with damaging wind events with emphasis on thunderstorms, tornadoes, and hurricanes.

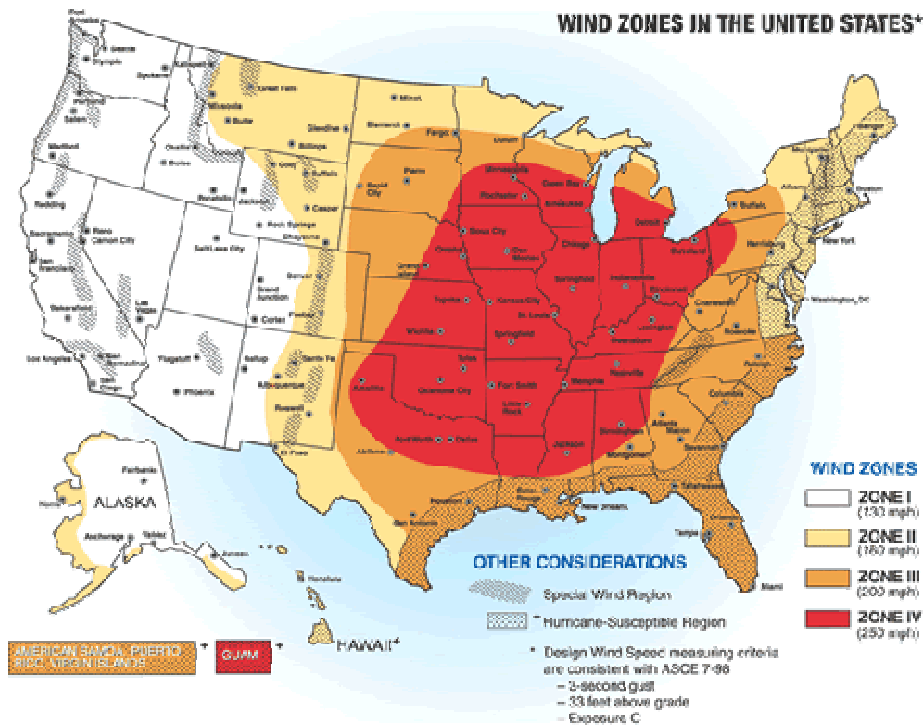


FIGURE 3-37. FEMA SAFE ROOM DESIGN WIND SPEED ZONES FOR UNITED STATES



### 3.8.2 THUNDERSTORMS

A thunderstorm is formed from a combination of moisture, rapidly rising warm air, and a force capable of lifting air such as a warm or cold front, or a sea or lake-breeze. All thunderstorms contain lightning. Thunderstorms may occur singly, in clusters, or in lines. It is possible for several thunderstorms to affect one location in the course of a few hours or for a single, slow-moving storm to affect one location for an extended period. Thunderstorms can contribute to other hazard events, such as flooding (Section 3.7), strong straight-line winds, tornadoes (Section 3.8.3), hail, and lightning, as well as the possibility of lightning-initiated fires.

Downburst winds, typically associated with thunderstorms, are “straight-line” winds that are distinguishable from tornadic activity by their pattern of destruction and debris. Depending on the size, intensity, and location of these events, the destruction to property can be devastating. Downburst winds generally fall into two categories:

1. Microburst: covers an area less than 2.5 miles in diameter;
2. Macroburst: covers an area at least 2.5 miles in diameter.

Another widespread thunderstorm wind event is known as a derecho. Derechos are associated with lines (squall lines) of fast-moving thunderstorms that might vary in length and have the potential to travel hundreds of miles. Winds in these types of events can rival those of “weaker” tornadoes with gusts of 80 to 100 mph covering a wide area. Derechos often taken on a bow-like appearance on Doppler, radar as was observed in the June 29, 2012 event (Figure 3-38) that had a significant impact on West Virginia. Section 3.8.1 provides a full account of this event.

A thunderstorm is considered severe by the NWS if it produces one or more of the following:

1. Winds of 58 mph or higher;
2. Hail 1 inch in diameter (quarter-sized) or larger; or
3. Tornadoes.



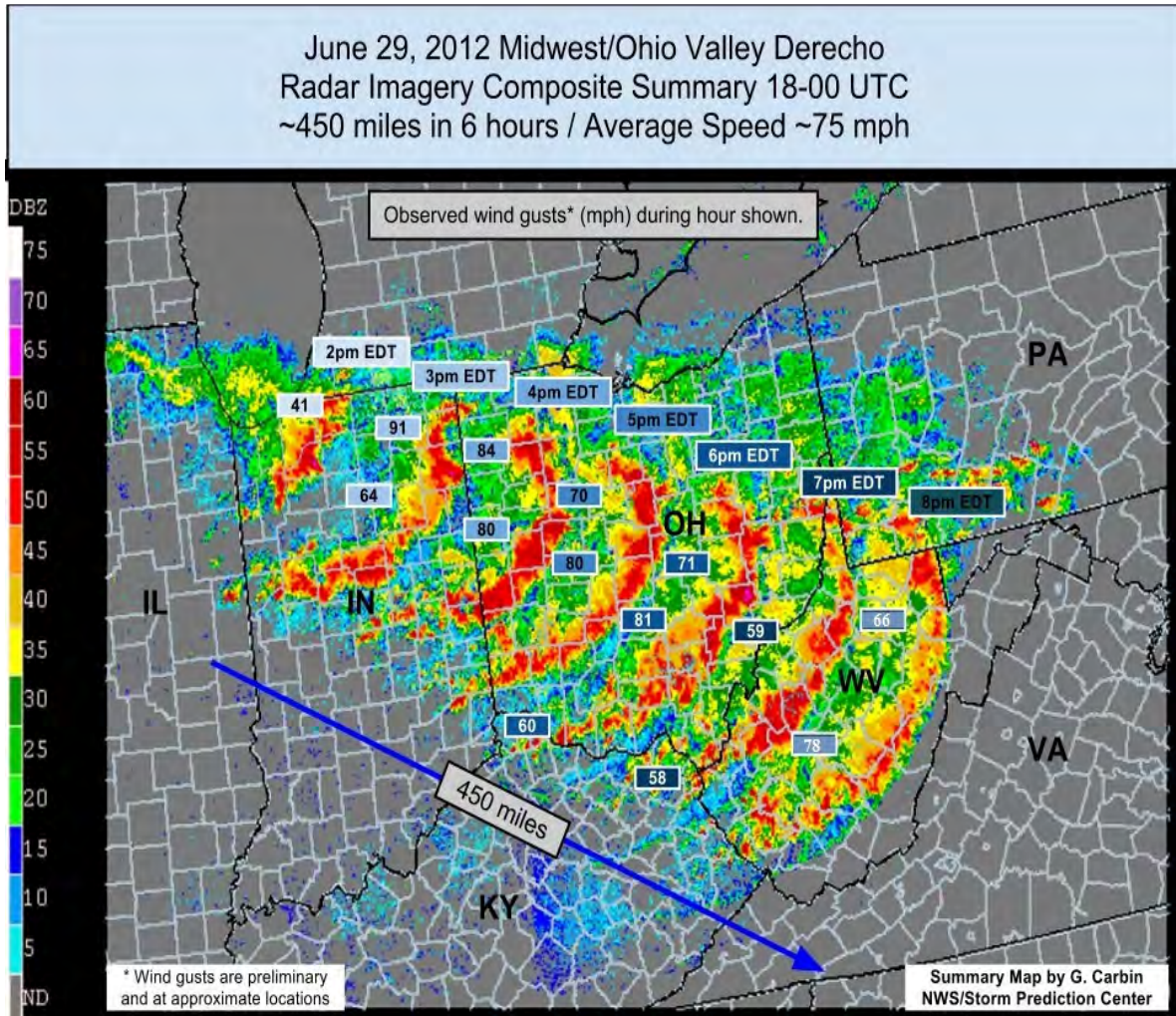


FIGURE 3-38: TIME-SEQUENCED DOPPLER RADAR IMAGERY SHOWS THE PROGRESSION OF A DERECHO EVENT THAT DEVELOPED IN THE MIDWEST AND PROPAGATED RAPIDLY SOUTHEAST ON JUNE 29, 2012 (SOURCE: NWS STORM PREDICTION CENTER).

### 3.8.3 LIGHTNING AND HAIL

Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt." This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches a temperature approaching 50,000° Fahrenheit in a split second. The rapid heating and cooling of air near the lightning causes thunder.

In the United States, 75 to 100 Americans are struck and killed each year by lightning. According to a NOAA technical report, from 1959 through 1994, West Virginia experienced 108 deaths attributed to lightning (NOAA, 2003). According to the NCDC, in the period from 1993 through September, 2012, West Virginia had 82 lightning



events causing six deaths, 49 injuries, no crop damage, and \$4.8 million in property damage.

Some notable lightning events include:

1. On July 25, 2005, one person died as a result of lightning in Kanawha County.
2. Two deaths and one injury occurred on June 11, 1995, due to a lightning strike in Raleigh County.
3. A thunderstorm on August 1, 1995, produced lightning that killed one person and injured another in Mason County.
4. On August 17, 1997, lightning is to blame for one death and approximately \$35,000 in damages in Harrison County.

Since thunderstorms and lightning strikes are difficult to predict, it is extremely difficult to determine probability of future occurrence with any degree of accuracy. It can be projected that West Virginia will continue to experience thunderstorms and additional lightning events are likely. Based on analysis of previous events in the NCDC database, lightning events causing injury, death, or damage have occurred on a seemingly random basis with no particular area West Virginia at higher or lower risk of occurrence. The county ranking of the lightning hazard was performed using NCDC Storm Events data parameters (Figure 3-39). Scores for each county were calculated based on population and measures of historical impact including property damage, crop damage, the number of reported events, and deaths and injuries. Based on this ranking, Barbour, Kanawha, and Jefferson Counties were assigned a Medium-High lightning risk.

Hailstones are balls of ice caused by water droplets being caught in updrafts and transported to a level in the atmosphere that is below freezing. Hailstones can vary in size from small balls of less than 2 centimeters to hailstones as large as softballs. While thunderstorms with hail and lightning can be found throughout the United States, they are most likely to occur in the central and southern states (FEMA, 1997a). NCDC data indicate that there were 2,212 hail events in West Virginia between 1955 and September 2012, causing 3 injuries but no deaths, and \$180,495 in crop damage (in 2012 dollars) and \$34.16 million (in 2012 dollars) in property damage.

Some notable hail events include:

1. On August 30, 2006, hail, the size of golf balls to tennis balls, fell on the West Side hills of Charleston, then across the Knollwood and Mink Shoals vicinity, to Coonskin Park and Capital High School. The swath of reported hail damage extended to Crede and Big Chimney.
2. On April 23, 1999, \$2 million in damages was reported in Barbour County. The county emergency manager reported damage to 172 residences, mostly from hail.

3. Kanawha County experienced approximately \$9 million in damages on June 2, 1998, from large hail. A rotating storm that had formed in southeast Ohio moved southeast through the Kanawha River Valley. The greatest damage was from large hail hitting the urban areas, especially the Kanawha City section of Charleston. Hundreds of vehicles were dented.
4. On June 24, 1992, a thunderstorm produced large hail that injured three in Calhoun County.

As with lightning, thunderstorms are difficult to predict; the occurrence of hail is even more so. As a result, it is difficult to determine probability of future occurrence accurately. It can be projected that West Virginia will continue to experience hail-producing thunderstorms. Through analysis of previous events in the NCDL database, hail events causing injury and damage have occurred randomly.

Ranking county hail hazards was done by using NCDL Storm Events data parameters (Figure 3-40). County scores were calculated based on population and measures of historical impact including property damage, crop damage, the number of reported events, and deaths and injuries. Based on this ranking, Kanawha County has a High risk for hail.

There have not been any Presidential Disaster or Federal Emergency Declarations, nor is there a history of any State Disasters for lightning or hail in West Virginia.

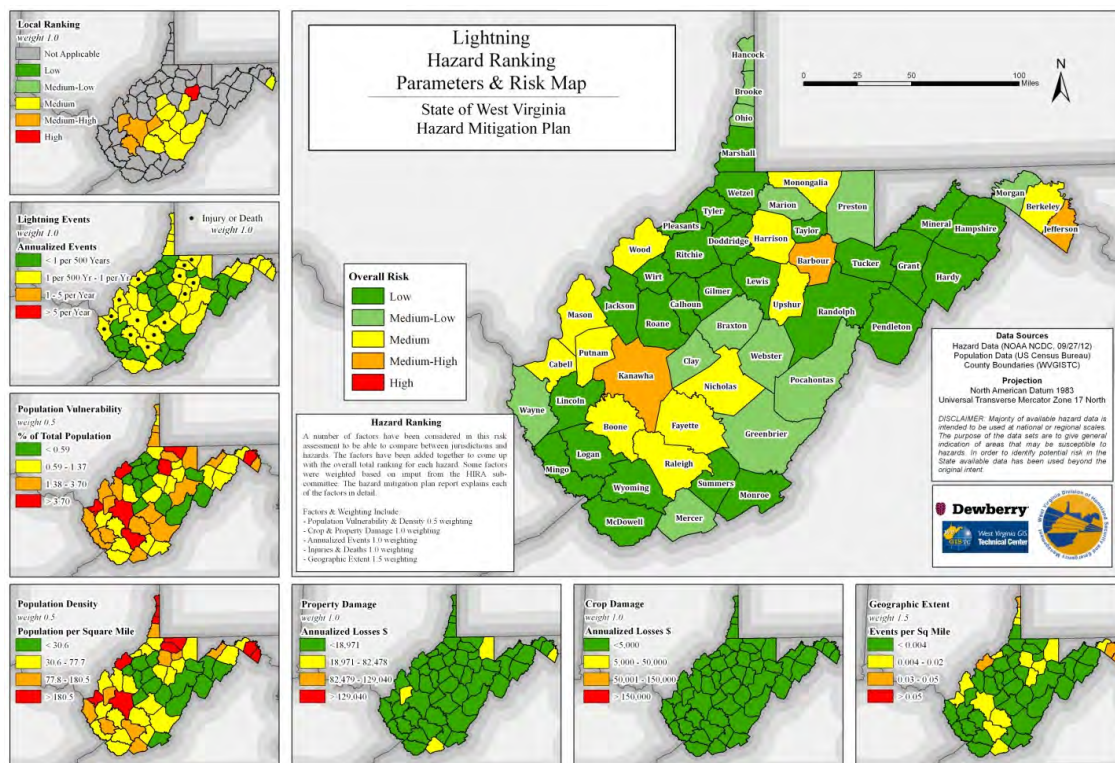


FIGURE 3-39. LIGHTNING HAZARD RANKING PARAMETERS AND RISK MAP

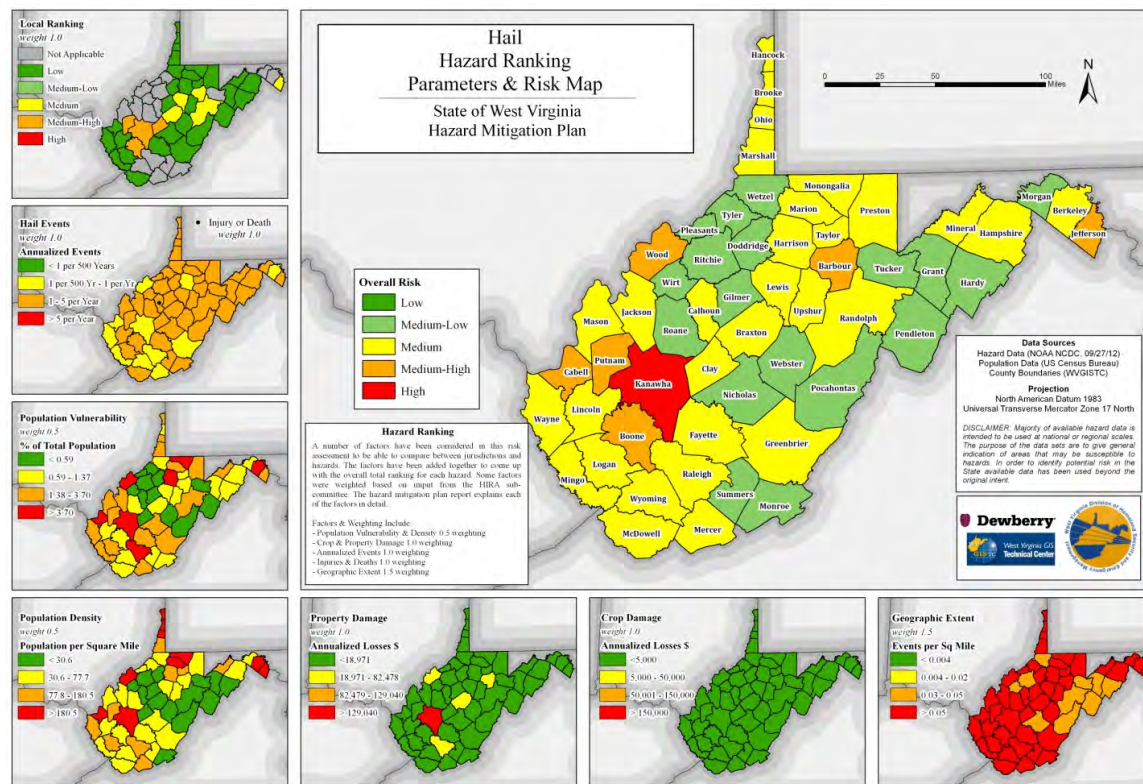


FIGURE 3-40. HAIL HAZARD RANKING PARAMETERS AND RISK MAP

### 3.8.4 HIGH WIND (INCLUDING THUNDERSTORM WINDS)

#### HISTORIC OCCURRENCE

Excluding tornadoes, NCDC data indicates 4,135 recorded wind events in West Virginia between 1955 and September 2012, most associated with thunderstorms. The wind events resulted in \$105.5 million (in 2012 dollars) in property damage. The data show that crops have been damaged by wind as well, with \$1.2 million (in 2012 dollars) reported in crop damages. Table 3-35 lists NCDC wind events by county.

Some notable recent wind events include:

1. On June 29, 2012, storms developed over the Midwest during the late morning, strengthening and consolidating into a nearly solid line west of Chicago. The line extended several hundred miles long, oriented from northeast to southwest. The line of storms raced southeastward through the Midwest and into the Ohio Valley during the afternoon at speeds exceeding 50 mph. The line held together, barreling through West Virginia during the early evening hours. The line produced widespread damage as wind gusts reached more than 80 mph in some locations. Trees and power lines were downed, leaving power and communication outages impacting millions of people from Illinois to Virginia and that lasted for more than a week in some areas. The outages occurred



during particularly hot and humid weather when daily high temperatures in West Virginia ranged from the upper 90s into the lower 100s. The closure of gas stations and grocery stores led to significant inconvenience and in some instances shortages of fuel and food. Governor Earl Ray Tomblin declared a State of Emergency immediately after the event. Damages in the State were estimated to be approximately \$55.7 million.

2. On February 11, 2009, a line of showers produced wind gusts that lifted and shifted the gym roof off of the Twin Branch Pentecostal Christian Academy in McDowell County. The shifting caused the walls of the gym to collapse. A 35 year old woman standing in an adjacent parking lot was killed by debris. Gusts during the event reached 70 to 85 mph.
3. On April 7, 2006, a squall line blew through the southern coal fields region producing damage to homes and businesses and knocking down trees and power lines. Property damage totaled nearly \$1 million. Particularly hard hit were Mingo, Wyoming, and Logan Counties. At least two people were injured as a result of the storms.
4. On July 25, 2005, a 79-year-old man was killed in Charleston when a tree was blown onto him during a thunderstorm. Winds from severe thunderstorms caused scattered damage throughout the State and left at least 50,000 without power.

TABLE 3-34. NOTABLE WIND EVENTS

Date	Event	Location	Injuries	Deaths	Property Damage
6/29/2012	Wind	Statewide	3		\$55.7 M
2/11/2009	Wind	Scattered Statewide		1	\$250 K
4/7/2006	Wind	Southern WV	2		\$958 K
7/25/2005	Wind	Kanawha County	1		\$5 K
6/2/1998	Wind	Kanawha County			\$3.9 M
4/9/1991	Wind	Kanawha County	58		



TABLE 3-35. NCDC WIND EVENTS BY COUNTY.

County	Total Events	Total Property Damage*	Crop Damage*
Barbour County	56	\$1,530,243	\$0
Berkeley County	151	\$1,216,062	\$186,006
Boone County	72	\$1,147,141	\$0
Braxton County	72	\$1,701,310	\$0
Brooke County	104	\$1,748,588	\$0
Cabell County	125	\$4,468,487	\$0
Calhoun County	47	\$1,034,858	\$0
Clay County	49	\$1,139,437	\$0
Doddridge County	51	\$1,734,480	\$0
Fayette County	89	\$3,291,350	\$0
Gilmer County	48	\$1,082,161	\$0
Grant County	87	\$402,076	\$136,707
Greenbrier County	125	\$1,818,300	\$105
Hampshire County	106	\$922,590	\$144,652
Hancock County	105	\$1,174,186	\$0
Hardy County	75	\$422,498	\$136,707
Harrison County	128	\$4,286,580	\$0
Jackson County	86	\$3,930,153	\$0
Jefferson County	137	\$1,564,181	\$157,836
Kanawha County	260	\$13,828,569	\$0
Lewis County	70	\$1,157,351	\$0
Lincoln County	75	\$1,446,566	\$0
Logan County	70	\$1,265,364	\$0
Marion County	97	\$1,314,668	\$0
Marshall County	119	\$1,646,230	\$0
Mason County	98	\$1,907,237	\$0
McDowell County	78	\$1,729,678	\$0
Mercer County	83	\$463,740	\$0
Mineral County	92	\$640,701	\$136,707
Mingo County	60	\$1,961,126	\$0
Monongalia County	117	\$2,205,374	\$0
Monroe County	58	\$990,600	\$0
Morgan County	68	\$691,868	\$143,750
Nicholas County	60	\$2,268,406	\$0
Ohio County	105	\$1,228,380	\$0
Pendleton County	60	\$419,709	\$136,707
Pleasants County	50	\$836,691	\$0
Pocahontas County	33	\$948,059	\$0



County	Total Events	Total Property Damage*	Crop Damage*
Preston County	139	\$1,192,943	\$0
Putnam County	111	\$4,030,331	\$0
Raleigh County	102	\$4,589,527	\$0
Randolph County	88	\$2,204,516	\$0
Ritchie County	65	\$2,041,823	\$0
Roane County	66	\$2,408,477	\$0
Summers County	62	\$489,859	\$0
Taylor County	68	\$774,354	\$0
Tucker County	72	\$878,784	\$0
Tyler County	63	\$1,071,284	\$0
Upshur County	64	\$1,404,394	\$0
Wayne County	109	\$2,285,900	\$0
Webster County	62	\$1,467,491	\$0
Wetzel County	62	\$743,070	\$0
Wirt County	45	\$1,520,961	\$0
Wood County	119	\$6,397,356	\$0
Wyoming County	67	\$463,479	\$0
<b>Total**</b>	<b>4,135</b>	<b>\$105,529,546</b>	<b>\$1,179,178</b>

\*Damages are expressed in 2012 dollars

\*\*Total does not double count zonal events

### 3.8.5 RISK ASSESSMENT

#### PROBABILITY

Due to the somewhat unpredictable nature (especially into the longer term) of damaging wind and thunderstorms in particular, it is difficult to quantitatively determine future probability of the hazard. Modeling of future occurrence is difficult and not practical for purposes of this plan. Instead, an examination of past events was performed using NCDC data that dates to 1950.

Based on historic data, any given West Virginia county has experienced an average of one to four significant wind events per year. At the high end of the spectrum, Kanawha County has experienced approximately 4 events annually. It is worth noting that the differences in the number of reported events may be significantly related to population and population density. Regardless, based on this analysis, it is clear that wind is a significant hazard to West Virginia.

#### IMPACT AND VULNERABILITY

The impact of wind can be measured in financial terms (property and crop damage – see details in *Risk* below) as well as fatalities and injuries. An examination of NCDC data shows that wind contributed to the deaths of at least 13 individuals and injuries sustained by 165 others. Wind vulnerability is based in large part on building



construction and standards. Other factors, such as location, condition, and maintenance of trees also plays a significant role in determining vulnerability.

**RISK**

Risk, as defined as probability multiplied by impact, cannot be fully estimated for damaging winds due to the lack of intensity-damage models for this hazard. Instead, financial impacts of damaging winds can be analyzed based on NCDC Storm Events data. Using this data, property damage adjusted for inflation (in 2009 dollars) related to wind events totaled nearly \$105.5 M or \$1.8M annually. Crop damage from wind was reported at approximately \$1.2 million. Annualized NCDC wind events by county are listed in Table 3-36.

TABLE 3-36. ANNUALIZED NCDC WIND EVENTS BY COUNTY.

County	Annualized Events	Annualized Property Damage	Annualized Crop Damage	Total Annualized Damages
Barbour	0.97	\$26,383	\$0	\$26,383
Berkeley	2.60	\$20,967	\$3,207	\$24,174
Boone	1.24	\$19,778	\$0	\$19,778
Braxton	1.24	\$29,333	\$0	\$29,333
Brooke	1.79	\$30,148	\$0	\$30,148
Cabell	2.16	\$77,043	\$0	\$77,043
Calhoun	0.81	\$17,842	\$0	\$17,842
Clay	0.84	\$19,645	\$0	\$19,645
Doddridge	0.88	\$29,905	\$0	\$29,905
Fayette	1.53	\$56,747	\$0	\$56,747
Gilmer	0.83	\$18,658	\$0	\$18,658
Grant	1.50	\$6,932	\$2,357	\$9,289
Greenbrier	2.16	\$31,350	\$2	\$31,352
Hampshire	1.83	\$15,907	\$2,494	\$18,401
Hancock	1.81	\$20,245	\$0	\$20,245
Hardy	1.29	\$7,284	\$2,357	\$9,641
Harrison	2.21	\$73,907	\$0	\$73,907
Jackson	1.48	\$67,761	\$0	\$67,761
Jefferson	2.36	\$26,969	\$2,721	\$29,690
Kanawha	4.48	\$238,424	\$0	\$238,424
Lewis	1.21	\$19,954	\$0	\$19,954
Lincoln	1.29	\$24,941	\$0	\$24,941
Logan	1.21	\$21,817	\$0	\$21,817
Marion	1.67	\$22,667	\$0	\$22,667
Marshall	2.05	\$28,383	\$0	\$28,383
Mason	1.69	\$32,883	\$0	\$32,883
McDowell	1.34	\$29,822	\$0	\$29,822
Mercer	1.43	\$7,996	\$0	\$7,996
Mineral	1.59	\$11,047	\$2,357	\$13,404
Mingo	1.03	\$33,813	\$0	\$33,813
Monongalia	2.02	\$38,024	\$0	\$38,024
Monroe	1.00	\$17,079	\$0	\$17,079





County	Annualized Events	Annualized Property Damage	Annualized Crop Damage	Total Annualized Damages
Morgan	1.17	\$11,929	\$2,478	\$14,407
Nicholas	1.03	\$39,110	\$0	\$39,110
Ohio	1.81	\$21,179	\$0	\$21,179
Pendleton	1.03	\$7,236	\$2,357	\$9,593
Pleasants	0.86	\$14,426	\$0	\$14,426
Pocahontas	0.57	\$16,346	\$0	\$16,346
Preston	2.40	\$20,568	\$0	\$20,568
Putnam	1.91	\$69,488	\$0	\$69,488
Raleigh	1.76	\$79,130	\$0	\$79,130
Randolph	1.52	\$38,009	\$0	\$38,009
Ritchie	1.12	\$35,204	\$0	\$35,204
Roane	1.14	\$41,525	\$0	\$41,525
Summers	1.07	\$8,446	\$0	\$8,446
Taylor	1.17	\$13,351	\$0	\$13,351
Tucker	1.24	\$15,151	\$0	\$15,151
Tyler	1.09	\$18,470	\$0	\$18,470
Upshur	1.10	\$24,214	\$0	\$24,214
Wayne	1.88	\$39,412	\$0	\$39,412
Webster	1.07	\$25,302	\$0	\$25,302
Wetzel	1.07	\$12,812	\$0	\$12,812
Wirt	0.78	\$26,223	\$0	\$26,223
Wood	2.05	\$110,299	\$0	\$110,299
Wyoming	1.16	\$7,991	\$0	\$7,991
<b>Total</b>		<b>\$1,819,475</b>	<b>\$20,331</b>	<b>\$1,839,806</b>

## JURISDICTIONAL RISK

The county wind hazard risk ranking is based on NCDC Storm Events data parameters. Scores for each county were calculated based on population and measures of historical impact, including property damage, crop damage, the number of reported events, and deaths and injuries. The summary wind hazard rank for West Virginia shows that nearly all counties in the State are considered either Medium-High or High. (See Figure 3-50 Wind Hazard Ranking Parameters and Risk Map)

Counties with a High wind risk include:

1. Barbour County
2. Berkeley County
3. Boone County
4. Cabell County
5. Fayette County
6. Greenbrier County
7. Harrison County
8. Jackson County
9. Jefferson County
10. Kanawha County
11. Logan County
12. Marion County
13. Marshall County
14. Mingo County
15. Monongalia County
16. Morgan County



- 17. Nicholas County
- 18. Ohio County
- 19. Preston County
- 20. Putnam County

- 21. Randolph County
- 22. Roane County
- 23. Wayne County
- 24. Wood County

### 3.8.6 TORNADO WIND

#### DESCRIPTION

A tornado is “a rapidly rotating vortex or funnel of air extending ground-ward from a cumulonimbus cloud” (FEMA, 1997). They typically spawn from thunderstorms, hurricanes, and wildfires. While roughly 1,000 tornadoes a year are generated by thunderstorms, relatively few touch down. As wind speeds increase, as does the level of destruction. The Fujita scale, introduced in 1971 by Dr. Ted Fujita, provided a way to characterize tornadoes based on the damage they produced and relating that damage to the fastest quarter-mile wind at the height of a damaged structure. An Enhanced Fujita scale became operational in 2007 and improves upon the original scale by including more damage indicators, taking into account construction quality and variability, and providing a more definitive correlation between damage and wind speed (see Table 3-41).

TABLE 3-37. ENHANCED FUJITA SCALE FOR TORNADOES COMPARED TO ORIGINAL PREVIOUSLY USED FUJITA SCALE

Fujita Scale			Enhanced Fujita Scale	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)
0	40-72	45-78	0	65-85
1	73-112	79-117	1	86-110
2	113-157	118-161	2	111-135
3	158-207	162-209	3	136-165
4	208-260	210-261	4	166-200
5	261-318	262-317	5	Over 200

#### HISTORIC OCCURRENCE

According to NOAA, West Virginia experiences an average of two tornadoes a year (NCDC, 2012). “Tornado Alley,” which roughly includes portions of South Dakota, Nebraska, Kansas, Oklahoma, and Texas, is known for its susceptibility to tornadoes. This area of high susceptibility does not extend into West Virginia. However, West Virginia has experienced devastating tornadoes in its past. Some notable tornadoes are documented below.

1. On March 2, 2012, an outbreak of tornadoes occurred from the Tennessee and Ohio Valleys and through western portions of West Virginia. An EF-3 tornado



moved from Lawrence County, KY, into and through Wayne County, WV, just after 6:30 pm EST before eventually dissipating in Lincoln County, WV. At least five homes were destroyed in Dunlow and 15 others around Kiahsville and Cove Gap. Winds in the tornado are estimated to have reached 138 mph as it moved through the Dunlow area. Although damage was estimated at nearly \$2 million, no injuries were reported. A separate EF-2 tornado moved out of Martin County, KY, into Mingo County, WV, just after 9:30pm. That tornado scattered debris it had picked up in Kentucky along Route 52 and also the surrounding mountainside. The twister hit and destroyed a railroad communication tower, but did not cause injuries.

2. On September 16, 2010, an EF-3 tornado packing winds of up to 160 mph crossed the Ohio River into Wood County near Belleville. The twister killed a 57-year-old man and injured 10 others. Damage was estimated at \$1 million; at least 10 homes were destroyed and 6 others receiving major damage.
3. On September 17, 2004, an F-2 tornado touched down in Darkesville (Berkeley County) and caused extensive damage to homes and businesses. The twister overturned vehicles on I-81, injuring at least six.
4. A Presidential Disaster was declared for West Virginia from the effects of tornadoes, severe storms, flooding, mudslides, and landslides on June 19, 2008.
5. In November of 2002, there was a State Disaster declaration for damages in Jackson County due to a tornado. For recovery after this event, the State provided more than \$200,000 in individual assistance and approximately \$30,000 in SBA loans were arranged (SBA, 2003).
6. On June 2, 1998, \$5 million in property damage and \$2 in crop damage resulted from an F-2 tornado as it passed southeast through southern Fayette County, PA, the northeast tip of Preston County, WV, and into northwest Garrett County, MD. The total length of the tornado as it passed across these three counties was 12 miles.
7. On June 23, 1944, a tornado struck Shinnston (Harrison County) killing at least 100 people and damaging a significant portion of the town.

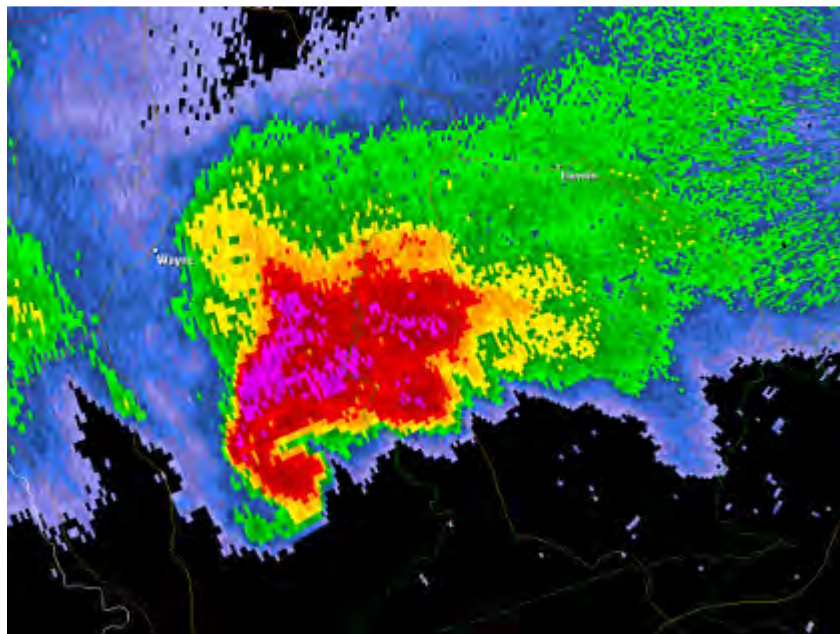


FIGURE 3-41: MARCH 2, 2012 TORNADO OUTBREAK: EF-3 TORNADO TRACKS THROUGH WAYNE & LINCOLN COUNTIES.

\*This Doppler radar image of the parent thunderstorm shows a distinct “hook” echo, which is an indication of strong rotation within the storm. The location of the tornado is near the “ball” of red reflectivity that makes up the end or tail of the hook near the bottom of the image.

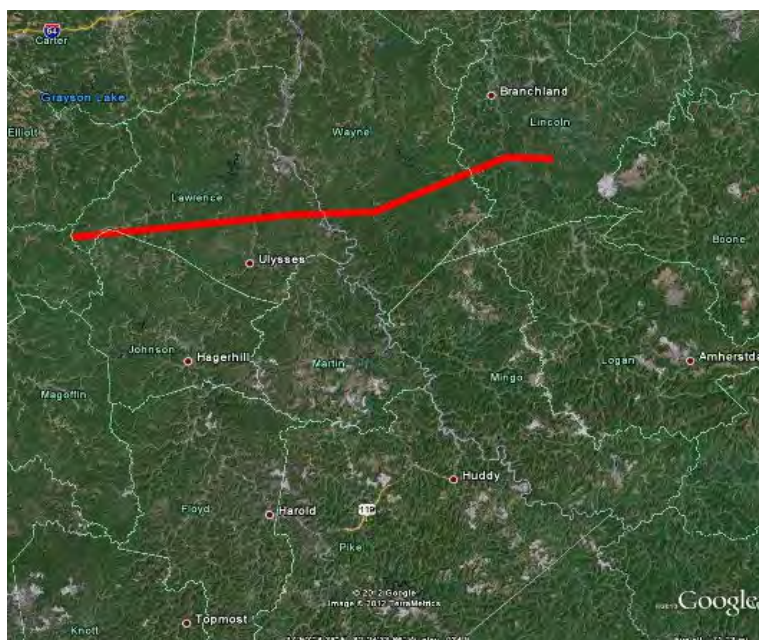


Figure 3-42. March 2, 2012 Tornado Outbreak: EF-3 tornado tracks through Wayne & Lincoln Counties



TABLE 3-38. NCDC TORNADO EVENTS BY COUNTY.

County	Total Events	Total Property Damage*	Crop Damage*
Barbour County	1	\$0	\$0
Berkeley County	10	\$1,919,661	\$14,085
Boone County		\$0	\$0
Braxton County	1	\$4,214	\$0
Brooke County		\$0	\$0
Cabell County	2	\$366,655	\$0
Calhoun County		\$0	\$0
Clay County		\$0	\$0
Doddridge County	2	\$1,047,413	\$0
Fayette County	4	\$13,606,237	\$0
Gilmer County	1	\$106,688	\$0
Grant County	3	\$21,128	\$21,457
Greenbrier County	6	\$14,254,749	\$0
Hampshire County	3	\$169,026	\$211,282
Hancock County		\$0	\$0
Hardy County		\$0	\$0
Harrison County	4	\$15,745,285	\$0
Jackson County	1	\$1,875,760	\$0
Jefferson County	4	\$784,966	\$0
Kanawha County	8	\$497,701	\$0
Lewis County	3	\$2,990,571	\$0
Lincoln County	5	\$638,296	\$0
Logan County		\$0	\$0
Marion County	5	\$756,431	\$4,390
Marshall County	4	\$233,264	\$0
Mason County	3	\$129,293	\$0
McDowell County	2	\$11,749,335	\$0
Mercer County	1	\$18,222	\$0
Mineral County	2	\$218,325	\$154,940
Mingo County	1	\$90,000	\$0
Monongalia County	5	\$8,155,408	\$0
Monroe County	2	\$1,447,917	\$0
Morgan County	2	\$31,160	\$0
Nicholas County	3	\$1,740,274	\$15,310
Ohio County	2	\$0	\$0
Pendleton County	2	\$11,268	\$0
Pleasants County	1	\$631,444	\$0
Pocahontas County			\$0
Preston County	11	\$15,488,529	\$2,817,092
Putnam County	7	\$243,427	\$0
Raleigh County	6	\$12,184,291	\$0



County	Total Events	Total Property Damage*	Crop Damage*
Randolph County	4	\$2,130,182	\$0
Ritchie County		\$0	\$0
Roane County	1	\$0	\$0
Summers County	2	\$193,859	\$0
Taylor County	2	\$171,979	\$0
Tucker County	3	\$0	\$0
Tyler County	1	\$113,330	\$0
Upshur County		\$0	\$0
Wayne County	6	\$3,722,167	\$0
Webster County		\$0	\$0
Wetzel County	1	\$14,633	\$4,390
Wirt County	1	\$78,968	\$0
Wood County	9	\$3,433,368	\$0
Wyoming County	1	\$11,642,647	\$0
<b>Total**</b>	148	\$128,658,072	\$3,242,947

\*Damages are expressed in 2012 dollars; \*\*Total does not double count zonal events

As reported in the NCDC database (Table 3-38), between 1950 and September 2012, these events have resulted in three deaths, 114 injuries, approximately \$3.2 million in crop damages, and \$128.7 million in property damages. Reaching back to 1944, the death toll becomes significant for an eastern State outside of Tornado Alley. Figure 3-43 shows historic tornado tracks and F-Scale rating between 1950 and 2012. The data during this period shows that most West Virginia tornadoes have traveled relatively short distances and were rated F-2 or lower.

The greatest concentrations of events have been in southeastern and north central West Virginia. Table 3-39 below highlights some of the notable tornado events that have impacted the State.

TABLE 3-39. NOTABLE WEST VIRGINIA TORNADO EVENTS

Date	Event	Magnitude	Injuries	Deaths	Property Damage
3/2/2012	Tornado	EF3	0	0	\$1.9 M
3/2/2012	Tornado	EF2	0	0	\$90 K
9/16/2010	Tornado	EF3	10	1	\$1 M
9/17/2004	Tornado	F2	6		\$25 K
6/16/1982	Tornado	F1	0	1	\$250K
6/3/1980	Tornado	F3	15		\$2.5 M
4/4/1974	Tornado	F3	12		\$2.5 M
4/4/1974	Tornado	F3	8	1	\$2.5 M
6/23/1944	Tornado	F4	N/A	100	N/A



### 3.8.7 RISK ASSESSMENT

#### PROBABILITY

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While incidence of tornadoes in West Virginia is relatively infrequent, tornadoes have occurred in West Virginia in the past and will likely occur in the future. Tornado probability was assessed using a modified version of the FEMA Benefit-Cost Analysis Reengineering Methodology Report<sup>27</sup>, for the Tornado Safe Room Module. This methodology report details how Tornado probability was calculated for the Tornado Module of FEMA's Benefit Cost Analysis Toolkit. According to this methodology report, Tornado records maintained by NOAA were geocoded to estimate probability. For complete details on how probability is determined please refer to this report. Figure 3-44 shows historic Tornado Tracks from 1950-2012 in West Virginia.

Historic tornado data is based on the NCDC tornado database (1950-2011) for the State of West Virginia and neighboring States. The database contains records of approximate tornado touchdown points as well as the estimated swath length and width. However, assigning the data to individual counties will result in some counties showing high probabilities, while adjacent counties will show low probabilities.

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<sup>27</sup> FEMA, 2010. Benefit-Cost Analysis Re-engineering Report: Tornado Methodology Report. Pg 8. Retrieved on 9/24/13 from: <http://www.fema.gov/media-library/assets/documents/19110>

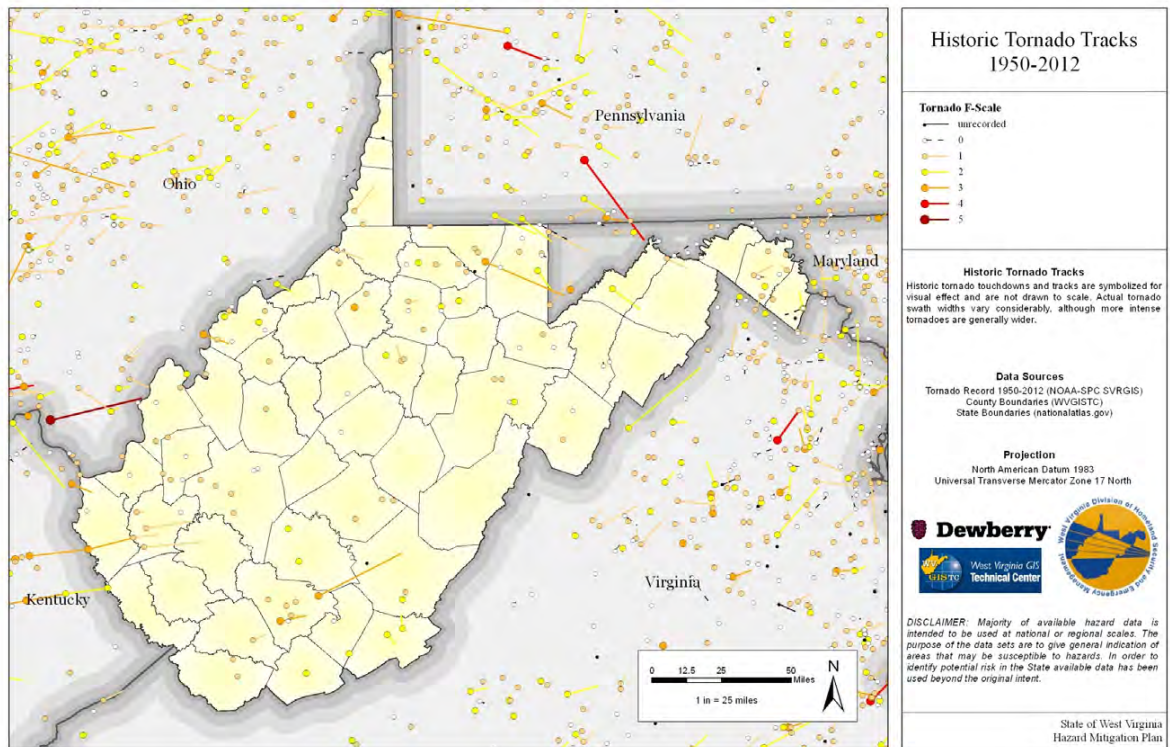


FIGURE 3-43. HISTORIC TORNADO TRACKS, 1950-2012

Actually, tornado probability is much more gradual when examined over large areas. Therefore, tornado events were assigned to a grid-cell system, an approach developed by Ashley, 2007<sup>28</sup>. For this assessment, a 60-square-kilometer grid-cell system was developed for West Virginia, Ohio, Pennsylvania, Kentucky, and Virginia. Each tornado touchdown point was assigned to coincident grid cells. The effective area for each event was estimated by multiplying the swath width by the swath length. The result is a probability grid where each grid cell represents the annual tornado probability as a percentage. Although generally low statewide, tornado probability was calculated as slightly elevated (still generally less than 7% probability annually) in the State’s panhandles relative to the rest of the State.

This data does not necessarily mean that more tornadoes have occurred in the past in these particular areas or that the probability is necessarily higher that future tornadoes will occur there. It is possible that more tornadoes were reported in these

<sup>28</sup> Ashley, W.S., 2007: Spatial and Temporal Analysis of Tornado Fatalities in the United States: 1880–2005. *Wea. Forecasting*, 22, 1214–1228.



areas since they have higher populations and therefore more people to witness tornado events. Tornadoes that occur in less densely populated counties may go unobserved and/or under-reported.

There were 148 tornadoes reported between 1950 and September 2012. Many were too weak to cause damage. The data shows that on an annualized basis, the highest tornado event totals by county approach 0.2 tornado events per year. In other words, the highest tornado frequency for any particular county is roughly one tornado every six years, with twisters generally occurring less frequently in most counties. For reference, annualized totals for winter weather events show the highest occurrence of about 10 events annually in the highest elevations of the State. There does not appear to be a distinct pattern as to which portions of West Virginia are at the greatest risk for future tornado occurrence.

### IMPACT AND VULNERABILITY

Tornadoes are high-impact, low-probability hazards whose effect is dependent on its intensity and the vulnerability of development in its path. Qualification of tornado impact has not been performed for this analysis. Future plan updates might investigate the feasibility of methods for doing so.

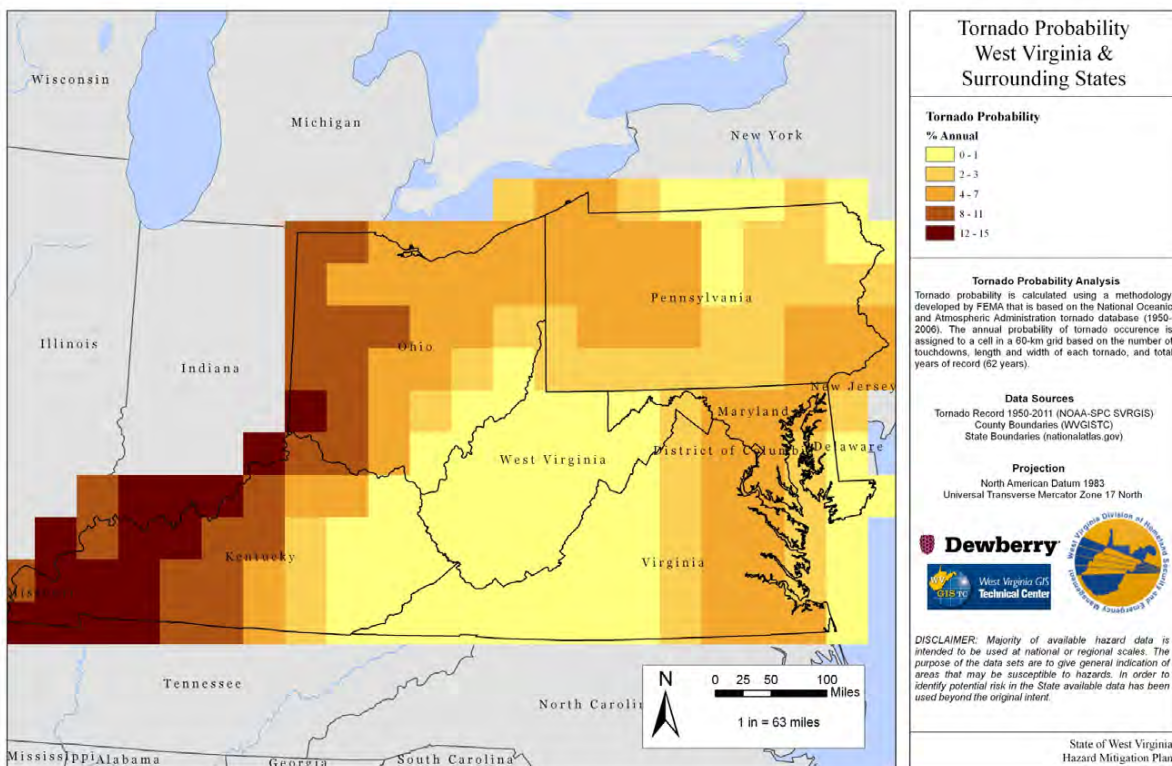


FIGURE 3-44. TORNADO PROBABILITY.



Tornado vulnerability is based on building construction and standards, the availability of shelters or safe rooms, and advanced warning capabilities. Even well-constructed buildings are vulnerable to the effects of a stronger (generally EF-2 or higher) tornado. Due to the relatively low incidence and risk for tornado, traditional “Tornado Alley” mitigation methods such as tornado safe rooms may not be economically feasible in West Virginia.

## RISK

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A calculation of annualized tornado risk as a function of probability and impact has not been performed for this analysis. Instead, tornado probability has been quantified in terms of historical frequency. Although it is possible that this data may be biased by population factors, the frequency analysis provides a reasonable estimation of relative tornado hazard probability across the State.

Based on NCDC Storm Events data, between 1950 and 2012, nearly \$128 million (adjusted to 2012 dollars) in tornado-related property damage was reported in West Virginia. On an annualized basis, this is about \$2 million annually. During the same period, tornado-related crop damage totaled nearly \$3.2 million (adjusted to 2012 dollars), or roughly \$51,475 annually.



TABLE 3-40. ANNUALIZED NCDC TORNADO EVENTS BY COUNTY.

County	Annualized Events	Annualized Property Damage	Annualized Crop Damage	Total Annualized Damages
Barbour County	0.02	\$0	\$0	\$0
Berkeley County	0.16	\$30,471	\$224	\$30,694
Boone County				\$0
Braxton County	0.02	\$67	\$0	\$67
Brooke County				\$0
Cabell County	0.03	\$5,820	\$0	\$5,820
Calhoun County				\$0
Clay County				\$0
Doddridge County	0.03	\$16,626	\$0	\$16,626
Fayette County	0.06	\$215,972	\$0	\$215,972
Gilmer County	0.02	\$1,693	\$0	\$1,693
Grant County	0.05	\$335	\$341	\$676
Greenbrier County	0.10	\$226,266	\$0	\$226,266
Hampshire County	0.05	\$2,683	\$3,354	\$6,037
Hancock County				\$0
Hardy County				\$0
Harrison County	0.06	\$249,925	\$0	\$249,925
Jackson County	0.02	\$29,774	\$0	\$29,774
Jefferson County	0.06	\$12,460	\$0	\$12,460
Kanawha County	0.13	\$7,900	\$0	\$7,900
Lewis County	0.05	\$47,469	\$0	\$47,469
Lincoln County	0.08	\$10,132	\$0	\$10,132
Logan County				\$0
Marion County	0.08	\$12,007	\$70	\$12,077
Marshall County	0.06	\$3,703	\$0	\$3,703
Mason County	0.05	\$2,052	\$0	\$2,052
McDowell County	0.03	\$186,497	\$0	\$186,497
Mercer County	0.02	\$289	\$0	\$289
Mineral County	0.03	\$3,465	\$2,459	\$5,925
Mingo County	0.02	\$1,429	\$0	\$1,429
Monongalia County	0.08	\$129,451	\$0	\$129,451
Monroe County	0.03	\$22,983	\$0	\$22,983
Morgan County	0.03	\$495	\$0	\$495
Nicholas County	0.05	\$27,623	\$243	\$27,866
Ohio County	0.03	\$0	\$0	\$0
Pendleton County	0.03	\$179	\$0	\$179
Pleasants County	0.02	\$10,023	\$0	\$10,023
Pocahontas County				\$0
Preston County	0.17	\$245,850	\$44,716	\$290,565



County	Annualized Events	Annualized Property Damage	Annualized Crop Damage	Total Annualized Damages
Putnam County	0.11	\$3,864	\$0	\$3,864
Raleigh County	0.10	\$193,401	\$0	\$193,401
Randolph County	0.06	\$33,812	\$0	\$33,812
Ritchie County				\$0
Roane County	0.02	\$0	\$0	\$0
Summers County	0.03	\$3,077	\$0	\$3,077
Taylor County	0.03	\$2,730	\$0	\$2,730
Tucker County	0.05	\$0	\$0	\$0
Tyler County	0.02	\$1,799	\$0	\$1,799
Upshur County				\$0
Wayne County	0.10	\$59,082	\$0	\$59,082
Webster County				\$0
Wetzel County	0.02	\$232	\$70	\$302
Wirt County	0.02	\$1,253	\$0	\$1,253
Wood County	0.14	\$54,498	\$0	\$54,498
Wyoming County	0.02	\$184,804	\$0	\$184,804
<b>Total</b>		\$2,042,192	\$51,475	\$2,093,667

## FACILITY RISK

State facility risk was determined by examining annualized tornado events, annualized property damage, and facility details such as construction type and distribution throughout West Virginia. Tornado risk can be described in part in terms of historical event frequency and property data. For our analysis we relied on NCDC Storm Events data. While the tornado frequency in West Virginia is quite low relative to that of the Plains and Gulf Coast States, there is some minor variability of reported occurrence across the State. Preston, Berkeley, Wood, and Kanawha Counties have slightly elevated tornado frequency relative to other counties in the State, having recorded between 0.14 and 0.17 events on an annualized basis. Harrison County has the highest annualized losses at approximately \$249,000 based on historical damages.

Construction type and age also play a role in vulnerability of facilities to tornadoes. In general, concrete, brick, and steel-framed structures fare better during tornadoes than older, wood-framed structures. It is noted that of the State facilities located in counties found to have elevated tornado risk (relative to all counties in the State), most were not constructed of heavy timber. Table 3-41 lists the types of construction of State facilities and Table 3-42 provides the dollar values of buildings and building contents in counties considered at high risk from tornadoes. No further spatial definition for the risk areas could be defined; as such, the values shown in the tables are the total number of facilities, as shown in Table 3-16.



TABLE 3-41. CONSTRUCTION TYPE OF STATE FACILITIES IN ‘HIGH’ TORNADO RISK COUNTIES

County	Brick	Frame/Metal	Heavy Timber	Masonry Joisted	Total Structures
Jefferson	28	108	2	101	329
Berkeley	39	165	2	90	362

TABLE 3-42. DOLLAR VALUES OF STATE FACILITIES IN ‘HIGH’ TORNADO RISK COUNTIES

County	Number of facilities	Sum of Building Values	Sum of Contents Values	Total Value (building & contents)
Jefferson	329	\$591,326,408	\$88,778,908	\$680,105,316
Berkeley	362	\$360,225,643	\$50,067,463	\$410,293,106

Even a well-constructed brick or concrete structure may be vulnerable to the most intense (EF-3 or higher) tornadoes. For this reason, consideration should be given to including safe rooms in new construction or retrofitting previously constructed buildings with safe rooms.

Critical facility risk was determined in the same way as State Facility Risk, by examining annualized tornado events and annualized property damage; however, facility details such as construction type were not available. Tornado risk can be described in part in terms of historical event frequency and property data. NCDC Storm Events data formed the basis of the analysis. While much of West Virginia experiences relatively infrequent tornado occurrence, Preston, Berkeley, Wood, and Kanawha Counties have slightly elevated tornado frequency relative to other counties in the State, having recorded between 0.14 and 0.17 events on an annualized basis. In terms of damages, based on historical data, Harrison County has the highest annualized losses at approximately \$249,000. When considering all factors that determine hazard ranking, including population, Jefferson and Berkeley Counties were determined to be high relative to the other counties of the south.

The type and age of construction plays a role in vulnerability of facilities to tornadoes. In general, concrete, brick and steel-framed structures tend to fare better in tornadoes than older, wood-framed structures. Table 3-43 shows a listing of the number of critical facilities in counties considered at ‘high’ risk from tornadoes. This is just a subset of the facilities shown in Table 3-18.

TABLE 3-43. NUMBER OF CRITICAL FACILITIES IN ‘HIGH’ TORNADO RISK COUNTIES

County	EOC	Fire Depts	Hospital	Police Depts	School	Total
Berkeley County	1	13	1	6	33	54
Jefferson County	1	7	1	8	17	34



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## JURISDICTIONAL RISK

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The county tornado hazard rank is based on NCDC Storm Events data parameters. Scores for each county were calculated based on population and measures of historical impact including property damage, crop damage, and the number of reported events. The composite tornado hazard rank for West Virginia shows that the counties facing the greatest tornado risk are located in the northeastern Panhandle of the State. Counties with a high tornado risk include Berkeley and Jefferson.

Counties with Medium-High risk of tornadoes includes:

1. Fayette County
2. Greenbrier County
3. Kanawha County
4. Lewis County
5. Monongalia County
6. Nicholas County
7. Preston County
8. Raleigh County
9. Randolph County
10. Wood County

While some counties have a Low tornado risk ranking, it is important to remember that tornadoes can occur spontaneously at any time in any county.

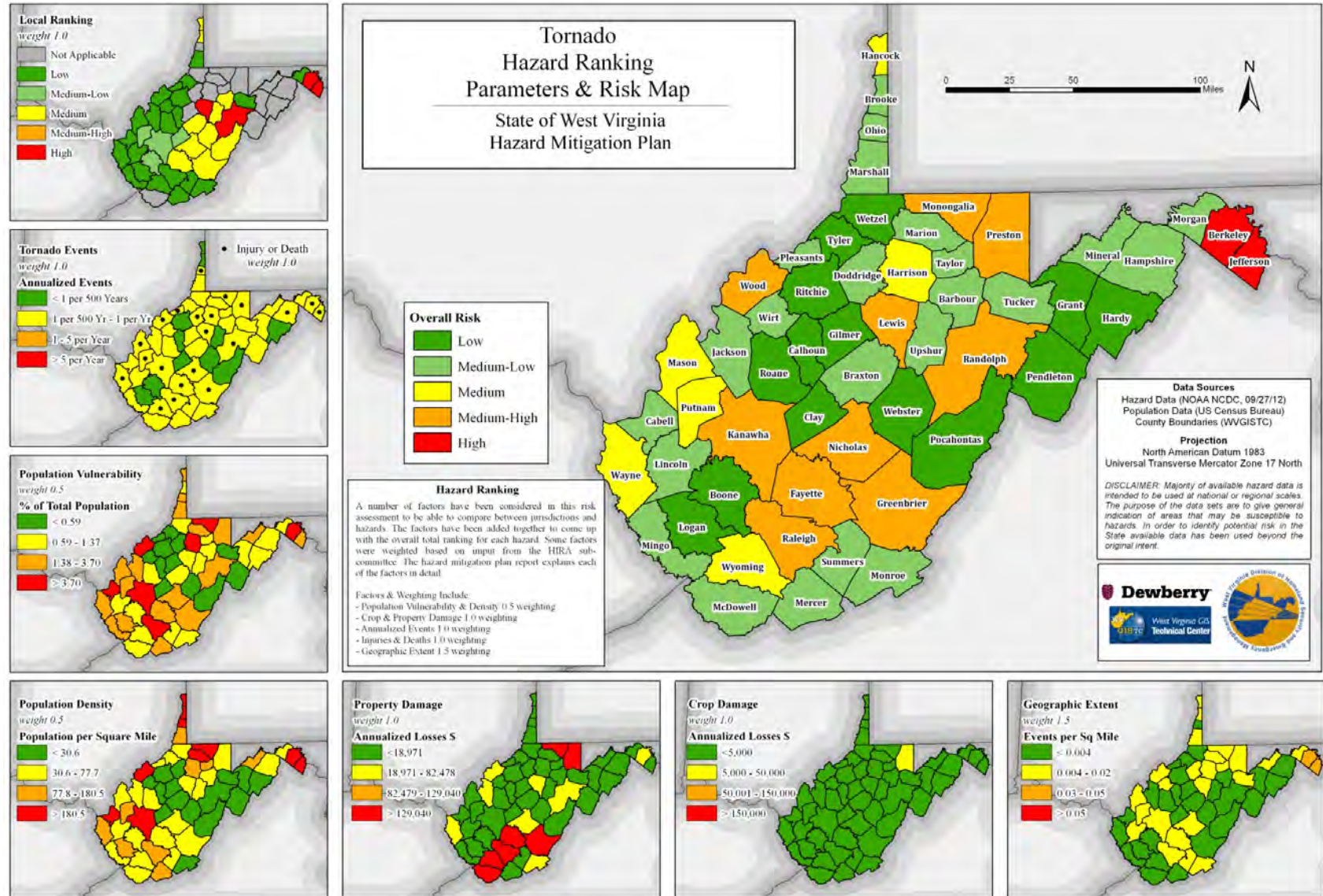


FIGURE 3-45. TORNADO HAZARD RANKING PARAMETERS AND RISK MAP



### 3.8.8 HURRICANES

#### DESCRIPTION

Hurricanes pose a danger from torrential rains, high winds, and storm surges in coastal areas, and pose more of a flooding and occasional gusty wind threat once inland and impacting West Virginia. In order to be classified as a hurricane, the storm must have sustained winds exceeding 74 mph. Although originating over the ocean, a hurricane can move across inland areas and can last for days. Hurricanes can also spawn other severe weather events (e.g., thunderstorms, tornados and flash floods).

Hurricanes are classified by their damage potential according to a scale developed in the 1970s by Robert Simpson and Herbert Saffir, and updated slightly by the National Hurricane Center in 2012. The scale is designed to give public officials and the general public usable information on the magnitude of a storm. Table 3-44 presents a simplified version of the Saffir / Simpson scale. Hurricanes of Category 3 or greater are responsible for the greatest loss of life and the largest amounts of property damage.

TABLE 3-44. SAFFIR / SIMPSON SCALE OF HURRICANE INTENSITY

Hurricane Category	Wind Speed	Damage Potential
1	75-95 mph	Some Damage
2	96-110 mph	Extensive
3	111-129 mph	Devastating
4	130-156 mph	Catastrophic
5	>157 mph	Catastrophic

By the time a storm classified as a hurricane at the United States coastline arrives in West Virginia, it has most likely weakened into a tropical storm or depression. Tropical storms are defined as tropical cyclones with sustained winds from 39 to 73 mph, and depressions are characterized by sustained winds of less than 39 mph. Both are low-pressure systems formed over tropical oceans and are accompanied by torrential rains. These types of storms pose similar dangers as hurricanes, but with reduced threat from wind speeds.

#### HISTORIC OCCURRENCE

Presidential Disasters have been declared for West Virginia counties associated with hurricane events. However, these storms generally do not have hurricane force winds by the time they reach the West Virginia border, and the resulting damages from the storms are mostly due to flooding. A rather unusual situation occurred in late October 2012 with Hurricane Sandy. The hurricane tracked along the East Coast and made landfall over the New Jersey coast. At the time of landfall, the hurricane was transitioning into a non-tropical (extratropical or post-tropical) storm, which is





something more akin to a strong Nor'easter. The wind field associated with Sandy was unusually wide, with tropical-storm force winds extending for several hundred miles away from the storm's center. West Virginia was on the cold side of the storm, where much of the precipitation in the higher elevations fell as a heavy, wet snow. The combination of heavy snow and strong winds brought down trees and power lines and led to widespread power outages and significant disruption to travel. At least six deaths in West Virginia were attributed to the storm.

Federally declared hurricane related events are listed and described in Section 3.3 of this report. Section 3.7 describes flooding related hazards for West Virginia. Federally declared hurricane related events in West Virginia include:

1. July 3, 1972 Tropical Storm Agnes (DR 344)
2. September 11, 1996 Hurricane Fran (DR 1137)
3. September 23, 2003 Hurricane Isabel (DR 1496)
4. September 2005 Hurricane Katrina Evacuation (Emergency Declaration 3221)
5. October 29, 2012 Hurricane Sandy (Emergency Declaration 3358)

Planners can learn from past hurricane/tropical storm events to best prepare for such storms tracking toward the State. Located inland from the Atlantic and Gulf coastlines, West Virginia is relatively less susceptible to major damages from hurricanes and tropical storms than other States in the eastern United States. However, many of these storms have affected West Virginia in some way during the 20th century. Figure 3-46 shows the paths of some of the major tropical systems that have passed through or near West Virginia. As shown, most of these major storms tracked across or nearest to the eastern portion of the State.

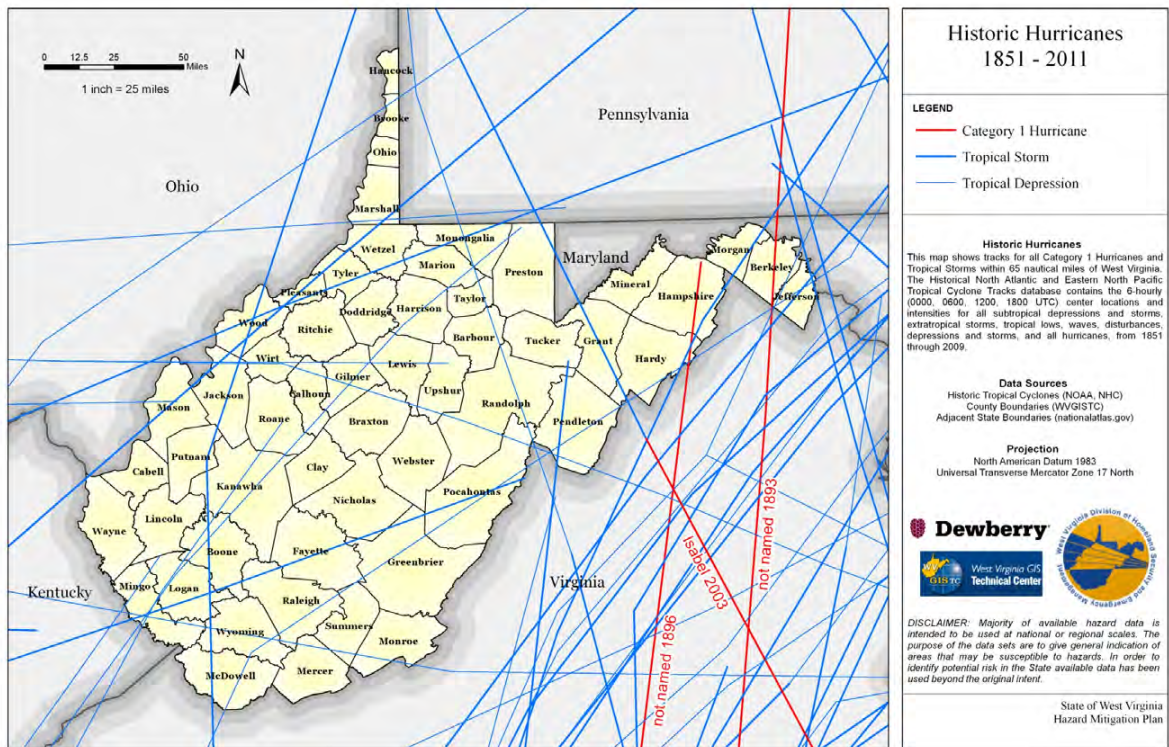


FIGURE 3-46. HISTORIC HURRICANES, 1851 – 2012

## RISK ASSESSMENT

Results from FEMA’s Hazus-MH hurricane model have been used to estimate annualized losses. It allows users to estimate hurricane winds and potential damage and loss to residential, commercial, and industrial buildings. The model makes use of state-of-the-art wind field models, calibrated and validated using full-scale hurricane data. Wind speed has been calculated as a function of central pressure, translation speed, and surface roughness. The results presented here are based on a Level 1 analysis for the hurricane wind module. Level 1 analysis involves using the provided hazard and inventory data with no outside data collection. This is an acceptable level of information for mitigation planning; future updates of the plan might be enhanced with Level 2 and 3 analysis.

## PROBABILITY

The Hazus-MH hurricane analysis of 100-year wind shows that only McDowell and Mercer Counties experienced low-end Category 1 hurricane peak wind gusts of 74 to 75 mph, while much of the southern and central portions of the State can expect peak gusts of tropical storm strength (39-73 mph). Most office buildings are designed for a 50-year wind event (2% annual probability). ASCE 7 requires office buildings where more than 300 people congregate in one area to be designed for a 100-year mean



recurrence interval wind event; therefore, these particular office buildings are designed to resist stronger, rarer storms than most office buildings.<sup>29</sup> Other office buildings that must be designed for a 100-year mean recurrence interval wind event include:

1. Buildings that will be used for hurricane or other emergency shelter
2. Buildings housing a day care center with capacity greater than 150 occupants
3. Buildings designated for emergency preparedness, communication, or emergency operation center or response
4. Buildings housing critical national defense functions
5. Buildings containing sufficient quantities of hazardous materials

The Hazus 1000-year recurrence wind speed analysis shows that much of the southern/southwestern portion of the State can experience low-end Category I (75 mph) peak gusts, and Mercer County may have up to low-end Category II wind gusts (up to 97 mph). The central portions of the State were analyzed as experiencing up to tropical storm strength gusts of 39 – 73 mph, while the remainder of the State would theoretically see gusts of tropical depression strength (less than 39 mph). It should be noted that winds on ridge tops may be slightly higher than winds at lower elevations within decaying tropical weather systems.

Based on a range of long-term global climate models under Intergovernmental Panel on Climate Change (IPCC) warming scenarios, it is likely that hurricanes in the Atlantic basin will become more intense, with stronger winds and heavier precipitation through the 21<sup>st</sup> century. Using an ensemble-mean of 18 climate models, IPCC A1B emissions scenario<sup>30</sup>, and operational hurricane forecast models, one study<sup>31</sup> showed a decrease in the total number of tropical storms and hurricanes, but an increase in the number of intense hurricanes, particularly Category 4 or 5 hurricanes. What impact this might have on West Virginia in the future remains uncertain.

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<sup>29</sup> Whole Building Design Guide (WBDG) Wind Safety of the Building Envelop by Tom Smith 5/26/2008

<sup>30</sup> IPCC Special Report on Emissions Scenarios, 2000

<sup>31</sup> Modeled Impact of Anthropogenic Warming on the Frequency of Intense Atlantic Hurricanes, Morris A. Bender, Thomas R. Knutson, Robert E. Tuleya, Joseph J. Sirutis, Gabriel A. Vecchi, Stephen T. Garner, Isaac M. Held

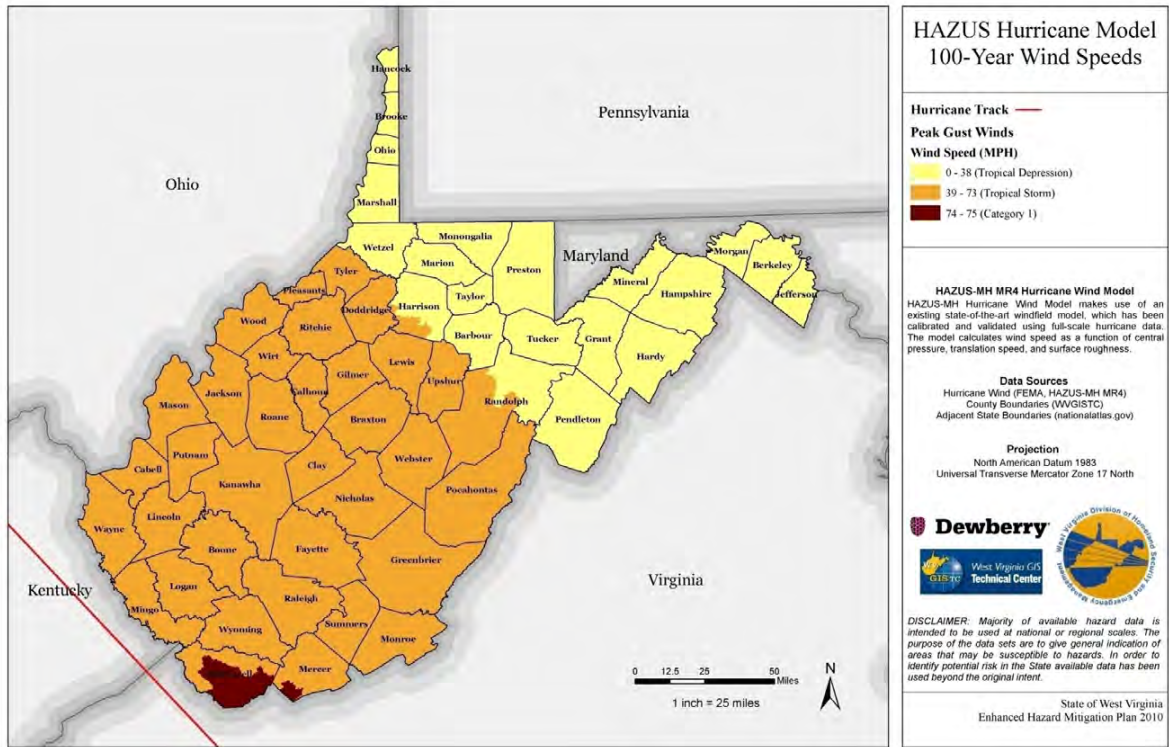


FIGURE 3-47. HAZUS HURRICANE MODEL, 100-YEAR EVENT WIND SPEEDS

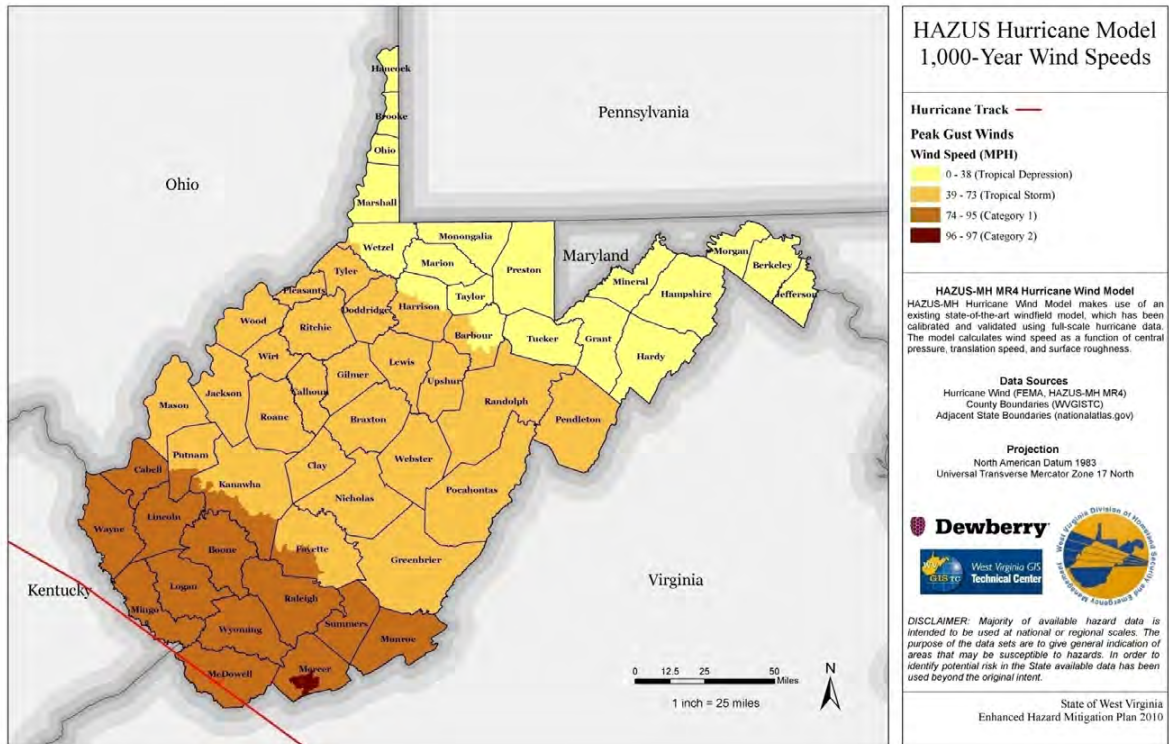


FIGURE 3-48. HAZUS HURRICANE MODEL, 1,000-YEAR EVENT WIND SPEEDS



## IMPACT AND VULNERABILITY

In instances where tropical storms have tracked over the State, they have quickly moved out of the area and been significantly weakened. Risk from tropical storm events in West Virginia is somewhat higher in the southern counties and for properties in areas prone to flash flooding and areas susceptible to damage from high winds. These hazards are profiled in Sections 3.7 (Floods) and 3.8 (Wind).

The flooding and high winds associated with hurricanes may also disrupt the distribution of gasoline, kerosene, diesel fuel, fuel oils, propane, and other petroleum products. This disruption could cause major problems for organizations and businesses that rely on such supplies. Additionally, such a disruption could affect backup power generation.

An indirect cost to West Virginia due to hurricanes is evacuation aid given to residents of other States directly hit by the events. A Federal Emergency declaration was declared for all West Virginia counties in September of 2005 “to supplement its efforts to assist evacuees from areas struck by Hurricane Katrina” (FEMA, 2005). The State opened Camp Dawson in Pendleton County, and received approximately 323 evacuees at that location. Public Assistance was provided to the many State agencies providing aid to evacuees located at Camp Dawson as well as other locations across the State.

## RISK

Annualized loss was calculated by Hazus-MH using the probabilistic scenario and is shown by county in Figure 3-49. Annualized loss is defined as the expected value of loss in any one year, and is developed by aggregating the losses and their exceedance probabilities. The total annualized loss for the State based on this analysis was nearly \$1.5M averaging \$26,707 per county. Kanawha County had the highest annualized loss of any West Virginia county at \$104,720. Table 3-45 shows annualized losses for other select counties where losses were greater than \$50,000.

TABLE 3-45. HAZUS-MH HURRICANE WIND ANNUALIZED LOSS

County	Annualized Loss (for HAZUS hurricane wind)
Kanawha County	\$104,720
Berkeley County	\$97,300
Jefferson County	\$91,310
Raleigh County	\$65,740
Mercer County	\$58,260
Greenbrier County	\$54,380

Figure 3-50 shows the hazard rank for high winds (tropical storm, thunderstorm, and non-thunderstorm winds) that excludes tornadoes. Most of the State is at medium-

high and high risk for non-rotational winds. This ranking, based on NCDC records, does not distinguish winds resulting from tropical and non-tropical weather systems.

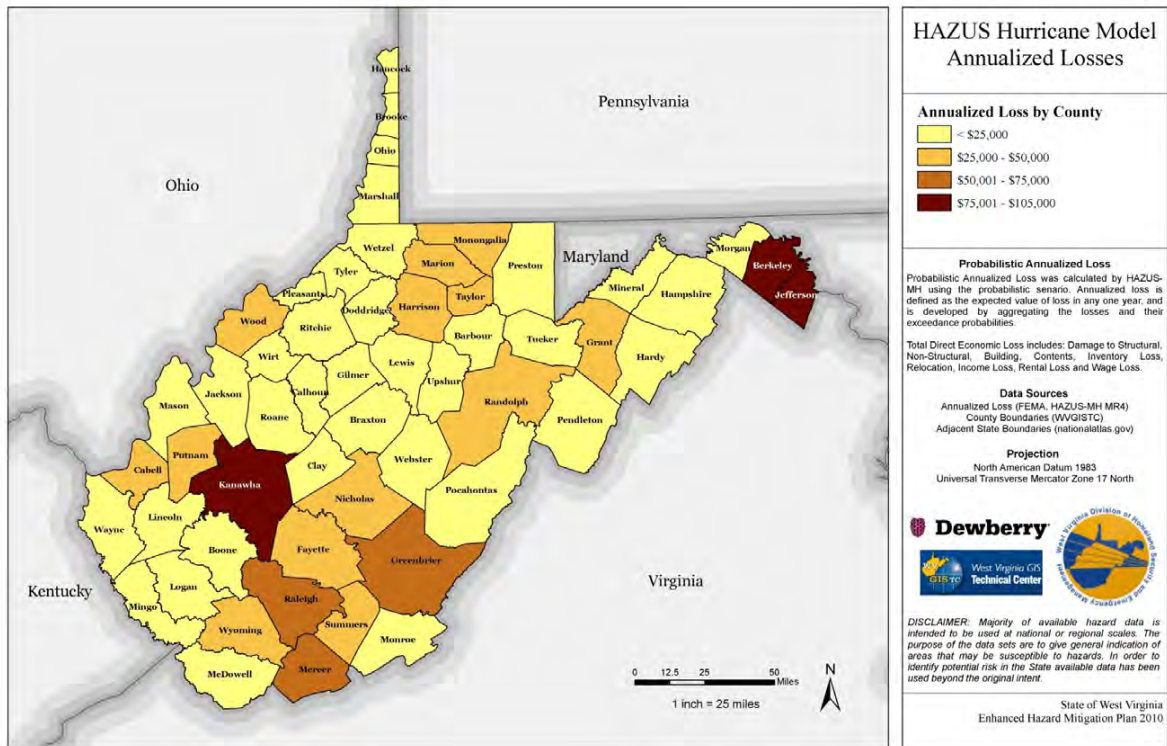


FIGURE 3-49. HURRICANE PROBABILISTIC ANNUALIZED LOSS (HAZUS)

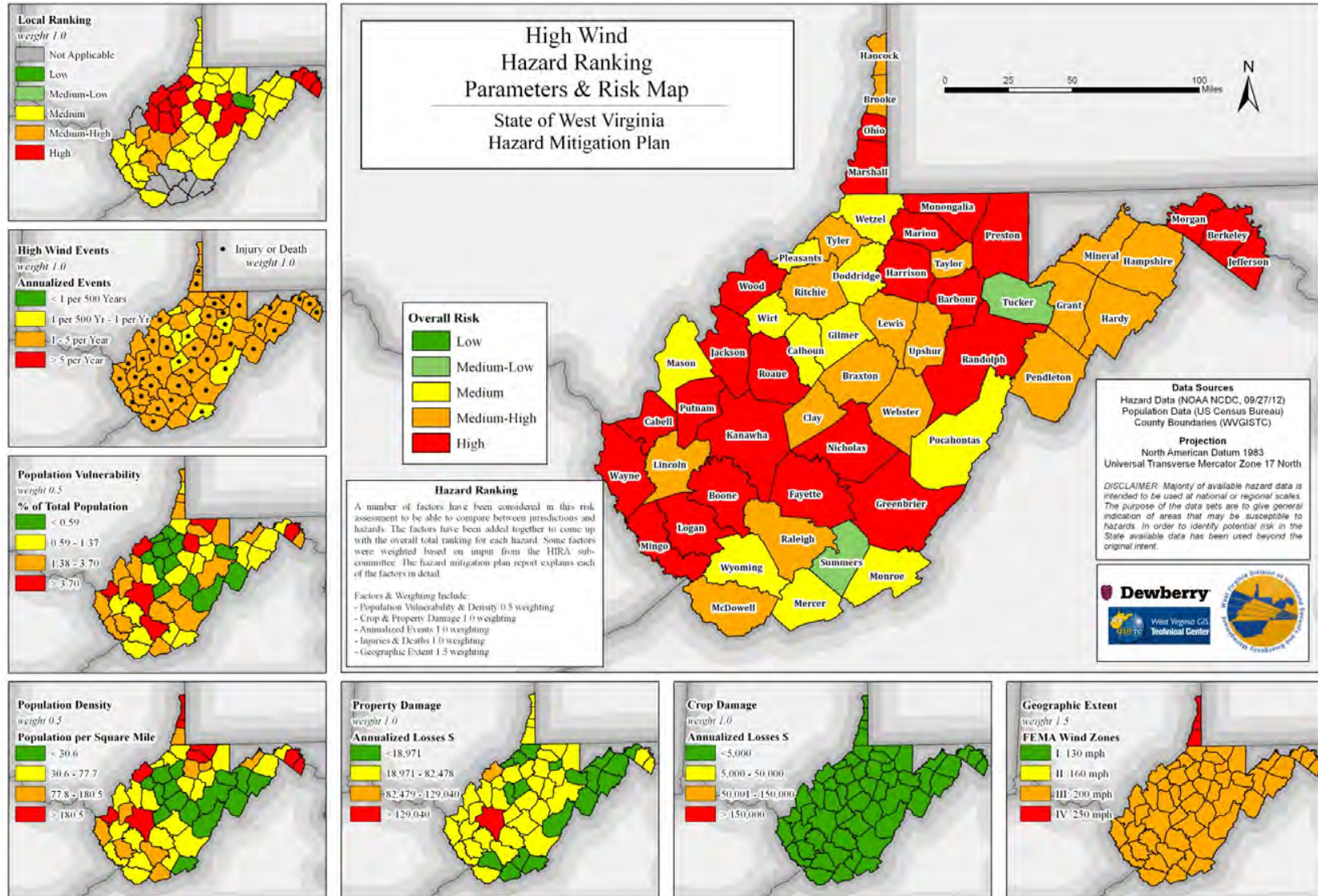


FIGURE 3-50. WIND HAZARD RANKING PARAMETERS AND RISK MAP



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## LOCAL PLAN RISK ASSESSMENT

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Local plans were reviewed for spatial data sources used, historical occurrences, hazard probabilities, vulnerability, loss estimations, and land use and development trends. None of the local plans featured calculated loss estimates directly related to hurricanes or tropical storms.

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## COMPARISON WITH LOCAL RANKING

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Two local plans (Braxton and Monongalia Counties) ranked hurricanes as high or significant for their county, 30 ranked hurricanes as low, and 20 plans did not include hurricanes in their plan and/or did not rank the hazard.

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## CHANGES IN DEVELOPMENT

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Most local plans did not specifically address changes in development for each hazard or the effects of changes in development on loss estimates. In most cases overall development patterns were discussed in general.

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## 3.9 WINTER WEATHER

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### 3.9.1 DESCRIPTION

West Virginia experiences frequent hazardous winter weather events. Winter weather may include heavy snows, damaging ice, extreme cold, or any combination thereof. A heavy snow is generally defined as having more than 8 inches of accumulation in less than 24 hours. Ice storms result from the accumulation of freezing rain, which is rain that becomes super-cooled and freezes upon impact with cold surfaces. Freezing rain most commonly occurs in a narrow band within a winter storm that is also producing heavy amounts of snow and sleet in other locations.

The definition of extreme cold temperature varies according to the normal climate of a region. In areas unaccustomed to winter weather, near freezing temperatures are considered "extreme cold." In West Virginia, extreme cold usually involves temperatures below 0° Fahrenheit. Excessive cold may accompany winter storms, linger after the winter storm event, and occur without storm activity.

Injuries and deaths related to heavy snow usually occur as a result of vehicle accidents. Casualties also occur due to overexertion while shoveling snow. It does not take several feet of snow to cause significant risk to West Virginians. On February 16, 1987, a mixture of rain, sleet, and snow contributed to more than 45 motor vehicle accident calls received by the Kanawha County 911 system in less than 1 hour. More than 200 accidents were reported throughout the county by mid-afternoon.





Ice is a significant hazard if the surface temperature is at or below freezing and a layer of the atmosphere above the surface is warm enough for precipitation to fall as rain rather than snow. The greatest threat from ice storms is to essential utility and transportation systems. When it coats power and communications lines, trees, highways, bridges and other surfaces, the ice-weighted wires, antennae, and support structures can break and collapse. Downed trees and limbs can also damage lines and block transportation routes.

Significant icing events hinder delivery of emergency services and endanger the responders. If extreme cold conditions are combined with low/no snow cover, the cold can better penetrate downward through the ground and potentially create problems for underground infrastructure as well. When utilities are affected and heaters do not work, water and sewer pipes can freeze and even rupture. Finally, extensive damage to forests can affect timber values and create flammable woody debris, exacerbating wildfire vulnerability.

Extreme cold can lead to hypothermia and frostbite, which are both serious medical conditions. House fires and carbon monoxide poisoning are also possible as people use supplemental heating devices (wood, kerosene, etc. for heat, and fuel burning lanterns or candles for emergency lighting).

Heavy snow can bring a community to a standstill by obstructing and slowing transportation, knocking down trees and utility lines, and causing structural collapse in buildings not designed to withstand the weight of the snow. Until the snow can be removed, airports and roadways are impacted, sometimes even closed completely, stopping the flow of supplies and disrupting emergency and medical services.

Repair and snow removal costs from winter storms can be significant. A quick thaw or rain event after a heavy snow can cause substantial flooding, especially along small streams and in urban areas. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on cities and towns.

### 3.9.2 HISTORIC OCCURRENCE

NCDC data indicates that between 1993 and 2012, there were 876 incidents related to snow and ice damage, causing 10 deaths, 14 injuries, \$14.085 in crop damage, and approximately \$137.7 million in property damage. Table 3-46 provides the summary of winter storm events by county.



TABLE 3-46. WINTER WEATHER EVENTS AND RESULTING LOSSES

Date	Event	Location	Property Damage
3/13/1993	Winter Storm		\$500K
1/4/1994	Winter Storm (Snow)	Southern/eastern WV	\$50 M
1/27/1998	Winter Storm (Snow)	Southern/eastern WV	\$12.5 M
1/8/1999	Winter Storm		N/A
2/14 - 2/18/2003	Winter Storm (Ice)	Central WV	\$9.5 M
12/18 - 12/19/2009	Winter Storm (Snow)	Statewide	\$2.8 M
2/5 - 2/6/2010	Winter Storm (Snow)	Statewide	N/A
1/26/2011	Winter Storm (Snow)	Eastern WV	\$75K
10/28/2011	Winter Storm (Snow)	Eastern WV	\$50K
2/19/2012	Winter Storm (Snow)	Southern WV	\$750 K
10/29/2012	Winter Storm (Snow)	Eastern WV	Unknown

There have been five Presidential Disaster Declarations and one Federal Emergency declaration for winter storm events (including Blizzard) in West Virginia. Although officially labeled a declaration for a hurricane, including West Virginia in Federal Emergency Declaration (EM-3358) for Hurricane Sandy on October 29, 2012, was the result of the strong wind and heavy snowfall the storm brought to the State. A Presidential Disaster was declared (DR 1319) for a February 2000 winter storm classified as a flooding event since assistance was provided primarily for flood damages. A statewide Federal Emergency was declared for a March 1993 winter storm. Several significant winter storm events are profiled below:

- EM-3356 was declared for Hurricane Sandy on October 29, 2012. This unusual storm brought wind gusts greater than 50 mph to much of the eastern half of the State and heavy, wet snowfall to the higher elevations. Some of the highest elevations in the eastern portions of the State recorded over two feet of snow. The combination of heavy snow and wind brought down trees and power lines knocking out power to thousands across the State. At least six deaths in West Virginia were attributed to this so-called Superstorm.
- DR 1084 was declared for a winter storm in February 1996. This storm caused four known deaths.
- DR 1455 was declared statewide due to winter storm damage during February 2003. Approximately \$9.7 million in Public Assistance and \$1.3 million in SBA loans were distributed (FEMA data compiled by WVDHSEM; SBA, 2003). Detail on reported deaths is provided in the President’s Day Storm discussion below.

- DR 1881 was declared on March 2, 2010, for winter storm damages that resulted from December 18 to 20, 2009. Counties included in the declaration were Boone, Calhoun, Clay, Fayette, Greenbrier, Kanawha, McDowell, Mingo, Nicholas, Pendleton, Pocahontas, Raleigh, Ritchie, Roane, and Wyoming.
- DR 1903 was declared on April 23, 2010 for winter storm damages that resulted from heavy snowfall during the period February 5-11, 2010. Counties included in the declaration were Berkeley, Brooke, Doddridge, Hampshire, Hancock, Hardy, Jefferson, Marion, Marshall, Morgan, Ohio, Pocahontas, Preston, Ritchie, Tucker, Tyler, and Wetzel.
- A disaster declaration was made by the Secretary of Agriculture for freezing temperatures in April 2007. Counties included in the declaration were Greenbrier, Hampshire, McDowell, Mercer, and Monroe.

A crippling winter storm struck West Virginia December 18-20, 2009, producing a heavy, wet snowfall in the southern coal field counties and through the mountains. Totals of 1 to 2 feet were common in these areas. A jackknifed tractor trailer on the West Virginia Turnpike resulted in a complete closure of that major thoroughfare. Between 800 and 900 vehicles were trapped along a 3-mile section of the Turnpike. Travelers were forced to wait 15 to 20 hours before crews could reopen the roadway.



Piles of Snow in Terra Alta, West Virginia.  
Source: Frazee, 2003.

Another major snowstorm impacted the southern and eastern sections of West Virginia February 5-6, 2010. This blockbuster storm produced 20 to 30 inches of snow in some areas, with the heaviest amounts through the higher elevations.

### **PRESIDENT'S DAY WEEKEND, 2003**

The President's Day weekend storm of 2003 provides a case study for damages that can occur due to ice. Two to 5 inches of accumulated ice resulted in several thousand acres of timber damage, phone and power outages to many communities, and fallen trees blocking roads. Initially, Mason, Jackson, Calhoun, Roane, and Braxton Counties suffered the most damage, but the Federal disaster declaration eventually applied to the entire State.

In parts of Mason and Jackson counties, entire conifer stands were either uprooted or bent over and lying on the ground. Hardwood species such as yellow poplar, black locust, and black cherry were particularly susceptible to limb breakage.



For this disaster (DR 1455), Kanawha County received the greatest amount of Public Assistance (\$242,652 compared to \$70,012 to Wyoming County, the next greatest distribution). Public Assistance to counties (\$1.6 million) was dwarfed by the assistance provided to State agencies (\$8.1 million). Of Public Assistance project worksheets dedicated to State agency infrastructure repair or replacement, 95% went to the WVDOH for road

Ice Storm February 2003 Source: USDA, 2003.

repair and replacement.

Eight deaths were linked to the President’s Day storm. Two people drowned while trying to cross rain-swollen creeks, two people died while shoveling snow, three people were killed in traffic accidents, and one man was killed when his trailer caught fire, after he apparently tried to heat it with either a candle or gas oven because of power outages.

Table 3-47 lists snowfall records by period for West Virginia.

TABLE 3-47. SNOWFALL – GREATEST AMOUNTS BY PERIOD

Amount	Location	Period	Date
35 Inches	Flat Top (Mercer County)	24 Hours	January 27-28, 1998
57 Inches	Pickens (Randolph County)	Single Storm	November 24-29, 1950
104 Inches	Terra Alta (Preston County)	Month	January 1977
301.4 Inches	Kumbrabow State Forest (Randolph County)	Year	Winter of 1959-60
62 Inches	Snowshoe (Pocahontas County)	Uniform Depth	March 8, 1978

Source: NWS Forecast Office, 2012

### HISTORIC OCCURRENCE OF EXTREME COLD

There have not been any Presidential Disaster or Federal Emergency declarations, nor is there a history of any State Disasters or other major incidents, for extreme cold in West Virginia. While West Virginia generally has a temperate climate, periods of extreme cold can and have occurred. According to NCDC data, in January 18, 1994, three people died as a result of extreme cold in a statewide event. A couple was found dead in their home, apparently from carbon monoxide poisoning from a faulty, overworked furnace. A 46-year-old man froze in his four-wheel drive vehicle that



became stuck in snow. An 84-year-old woman died in McDowell County from exposure to cold in her home on January 23, 2005.

The NWS issues cold weather-related products to inform citizens of forecasted extreme cold conditions. These products are based on projected or observed temperature and/or wind chill values and include:

1. Wind Chill Advisory: When wind chill values less than or equal to  $-10^{\circ}$  F for 3 hours or more, with wind speeds greater than 5 mph;
2. Wind Chill Warning: Wind Chill values less than or equal to  $-25^{\circ}$  F for 3 hours or more, with wind speeds greater than 5 mph.

In West Virginia, extreme cold constitutes a low risk to the general populace. The elderly, infants, and small children are more vulnerable to excessive cold than the general population. Educational materials for preventing injury are readily available at FEMA and NOAA websites and news of impending extreme temperature conditions, including expected intensity, are broadcast on local radio, NOAA Weather Radio, and television stations.

### 3.9.3 RISK ASSESSMENT

#### PROBABILITY

The NCDC Storm Events database maintains a record of winter storm events and related damages, deaths, and injuries dating to 1993. Based on historical frequency of occurrence using this data, a determination of probability of future winter weather events can be made. Limitations of this data include the lack of a systematic methodology for accounting for the intensity or magnitude of individual events.

The data show that on an annualized basis, the highest number of winter storm events by county approaches 10 events per year (Grant County) and the lowest event total is one event per year (Mason County). The data indicate that the higher elevations of the State, including the foothills, tend to experience more frequent winter weather events with the western portions of the state generally observing events on a less frequent basis. Figure 3-51 indicates the average annual snowfall distribution across the state while Figure 3-52 shows the average number of days annually where more than 10 inches falls in a particular day. Some of the higher elevations in the east see greater than 70 inches of snow on average each winter and may experience 7 or more days annually where snowfall exceeds 10 inches. Assuming that long-term trends continue into the future, probability for winter weather events will continue to be highest in the eastern portions of West Virginia, particularly the higher elevations (Table 3-49).

It is expected that as climate changes, more winter-season precipitation may fall as rain rather than snow in the future.<sup>32</sup> This may benefit West Virginia through lowered future frequency of damaging snow and icing events. However, it could have negative implications for industries such as ski resorts, whose livelihoods depend on wintry weather and near or below freezing temperatures. Future plan updates should further investigate implications of climate change related to potential future changes in temperature, storm track and frequency, as well as lake-effect and other winter weather processes on the State.

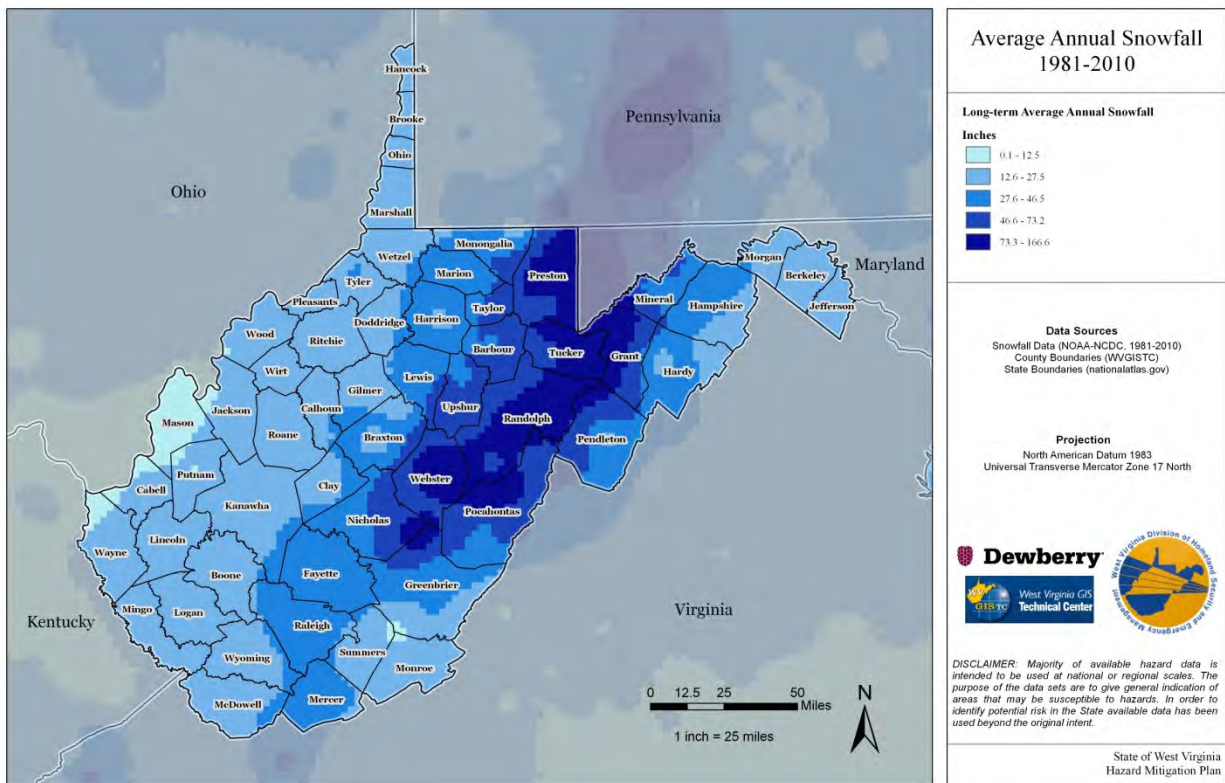


FIGURE 3-51. AVERAGE ANNUAL SNOWFALL (BASED ON PERIOD 1981-2010)

<sup>32</sup> Global Climate Change Impacts in the United States, Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson, (eds.). Cambridge University Press, 2009.

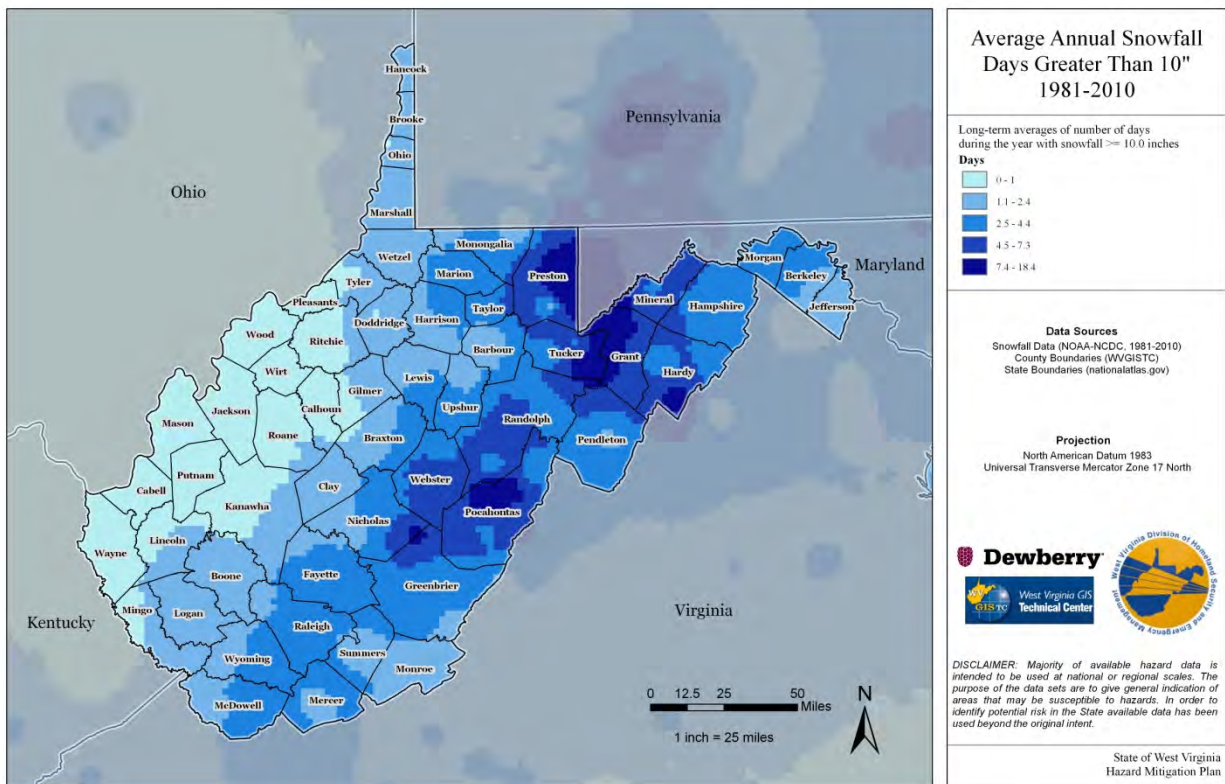


FIGURE 3-52. AVERAGE NUMBER OF DAYS ANNUALLY WITH SNOWFALL GREATER THAN 10'' (1981-2010)

## IMPACT AND VULNERABILITY

The impact of a winter storm is primarily measured in terms of the financial costs associated with preparing for, responding to, and recovering from the event. Modeling the relationship between actual financial impact and winter storm magnitude is difficult. The NCDC data set provides estimates of property and/or crop damage from many of the significant events in the period of record that begins 1993. Though the data is not necessarily complete or entirely consistent in its reporting from event to event, it provides a basis for meaningful initial analysis.

Winter storms that include ice accretion are typically more damaging than those that produce only snow. Generally, icing events are more likely to result in damage to power lines and trees than all-snow events, particularly compared against those snow events involving drier, fluffy snowfall (which has lower water content).

Much of the financial burden of winter storms falls onto transportation agencies and utility companies. For example, the West Virginia Department of Transportation (WVDOT) and local public works departments are responsible for roadway treatments that often commence prior to the onset of a winter storm and continue for as long as



necessary after precipitation has ended. Table 3-48 below shows costs by year for snow removal and ice control on roadways for which WVDOT is responsible. These costs vary considerably year to year. Note that costs in 2010, a particularly snowy year for eastern sections of the State, were \$66 million.

TABLE 3-48. WEST VIRGINIA DEPARTMENT OF TRANSPORTATION SNOW REMOVAL ICE CONTROL COSTS

Fiscal Year	Cost
2012	\$26 million
2011	\$56 million
2010	\$66 million
2009	\$43 million
2008	\$33 million
2007	\$32 million

Individual, societal, and property characteristics are all factors in determining vulnerability to winter weather. For an individual, winter weather events may lead to exposure to automobile accidents, ice/snow covered walkways, potential for injury due to falling ice (from rooftops, power lines, or trees) and extreme cold. Disruption of utility services and transportation as well as lost business opportunity and decreased productivity may impact society as a whole. Property vulnerability to winter weather includes damages to trees or due to tree failure, structural failure due to snow/ice loads, and water main/pipe breakage.

Vulnerability to winter weather events varies based on a number of factors. Jurisdictions experiencing winter storms on a regular basis are typically less vulnerable than those that rarely or only occasionally experience wintry weather. This difference in vulnerability may in part be explained by the fact that communities that frequently experience winter weather may undertake proactive measures such as maintenance (i.e., tree pruning) or winterization that can act to minimize property vulnerability.

## RISK

Risk, as defined as probability multiplied by impact, cannot be fully estimated for winter storms due to the lack of intensity-damage models for this hazard. Instead, estimates of the financial impacts of winter storms can be developed based on NCDC winter weather event data. Using this data, property damage adjusted for inflation (in 2012 dollars) related to winter weather events totaled to nearly \$137.7 million, or approximately \$6.8 million annually (Table 3-49). Not included in these estimates are costs involved with road clearing, lost productivity, energy consumption, and the like.





TABLE 3-49. ANNUALIZED NCDC WINTER STORM EVENTS BY COUNTY.

County	Annualized Events	Annualized Property Damage	Annualized Crop Damage	Total Annualized Damages
Barbour	3.2	\$95,336	\$0	\$95,336
Berkeley	5.7	\$63,320	\$0	\$63,320
Boone	1.75	\$130,209	\$0	\$130,209
Braxton	2.05	\$151,865	\$0	\$151,865
Brooke	1.5	\$8,170	\$0	\$8,170
Cabell	1.2	\$134,591	\$0	\$134,591
Calhoun	1.55	\$152,096	\$0	\$152,096
Clay	2.05	\$104,151	\$0	\$104,151
Doddridge	1.5	\$96,983	\$0	\$96,983
Fayette	3.7	\$266,636	\$0	\$266,636
Gilmer	1.6	\$152,113	\$0	\$152,113
Grant	10.85	\$62,609	\$141	\$62,750
Greenbrier	4.15	\$124,750	\$0	\$124,750
Hampshire	5.65	\$61,351	\$141	\$61,492
Hancock	1.55	\$5,290	\$0	\$5,290
Hardy	5.15	\$62,527	\$141	\$62,668
Harrison	1.8	\$95,300	\$0	\$95,300
Jackson	1.65	\$183,560	\$0	\$183,560
Jefferson	5.4	\$63,626	\$0	\$63,626
Kanawha	1.95	\$130,209	\$0	\$130,209
Lewis	2.1	\$95,300	\$0	\$95,300
Lincoln	1.25	\$118,667	\$0	\$118,667
Logan	1.5	\$119,784	\$0	\$119,784
Marion	1.25	\$94,293	\$0	\$94,293
Marshall	1.4	\$8,170	\$0	\$8,170
Mason	1.15	\$182,185	\$0	\$182,185
McDowell	2.8	\$280,887	\$0	\$280,887
Mercer	3.15	\$127,803	\$0	\$127,803
Mineral	6.7	\$74,944	\$141	\$75,085
Mingo	1.65	\$132,269	\$0	\$132,269
Monongalia	1.45	\$96,350	\$0	\$96,350
Monroe	2.3	\$124,664	\$0	\$124,664
Morgan	5.2	\$63,320	\$0	\$63,320
Nicholas	4.65	\$281,781	\$0	\$281,781
Ohio	1.35	\$8,170	\$0	\$8,170
Pendleton	7.75	\$61,491	\$141	\$61,632
Pleasants	1.75	\$98,969	\$0	\$98,969
Pocahontas	6.35	\$217,397	\$0	\$217,397
Preston	6.6	\$101,349	\$0	\$101,349
Putnam	1.45	\$130,713	\$0	\$130,713
Raleigh	3.55	\$243,132	\$0	\$243,132
Randolph	4.4	\$217,694	\$0	\$217,694
Ritchie	1.7	\$97,632	\$0	\$97,632
Roane	1.6	\$178,154	\$0	\$178,154
Summers	2.45	\$124,318	\$0	\$124,318



County	Annualized Events	Annualized Property Damage	Annualized Crop Damage	Total Annualized Damages
Taylor	2.2	\$95,718	\$0	\$95,718
Tucker	6.45	\$99,195	\$0	\$99,195
Tyler	1.8	\$98,701	\$0	\$98,701
Upshur	4.05	\$150,486	\$0	\$150,486
Wayne	1.85	\$138,693	\$0	\$138,693
Webster	4.75	\$272,863	\$0	\$272,863
Wetzel	1.45	\$98,706	\$0	\$98,706
Wirt	1.6	\$152,631	\$0	\$152,631
Wood	1.75	\$102,639	\$0	\$102,639
Wyoming	2.55	\$251,457	\$0	\$251,457
<b>Total</b>		<b>\$6,885,218</b>	<b>\$704</b>	<b>\$6,885,922</b>

## FACILITY RISK

Transportation structures are at great risk from winter storms. In addition, building construction type – particularly roof span and construction methods, support the capacity of a building to withstand severe stress weights from snow. Finally, State and critical facilities often do not have redundant power sources and are not even wired to accept a generator for auxiliary heat.

A comprehensive analysis for state and critical facility vulnerability was not possible. State facility data was intersected with the average snowfall in inches data that was created for the 2013 plan update in an effort to quantify vulnerability. The eastern portion of the State has more State facilities in areas receiving between 12 and 46 inches of snow annually (Table 3-50). Table 3-51 summarizes the number of facilities located in areas with greater than 73.3 inches of average annual snowfall.

Critical facilities were not intersected with the average annual snowfall due to the lack of meaningful conclusions that could be made from the data. Facilities located in Grant, McDowell and Nicholas Counties would be expected to be more vulnerable to winter related events. Future updates to the risk assessment should include a more comprehensive examination of State and critical facility vulnerability to winter storms, such as construction and roof types.



TABLE 3-50. STATE FACILITY TOTALS BY AVERAGE ANNUAL SNOWFALL

Annual Average Snow in Inches	Number of Buildings	Total Building	Total Contents	Total Value
<=12.5	676	\$1,103,131,586	\$146,535,454	\$1,249,667,040
12.6-27.5	6,627	\$5,513,665,361	\$1,048,317,920	\$6,561,983,281
27.6-46.5	3,475	\$4,592,812,395	\$847,564,863	\$5,440,377,258
46.6-73.2	1,094	\$471,984,147	\$111,519,472	\$583,503,619
>=73.3	819	\$331,795,095	\$81,442,556	\$413,237,651

TABLE 3-51. STATE FACILITY TOTALS FOR 73.3" AVERAGE ANNUAL SNOWFALL BY COUNTY

County	Number of Buildings	Total Building	Total Contents	Total Value
BARBOUR	1	\$80,000	\$0	\$80,000
GRANT	20	\$1,154,960	\$270,500	\$1,425,460
HAMPSHIRE	2	\$98,640	\$15,725	\$114,365
HARDY	1	\$2,530	\$0	\$2,530
KANAWHA	3	\$61,840	\$20,000	\$81,840
MARION	2	\$300,000	\$481,000	\$781,000
MARSHALL	1	\$130,000	\$200,000	\$330,000
MASON	2	\$80,000	\$50,500	\$130,500
MCDOWELL	2	\$7,350,000	\$700,000	\$8,050,000
MERCER	1	\$355,000	\$548,000	\$903,000
MINERAL	5	\$2,040,350	\$726,000	\$2,766,350
MONONGALIA	18	\$1,157,200	\$90,000	\$1,247,200
NICHOLAS	38	\$24,559,146	\$6,508,154	\$31,067,300
PENDLETON	2	\$81,571	\$50,000	\$131,571
POCAHONTAS	99	\$31,381,711	\$2,414,500	\$33,796,211
PRESTON	285	\$157,200,130	\$48,026,973	\$205,227,103
RANDOLPH	105	\$16,286,548	\$7,105,200	\$23,391,748
ROANE	1	\$15,500	\$18,000	\$33,500
SUMMERS	1	\$480,000	\$233,275	\$713,275
TUCKER	187	\$80,437,354	\$12,198,164	\$92,635,518
TYLER	5	\$259,771	\$5,000	\$264,771
UNKNOWN	1	\$11,099	\$26,295	\$37,394
WEBSTER	37	\$8,271,745	\$1,755,270	\$10,027,015

## JURISDICTIONAL RISK

The jurisdictional or county winter storm hazard rank is based on NCDC Storm Events data parameters. The geographic extent is based on the NWS weather station data for mean number of days annually with greater than 10 inches of snowfall. Section 3.5 describes the methodology for calculating the hazard rankings. Figure 3-51 includes each parameter assessed for the composite winter ranking. Forty counties received a High ranking and 15 received Medium-High ranking.



In addition to the frequency of winter weather events trending higher in high elevation counties, the annualized property damage values have historically been highest in this same general area. Grant County is expected to experience more than 10 winter events per year. McDowell and Nicholas Counties make up the largest percentage (4% each) of the annualized damages. West Virginia can expect to experience nearly \$7 million in winter related damages annually. While the eastern sections of the State may more frequently experience winter weather events, other portions of the State, including the western sections, are certainly not immune to damaging winter weather.

Since the 2010 update of this plan, local plans have been updated regionally and there have been some changes in hazard ranking level for winter storms. Appendix G summarizes the local plan ranking consideration levels at the time of the 2010 and 2013 State plan update. All counties have ranked winter weather as Medium or higher, and show an increase in risk since the previous plans. Figure 3-53 includes the local ranking map that was used as a parameter in the composite risk for winter storm.

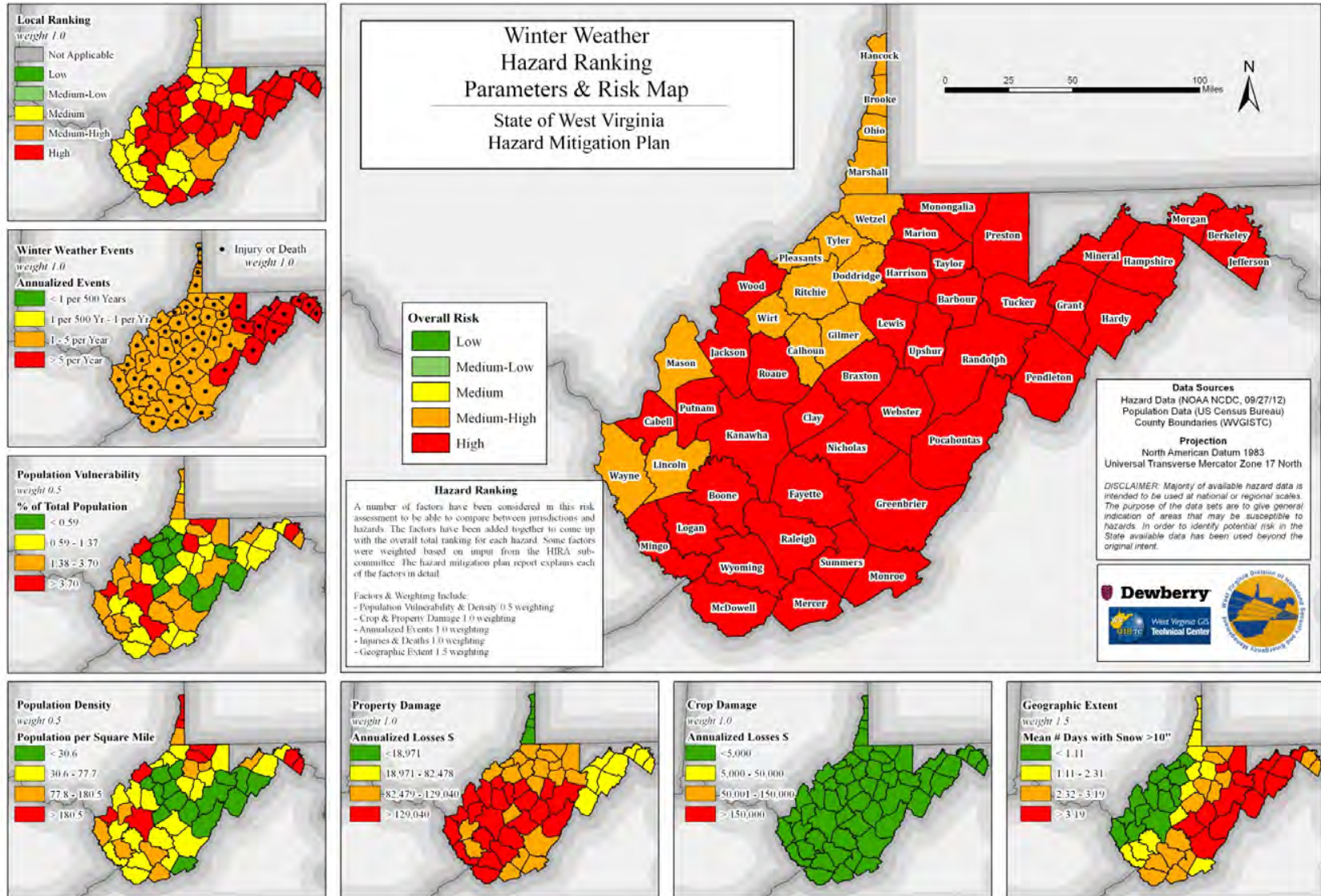


FIGURE 3-53. WINTER STORM HAZARD RANKING PARAMETERS & RISK MAP



## 3.10 DROUGHT AND EXTREME HEAT

### 3.10.1 DESCRIPTION

Drought is a normal, recurrent feature of climate that can be defined in different ways. Four methods are used to define the severity of drought: meteorological, hydrological, agricultural, and socioeconomic. Meteorological drought refers to a reduction in the normal rainfall for a given geographic area. This needs to be area-specific, as the average rainfall can vary greatly in different areas. Hydrological drought is based on the amount of surface and groundwater relative to normal levels. Agricultural drought deals with the amount of moisture in soils available for plants. The last, socioeconomic drought, measures the impact that any or all of the first three have on people and businesses.

Perhaps the simplest and most consistent measure is meteorological drought. Characteristics and impacts of drought differ in many ways, so it is difficult to quantify drought. An existing index called the Palmer Drought Severity Index (PDSI)<sup>33</sup> (Table 3-52) that used temperature and precipitation levels to determine dryness, measuring a departure from the normal rainfall in a given area.

The PDSI uses temperature and precipitation levels to determine dryness. The advantage of the PDSI is that it is standardized to local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions. A monthly PDSI value below -2.0 indicates moderate drought, and a value below -3.0 indicates severe drought.

TABLE 3-52. PALMER DROUGHT SEVERITY INDEX

Severity	Index Value
Extreme Drought	-4 or less
Severe Drought	-4 to -3
Moderate Drought	-3 to -2
Mild Drought	-2 to -1
Incipient Dry Spell	-1 to -0.5

Current drought conditions in West Virginia and the Nation are tracked by the U.S. Drought Monitor, a partnership between the University of Nebraska-Lincoln, as well as various Federal and State agencies and other experts. Graphic and text summaries of current and projected drought conditions are updated on a weekly basis and are

<sup>33</sup> NOAA Drought Information Center, <http://www.drought.noaa.gov/palmer.html> (February 2012)



available through <http://www.drought.unl.edu/dm/monitor.html>. West Virginia has incorporated plans for assessing and responding to drought into its EOP as Annex U (available through the WVDHSEM website). The impacts of drought are difficult to prepare for, even though drought occurs over a relatively long time scale.

### 3.10.2 HISTORIC OCCURRENCE

West Virginia has received two Federal Emergency declarations due to drought. Both droughts were declared in 1977 and primarily affected the southeast border of the state. Additionally, the USDA declared a disaster (Secretarial Declaration) in 1999, after the culmination of a few years of drought resulted in lost crops and subsequent fires caused by the dry conditions. The NCDC database includes 45 records of events and over \$27 million in crop damages. Several significant events include:

1. The drought of 1930 (Dust Bowl) was greater in length and intensity than events that were previously recorded or have been recorded since. Public water supplies suffered, resulting in public health concerns for water and lack of flow for sewage.<sup>34</sup>
2. The West Virginia Department of Agriculture reported in August 2000, “although the agricultural economy of West Virginia suffered a loss of more than \$200 million, the long-term effects of the 1999 drought are still being witnessed”.<sup>35</sup>

Annual average PDSI values have been recorded for West Virginia since 1895<sup>36</sup>. Historically, West Virginia has ranged from near-normal moisture conditions to moderate and severe droughts throughout the past century (Figure 3-54). Table 3-53 highlights years where average annual PDSI value was -2 or less, this includes seven years when the statewide average denoted West Virginia in at least a moderate drought: 1895, 1900, 1904, 1930, 1947, 1953, 1959, 1966, 1969, 1988, and 1999. The NOAA Climate Division 6 for Northeastern West Virginia has experience 27 years in which the average annual PDSI was -2 or less.

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<sup>34</sup> The Drought of 1930 in West Virginia. L.Kermit Herndon and James R. Withrow. Journal of American Waterworks Association. Vol 23, No 5, May 1931. Pp 698-707.

<sup>35</sup> West Virginia Department of Agriculture, 2000.

<sup>36</sup> NOAA NCDC, <http://www.ncdc.noaa.gov/temp-and-precip/time-series/index.php?parameter=pdsi&month=5&year=2011&filter=ytd&state=46&div=0> (April 2013)

West Virginia, PDSI, January-December

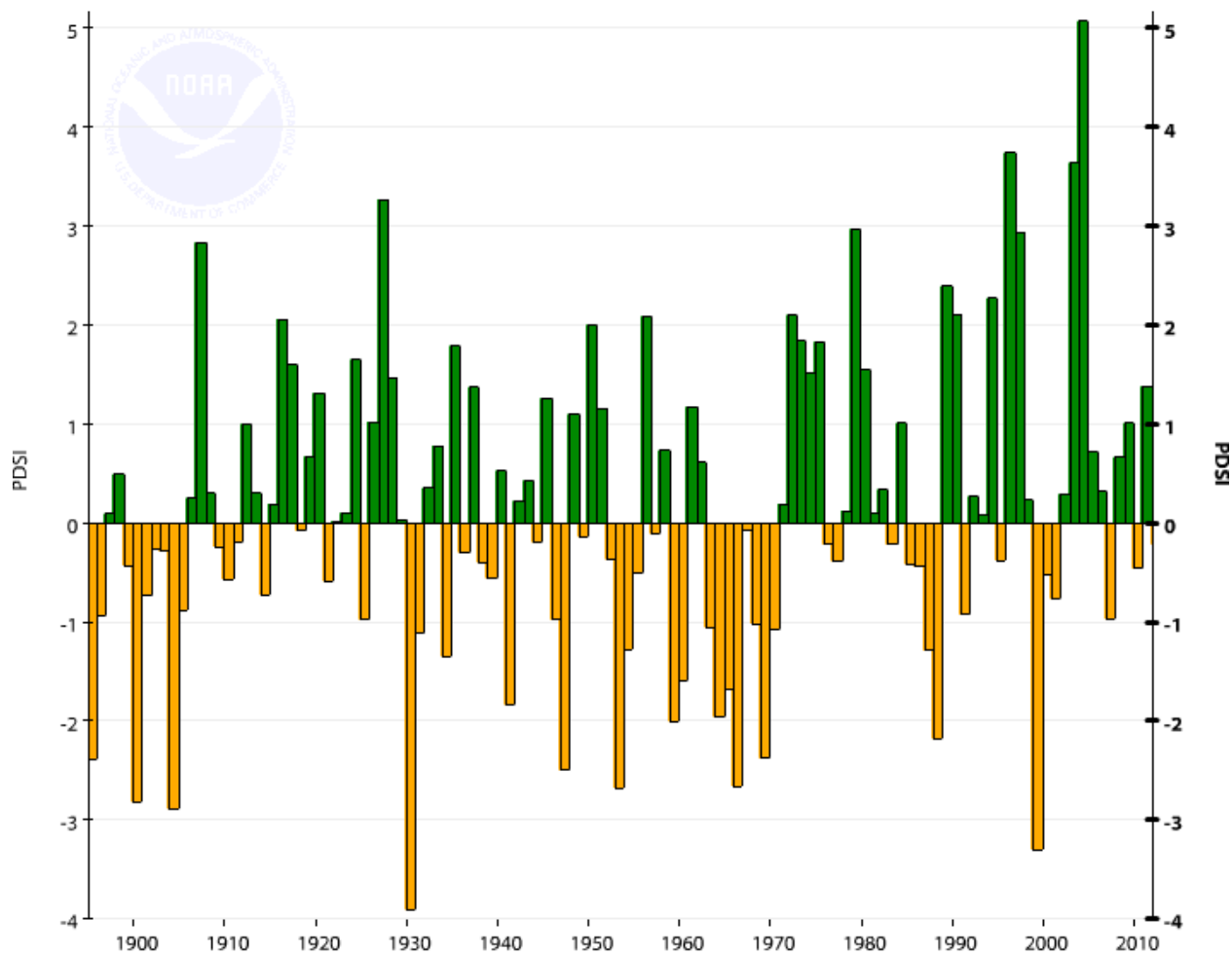


FIGURE 3-54. AVERAGE ANNUAL PALMER DROUGHT SEVERITY INDEX FOR WEST VIRGINIA (1895 – 2012).





TABLE 3-53. PALMER AVERAGE ANNUAL PDSI VALUES PER COUNTY, WHEN AT LEAST ONE CLIMATE DIVISION WAS IN AT LEAST A MODERATE DROUGHT (HIGHLIGHTED). (1895-APRIL 2013)

Year	Climate Division 1: Northwestern	Climate Division 2: North Central	Climate Division 3: Southwestern	Climate Division 4: Central	Climate Division 5: Southern	Climate Division 6: Northeastern	State wide
1895	-3.2	-2.7	0.65	0.59	0.91	0.5	-2.39
1896	-0.77	-1.05	-4.28	-4.26	-3.06	-4.59	-0.94
1897	0.78	0.34	1.08	-1.54	-1.19	-3.17	0.09
1900	-3.04	-2.75	-2.58	-2.49	-2.8	-3.62	-2.82
1901	-2.64	-0.93	-2.05	-3.06	-1.92	-4.67	-0.74
1904	-1.77	-2.25	-2.73	-2.66	-2.97	-1.08	-2.89
1905	-0.85	-0.86	-4.26	-4.15	-3.81	-2.45	-0.88
1909	-0.18	-0.45	-3.28	0.14	-1.1	-3.03	-0.24
1910	-1.9	-1.6	1.01	1.4	0.83	-2.73	-0.57
1911	-0.53	-0.61	0.81	1.66	1.58	-3.32	-0.2
1923	-0.61	-0.02	1.2	1.14	0.83	-2.33	0.1
1930	-2.62	-3.17	-0.6	-1.15	-1.13	-0.58	-3.91
1931	-4.27	-3.97	-6.41	-7.25	-6.25	-7.07	-1.12
1932	-1.53	-1.05	0.61	0.35	-3.01	-4.17	0.35
1934	-2.63	-1.47	-1.36	-0.26	-3.3	-1.6	-1.35
1940	0.43	0.32	-5.08	-3.3	-4.61	-0.52	0.53
1941	-1.41	-1.39	-3.08	-0.99	-1.4	1.77	-1.84
1942	-0.37	0.08	-3.75	-2.68	-3.94	-1.9	0.22
1944	-0.02	0.18	-2.46	-1.89	-2.4	-2.78	-0.2
1947	-0.54	-2.74	-1.24	-2.78	-3.32	-1.32	-2.5
1948	1.36	1.59	-2.15	-2.72	-2.9	-2.87	1.1
1953	-2.23	-2.9	-1.7	-1.74	-0.64	1.18	-2.68
1954	-1.15	-1.53	-4.43	-3.98	-3.14	-3.98	-1.28
1956	1.65	2.14	-3.46	-2.67	-4.31	-1.51	2.09
1959	-0.94	-2.08	-0.58	-1.28	-1.26	-2.15	-2.01
1960	-1.49	-1.83	-2.39	1.16	-1.51	0.25	-1.6
1961	1.37	1.06	-0.04	-1.08	-2.88	-2.13	1.17
1964	-2.48	-1.33	-3.2	-1.42	-1.72	1.01	-1.96
1965	-2.08	-1.61	-2.19	0.81	0.66	-2.16	-1.68
1966	-2.76	-3.86	-3.79	-4.73	-3.54	-4.71	-2.66
1969	-1.63	-2.11	-0.8	-2.48	-1.89	-2.71	-2.38
1981	0.84	0.92	-1.17	-2.11	-1.42	-2.11	0.09
1983	0.04	-0.25	-0.86	-1.41	-0.91	-2.13	-0.22
1987	-2.28	-1.76	0.02	-0.05	1.44	1.44	-1.29
1988	-3.13	-1.93	-2.43	-1.91	-2.99	0	-2.18
1989	2.41	2.57	0.11	0.1	1.18	-2.63	2.39
1992	-0.83	-0.06	-0.52	0.85	0.46	-3.7	0.27
1999	-2.54	-2.87	-1.23	-1.96	-1.87	-4.13	-3.3
2000	-0.13	0.17	-2.92	-3.68	-2.41	-3.4	-0.53
2002	-0.08	0.21	-2.13	-3.07	-2.28	-2.28	0.29
2011	1.86	2.04	0.81	-1.81	-0.68	-3.61	1.38

The Northeast Regional Climate Center at Cornell University analyzed drought data for the period 1896 to 2006 (Table 3-54); showing the entire State having experienced more than 70 months of drought. The northwestern and northeastern sections of West Virginia have experienced the most months of extreme or severe drought, while southern West Virginia has experienced the fewest months of extreme or severe drought.



There have not been any Presidential Disaster or Federal Emergency declarations, nor is there a history of any State Disasters or other major incidents, for extreme heat in West Virginia. While West Virginia generally has a temperate climate, periods of extreme heat have occurred and are probable in the future. According to NCDC data, in summer 1995 three people were hospitalized for heat related injuries and an infant died from effects of the heat. Similarly, in the summer of 1999, three people were treated for severe heat disorders. The most recent extreme heat events were in July 2011 and 2012, when heat indices recorded temperatures between 105 and 110.



TABLE 3-54. HISTORY OF DROUGHT IN WEST VIRGINIA

Date	Duration	Area	Severity*
6/1895	12 months	Statewide-with more extended period in northern WV	Extreme drought (-5.19)
5/1900	10 months	Statewide-with more extended period in northern WV	Extreme Drought (-4.24)
11/1904	7 months	Statewide-with more extended period in northern WV	Extreme Drought (-5.03)
10/1908	4 months	Statewide-with more extended period in northern WV	Extreme Drought (-4.84)
11/1910	2 months	Northwestern and North central WV	Severe drought (-3.37)
3/1910	3 months	Northeastern WV	Severe drought (-3.66)
10/1910	6 months	Northeastern WV	Severe drought (-3.81)
5/1911	3 months	Northeastern WV	Severe drought (-3.97)
7/1930	14 months	Statewide WV	Extreme Drought (-7.14)
11/1931	2 months	Southwestern WV	Severe drought (-3.30)
6/1934	2 months	Northwestern WV	Severe Drought (-3.58)
10/1934	5 months	Northwestern WV	Severe drought (-3.71)
8/1936	2 months	Southwestern WV	Severe Drought (-3.74)
11/1939	7 months	Southwestern WV	Extreme Drought (-5.02)
1/1941	7 months	Southwestern WV	Extreme Drought (-4.68)
11/1941	7 months	Southwestern WV	Severe Drought (-3.95)
4/1947	3 months	North central WV	Severe Drought (-3.62)
9/1953	10 months	Statewide WV	Extreme Drought (-5.62)
12/1955	2 months	Southwestern WV	Severe Drought (-3.42)
9/1959	2 months	North central WV	Severe Drought (-3.92)
10/1963	5 months	Northwestern and Southwestern WV	Extreme Drought (-4.42)
7/1964	2 months	Southwestern WV	Severe Drought (-3.27)
7/1965	2 months	Northwestern WV	Severe Drought (-3.14)
11/1965	5 months	North central, Northeastern, and Southwestern WV	Extreme Drought (-4.58)
5/1966	8 months	Statewide WV	Extreme Drought (-5.23)
4/1969	4 months	Northeastern WV	Extreme Drought (-4.37)
10/1969	2 months	Northeastern WV	Severe Drought (-3.34)
7/1987	2 months	Northwestern WV	Severe Drought (-3.11)
10/1987	4 months	Northwestern WV	Severe Drought (-3.59)
4/1988	7 months	Northwestern, North central, and Southwestern WV	Extreme Drought (-4.59)
8/1991	7 months	Northeastern WV	Extreme Drought (-4.42)
10/1991	2 months	North central WV	Severe Drought (-3.45)
11/1998	2 months	North central, Central WV	Severe Drought (-3.62)
11/1998	16 months	Northeastern WV	Extreme Drought (-4.79)
6/1999	5 months	Northwestern, North central, and Southwestern WV	Severe Drought (-3.84)
6/1999	8 months	Central	Severe drought (-3.95)
12/2001	3 months	Central	Severe drought (-3.75)

\*Based on the monthly Palmer Drought Severity Index as computed by the NCDC. Period of record: January 1895 through March 2006

Source: Northeast Regional Climate Center, 2010



The NWS can issue heat-related information products to inform citizens of forecasted extreme heat conditions. These products are based on projected or observed heat index values and include:

1. **Excessive Heat Outlook:** When there is a potential for an excessive heat event within 3 to 7 days;
2. **Excessive Heat Watch:** When conditions are favorable for an excessive heat event within 12 to 48 hours but some uncertainty exists in regards to occurrence and timing;
3. **Excessive Heat Warning / Advisory:** When an excessive heat event is expected within 36 hours. These products are usually issued when confidence is high that the event will occur. A warning implies that conditions could pose a threat to life or property, while an advisory is issued for less serious conditions that may cause discomfort or inconvenience, but could still lead to threat to life and property if caution is not taken.

In West Virginia, extreme heat constitutes a low risk to the general populace. The elderly, small children, the chronically ill, and pets are considered to be more vulnerable to excessive heat than the general population.

### 3.10.3 RISK ASSESSMENT

A drought typically does not start or end in a sudden fashion, and is known as the "creeping disaster." Droughts rank second in types of phenomena associated with billion-dollar weather disasters during the past three decades. With annual losses exceeding \$5 billion annually, drought is a serious hazard with substantial socioeconomic risks for the United States.<sup>37</sup>

#### PROBABILITY

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Extended periods of dry weather with significant negative impacts on crops, livestock, and people have occurred in the past and should be expected to occur into the future. Since drought is highly unpredictable and may be very localized, assessing probability of its occurrence is difficult. Calculation of annualized drought or extreme heat risk as a function of probability and impact has not been performed for this analysis. Quantifying drought in terms of historical frequency also proves to be a difficult task because of the variations in drought definition and the very limited and somewhat spotty nature of past drought reporting.

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<sup>37</sup> NWS Drought Monitor Intensities.

[http://www.erh.noaa.gov/cle/wx\\_events/2012/July/drought/drought.php](http://www.erh.noaa.gov/cle/wx_events/2012/July/drought/drought.php)



Long-term climate forecast models suggest that a warming planet will lead to changes in precipitation distribution and more frequent and severe drought in some parts of the country. The IPCC Fourth Assessment Report indicates that it is very likely that hot extremes and heat waves will become more frequent as the Earth warms.

## IMPACT AND VULNERABILITY

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According to the USDA, West Virginia had approximately 3.7 million acres of farmland in 2009. West Virginia has extensive agricultural operations throughout the State, many of which are vulnerable to shortages in rainfall. USDA NSAA cropland data was used as the geographic extent factor in the statewide ranking for drought (Figure 3-54). Jefferson County has the highest amount of agricultural land per square mile (0.44) followed by Berkeley County (0.27). McDowell County has the smallest percentage of agricultural land per square mile (0.012).

Short-term droughts can impact agricultural productivity, while longer term droughts are more likely to impact agriculture and water supply. Jurisdictions that have invested in water supply and distribution infrastructure are generally less vulnerable to drought. Short- and long-term drought may lead to an increase in the incidence of wildfires, which might in turn lead to increased potential for landslides or mudflows once rain occurs.

As reported by the National Drought Mitigation Center (NDMC) at the University of Nebraska at Lincoln, “drought is rarely a direct cause of death in the United States, although associated heat waves, dust, and stress all contribute to mortality”. Drought impacts are inherently hard to quantify. They are mostly in the form of crop damage reports, though losses from subsequent fires and the suppression costs can also be a large contributor to impacts.

## RISK

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Risk from drought has not been formally quantified, due to difficulty in assessing its frequency and a lack of data detailing its impact. From the limited data regarding previous drought events available through NCDC Storm Events, it is apparent that drought has taken a considerable toll on the State’s crops in the past. Between 1995 and 2012, crop damage in the West Virginia was reported over \$27.8 million (in 2012 dollars), which can be expressed annually as approximately \$1.9 million. No deaths, injuries or property damage appear in the NCDC dataset for drought. There have been 54 extreme heat events that have resulted in three injuries and one death; no damages were reported for events related to heat.



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## JURISDICTIONAL RISK

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The county drought hazard rank is based on NCDC Storm Events data parameters supplemented with data for the hazard area. Geographic extent is derived from the acres of agricultural land per county from the USDA NSAA cropland data for drought and heat events per square mile for extreme heat. Scores for a given county were calculated based on population and measures of historical impact including property damage, crop damage and the number of reported events.

The composite ranking for extreme heat ranges from low to medium-high, with no high ranked counties (Table 3-54). The ranking distribution is attributed to the lack of data available for crop and property damages, resulting in population parameters driving the vulnerability in some areas. Counties with a Medium-High extreme heat hazard risk include:

1. Wood County
2. Berkeley County
3. Jefferson County

As shown in Figure 3-56, the northeastern portion of the State and the eastern Panhandle have an increased vulnerability in terms of total drought hazard risk. Other counties throughout western, southern, and northern portions of the State are shown as having a Medium-High risk ranking.

Berkeley County was ranked as a High drought hazard risk, and the following counties were ranked as Medium-High:

1. Grant County
2. Hampshire County
3. Hardy County
4. Harrison County
5. Jefferson County
6. Marshall County
7. Mineral County
8. Morgan County

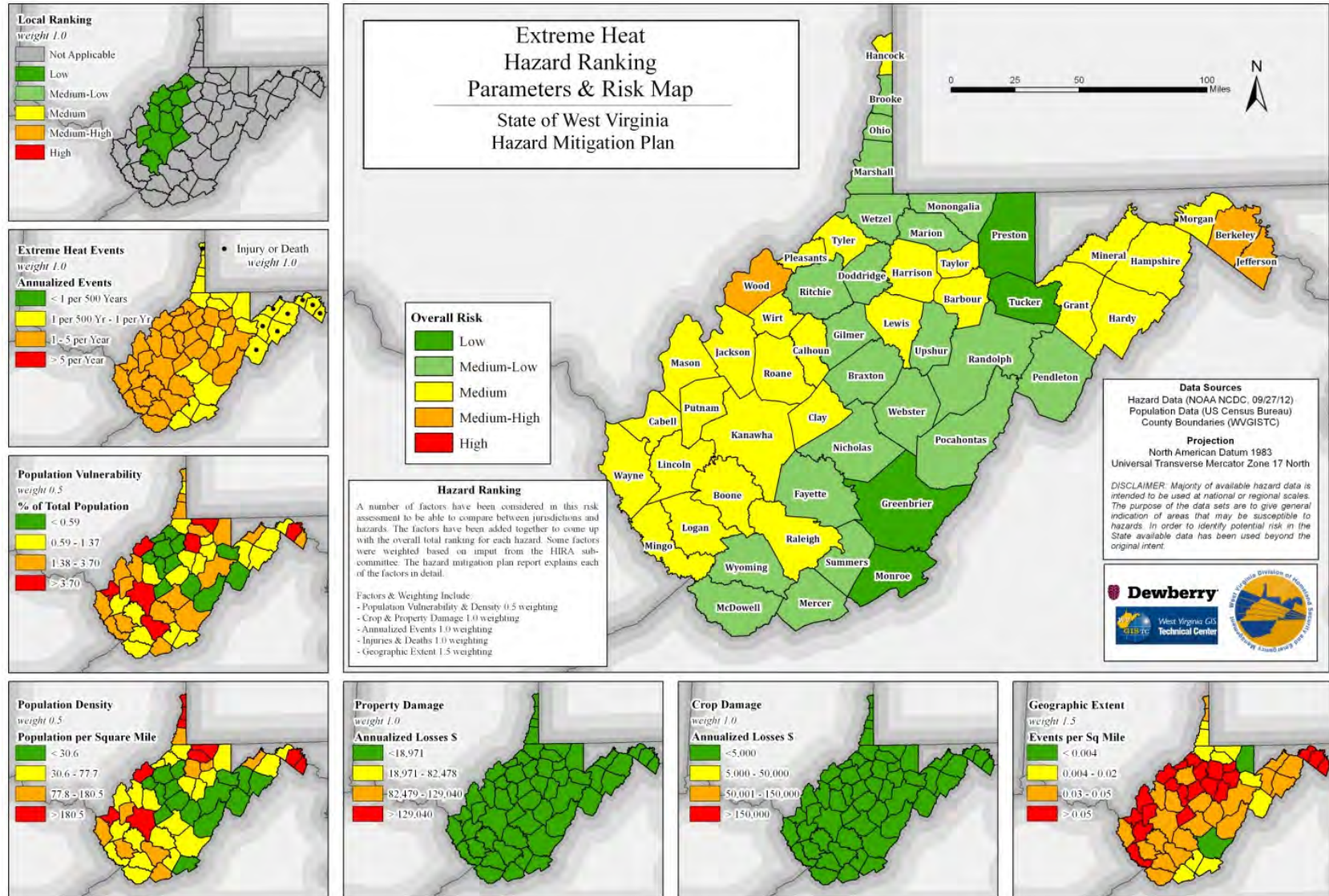


FIGURE 3-55. EXTREME HEAT HAZARD RANKING & RISK MAP

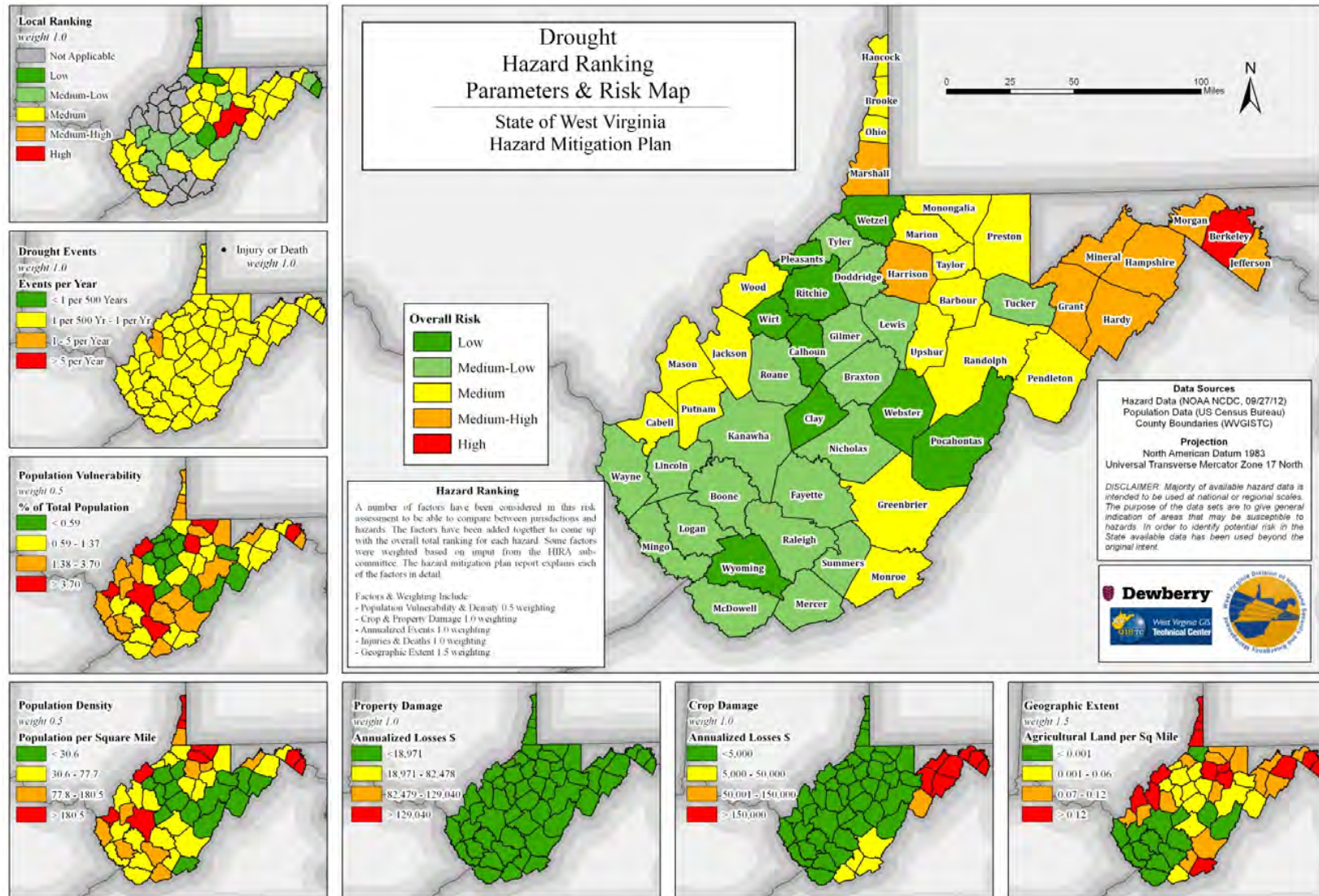


FIGURE 3-56. DROUGHT HAZARD RANKING & RISK MAP



## 3.11 WILDFIRES

### 3.11.1 DESCRIPTION

This hazard is defined as a highly destructive, uncontrolled fire or any instance of uncontrolled burning. Although a fire may have components of both, fires are generally categorized as one of two types: wildfire or a non-wilderness structural fire. A wildfire is an uncontrolled burning in woodlands, grasslands, or brushlands. These commonly burn in excess of 50 acres. A non-wilderness fire is uncontrolled burning in residential or commercial development.



Cottonville, West Virginia  
Source: West Virginia Department  
of Commerce

Wildfires commonly begin unnoticed and spread quickly through vegetative fuels. Non-wilderness fires are primarily structural fires in urban areas.

Fires in West Virginia have not affected large areas since the early 1960s, so fire as a hazard class is not as apparent a problem unless an unusually large fire occurs or the cumulative effects of many fires are examined.

Non-wilderness fires account for the most fatalities and economic losses of all hazards affecting West Virginia. Statistics collected by the West Virginia State Fire Marshall's Office (WVSFMO) show that most structural fires are caused by arson or negligence. Few fires of any type are the result of natural causes in West Virginia. Urban or non-wilderness fires are not addressed in this plan.

Historically, the State was devastated by wildfires following extensive logging in the late 19th and early 20th centuries as logging operations supported the post-Civil War building boom. Numerous fires were sparked by narrow gage rail Shay engines used to transport logs off of mountains. At the turn of the 20th century, wildfires devastated West Virginia's forests. In 1908, more than 1.7 million acres of forestland were destroyed by fire. As a result of this devastation, the West Virginia Reform Law of 1909 was established to protect the State's only renewable resource, the forest. Today the WVDOF is responsible for protecting nearly 12 million acres of forestland across West Virginia<sup>38</sup>. WVDOF does not manage structural fires; the WV State Fire Marshall's Office handles structural fires.

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<sup>38</sup> WVDOF website



Wildfires not only kill trees, but they also destroy and damage all facets of the forest ecosystem. Burned and damaged trees become more susceptible to disease and wildlife habitat is destroyed. Wildfires also result in severe soil erosion that pollutes and increases sedimentation in streams. Smoke and ash from wildfires also causes varying degrees of air pollution. Previously burned trees may appear to be healthy a few years after the fire; but damage has already occurred and it may be up to 20 years before the trees finally die. Such trees can never be harvested for quality timber.

Along with these ecological effects, wildfires can denude thousands of acres of forest, exposing the earth to the damaging effects of rain, wind, and other climatic events. As a result, the risks of flooding, mudflows, and landslides are greatly increased. The destruction of trees and natural ground cover by wildfires increases storm water runoff that may cause or exacerbate downstream damages due to flooding. Dead trees and other fire debris can obstruct hydraulic structures such as bridges, dams, and culverts, causing increased flooding.

Starting in 2006, WVDOF has compiled wildfire statistics and weather history. This information is combined with GIS layers of fuel, weather, and topography to develop Fire Danger Rating Areas. Figure 3-57 shows the land cover volatility rating completed to develop the danger rating areas. Precipitation was not considered as a factor for the rating due to annual variability. Areas with a higher risk factor and higher precipitation generally have a lower wildfire occurrence, especially when a significant portion of the precipitation is snowfall. Although the higher elevation counties have a very high or extreme land risk rating, the precipitation amount negates most of the wildfire risk. The risk of a major wildfire is as high in the eastern Panhandle as in the southern part of the State.

Fire Danger Rating Areas provide better management decision models for enacting burning restrictions/bans, mobilization of additional resources, Middle Atlantic Forest Fire Protection Compact activation, and call-up of the National Guard. The Fire Danger Rating Areas are utilized in the wildfire vulnerability section of this update.

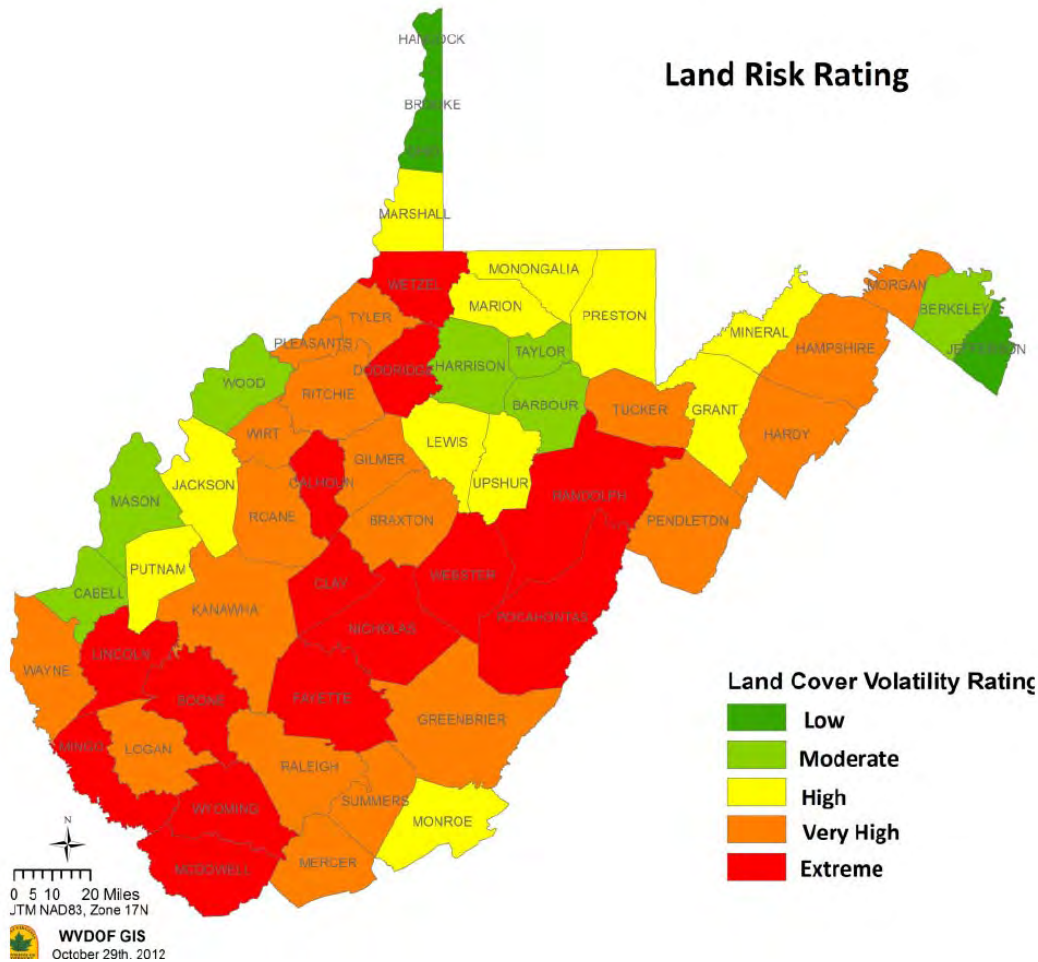


FIGURE 3-57. WVDOF LAND RISK RATING. (2012)

### 3.11.2 HISTORIC OCCURRENCE

Wildfire occurrences have been documented across West Virginia. Two incidents have led to Federal Emergency declarations; both occurred in 2001. Twelve counties were included in Fire Management Assistance declaration for the November 16, 2001, Trough-Smoke Hole Fire Complex and Southwest West Virginia Complex:

1. Boone County
2. Cabell County
3. Hardy County
4. Kanawha County
5. Lincoln County
6. Logan County
7. McDowell County
8. Mercer County
9. Mingo County
10. Raleigh County
11. Wayne County
12. Wyoming County



Boone, Logan, McDowell, Mingo, and Wyoming Counties also have the most (four) NCDC wildfire events recorded in the State since 1995. Kanawha and Raleigh Counties have three NCDC wildfire events recorded.

Between 1987 through spring 2010, there were 27,643 incidents of wildland fires in West Virginia. Since the 2010 plan update, 1,590 additional wildfire incidences have occurred in West Virginia, for a total of 29,233 events. Nearly 65% of these events have occurred in the spring season, but ironically the top eight occurrence years were dominated by fall fires. This is due to fall recreational and hunting activity in forested areas. Figure 3-58 below shows the distribution of wildfires by year and season. Figure 3-60 shows the acres burned and number of wildfires by county. The southern part of the State continues to have the most acreage burned. Since the 2010 update, there has been a reduction in fire occurrences in southern counties.

Table 3-55 is based on available records from WVDOF and includes the dates of significant wildfires in West Virginia during the past century. These events occurred between fall 1987 and fall 1991. Figure 3-59 summarizes wildfire structure and property damages since 2001. Debris burning caused 67% of the damages, followed by arson with 16% of damages. Structure and property damages are based on estimates derived following the event. Several houses were completely destroyed during fires in 2004. Mitigation strategies have been developed to fully integrate the property damages from WVDOF in future updates to this plan.

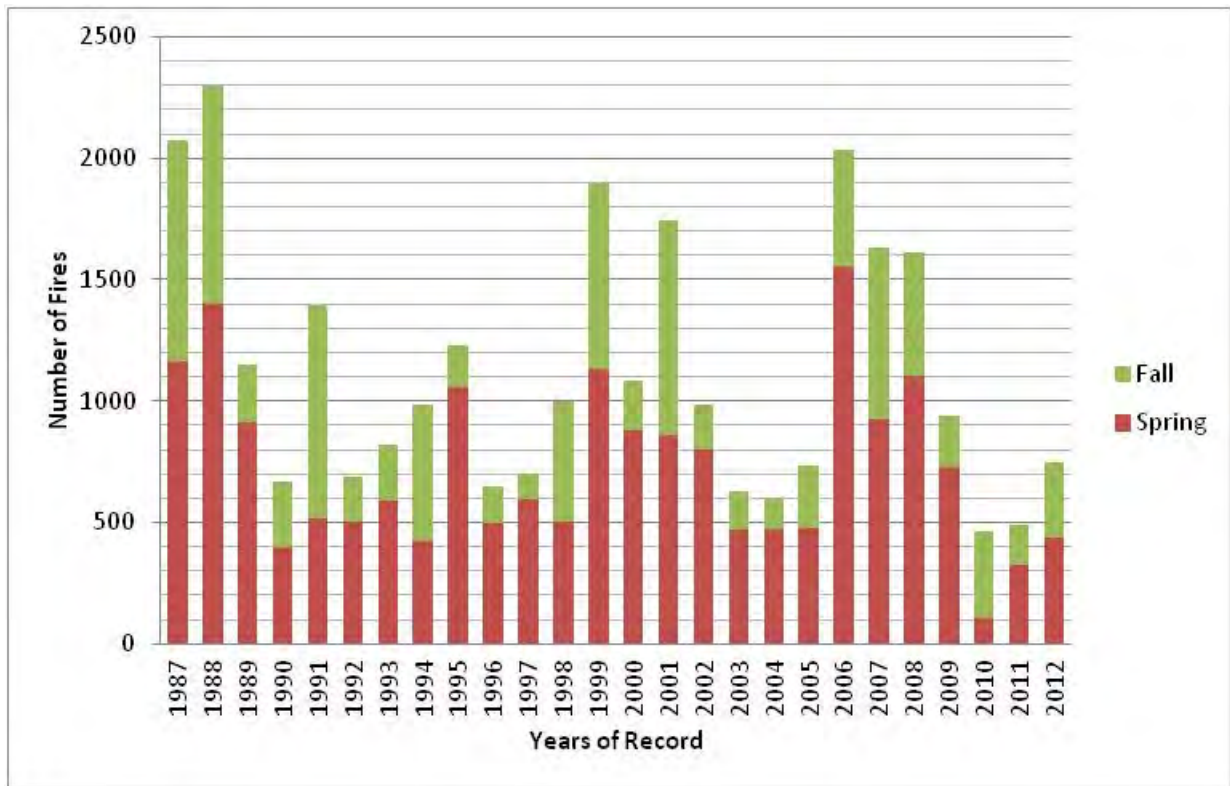


FIGURE 3-58. DISTRIBUTION OF WILDFIRES BY YEAR (WV DOF, 2012).

TABLE 3-55. HISTORICAL WILDFIRE EVENTS IN FROM WVDOF WITH >10,000 ACRES BURNED

Date	Season	County	Cause	Total Acres Burned
November 4, 1987	Fall	Boone County	Misc.	13,344
November 5, 1987	Fall	Raleigh County	Incendiary	19,560
October 26, 1991	Fall	Logan County	Incendiary	14,173
October 28, 1991	Fall	Mingo County	Incendiary	12,105
October 29, 1991	Fall	Boone County	Misc.	15,192
October 29, 1991	Fall	Fayette County	Misc.	12,517
October 30, 1991	Fall	Kanawha County	Misc.	10,906
October 31, 1991	Fall	Boone County	Incendiary	10,262

### Structure and Personal Property Damage

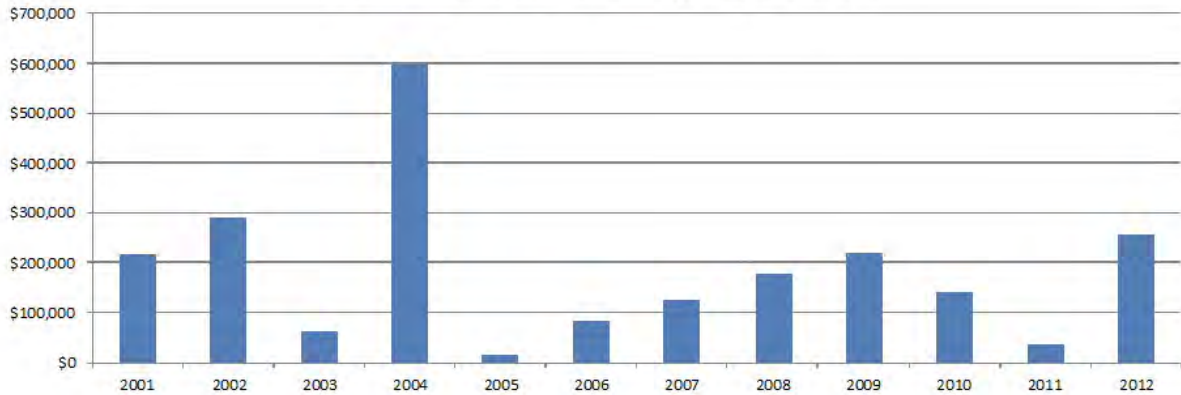


FIGURE 3-59. DISTRIBUTION STRUCTURE AND PROPERTY DAMAGE BY YEAR (WVDOF, 2012).

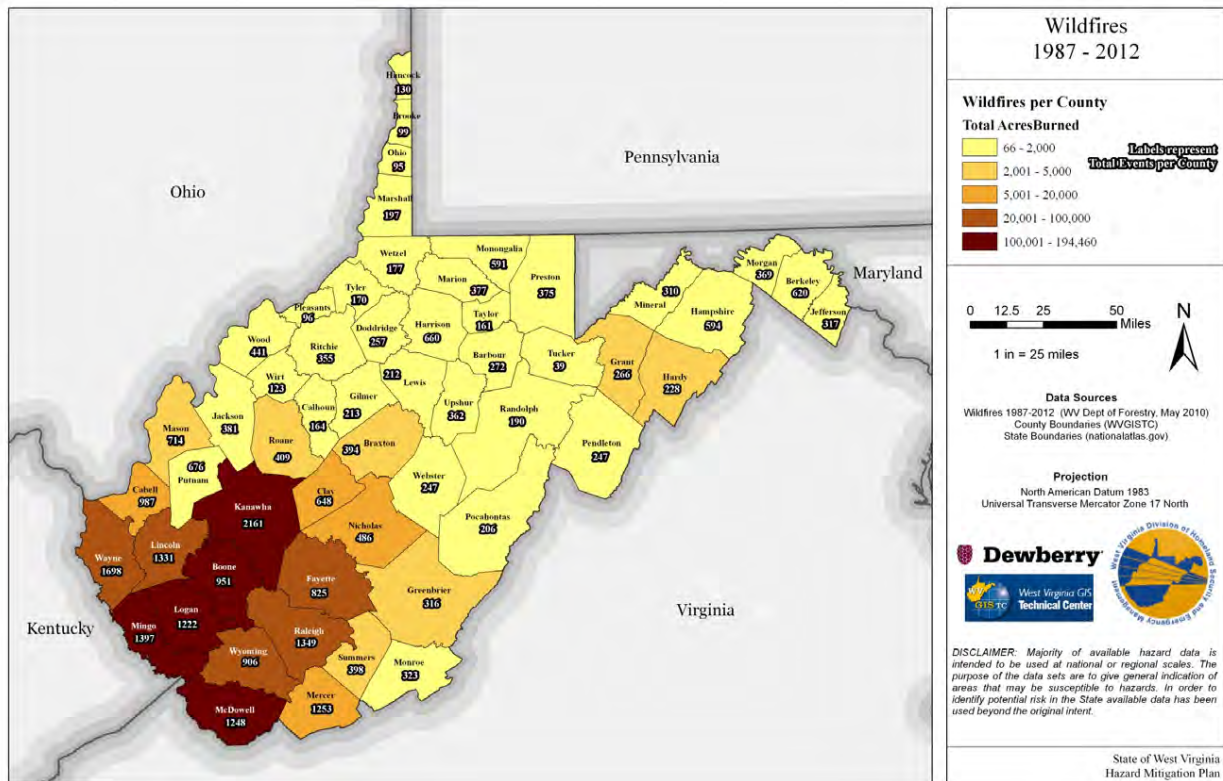


FIGURE 3-60. NUMBER OF WILDFIRES AND ACRES BURNED (1987 – 2012)

### 3.11.3 RISK ASSESSMENT

The occurrence of wildfires depends largely on the amount of fuel, wind direction, and speed, weather conditions, and the effectiveness of fire prevention measures. Further, the steep terrain and the aspect of the slopes were major contributors to the fires

becoming large in the Trough-Smokehole Wildfire Complex and the Southwest West Virginia Wildfire Complex.

According to statistics available from the United States Fire Administration (USFA), the annual death rate from urban fires in West Virginia was the eighth highest among States in the country. While the national average in 2009 was 11.0 deaths per million population, the West Virginia rate in 2009 was 19.8 fire deaths per million (USFA, 2009).

During the past 26 years, over 1.15 million acres have been burned as a result of wildfires. Figure 3-60 illustrates the total number of acres burned, by year, from 1987 through November 2012. The years 1987 and 1991 have the highest total acreage burned; these years correspond to significant droughts in West Virginia. Section 3.10 provides information on droughts in West Virginia.

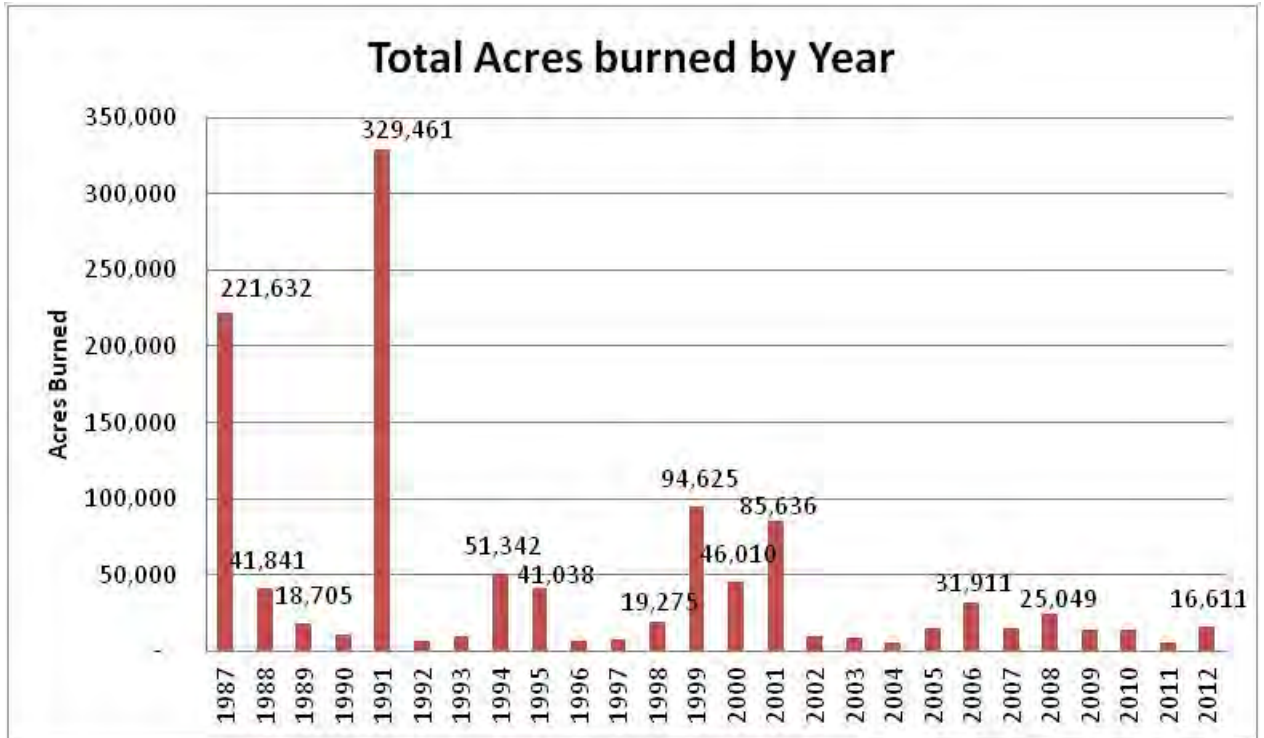


FIGURE 3-61. ACRES BURNED BY ALL CAUSES BY YEAR FROM 1987 – 2012.

## PROBABILITY

Historically, West Virginia experienced an extremely severe fire season or series of fire seasons about once every decade; the last severe season was during fall 2001.



Future wildfire incidents are difficult to predict, as the factors influencing wildfire ignition vary greatly with changing weather conditions and with human activities. There is currently no quantitative estimate of future wildfire probability for specific regions of the State. Probability for wildfire cannot be deduced into specific return periods or recurrence intervals as it can be for some of the other hazards because of annual variability of weather, which affects forest moisture conditions. However, on a daily basis foresters do predict fire hazard (fire danger) based on a calculated index of weather conditions, fuel moisture, and other factors.

## IMPACT & VULNERABILITY

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Vulnerability to wildfire is influenced by a variety of factors, such as land cover conditions, weather, and the effectiveness of land management techniques. Highly urbanized areas are less vulnerable to wildfire, but suburban neighborhoods located at the “wildland urban interface” are very vulnerable to wildfire. Individual buildings may be more or less vulnerable to damage from wildfire based on factors such as the clear distance around the structure, and the structure’s construction materials.

Wildfire primarily impacts timber and forest ecosystems, although the threat to nearby buildings is always present.

The economic history of West Virginia’s forests makes them particularly vulnerable to wildfires. The State’s forests were extensively logged from 1890-1920. Shay engines were used to move logs off the mountain. These often sent sparks into dry, residual woody debris, igniting forest fires that burned untended through the State for years. Other factors contributing to wildfires across the State include intense forest recreation (e.g., camping, hiking, etc.), deteriorating and neglected buildings, areas prone to lightning strikes (e.g., high ridges, mountains), drought, windy conditions, lack of adequate fire prevention and/or suppression apparatus, increased arson activity, presence of non-indigenous flora, and lack of proper supervision during debris burning in rural areas.

Arson and debris burning are the most frequently reported cause of wildfires in West Virginia. Figure 3-62 shows the distribution of wildfires by cause in West Virginia for 2001 through 2012. Debris burning and incendiary continue to be primary causes of wildfires. Electric power transmission is the primary cause of equipment related fires and the fourth leading cause of acreage burned. Burning coal seams and mine refuse piles cause the most miscellaneous wildfires and are the second leading cause of acreage burned.

Human activities are the leading cause of wildfire incidents in West Virginia. Intentional setting of fires, debris burning and miscellaneous causes were responsible for the greatest number of reported wildfire incidents and acres burned during years





1987 through fall 2012 (Figure 3-63 and Table 3-56). As suburban residential development continues to expand, it is reasonable to expect an increase in human/wildland interactions, resulting in more wildfires. During the past 26 years, there have been 29,233 wildfire incidents resulting in 1.15 million acres burned in West Virginia.

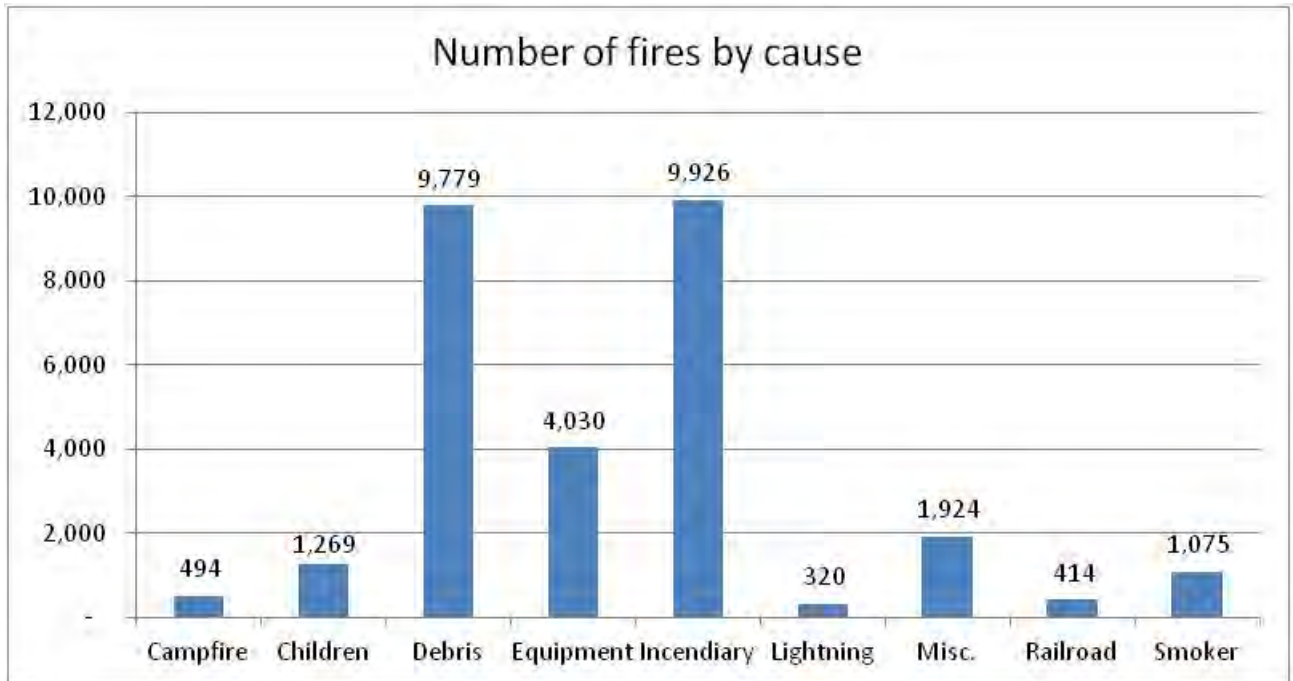


FIGURE 3-62. NUMBER OF WILDFIRES BY CAUSE 1987- 2012. (WVDOF, 2012)

TABLE 3-56. WILDFIRE INCIDENTS AND ACRES BURNED IN WEST VIRGINIA (1987- 2012)

General Cause	Incidents	Total Acreage Burned	% Total Incidents	% Total Acres Burned
Incendiary	9,926	738,867	34.0%	64.1%
Misc.	1,924	235,241	6.6%	20.4%
Debris	9,779	110,968	33.5%	9.6%
Equipment	4,030	36,110	13.8%	3.1%
Railroad	414	7,759	1.4%	0.7%
Children	1,269	7,349	4.3%	0.6%
Campfire	494	7,084	1.7%	0.6%
Smoker	1,075	5,001	3.7%	0.4%
Lightning	320	4,982	1.1%	0.4%
False Alarm	2	-	0.0%	0.0%
<b>Total</b>	<b>29,233</b>	<b>1,153,361</b>		

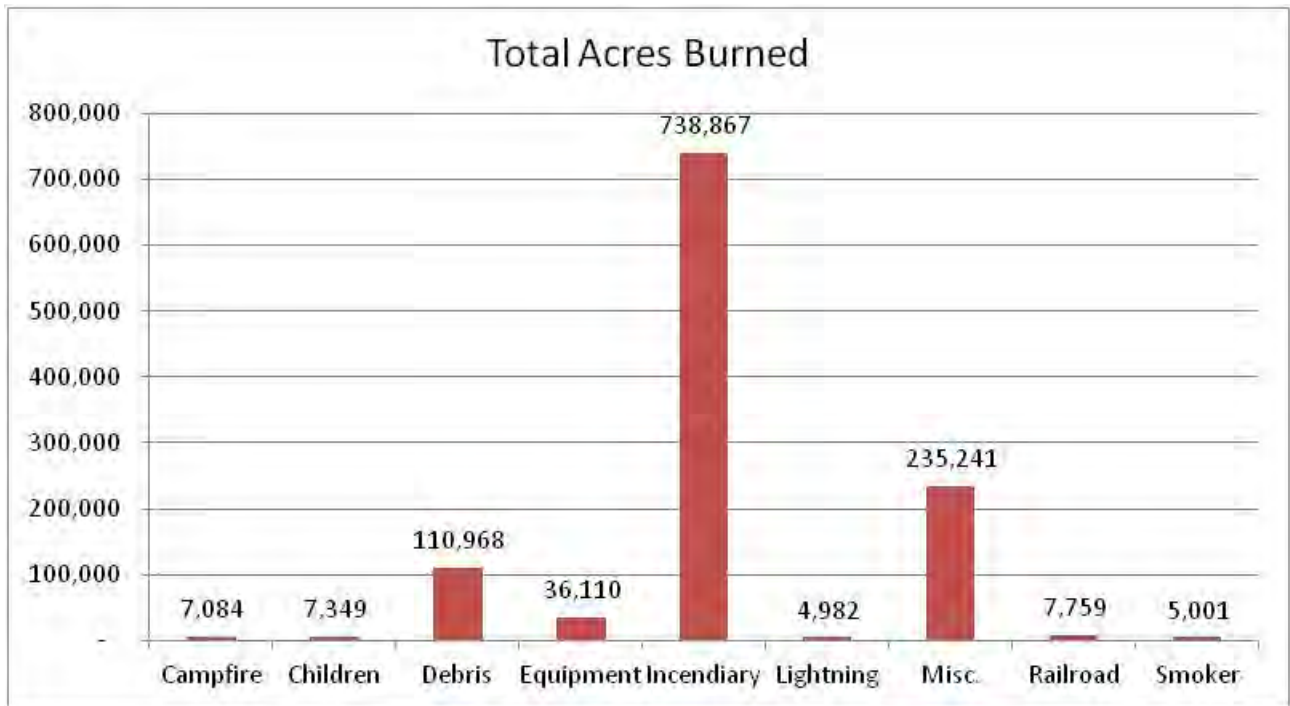


FIGURE 3-63. WILDFIRE NUMBER OF ACRES BURNED BY CAUSE 1987 - 2012. (WVDOF, 2012)

## RISK

The risk associated with wildfire in West Virginia has not been formally quantified, due to the lack of precise information on probability and impact. Based on information from WVDOF, two areas in the State have been identified as priority areas for the fire program:

1. “Hot” counties in the southern coal fields
2. Eastern Panhandle

These include:

1. Boone County
2. Cabell County
3. Clay County
4. Fayette County
5. Kanawha County
6. Lincoln County
7. Logan County
8. McDowell County
9. Mercer County
10. Mingo County
11. Nicholas County
12. Raleigh County
13. Wayne County
14. Wyoming County

WVDOF has created composite maps of the highest priority areas in West Virginia.

Figure 3-64 shows areas of wildfire concern based on past fire occurrences (1999 – 2009), topography, and wildland-urban interface. The highest priority areas were



further summarized by WVDOF on a county basis, to better assess staffing, dispatching, availability of volunteer fire department assistance, and other factors that are important in a fire management program (Figure 3-65).

The counties with a high composite score include:

- |                    |                    |
|--------------------|--------------------|
| 1. Boone County    | 7. Mercer County   |
| 2. Cabell County   | 8. Mingo County    |
| 3. Kanawha County  | 9. Raleigh County  |
| 4. Lincoln County  | 10. Wayne County   |
| 5. Logan County    | 11. Wyoming County |
| 6. McDowell County |                    |

Counties with a medium composite score:

- |                      |                    |
|----------------------|--------------------|
| 1. Monongalia County | 5. Putnam County   |
| 2. Berkeley County   | 6. Clay County     |
| 3. Jefferson County  | 7. Nicholas County |
| 4. Wood County       | 8. Fayette County  |

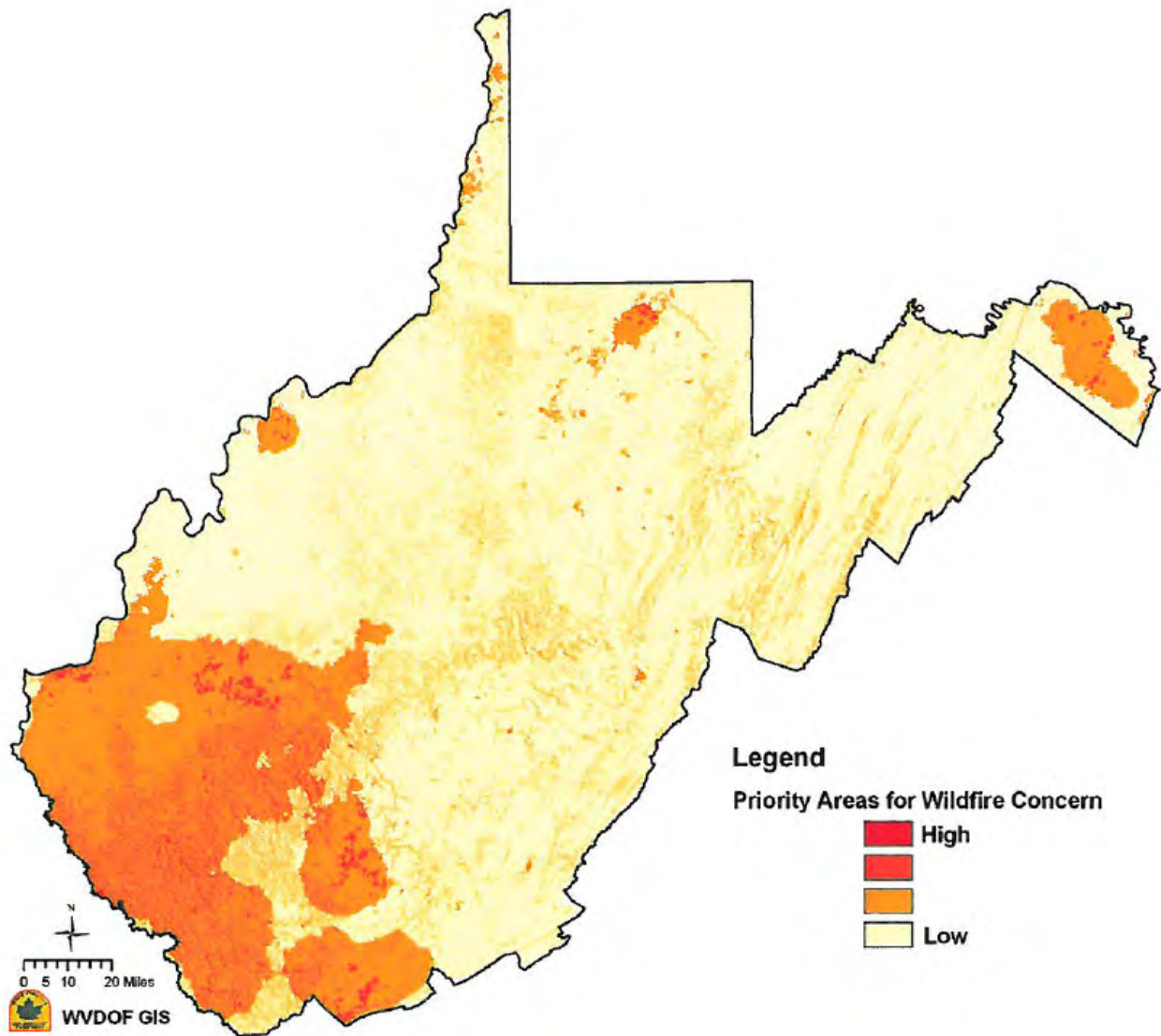


FIGURE 3-64. HIGHEST PRIORITY AREAS FOR WILDFIRE CONCERN IN WEST VIRGINIA (WVDOT GIS, 2009)





results of this analysis indicate 4,137 buildings are located in high-priority counties for wildfires. Kanawha County has the highest number of State facilities and total value at risk.

TABLE 3-57. STATE FACILITIES IN WVDOF HIGH WILDFIRE PRIORITY COUNTIES.

High Risk County	Number of State Facilities	Building Value at Risk	Contents Value at Risk	Total Value at Risk
Kanawha County	1,389	\$1,856,127,502	\$403,495,396	\$2,259,622,898
Raleigh County	557	\$733,816,584	\$94,946,408	\$828,762,992
Cabell County	423	\$825,765,653	\$96,123,109	\$921,888,762
Mercer County	318	\$333,633,852	\$52,152,550	\$385,786,402
Mingo County	308	\$181,987,175	\$35,228,772	\$217,215,947
Wayne County	279	\$174,010,826	\$41,523,811	\$215,534,637
McDowell County	238	\$234,002,751	\$33,798,677	\$267,801,428
Logan County	219	\$257,906,281	\$25,447,842	\$283,354,123
Wyoming County	209	\$91,676,924	\$14,703,450	\$106,380,374
Lincoln County	115	\$118,939,138	\$13,342,025	\$132,281,163
Boone County	82	\$29,919,232	\$4,891,200	\$34,810,432

The State facility data includes building construction details and the presence of sprinkler systems. Wood (heavy timber) is the construction material most susceptible to wildfire; the facilities database does not indicate that any of these structures have sprinkler or suppression systems. Randolph, Morgan, and Lewis Counties have the most wood structures with no sprinkler system in place. Notably, the more fire resistant buildings are equipped with sprinkler systems. It is likely that these structures have been built more recently. Buildings without sprinkler and/or suppression systems are considered vulnerable to wildfire.

The BOR also maintains data on the maximum foreseeable and probable maximum loss due to fire. Maximum Foreseeable Loss is the percentage of structure loss with complete failure of fire prevention measures. This is the percentage of loss in a worst circumstance, with the nonfunctioning of fire prevention equipment. In most cases 100% is recorded, accounting for the worst-case scenario. Probable Maximum Loss is the percentage of structure loss with fire prevention methods fully functioning. This assumes all firefighting equipment is functioning properly. In most cases 100% is recorded, accounting for the worst-case scenario.

The Insurance Services Office (ISO) provides underwriters with advance information on the fire-loss characteristics of individual communities through its Public Protection Classification (PPC) Service. Through this service, it collects and analyzes data using the Fire Suppression Rating Schedule (FSRS) and then assigns a Public Protection Classification from 1 to 10. By classifying a community's ability to suppress fires, ISO



provides underwriters with an understanding of the risk associated with a specific property. A community's PPC depends on:

- Fire alarm and communication systems, including telephone systems, telephone lines, staffing, and dispatching systems;
- The fire department, including equipment, staffing, training, and geographic distribution of fire companies; and
- The water-supply system, including the condition and maintenance of hydrants, and a careful evaluation of the amount of available water compared with the amount needed to suppress fires.

Generally, Class 1 represents the best public protection and Class 10 indicates no recognized protection. Table 3-58 summarizes the total number of structures within each class by county. Two-thirds of the facilities fall within Class 10 or the unknown fire protection classification. The high priority counties have been indicated with an asterisk (\*) in this table.

Risk for critical facilities was calculated in the same fashion as mentioned above for State facilities; the critical facilities data does not include information on building material or sprinkler systems. Table 3-59 shows the breakdown of the critical facility types in the counties at high priority for wildfire determined by WVDOF. Of these high priority counties, Kanawha County has the largest number (184) of critical facilities. Critical facility and wildfire priority areas have remained unchanged since the last plan, and that analysis remains valid.

## **JURISDICTIONAL RISK**

Based on the number of events in NCDC and WVDOF, an increased number of wildland fires occurs in the southwestern portion of the State. WVDOF has referred to these counties as the "hot counties of the southern coalfields." For the past decade, these counties accounted for more than 57% of the fires statewide and 95% of the acres burned statewide.<sup>39</sup> During the 2013 plan update, the "hot" counties in the southern part of the State continue to have the most acres burned. Incidences of fires and acres burned have been increasing in the Eastern Panhandle because of population growth and construction of homes in the wildland-urban interface.

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<sup>39</sup> Issues, Sub-Issues and Priority Area Identification – Issue 5: Wildfire Mgmt. Res. Protection/Public Safety WVDOF 2010



Using data provided by WVDOF and assuming a timber market value of \$300 per acre of timber burned, West Virginia can expect annualized damages of timber around \$13.3 million. Damages decreased slightly from the 2011 plan as a result of the additional years or record factoring into the annualized scores. Table 3-60 summarizes the loss estimates for counties with more than \$500,000 in estimated annual damages. The annualized damages calculated were used in the crop damage parameter in the ranking below; the estimated timber damages are used in place of the lack of data available through the NCDC database for wildfire. Table 3-60 compares the local plan loss estimates and State estimates for each county.





TABLE 3-58. FIRE PROTECTION CLASSIFICATION OF STATE FACILITIES. (\* HIGH PRIORITY COUNTY)

County	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class Unknown
Barbour				1	3	36	1	1	4	54	25
Berkeley			2		176	44	35	2	8	30	65
Boone*	1				5	23	13	1	4	19	16
Braxton					24	24	16	2		65	20
Brooke				2	9	9	2	5	1	5	11
Cabell*	14	102	20	1	36	43	6		2	49	150
Calhoun						2	2		1	10	13
Clay						2	15	5	7	11	7
Doddridge						8	1	4	16	21	8
Fayette				2	15	25	74	11	9	152	78
Gilmer						63	1	1	16	38	61
Grant						1	72	3	6	36	25
Greenbrier	1				26	21	1	1	8	104	28
Hampshire	1	1				32	1	14	7	81	115
Hancock	1				29	1	18	1	1	73	39
Hardy					10		16	1	15	132	23
Harrison	1		30	27	14	24	1	3	6	72	178
Jackson	1					64	1	1	1	56	38
Jefferson	3			2	5	105	12	1	54	41	106
Kanawha*	17	317	112	88	62	130	64	4	9	221	365
Lewis				1	2	6			1	95	76
Lincoln*					5	16		3	3	31	57
Logan*					105	25	3		2	25	59
Marion			1	53	21	31	7	9	37	38	117
Marshall				15	79	21	9	6	1	20	52
Mason		1			57	15	2	4	4	72	46
McDowell*		1	1	1	24	24	10	75	8	57	37
Mercer*	1		44	77	14	17	1	10	8	61	85
Mineral			1	1	26	75	1		6	52	24
Mingo*			76			14	20	52	36	84	26
Monongalia		1	72	2	6	8	13	15	10	86	231
Monroe	1						2	2		52	50
Morgan	1				1	62	3		9	90	20



**2013 WEST VIRGINIA STATEWIDE STANDARD  
HAZARD MITIGATION PLAN UPDATE**

County	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class Unknown
Nicholas	1				1	34	1	1	1	62	44
Ohio	1		127	1	4	14	2	12		14	96
Pendleton					1	5	4		1	55	21
Pleasants				1		35		3		28	10
Pocahontas					26	1	12		4	332	40
Preston	1		2		42	42	14	5	3	152	90
Putnam			2	2	23	173	30	7	7	48	20
Raleigh*	1		47	41	61	41	38	28	45	96	159
Randolph	1				30	11	11		3	135	108
Ritchie					2	5				64	46
Roane	1			1	20	35	1	1	1	19	16
Summers						33	10	1	2	153	45
Taylor	1				8	57	1	3	4	55	14
Tucker	4					7	13		1	174	26
Tyler					3	32	7	1	30	24	12
Upshur					12	3			1	50	37
Wayne*	3	9	26	2	6	10	4	83	14	35	87
Webster	1				14	2	41		10	72	17
Wetzel					9	2	9		3	18	18
Wirt						14	1			16	12
Wood	1		2	99	4	15	2	1	9	53	149
Wyoming*						47	44	3	35	73	7
<b>Total</b>	<b>59</b>	<b>432</b>	<b>565</b>	<b>420</b>	<b>1,020</b>	<b>1,589</b>	<b>668</b>	<b>386</b>	<b>474</b>	<b>3,761</b>	<b>3,325</b>



TABLE 3-59. CRITICAL FACILITIES IN HIGH PRIORITY COUNTIES

County	EOC	Fire Departments	Hospital	Law Enforcement	School	Total
Boone County	1	9	1	6	18	35
Cabell County	2	14	6	8	37	67
Kanawha County	3	51	8	37	85	184
Lincoln County	1	7		4	11	23
Logan County	1	13	1	10	19	44
McDowell County	1	17	1	12	21	52
Mercer County	1	14	3	15	27	60
Mingo County	1	14	1	8	17	41
Raleigh County	1	20	2	14	35	72
Wayne County	1	13	-	8	24	46
Wyoming County	1	9	-	5	14	29

TABLE 3-60. ESTIMATED TIMBER ANNUALIZED LOSS USING WVDOF DATA (1987 – 2012).

County	Annualized # Fires	Annualized Acres Total Burn	Annualized Loss Estimate
Mingo County	53.7	7,479.2	\$2,243,768
Logan County	47.0	6,328.1	\$1,898,432
Boone County	36.6	6,304.4	\$1,891,317
Kanawha County	83.1	4,306.1	\$1,291,816
McDowell County	48.0	4,006.8	\$1,202,040
Wayne County	65.3	3,012.5	\$903,756
Raleigh County	51.9	2,931.3	\$879,403
Fayette County	31.7	2,421.2	\$726,351
Wyoming County	34.8	2,081.5	\$624,441
Lincoln County	51.2	1,886.1	\$565,827

NCDC property damages indicate that West Virginia can expect approximately \$3,835 in annualized damages per year for wildfire related events. Annualized damages have been calculated by taking the total damages per jurisdiction and dividing by the period of record. For wildfire, the property damages statewide have been assigned the lowest score. As discussed in Section 3.3, this most likely underestimates what West Virginia would experience due to wildfire.

Figure 3-66 shows the relative wildfire rankings for each jurisdiction. The 2010 wildfire ranking relied heavily on the sparse NCDC data; the 2013 ranking has been expanded to include the WVDOF events, timber damages, and geographic extent. NCDS has relatively few records for wildfire events; as a result, the lowest ranking score (1) was assigned to property damage and deaths and injuries. This was completed in an effort to be able to compare wildfire to the other hazards; the ranking methodology is described in Section 3.5. Based on the ranking parameters, the high



WVDOF high priority counties have a high ranking. McDowell County was assigned a Medium-High ranking as a result of the local plan ranking score.

It should be noted that risk of wildfire, in this plan, is focused on risk in terms of damages to infrastructure and population. The risk of fires starting or spreading is different and not discussed in detail in this plan.

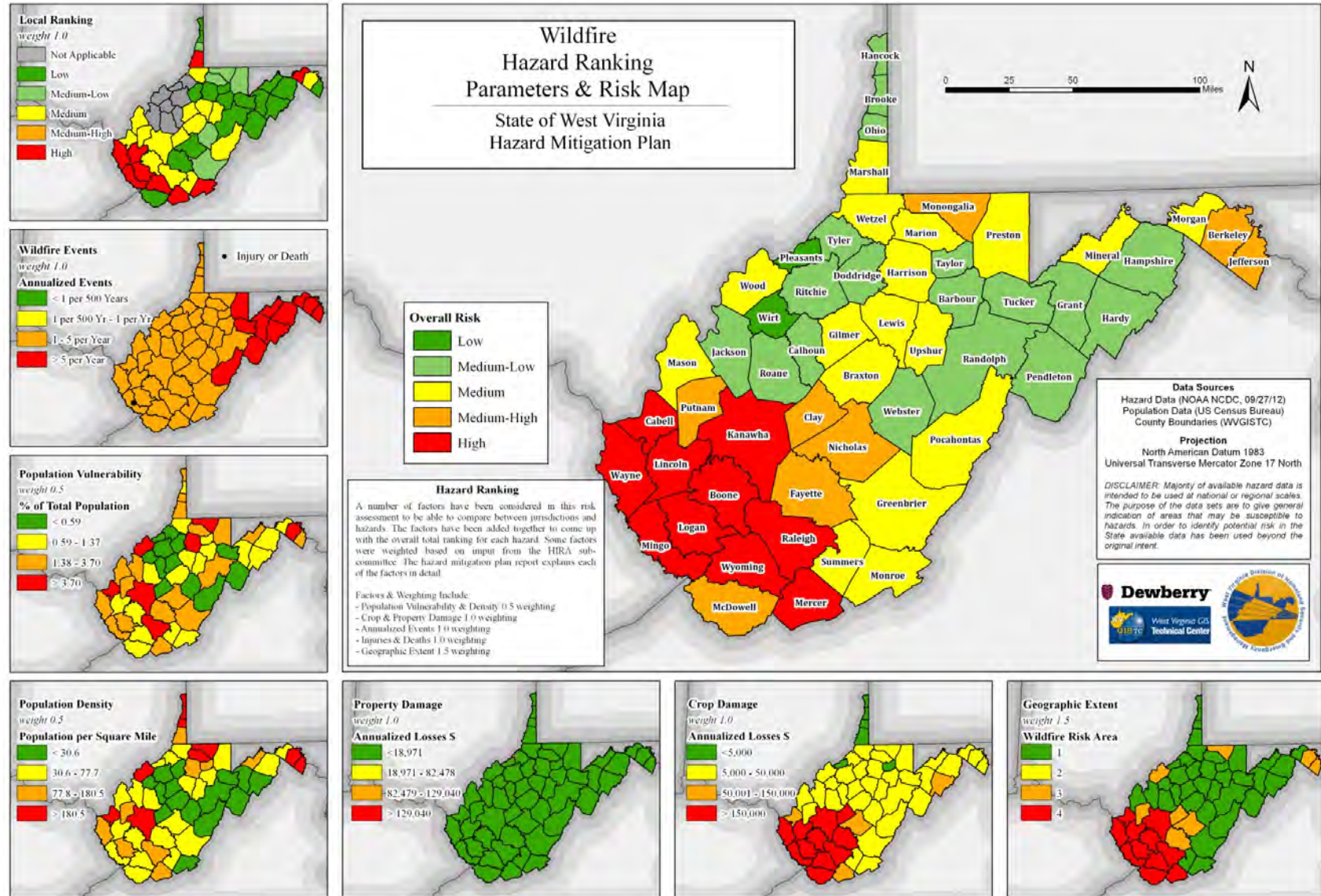


FIGURE 3-66. WILDFIRE HAZARD RANKING PARAMETERS AND RISK MAP

## 3.12 LANDSLIDES

### 3.12.1 DESCRIPTION

Landslides are the downward movement of large volumes of surface materials under gravitational influences.<sup>40</sup> The term landslide includes mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, and earth flows. The type of movement and type of material in motion generally classifies the landslides. Types of movement include: rotational, translational, block, falls, topples, debris flows, debris avalanche, earth flow, creep and lateral spreads.<sup>41</sup> The types of materials in motion generally consist of fractured or weathered bedrock and loose or unconsolidated soils. A combination of two or more of the principle flow types is referred to as a complex movement.



West Virginia University Arboretum March 26, 1976  
Source: WVGES Bulletin No. 15

Landslide-susceptible terrain includes:

1. Mountainous terrain with very steep slopes
2. Areas of moderate relief suffering severe land degradation
3. Areas of heavy precipitation events
4. Areas covered with thick layers of finely grained soil deposits
5. Areas subject to earthquake shaking

Geologic, physiographic, and climatic factors affect the nature and occurrence of landslides in West Virginia. Geology and physiographic factors affecting the incidence of landslides include folds, fractures, and faults in the underlying geologic formation.

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<sup>40</sup> Smith, K., *Environmental Hazards, Assessing Risk and Reducing Disaster, Third Edition*, Rutledge, New York, 1991

<sup>41</sup> USGS Fact Sheet 2004-3072



Steep areas with poor surface and/or subsurface drainage are particularly susceptible to landslides.

### 3.12.2 HISTORIC OCCURRENCE

Most of West Virginia is susceptible to landslides. A comprehensive database documenting all landslide occurrences in the State is lacking, as it is for karst. More than 30% of the federally-declared disasters include landslide as part of the disaster declaration; it is frequently included as a part of disaster declarations for flooding events. For instance, FEMA referred to DR 1410 (spring 2002) as Severe Storms, Flooding, Landslides. This affirms that the same high rainfall event that caused damaging floods also caused damages from landslides; people suffering damage from a landslide due to that event could potentially receive Federal assistance for that disaster declaration. Section 3.3 provides additional information and maps for Federally Declared Disasters. Table 3-61 below highlights some of the significant landslides that have occurred in West Virginia.

As discussed in Section 3.3, the NCDC storm events database is limited to the extent of reported geological hazards events. The NCDC database has three landslide events documented accounting for approximately \$130,000 in property damages. These events were documented for April 15, 2007 (Greenbrier County); March 30, 2009 (Kanawha County); and February 29, 2012 (Preston County).

A 1996 West Virginia Geological and Economic Survey (WVGES) study estimated that there have been nearly 500,000 landslides in the State to date; damage estimates are approximately \$30 million annually.<sup>42</sup>

Historical information for dates that landslides have occurred is very scarce. The 1976 WVGES Environmental Geology Bulletin Number 15 contains data on five landslides where rainfall occurred during a month-long period immediately preceding failure. Long rainy periods tend to generate more landslides than isolated storms occurring at the beginning of the rainy season<sup>43</sup>. Table 3-61 summarizes the location of the slide and the preceding amount of rainfall received.

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<sup>42</sup> Lessing, Peter, Kulander, B.D., Wilson, S.L. Dean, and S.M. Woodring. 1976. West Virginia Landslides and Slide-Prone Areas. Lessing, Peter. July 1996. West Virginia Geology, Environmental. West Virginia Geologic and Economic Survey. Available at <http://wvgs.wvnet.edu/www/geology/geolenvi.htm>

<sup>43</sup> 1976 WVGES Environmental Geology Bulletin No. 15



TABLE 3-61. SIGNIFICANT LANDSLIDES IN WEST VIRGINIA

Year	Location of Landslide	Description
1976	West Virginia University Arboretum	Landslide in the West Virginia University Arboretum that covered the railroad tracks on March 26, 1976. The slide is 275 feet across, and the slope is approximately 60 percent.
1985	Potomac and Cheat River Watersheds	Affecting both Virginia and West Virginia, 72 hours of storms produced record floods and extensive landslide and debris flow activity, causing 70 deaths and a total of \$1.3 billion in damage to homes, businesses, roads, and farmlands.
2007	Greenbrier County	A mud slide closed Route 12 between Alderson and Asbury. The slide also knocked down a power pole. An area of persistent, heavy rain developed on the northwest side of an area of low pressure that tracked from western North Carolina to eastern Virginia. Across Greenbrier County, WV, this rainfall amounted to 1.00 to 2.25 inches. This amount of rain in a short period of time, in an area with steep terrain, led to flash flooding in parts of the county, including reports of mudslides.
2009	Kanawha County	An abandoned underground mine in Coalburg Mountain near East Bank had filled with water due to a 4-day rainy period accounting for 1.75 to 2 inches of rainfall. The mine blew out the side, water gushed out and cascaded down the mountainside, and rocks and mud were picked up by the flowing current. Debris was deposited across roads and railroad tracks on the western end of the community. Highway maintenance crews worked for a week before Route 61 could be reopened.
2012	Marion County Monongalia County Preston County	Showers and thunderstorms with heavy rain developed on February 29, 2012. Two to three inches of rain were reported within only a few hours in addition to the rain from earlier in the day with the passage of the warm front. Roads were made impassable by fast moving floodwaters and mudslides. Approximately 260 homes and businesses were impacted, with estimated damage to public property in Marion \$557,000, Monongalia \$518,000, and Preston \$855,000.

### 3.12.3 RISK ASSESSMENT

West Virginia has an extensive inventory of landslide quadrangle maps that have been scanned and geo-referenced but not digitized. As a result this data was not available for the facility and jurisdictional analysis. Mitigation actions and future revisions of this plan should work closely with WVGES to determine data availability. Figure 3-67 below shows the landslide mapping agency for the various West Virginia quadrangle maps.



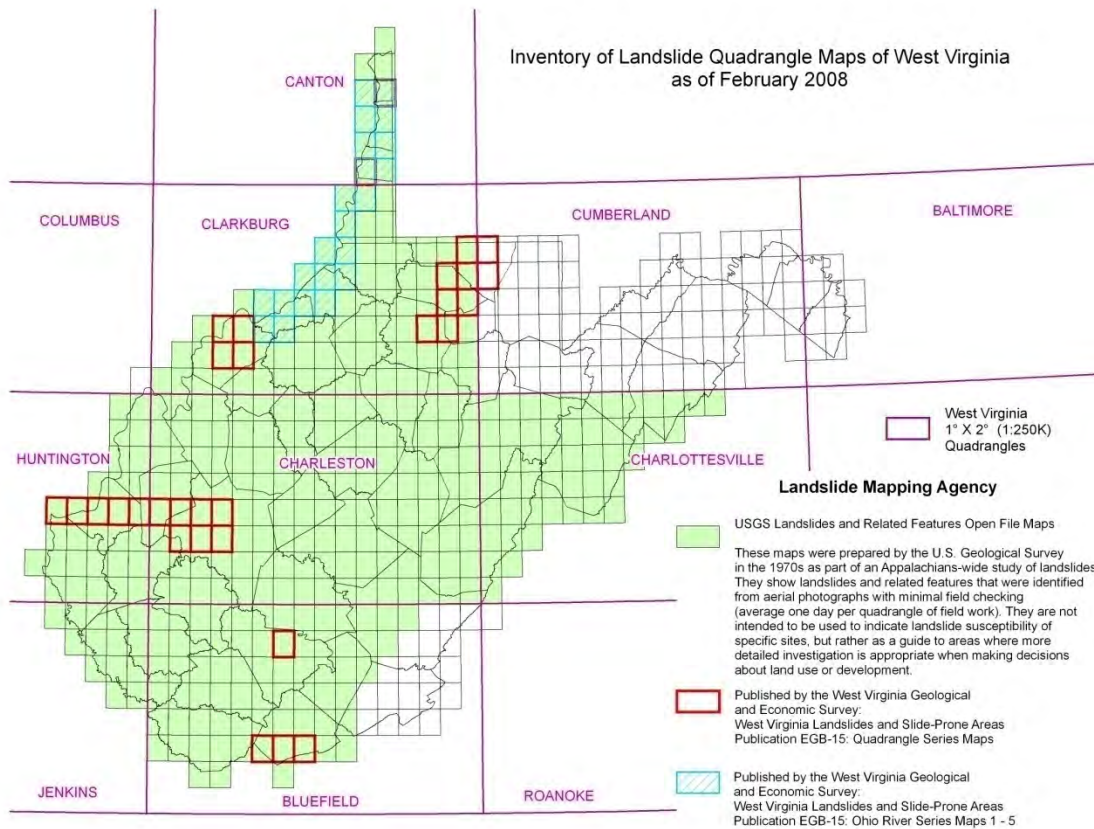


FIGURE 3-67. INVENTORY OF LANDSLIDE QUADRANGLE MAPS OF WEST VIRGINIA AS OF FEBRUARY 2008.

A different national landslide data set shows areas in the United States where large numbers of landslides have occurred and areas that are susceptible to landslides. This data set is a digital representation of USGS Open-File Report 97-289, which is a PDF version of the 1997 USGS Digital Representation of Landslide Overview Map (scale 1:4,000,000). The report classifies the major physical subdivisions of the United States and assesses vulnerabilities based on subdivision characteristics. Figure 3-68 shows areas that may be susceptible to landslides.

## PROBABILITY

The probability of a landslide occurrence cannot be estimated based on statistical data, nor can the “safety factor” for any given slope based on geotechnical laboratory test and mathematical computations be calculated. Nearly all of West Virginia exists in a zone of high landslide incidence. Landslides pose a significant threat to West Virginians and their property.

Conditions in West Virginia that contribute to the frequency of landslides include the mountainous terrain and the high average annual precipitation. Winter precipitation



seeps into cracks and fissures in rock slopes and expands upon freezing, which frequently results in sliding and toppling failures. Precipitation throughout the year can raise the groundwater table, which tends to reduce slope stability; water seeps into soil rock boundary layers and reduce friction between layers, resulting in translational or block slides; or increase the moisture content and weaken loose or unconsolidated soils, causing rotational failures or earth flows. Other factors also contributing to the occurrence of landslides include seismic activity, construction activities that increase surface runoff (e.g., wildfires), and construction of paved surfaces, that increases localized erosion.

## IMPACT AND VULNERABILITY

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Landslides can cause significant damage to highways, buildings, homes, and other structures that support a wide range of economies and activities. Landslides commonly coincide with other natural disasters. Expansion of urban development contributes to greater risk of damage by landslides.

The USGS recognizes six major impacts caused by landslides<sup>44</sup>:

1. Damage in all 50 States, Puerto Rico, and the U.S. Virgin Islands
2. Costs of \$3.5 billion per year, in 2005 dollars, in damage repair
3. Cause of between 25 and 50 deaths in the United States annually
4. Reduction in real estate values and tourist revenue
5. Cause of lost human, industrial, agricultural, and forest productivity
6. Damage to the natural environment

## RISK

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Conditions that increase the risk of a landslide include heavy rain, snowmelt, and changes in groundwater level; seismic or volcanic activity may trigger landslides. Long-term climate change may result in an increase in precipitation, precipitation intensity, ground saturation, and a rise in groundwater level, reducing the shear strength and increasing the weight of the soil. Erosion may remove the toe and lateral support of certain areas, triggering potential landslides. Storms and sea level rise often exacerbate coastal erosion and landslides. Human activities triggering landslides are usually associated with construction and changes in slope and surface water and groundwater levels. Changes in irrigation, runoff and drainage can increase erosion and change groundwater levels and ground saturation.

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<sup>44</sup> USGS Fact Sheet: FS-2005-3156: Landslide Hazards—A National Threat



This assessment focuses on areas that may be susceptible to landslides likely to occur based on past incidence. The assigning of any area to the lowest incidence or susceptibility category should not be construed to mean that no landslides exist or that no areas are susceptible to landslides. Even areas in the lowest category may contain landslides unknown to the compilers or have an incidence of less than 1.5 percent. The possibility is great that more landslides than indicated exist statewide (except for the highest category), due to the scarcity of landslide information for many parts of the country.<sup>45</sup>

The USGS divides landslide risk into six categories. These six categories were grouped into three, broader categories to be used for the risk analysis and ranking; geographic extent is based off of these groupings. These categories include:

### **High Risk**

- High susceptibility to landsliding and moderate incidence.
- High susceptibility to landsliding and low incidence.
- High landslide incidence (more than 15% of the area is involved in landsliding).

### **Moderate Risk**

- Moderate susceptibility to landsliding and low incidence.
- Moderate landslide incidence (1.5 - 15% of the area is involved in landsliding).

### **Low Risk**

- Low landslide incidence (less than 1.5 % of the area is involved in landsliding).

The six categories were grouped into High (categories 1-3), Medium (categories 4 – 5), and Low (category 6) to assess the risk to State facilities, critical facilities, and jurisdictions via the geographic extent parameter discussed in Section 3.5.

## **FACILITY RISK**

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To determine which facilities were at risk for landslide, State and critical facilities were intersected with the USGS Landslide Incidence and Susceptibility layer, and the dominant risk category was then assigned to the facilities. The results of this analysis indicate 10,507 buildings are in regions with relatively high landslide risk. Table 3-62

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<sup>45</sup> Radbruch-Hall, et al. Landslide Overview Map of the Conterminous United States, 1982. USGS Professional Paper 1183. <http://pubs.usgs.gov/pp/p1183/pp1183.html>

shows the distribution of risk and building value at risk for State facilities. Figure 3-69 shows the spatial location of the facilities in relation to the landslide risk zones. Table 3-63 summarizes the number of facilities by county in the high landslide risk category. Annualized loss estimates were not calculated for State facilities due to the scale of available landslide mapping and lack of probabilities of future occurrences.

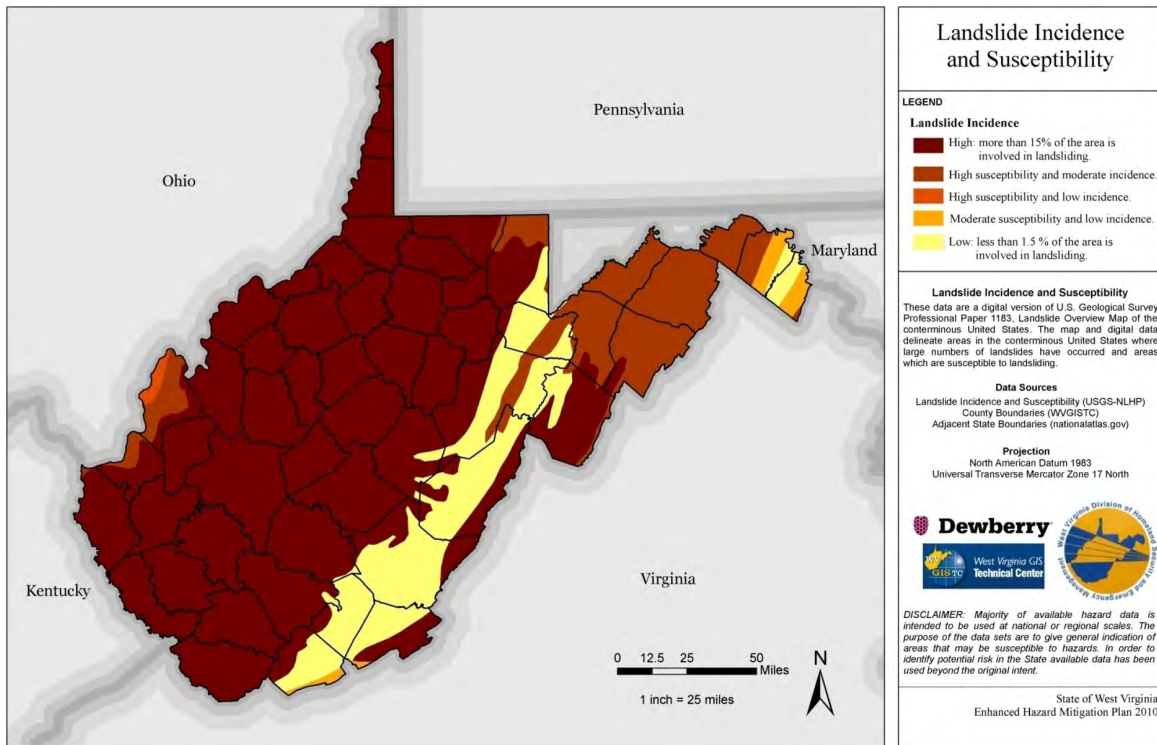


FIGURE 3-68. LANDSLIDE INCIDENCE AREAS

The top 10 State agencies that have the largest building value at risk have been listed in Table 3-64 by building value. The agencies listed represent 19% of the buildings and 36.3% of total building value in high landslide risk zones.



TABLE 3-62. NUMBER OF STATE FACILITIES LOCATED IN EACH LANDSLIDE RISK ZONE

Category	Risk	Landslide Type	Number of State Facilities	Building Value at Risk	Contents Value at Risk
1	High	High Incidence	8,894	\$8,377,974,970	\$1,719,876,965
2	High	High Susceptibility	1,476	\$1,216,644,740	\$170,543,711
		Moderate Incidence			
3	High	High Susceptibility	137	\$138,613,729	\$14,653,637
		Low Incidence			
4	Moderate	Moderate Susceptibility	515	\$514,714,811	\$74,585,514
		Low Incidence			
5	Moderate	Moderate Incidence	0	\$0	\$0
6	Low	Low Incidence	1,666	\$1,765,255,334	\$255,606,438
<b>Total</b>			<b>12,688</b>	<b>\$12,013,203,584</b>	<b>\$2,235,266,265</b>

TABLE 3-63. NUMBER OF STATE FACILITIES LOCATED IN HIGH LANDSLIDE RISK ZONE BY COUNTY

County	Number of State Facilities	Building Value at Risk	Contents Value at Risk
Barbour	37	\$4,153,899	\$6,957,359
Berkeley	7	\$284,418	\$97,000
Boone	21	\$638,330	\$372,700
Braxton	61	\$7,123,262	\$992,100
Brooke	8,256	\$1,072,860,986	\$146,600
Cabell	51	\$8,746,477	\$2,436,600
Calhoun	1	\$0	\$20,000
Clay	2	\$40,000	\$60,000
Doddridge	3	\$854,286	\$130,000
Fayette	111	\$95,849,660	\$13,866,714
Gilmer	33	\$1,707,472	\$146,800
Grant	35	\$1,216,977	\$311,000
Greenbrier	16	\$13,792,421	\$556,001
Hampshire	48	\$55,046,829	\$5,738,027
Hancock	57	\$4,715,632	\$1,557,500
Hardy	70	\$7,483,828	\$1,782,522
Harrison	79	\$17,847,364	\$2,727,421
Jackson	57	\$10,412,553	\$2,474,600
Jefferson	2	\$5,151	\$4,900
Kanawha	209	\$88,223,276	\$153,136,594
Lewis	45	\$10,501,078	\$1,571,548
Lincoln	9	\$661,030	\$91,000
Logan	23	\$16,043,733	\$3,000,709
Marion	42	\$11,180,636	\$2,787,712
Marshall	44	\$69,013,019	\$3,142,759
Mason	40	\$39,312,530	\$2,132,408
McDowell	50	\$5,584,848	\$767,961
Mercer	25	\$984,781	\$179,100



County	Number of State Facilities	Building Value at Risk	Contents Value at Risk
Mineral	7	\$2,825,369	\$226,022
Mingo	30	\$3,236,241	\$316,259
Monongalia	49	\$5,950,260	\$1,313,008
Monroe	17	\$641,915	\$136,600
Morgan	94	\$36,818,043	\$4,737,400
Nicholas	31	\$11,192,937	\$3,330,106
Ohio	20	\$15,574,781	\$2,105,171
Pendleton	20	\$1,669,375	\$767,900
Pleasants	25	\$31,923,117	\$2,143,348
Pocahontas	3	\$131,903	\$81,000
Preston	121	\$55,280,972	\$8,899,464
Putnam	15	\$66,894,939	\$22,511,000
Raleigh	35	\$5,508,376	\$1,549,200
Randolph	66	\$57,686,206	\$7,155,015
Ritchie	46	\$8,539,865	\$1,157,900
Roane	6	\$2,211,585	\$234,637
Summers	3	\$49,000	\$0
Taylor	49	\$17,139,937	\$2,347,400
Tucker	151	\$43,514,766	\$7,659,064
Tyler	7	\$110,930	\$37,100
Upshur	36	\$7,975,678	\$3,608,012
Wayne	65	\$18,120,379	\$1,364,864
Webster	52	\$2,673,377	\$334,100
Wetzel	11	\$400,293	\$253,500
Wirt	11	\$559,880	\$220,600
Wood	50	\$29,841,345	\$4,029,094
Wyoming	53	\$9,797,273	\$1,282,400

TABLE 3-64. THE TOP TEN STATE AGENCIES IN A HIGH LANDSLIDE RISK ZONE

Agency	Number of Buildings in High Risk Zone	Building Value in High Risk Zone
West Virginia University	393	\$1,142,209,311
General Services Division Department of Administration	40	\$632,419,839
Health & Human Resources, Department of State of West Virginia	211	\$297,598,265
Armory Board State of West Virginia	154	\$270,878,719
Fairmont State University	34	\$270,263,060
Marshall University	27	\$255,925,771
Corrections, Division of State of West Virginia	124	\$225,658,382
Highways, Division of State of West Virginia	919	\$179,222,380
Regional Jail & Correctional Fac. Authority State of West Virginia	8	\$137,278,492
West Virginia State University	82	\$124,443,141
<b>Total</b>	<b>1,992</b>	<b>\$3,535,897,360</b>

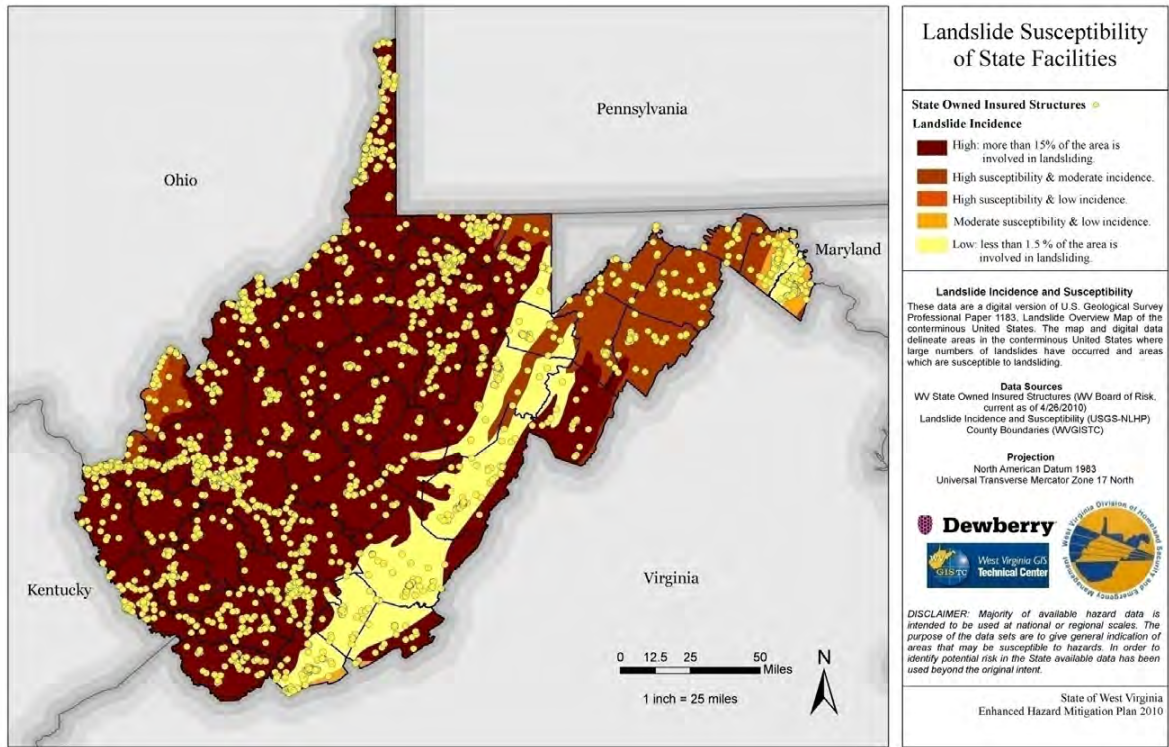


FIGURE 3-69. LANDSLIDE SUSCEPTIBILITY OF STATE FACILITIES

Risk for critical facilities was calculated in the same fashion as for State facilities. Almost all critical facilities are in regions with some level of landslide hazard, with over 86% in areas of high risk. Table 3-65 and Table 3-66 shows the distribution of risk, by landslide type, for critical facilities. Annualized loss estimates were not calculated for critical facilities due to the scale of available landslide mapping, limited information on mapped critical facilities, and the lack of probabilities of future occurrences.

### JURISDICTIONAL RISK

Landslide is a major geological hazard in West Virginia. From the 1976 WVGES report on Landslide and Slide-Prone Areas, it was estimated that annual costs exceed \$10 million not including unreported damage to homes, land, and property. These events have been used in place of the NCDC events for the Events ranking parameters (Figure 3-70). Damages have not been included in this ranking because of the lack of reliable available data.



TABLE 3-65. NUMBER OF CRITICAL FACILITIES LOCATED IN EACH LANDSLIDE RISK ZONE

Risk Zone	Landslide Type	Law Enforcement	Fire Station	Hospital	School K-12	EOC	Total
High	High Incidence	295	441	49	690	44	1,519
High	High Susceptibility	34	53	7	67	5	166
	Moderate Incidence						
High	High Susceptibility	7	4	1	9	1	22
	Low Incidence						
Moderate	Moderate Susceptibility	10	17	3	44	2	76
	Low Incidence						
Moderate	Moderate Incidence	0	0	0	0	0	0
Low	Low Incidence	49	58	6	75	7	195
<b>Total</b>		<b>395</b>	<b>573</b>	<b>66</b>	<b>885</b>	<b>59</b>	<b>1,978</b>

TABLE 3-66. NUMBER OF CRITICAL FACILITIES LOCATED IN HIGH LANDSLIDE RISK ZONE BY COUNTY

County	Law Enforcement	Fire Station	Hospital	School K-12	EOC	Total
Barbour	5	4	1	11	1	22
Berkeley		3		4		7
Boone	6	9	1	18	1	35
Braxton	7	8	1	8	1	25
Brooke	6	10	1	14	1	32
Cabell	8	14	6	37	2	67
Calhoun	4	3	1	4	2	14
Clay	2	3		8	1	14
Doddridge	4	5		4	1	14
Fayette	14	15	2	28	1	60
Gilmer	5	5		5		15
Grant	3	3	1	6	1	14
Greenbrier	2	3		4		9
Hampshire	6	9	1	12	1	29
Hancock	5	11		13	1	30
Hardy	4	5		5	1	15
Harrison	19	20	1	34	3	77
Jackson	4	5	1	14	1	25
Jefferson	37	51	8	85	3	184
Kanawha	4	6	2	10	1	23
Lewis	4	7		11	1	23
Lincoln	10	13	1	19	1	44
Logan	12	24	2	25	1	64
Marion	7	18	1	20	1	47
Marshall	9	8	1	14	1	33
Mason	12	17	1	21	1	52
McDowell	4	4		3		11
Mercer	7	13	1	14	1	36





County	Law Enforcement	Fire Station	Hospital	School K-12	EOC	Total
Mineral	8	14	1	17	1	41
Mingo	7	15	3	29	1	55
Monongalia	1	2		3		6
Monroe	5	4	1	9	1	20
Morgan	7	8	2	17	1	35
Nicholas	11	14	3	22	1	51
Ohio	2	6		4	1	13
Pendleton	3	2		6	1	12
Pleasants		1		1		2
Pocahontas	8	10	1	11	1	31
Preston	8	10	1	26	1	46
Putnam	14	20	2	35	1	72
Raleigh		5		4		9
Randolph	4	6		7	1	18
Ritchie	3	7	1	6	1	18
Roane		1		1		2
Summers	4	4	1	8		17
Taylor	2	3		1		6
Tucker	2	4	1	4	1	12
Tyler	3	7	1	15	1	27
Upshur	8	13		24	1	46
Wayne	4	5	1	5	1	16
Webster	6	12	1	8	1	28
Wetzel	2	1		3	1	7
Wirt	9	19	3	35	1	67
Wood	5	9		14	1	29
Wyoming	5	4	1	11	1	22

Ranking inputs for landslide were very limited because information on only three historical landslide events was available from the NCDC database. The Slide-Prone Areas from the 1976 report have been used as the Geographic Extent parameter to better represent areas within West Virginia that have experienced landslides. Kanawha and Monongalia Counties have the highest ranking (Medium-High) for landslides of all the counties within West Virginia. The ranking parameters are illustrated in Figure 3-70, along with the total ranking. Although rankings for landslide have been improved during this update, data limitations for events and damage are limiting factors, with the result that the population parameters drive the ranking and skew the results. Section 3.5 provides additional information on the hazard ranking parameters.

Seven urban areas were inventoried as part of the 1970s Appalachians-wide study of landslides. These are the areas where most West Virginians live, where significant development is occurring, and where landslide would cause the greatest financial losses. They include:



1. Morgantown
2. Fairmont
3. Clarksburg
4. Charleston
5. Huntington
6. Parkersburg
7. Wheeling
8. Additional areas have been studied along the Ohio River

Currently the NCDC database is the most standardized and comprehensive database for all of the hazards discussed in this plan. However, it is limited in the available geological hazard data. See section 3.5 for more information on the methodology used for ranking hazards.

With future growth, various non-structural methods, such as zoning and grading ordinances, as well as structural methods, would have to be analyzed in terms of being cost-effective alternatives. One non-structural method to reduce the likely consequences of debris flows is development of zoning and grading ordinances to avoid building in areas of potential hazard or to regulate construction to minimize potential for landslides.

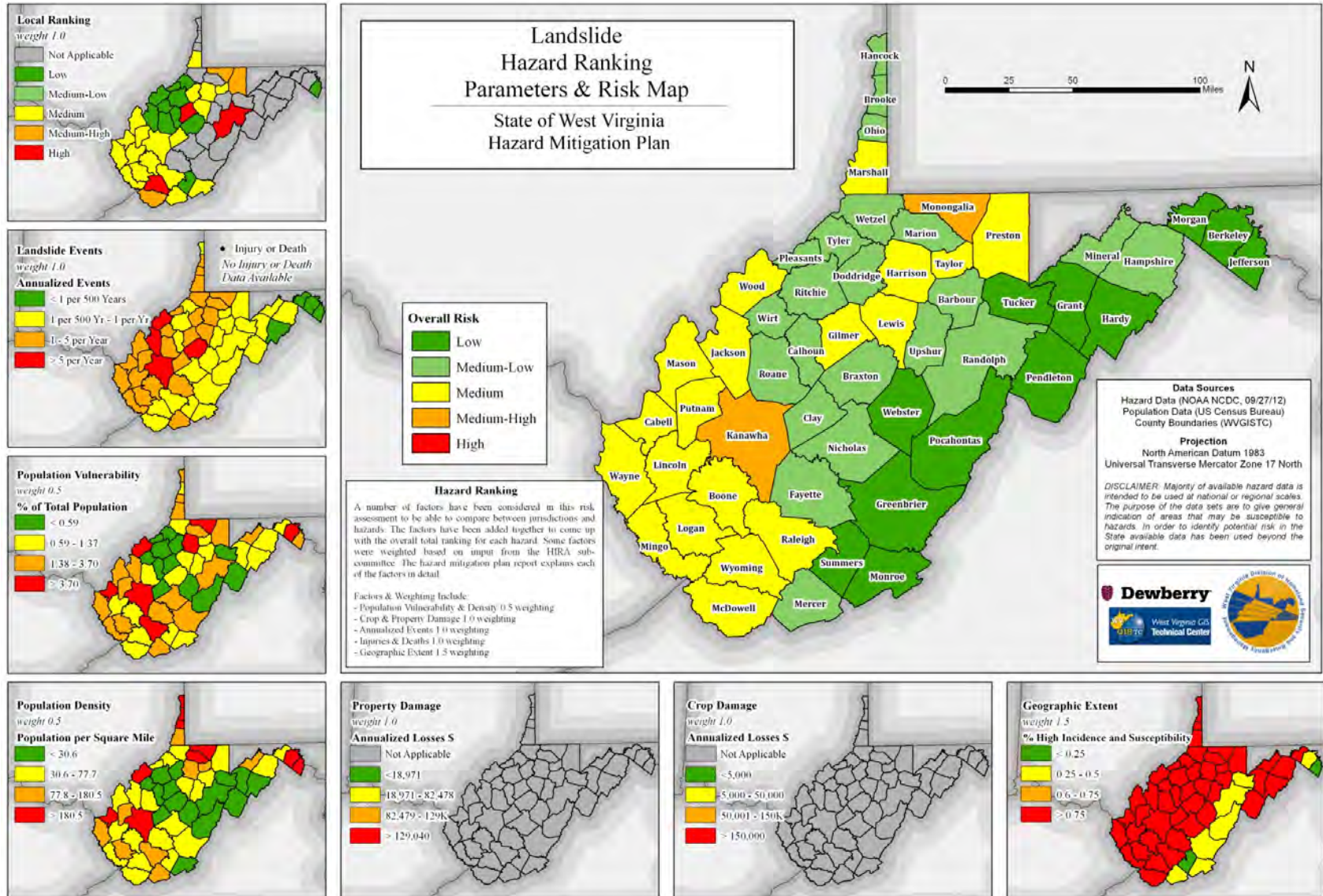


FIGURE 3-70. LANDSLIDE HAZARD RANKING PARAMETERS AND RISK MAP



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## 3.13 EARTHQUAKE

### 3.13.1 DESCRIPTION

Earthquakes are the sudden, rapid shaking of the ground. Caused by the shifting and breaking of rock beneath the earth's surface, earthquakes result in three basic phenomena: ground motion, surface faulting, and related ground failures. While most earthquakes tend to occur at the boundaries where tectonic plates meet, some earthquakes do occur in the middle of the plates.

Earthquakes are measured using two methods. The Seismic Magnitude scientifically measures the severity of ground motion, while the Modified Mercalli Intensity (MMI) Scale measures the "felt intensity" of the earthquake. In terms of measuring community impact and potential damage, the MMI provides the best measurement, as it takes into account the stricter construction requirements in regions more prone to earthquakes than those that experience relatively few earthquakes. The following Table 3-67 provides ranking and classification definitions for the two methods.

### 3.13.2 HISTORIC OCCURRENCE

To date, there have been no Federal Declared Disasters or NCDC recorded events for earthquakes in West Virginia. West Virginia has a moderate risk of seismic activity; however the potential damage from this seismic activity is relatively low compared to States with more dense populations and more tall buildings. From 1887 through 1974, only a handful of earthquakes were detected in and around the State. The strongest earthquake experienced by West Virginia occurred on November 19, 1969. More significant damage was sustained during the Giles County, Virginia, earthquakes of 1897 and 1959. During these two events, residents reported damage to chimneys<sup>46</sup>.

Seismic event epicenters for West Virginia have been compiled from several data resources by the WVGES and summarized in Section 3.13.3 and by the number of earthquakes for each MMI scale, defined in Table 3-67 and Table 3-68. West Virginia has experienced 89 earthquakes since 1824, the majority being MMI I or less. These historic events have been used to supplement the earthquake hazard ranking (Figure 3-76). Epicenter locations and quaternary fault zones are shown in Figure 3-71. This illustrates that the southwest portion of the State is more susceptible to earthquakes. These and other Quaternary fault zones mapped by the USGS are believed to be

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<sup>46</sup> USGS, 2003



sources of most Magnitude 6 or greater earthquakes during the past 1.6 million years in the United States<sup>47</sup>.

TABLE 3-67. COMPARISON OF EARTHQUAKE SCALES

Richter Magnitude Scale	Modified Mercalli Intensity Scale
1.0 to 3.0	I
3.0 to 3.9	II to III
4.0 to 4.9	IV to V
5.0 to 5.9	VI to VII
6.0 to 6.9	VII to IX
7.0 and Higher	VIII or Higher

TABLE 3-68. DEFINED MODIFIED MERCALLI INTENSITY SCALE RATING

Scale Rating	Definition
I	Not felt except by a very few under especially favorable conditions
II	Felt only by a few persons at rest, especially on upper floors of buildings
III	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck.
IV	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors, disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken
VIII	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
XI	Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.
XII	Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Effects from intraplate earthquakes in other States are often felt in West Virginia. The New Madrid fault is considered a major seismic zone for the southern and Midwestern United States. The New Madrid fault caused a series of devastating earthquakes from

<sup>47</sup> USGS Fact Sheet 2004-3033



1811 through 1812, and intensities of V and VI on the Modified Mercalli Intensity Scale could be felt throughout West Virginia. In September of 1886 a magnitude 7.3 earthquake occurred in Charleston, SC. Intensities of II to V on the MMI Scale were felt throughout West Virginia. While these events occurred in other States, it is a great example of how the effects of earthquakes are felt over a very broad region east of the Rockies<sup>48</sup>. Historical earthquake occurrences and descriptions (Table 3-70) are based on available records from the USGS earthquake hazards program and on West Virginia history.

### 3.13.3 RISK ASSESSMENT

In spite of extensive research and sophisticated equipment, it is impossible to predict an earthquake, although experts can estimate the likelihood of an earthquake occurring in a particular region. FEMA has developed a software suite, named Hazus, for estimating potential losses from disasters. The Hazus-MH earthquake model estimates damages and loss to buildings, lifelines, and essential facilities from scenario and probabilistic earthquakes.

Earthquake risk is related to the following factors<sup>49</sup>:

1. Ground motion
2. Fault rupture under or near a building; often occurring in buildings located close to faults
3. Reduction of the soil bearing capacity under of near a building
4. Earthquake-induced landslide near a building
5. Earthquake-induced waves in bodies of water near a building

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<sup>48</sup>Historic United States Earthquakes. <http://earthquake.usgs.gov/regional/states/historical.php>

<sup>49</sup> HAZUS-MH Risk Assessment and User Group Series How-to-Guide: Using HAZUS-MH for Risk Assessment (FEMA 433/August 2004)



TABLE 3-69. WEST VIRGINIA EARTHQUAKE EPICENTERS AND MMI RATING SCALE (1824-2012).

County	MMI							Total
	1	2	3	4	5	5.5	6	
Berkeley					1			1
Boone		1						1
Braxton	9			1				10
Fayette	5							5
Greenbrier	8			1				9
Hardy				1				1
Harrison				1				1
Jefferson			1					1
Kanawha	2							2
Lewis	1							1
Lincoln	1			1				2
Logan	1							1
McDowell	5				1			6
Mercer	4						1	5
Mingo	4							4
Monongalia			3	1				4
Monroe	4							4
Morgan	2							2
Nicholas	2							2
Pendleton	1					1		2
Pocahontas	8							8
Raleigh	4							4
Summers	7							7
Upshur	1							1
Webster	1							1
Wood				1	1			2
Wyoming	2							2
<b>Total</b>	<b>72</b>	<b>1</b>	<b>4</b>	<b>7</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>89</b>



TABLE 3-70. HISTORICAL EARTHQUAKES IN OR NEAR WEST VIRGINIA (1897 -2012)<sup>50</sup>

Year	Month	Magnitude (Richter Scale)	Epicenter Location	Description
1897	31-May	5.8	Town of Pearisburg Giles County, Virginia	Damage to chimneys was reported at Bluefield, West Virginia, on May 31, 1897, from a strong earthquake located in Giles County, Virginia. Bluefield is approximately 40 kilometers (km) distant from the epicenter. Grafton, about 240 km distant, reported "windows broken and officials panic-stricken."
1909	2-Apr	MM V-VI	Charles Town West Virginia	Pictures were thrown from walls, and many people rushed from their houses in terror at Charles Town (MM V-VI). Many were awakened and alarmed at Winchester, Virginia, by the 2:25 a.m. tremor. The total felt area covered approximately 6,500 square km, including places in West Virginia, Virginia, Maryland, and Pennsylvania. The epicenter was near where the four States' boundaries are nearly convergent.
1935	1-Nov	MMI-IV MMI-III	Timiskaming, Quebec, Canada	A number of places in West Virginia felt tremors from the earthquake, which was centered near Timiskaming, Quebec, Canada. Moundsville and Wheeling reported MM IV effects, and Charleston, Fairmont, Parkersburg, Ravenswood, Sutton, and Wellsburg reported MM I-III effects. At 3:30 a.m. on the same day, about 2 1/2 hours after the Canadian earthquake, three trembling shocks lasting about 30 seconds each were felt by several people in Elkins. No damage was reported, but houses trembled and windows and dishes rattled.
1937	2-Mar	MM V	Anna, Ohio	Two damaging earthquakes in the Anna, OH, area on March 2 and 8, 1937, were reported felt at Huntington, WV; the intensity was estimated to be MM I-III. On March 8, 1943, an earthquake centered in Ohio was reported felt at Wheeling, WV (MM I-III).
1943	8-Mar	MM I-III	Ohio	
1944	5-Sep	MM I-III	Cornwall, Ontario, Canada	On September 5, 1944, a strong earthquake centered near Cornwall, Ontario, Canada, and Massena, NY, was reported felt at Parkersburg, WV (MM I-III).
1959	23-Apr	3.9	Giles County, Virginia	An earthquake located in the Virginia - West Virginia border region caused minor damage in Giles County, VA, where several chimneys were damaged, plaster on walls cracked, and articles fell from shelves. Two places in West Virginia felt this shock, Lindside (MM IV) and Rock Camp (MM I -III). The southern Illinois earthquake of November 9, 1968, magnitude 5.3, was felt in 23 States throughout the central and eastern United States. Hamlin, Huntington, Parkersburg, Point Pleasant, Wayne, and Williamson, WV, observed MM I-III effects.
1968	9-Nov		Southern Illinois	

<sup>50</sup> USGS West Virginia Earthquake History. <http://earthquake.usgs.gov> *Abridged from Earthquake Information Bulletin, Volume 10, Number 2, March - April 1978*, by Carl A. von Hake.





Year	Month	Magnitude (Richter Scale)	Epicenter Location	Description
1969	19-Nov	4.3		Probably the strongest, most widely felt earthquake in West Virginia's history. Only minor damage was sustained from the magnitude 4.3 shock. It consisted chiefly of cracked and fallen plaster and broken windows at Athens, Lerona, and Elgood (MM VI). Similar damage was reported from Glen Lyn and Rich Creek, VA. Loud earth noises accompanied the tremor at many places. A number of other towns outside the epicentral area noted MM V effects: Itmann (window cracks), Logan (slight plaster cracks), Pipestem (plaster cracks), and Ramp (slight damage). The earthquake was felt over approximately 260,000 square kilometers of West Virginia, Virginia, Georgia, Kentucky, Maryland (one place), North Carolina, Ohio, South Carolina, and Tennessee.
1970	11-Aug			A small shock in the west-central portion of the State was felt over a limited area. Charleston, Eskdale, Hamlin, Hurricane, and Saint Albans reported MM IV effects.
1972	12-Sep		Morgantown, West Virginia	A minor tremor was reported felt near Morgantown. The earthquake was recorded on the seismograph at Morgantown operated by the University of West Virginia.
1974	30-May		Giles County, Virginia	The active region in Giles County, VA, was the center of a moderate disturbance. No damage occurred, but small objects shifted, houses and windows rattled, and residents were frightened. Gap Mills and Pickaway, WV, observed MM V effects.
1974	20-Oct			A small area of northwestern West Virginia and southeastern Ohio reported a minor shock on October 20, 1974. One report of cracked plaster and articles toppling from shelves was received from Parkersburg. Ravenswood, West Virginia, and Belpre, Ohio, noted MM V effects. Belleville, Cottageville, New Haven, and Morgantown reported MM IV effects.
2010	4-Apr	3.4	Braxton County, West Virginia	The USGS documented 15 felt reports near the epicenter, which was registered south of Interstate 79, about halfway between the Frametown and Servia Road exits.
2011	23-Aug	5.8	Louisa County, Virginia	The epicenter, in Louisa County, was 38 miles northwest of Richmond and 5 miles south-southwest of the town of Mineral. It was an intraplate earthquake with a magnitude of 5.8 and a maximum perceived intensity of VII (very strong) on the Mercalli intensity scale. Several aftershocks, ranging up to 4.5 Mw in magnitude, occurred after the main tremor. The earthquake was felt throughout West Virginia but did not result in an deaths, injuries, or damages.

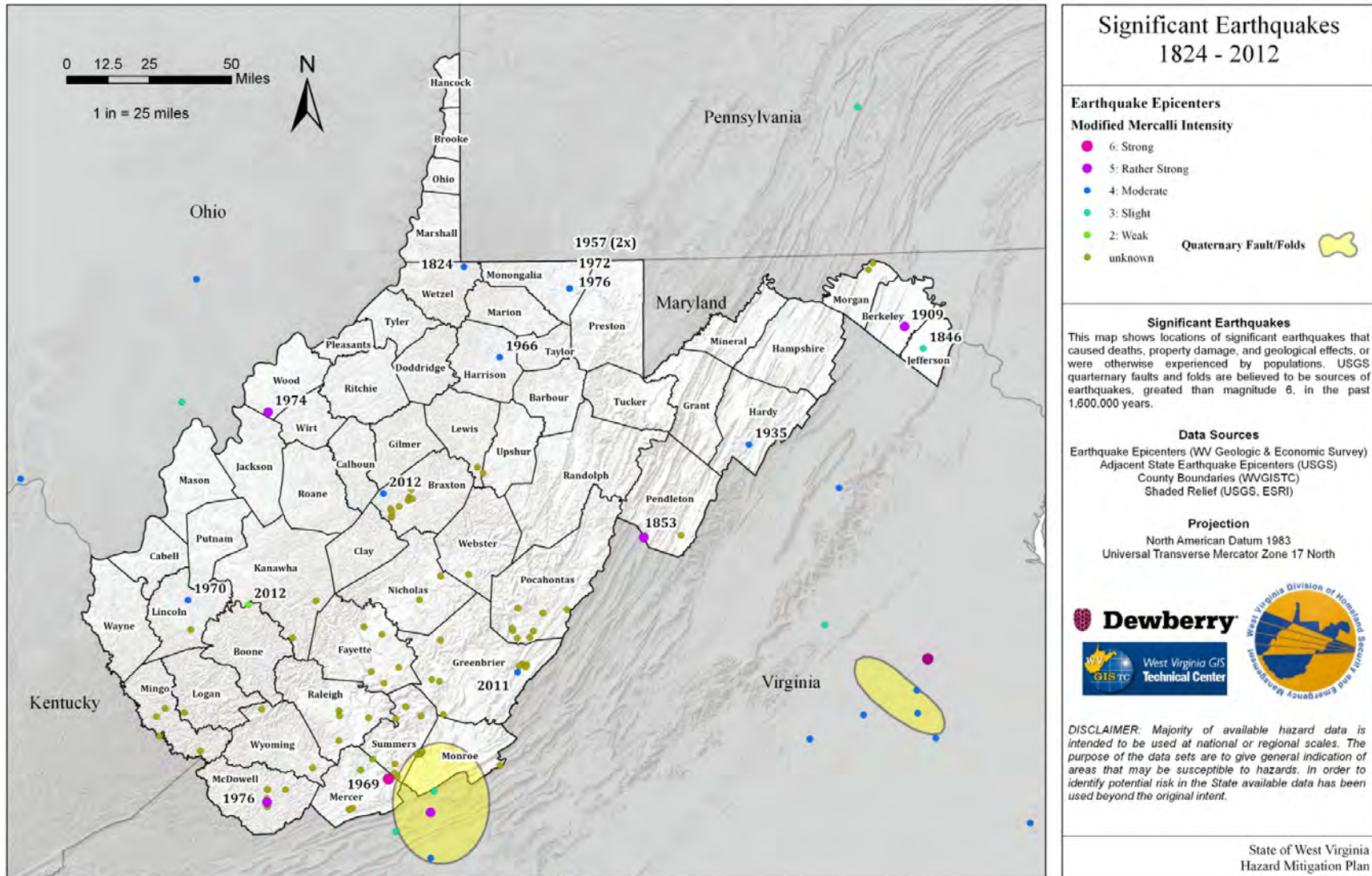


FIGURE 3-71. SIGNIFICANT EARTHQUAKES (1568 – 2012)

## PROBABILITY

Earthquakes are low probability, high-consequence events. Although earthquakes may occur only once in the lifetime of an asset, they can have devastating impacts. A moderate earthquake can cause serious damage to unreinforced buildings, building contents, and non-structural systems, and can cause serious disruption in building operations. Moderate and even very large earthquakes are inevitable, although very infrequent, in areas of normally low seismic activity. Consequently, in these regions buildings are seldom designed to deal with an earthquake threat; therefore, they are extremely vulnerable.

No single map is able to characterize seismic hazards because so many variables influence the magnitude and extent of areas affected. The map shown in Figure 3-72 was developed by the USGS and shows the relative hazard ranging from highest to lowest, and allows comparisons of the relative risk among different areas of the country. As can be seen on this map, West Virginia has a relatively low hazard level, with only a slight increase in the southern part of the State.

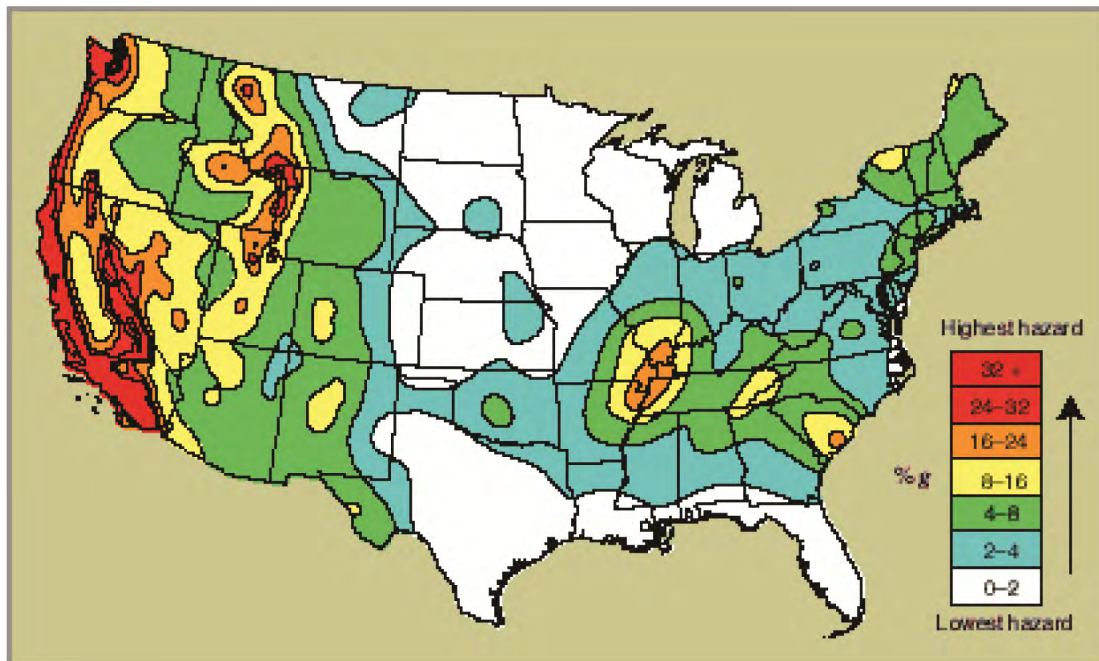


FIGURE 3-72. RELATIVE SEISMIC HAZARD MAP

Source: USGS, 2002

Probabilistic ground motion maps are typically used to assess the magnitude and frequency of seismic events. These maps measure the probability of exceeding a certain ground motion, expressed as percent Peak Ground Acceleration (PGA), over a specified period of years. The severity of earthquakes is site specific, and is influenced by

proximity to the earthquake epicenter and soil type, among other factors. Figure 3-73 shows the 10% 50-year peak ground acceleration of West Virginia and surrounding States. The counties in the southwest portion of the State have a slightly elevated PGA as compared to the rest of West Virginia.

Hazus-MH can be used to evaluate a variety of hazards and associated risks to support hazard mitigation. The revised Hazard Mitigation Plan uses Level 1 analysis for the hurricane and earthquake modules. Level 1 analysis uses the provided hazard and inventory data without additional data inputs. This is an acceptable level of information for mitigation planning; future versions of this plan can be enhanced with Level 2 and 3 analysis.

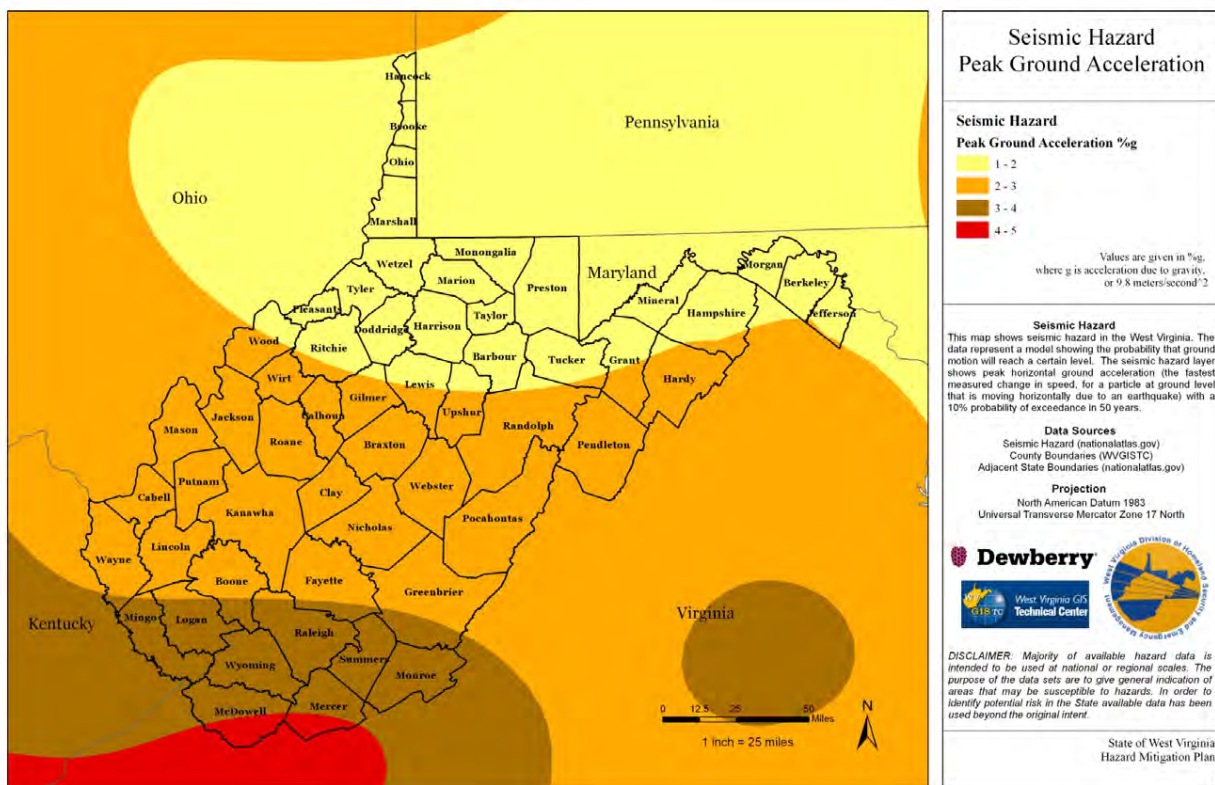


FIGURE 3-73. SEISMIC HAZARD, PEAK GROUND ACCELERATION

## IMPACT AND VULNERABILITY

Impacts from earthquakes can be severe and cause significant damage. Ground shaking can lead to the collapse of buildings and bridges and disruption of gas and electric lines, phone service, and other critical utilities. Death, injuries, and extensive property damage are possible vulnerabilities from earthquakes. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure.



Table 3-71 provides the corresponding intensity equivalents in terms of MMI as well as perceived shaking and potential damage expected for given values. These values were used as thresholds to group State and critical facilities into different vulnerability/risk zones based on potential damage.

TABLE 3-71. MMI AND PGA EQUIVALENTS

MMI	PGA (%g)	Perceived Shaking	Potential Damage
I	<0.17	Not Felt	None
II	0.17 - 1.4	Weak	None
III	0.17 - 1.4	Weak	None
IV	1.4 -3.9	Light	None
V	3.9 -9.2	Moderate	Very Light
VI	9.2 -18	Strong	Light
VII	18 -34	Very Strong	Moderate
VIII	34 - 65	Severe	Moderate to Heavy
IX	65 - 124	Violent	Heavy
X	> 124	Extreme	Very Heavy
XI	> 124	Extreme	Very Heavy
XII	> 124	Extreme	Very Heavy

Jurisdictional vulnerability and impact have been calculated in terms of total direct economic loss, as defined by Hazus. This includes damage to structural, non-structural, building, contents, inventory loss, relocation, income loss, rental loss, and wage loss. Additional information can be found in the Jurisdiction Risk portion of this section.

## RISK

Recent earthquakes worldwide depict a pattern of steadily increasing damages and losses that are due to significant growth in earthquake-prone urban areas and vulnerability of older building stock, including buildings constructed within the past 20 years. In April 2008, FEMA released an update to the 2000 report that conducted a nationwide evaluation of earthquake losses in the United States: *Hazus-MH Estimated Annualized Earthquake Losses for the United States*<sup>51</sup>. FEMA’s evaluation ranked West Virginia 36<sup>th</sup> in the Nation for Annualized Earthquake Loss Ratio (AELR) (\$34 million) and 39<sup>th</sup> for Annualized Earthquake Losses (AEL) (\$4,122,000).

As of the 2013 plan update, this study is still valid.

<sup>51</sup>HAZUS-MH *Estimated Annualized Earthquake Losses for the United States* FEMA 366, 2008



The evaluation considers two measures of losses:

- AEL in any single year; and
- AELR, which is a measure of seismic risk in relation to the value of the building inventory. The ratio is considered a more accurate picture of seismic risk and makes it easier to compare between regions.

The Giles County, VA, event of 1897 has been modeled in Hazus-MH MR4. This earthquake is one of the most important to have occurred in the eastern United States principally because of the large area over which it was felt. Figure 3-74 and Table 3-72 shows, in 2000 dollars, the probable damages that would result from this magnitude earthquake happening in the same location today. Total direct economic loss, as defined by HAZUS, includes damage to structural, non-structural, building, contents, inventory loss, relocation, income loss, rental loss, and wage loss. Damages over \$18 million would be expected around the epicenter, in Mercer, Summers, and Monroe Counties.

TABLE 3-72. TOTAL LOSS FROM 1897 HISTORICAL EPICENTER EVENT (HAZUS) BY COUNTY

County	Total Loss
Mercer County	\$6,952,197
Summers County	\$6,285,720
Monroe County	\$4,882,038
Greenbrier County	\$1,831,897
Raleigh County	\$1,193,069
Wyoming County	\$359,747
McDowell County	\$332,899
Fayette County	\$326,975
Nicholas County	\$44,282
Pocahontas County	\$25,402
Boone County	\$20,609
Kanawha County	\$18,126
Logan County	\$11,448
Webster County	\$8,532
Mingo County	\$2,704

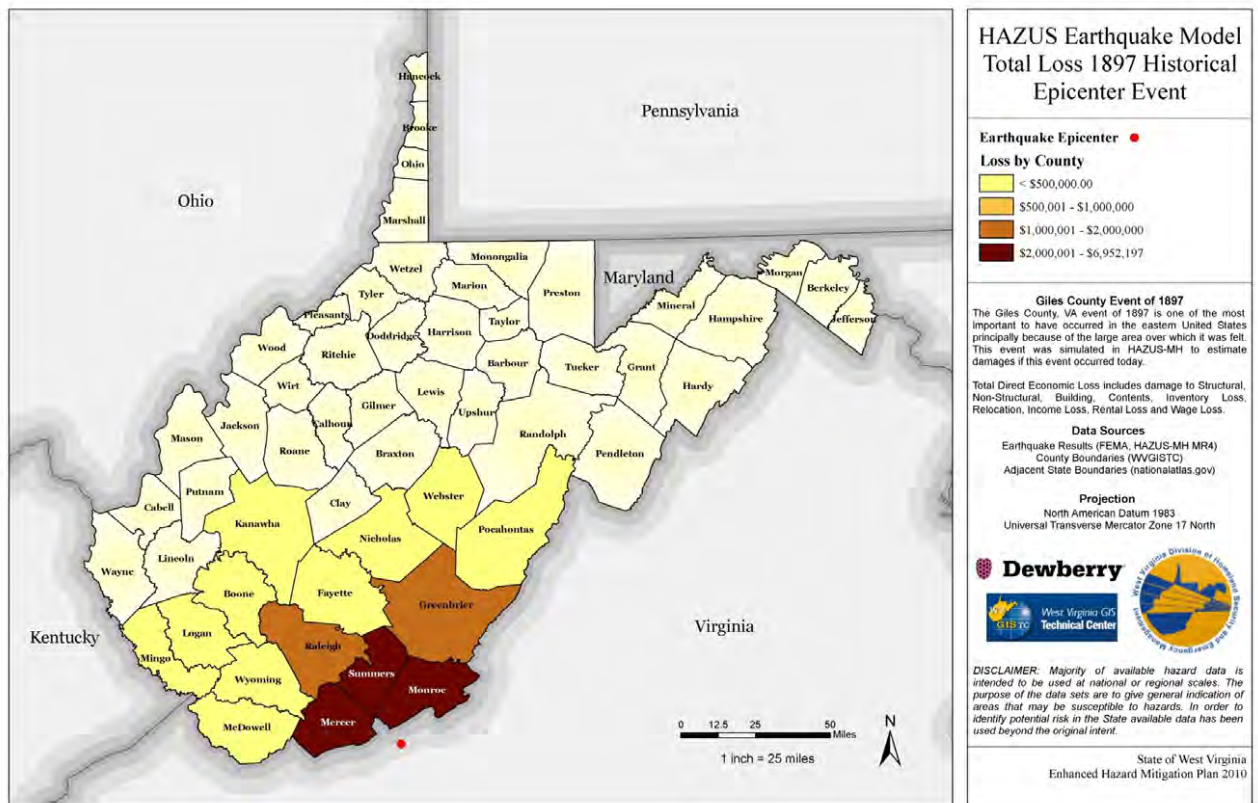


FIGURE 3-74. TOTAL LOSS FROM 1897 HISTORICAL EPICENTER EVENT (HAZUS)

## FACILITY RISK

At this time earthquake related losses to State and critical facilities were not calculated; improved infrastructure data should lead to better analysis techniques in the future. Based on the estimated damages from the 1897 Giles County, Virginia, earthquake, State facilities at a higher risk are noted below in Table 3-73. Most of the State is within PGA zones that would experience no potential damages (Table 3-71). McDowell and Mercer Counties are within PGA zones that may experience “very light” potential damages.



TABLE 3-73. COUNTIES WITHIN AREAS THAT EXPERIENCED DAMAGES DUE TO THE 1897 GILES COUNTY, VIRGINIA EVENT OR WITHIN PGA AREAS WITH VERY LIGHT POTENTIAL DAMAGES

County	Number of Structures	Total Building Value	Total Contents Value	Total Value
McDowell County	238	\$234,002,751	\$33,798,677	\$267,801,428
Mercer County	318	\$333,633,852	\$52,152,550	\$385,786,402
Monroe County	107	\$52,324,646	\$12,655,312	\$64,979,958
Raleigh County	557	\$733,816,584	\$94,946,408	\$828,762,992
Summers County	244	\$76,430,402	\$13,794,138	\$90,224,540
Wyoming County	209	\$91,676,924	\$14,703,450	\$106,380,374

Detailed information about the critical facilities was not available for this revision of the plan, as discussed in Section 3.4. As with State facilities, critical facilities were summarized based on the counties that experienced damage during the 1897 event or are within very light potential damage areas (Table 3-74). With more site-specific information (i.e., construction material), analysis could be completed to show the risk and annualized loss to the actual structure and function of the buildings.

TABLE 3-74. POTENTIAL DAMAGE TO CRITICAL FACILITIES DUE TO THE 1897 GILES COUNTY, VIRGINIA EVENT OR WITHIN PGA AREAS WITH VERY LIGHT POTENTIAL DAMAGES

County	EOC	Fire	Hospital	Law Enforcement	School	Total
McDowell County	1	17	1	12	21	52
Mercer County	1	14	3	15	27	60
Monroe County	1	7		6	7	21
Raleigh County	1	20	2	14	35	72
Summers County	1	9	1	4	6	21
Wyoming County	1	9		5	14	29

## JURISDICTIONAL RISK

Probabilistic earthquake events can also be modeled in Hazus-MH MR4. Hazus-MH was used to generate damage and loss estimates for the probabilistic ground motions associated with each of eight return periods (100, 250, 500, 750, 1000, 1500, 2000, and 2500 years). The building damage estimates were then used as the basis for computing direct economic losses. These include building repair costs, contents and business inventories losses, costs of relocation, capital-related, wage and rental losses.

Annualized loss was computed, in Hazus, by multiplying losses from eight potential ground motions by their respective annual frequencies of occurrence, and then summing the values. Table 3-75 and Figure 3-75 show the HAZUS results for the probabilistic annualized loss run by county. Kanawha County has the highest



annualized loss due to earthquake; West Virginia can expect \$7,159,176 in annualized losses due to earthquake.

The hazard ranking, Figure 3-76, is based on events reported in the NCDC Storm Events database and supplemented with 1824 through 2012 earthquake epicenter events. With limited inputs for damages, the population parameters drive the ranking and skew the results. At this time, West Virginia risk to earthquakes is low, showing a slightly elevated risk in Kanawha County due to population. See Section 3.5 for more information on the methodology used for ranking hazards.

With future growth, various non-structural methods, such as zoning and grading ordinances, as well as structural methods, would have to be analyzed in terms of being cost-effective alternatives. Zoning and grading ordinances to avoid building in areas of potential hazard or to regulate construction to minimize potential for landslide is one non-structural method to reduce the likely consequences of debris flows.

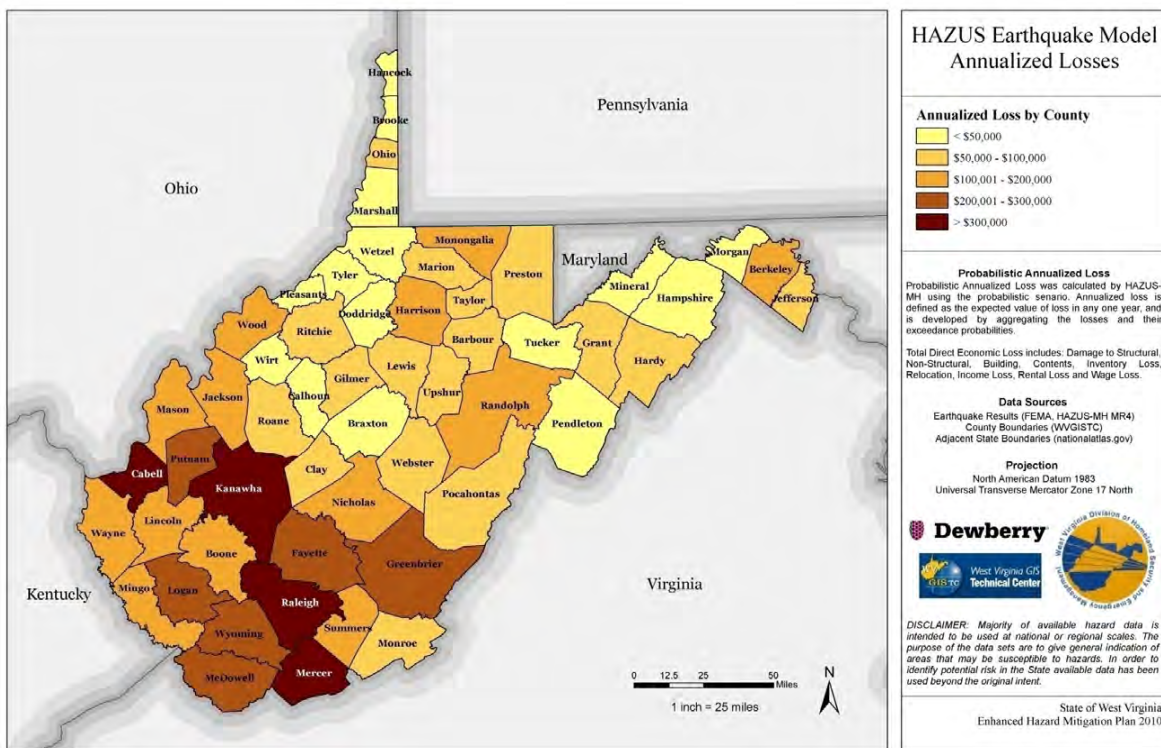


FIGURE 3-75. EARTHQUAKE PROBABILISTIC ANNUALIZED LOSS



TABLE 3-75. HAZUS TOTAL ANNUALIZED LOSS BY COUNTY

<b>Earthquake Annualized Loss Brackets</b>			
<b>&gt; \$500,000</b>			
Kanawha County	\$722,629		
<b>\$250,000 - \$499,999</b>			
Mercer County	\$446,362	Fayette County	\$289,284
Raleigh County	\$444,673	Putnam County	\$254,898
Cabell County	\$431,987		
<b>\$150,000 - \$249,999</b>			
Wyoming County	\$249,094	Summers County	\$175,517
Logan County	\$235,516	Lincoln County	\$166,138
Greenbrier County	\$224,473	Wood County	\$160,327
McDowell County	\$201,161	Wayne County	\$157,889
Mingo County	\$185,500	Boone County	\$153,024
<b>\$100,000 - \$149,999</b>			
Monongalia County	\$135,271	Mason County	\$117,508
Berkeley County	\$130,436	Jackson County	\$107,283
Nicholas County	\$123,458	Randolph County	\$103,604
Harrison County	\$121,371		
<b>\$50,000 - \$99,999</b>			
Marion County	\$96,570	Pocahontas County	\$62,390
Monroe County	\$94,281	Ritchie County	\$62,384
Webster County	\$83,590	Lewis County	\$59,266
Jefferson County	\$83,424	Hardy County	\$58,073
Ohio County	\$83,400	Upshur County	\$55,140
Roane County	\$79,612	Barbour County	\$53,590
Grant County	\$77,620	Preston County	\$52,819
Clay County	\$75,806	Gilmer County	\$52,612
Taylor County	\$64,658		
<b>&lt; \$49,999</b>			
Wetzel County	\$49,895	Tyler County	\$40,339
Braxton County	\$48,454	Hampshire County	\$39,834
Pendleton County	\$48,272	Pleasants County	\$39,019
Brooke County	\$46,969	Doddridge County	\$37,896
Wirt County	\$44,134	Mineral County	\$37,449
Morgan County	\$43,973	Hancock County	\$37,129
Marshall County	\$40,870	Tucker County	\$31,550
Calhoun County	\$40,759		

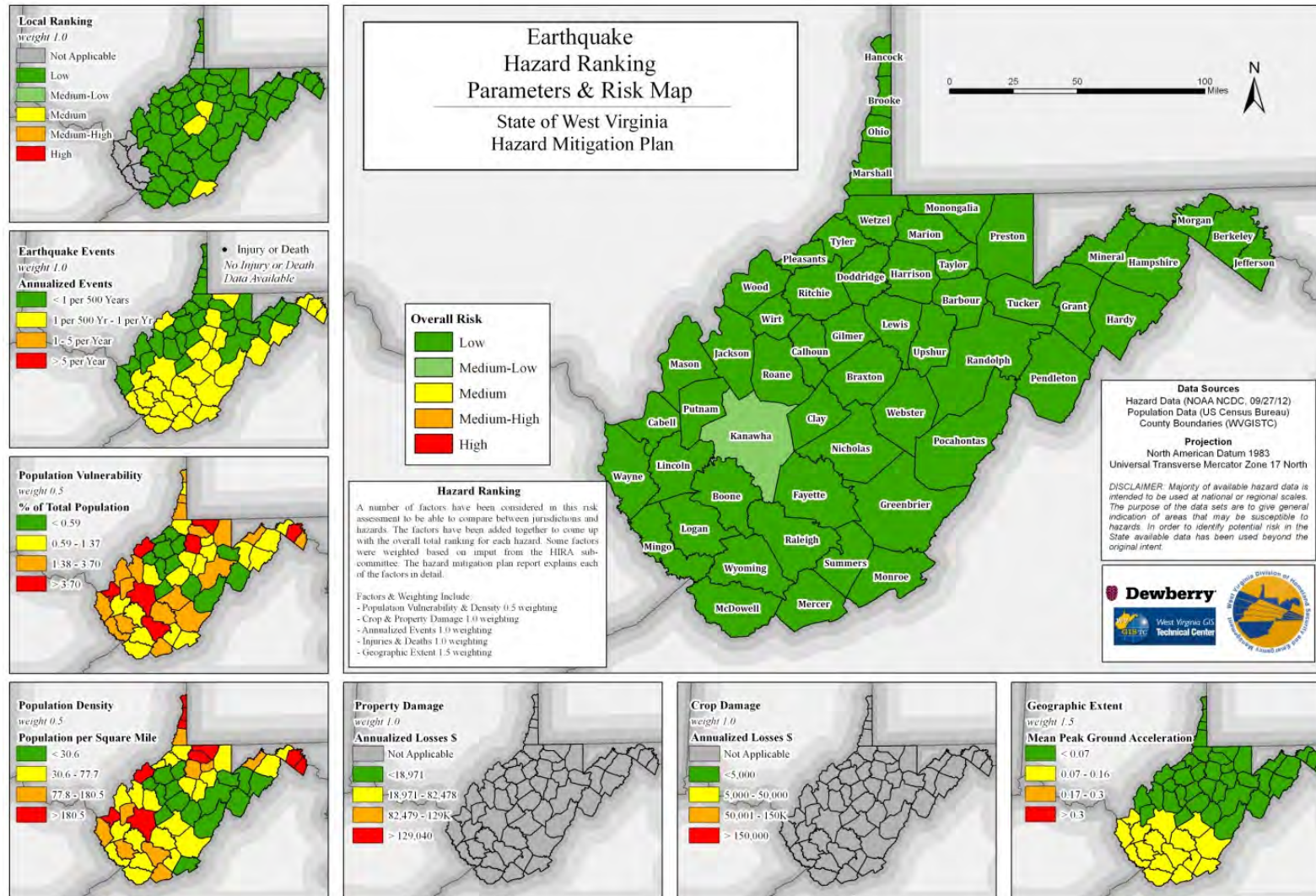


FIGURE 3-76. EARTHQUAKE HAZARD RANKING PARAMETERS AND RISK MAP

## 3.14 LAND SUBSIDENCE (KARST)

### 3.14.1 DESCRIPTION

Generally, land subsidence can be described as the loss of surface elevation due to the removal of subsurface support. This can range from broad regional lowering of surface land to localized collapse. The term subsidence is commonly used to imply a gradual sinking, but it also can refer to an instantaneous or catastrophic collapse.

Land subsidence is vertical earth movement resulting from increased stresses in the soil mass, or loss of shallow soil support. Subsidence can be described as rapid, caused by undermining or failure of the underlying strata, or slow, caused by consolidation.

Rapid subsidence, generally referred to as sinkholes, result from small subsurface voids enlarging over time until the thickness of soil/rock at the roof is insufficient to support the applied loads, including its own weight. When the loads exceed the strength of the roof, the roof collapses into the subsurface void forming a sinkhole.<sup>52</sup>



FIGURE 3-77. LAND SUBSIDENCE

Rapid subsidence frequently occurs in areas of abandoned mines (Section 3.15), and karst areas underlain by carbonate rocks (limestone and dolomite). Karst is a landscape with topographic depressions caused by the dissolution of carbonate rocks (limestone and dolomite) by moving groundwater.

Karst topography develops throughout the United States. In West Virginia, karst topography exists in the eastern counties; the terrain in Greenbrier County is particularly known for karst topography. Rapid subsidence can also occur in developed areas as a result of subsurface erosion caused by leaking water lines, or changes in groundwater flow caused by pumping associated with dewatering excavations, especially in karst areas.

<sup>52</sup> Sowers, G. F., *Introductory Soil Mechanics*, Fourth Edition, Macmillan, 1979



Slow subsidence is typically caused by consolidation in areas in which the soil stresses increase materially. Slow developing regional subsidence is often the result of excessive removal of groundwater, or petroleum that increases the effective stresses in subsurface soils. Slow developing, site-specific subsidence is often the result of construction structures or facilities over uncontrolled fills, including soils dumped loosely at convenient dumping locations, leveled deposits of mine spoil, highway construction spoil, head-of-hollow fills, covered sanitary landfills, etc.<sup>53</sup>

#### 3.14.2 HISTORIC OCCURRENCE

To date, there have been no Federal Declared Disasters or NCEM recorded events for karst related events. Land subsidence is very site-specific. Currently there is no comprehensive long-term record of past events in West Virginia. For future revisions of this section, it is recommended that the WVDOH be involved to determine areas where roads experience sinkholes to improve on the incidence reporting.

The USGS Engineering Aspects of Karst map (Figure 3-78) highlights Greenbrier County and the southern portion of Pocahontas County as having extensive historical subsidence it has been used for the "events" parameter in the hazard ranking (Figure 3-80). Mapping completed by the WVGES in 1979<sup>54</sup> shows similar, detailed areas of subsidence and linear features for Greenbriar and Monroe Counties. Mitigation strategies to convert this information to spatial products would greatly improve analysis for karst related vulnerabilities.

#### 3.14.3 RISK ASSESSMENT

Rapid subsidence exposes surface facilities to a sudden loss of support resulting in major damage and potential collapse. Slow subsidence exposes facilities to long-term settlements that can result in damaging differential settlements and damage to horizontal transportation utilities, especially underground pipelines.

Rapid-subsidence mitigation measures from an engineering perspective include:

1. Filling known subsurface voids
2. Supporting facility on competent rock
3. "Dental work" to fill cracks, slots or solution channels in the rock surface
4. Heavy compaction of surface soils to collapse soils above near surface voids
5. Use of flexible connections between structures and underground utility lines

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<sup>53</sup> Homeowner's Guide to Geologic Hazards, West Virginia Geologic Survey, [www.wvgs.wvnet.edu](http://www.wvgs.wvnet.edu)

<sup>54</sup> West Virginia Geological and Economic Survey 1979. Karst Subsidence and Linear Features in Greenbriar and Monroe Counties.



6. Hydraulic barriers, such as recharge trenches, to minimize area impacts of large excavation dewatering; e.g. surface mining of limestone.

Slow subsidence is more problematic because it is not considered until years after the root -cause activity has started. Engineering strategies for mitigation include:

1. Underpinning buildings with foundations bearing at a depth below the consolidating layer
2. Avoid structural connections between main building and appurtenances such as entryways, canopies, etc.
3. Use of flexible connections for all underground utilities

The Engineering Aspects of Karst data set shows areas of karst in the United States. This data set is a digital representation of USGS Open-File Report 2004-1352, which is a PDF version of the 1984 USGS Engineering Aspects of Karst map (scale 1:7,500,000). Figure 3-78 shows the areas containing distinctive surficial and subterranean features developed by solution of carbonate and other rocks and characterized by closed depressions, sinking streams, and cavern openings.

During 1968 the WVGES published a State Geologic Map. The topographic base was compiled from the Army Map Service 1:250,000 scale map sheets. In 1998 the West Virginia Division of Environmental Protection (WVDEP) scanned, geo-referenced, digitized and attributed the rock unit boundaries. The USGS-Water Resources Division later revised the attributes of large water bodies and geo-referenced the datum to NAD83. The West Virginia Bureau of Public Health extracted the limestone and dolomite formations from the statewide geologic coverage to create separate karst GIS coverage. The results of this analysis are very similar to the Engineering Aspects of Karst map and as a result, they have not been included in this revision. The scale of both maps should only be used for general observations and not site-specific planning purposes.

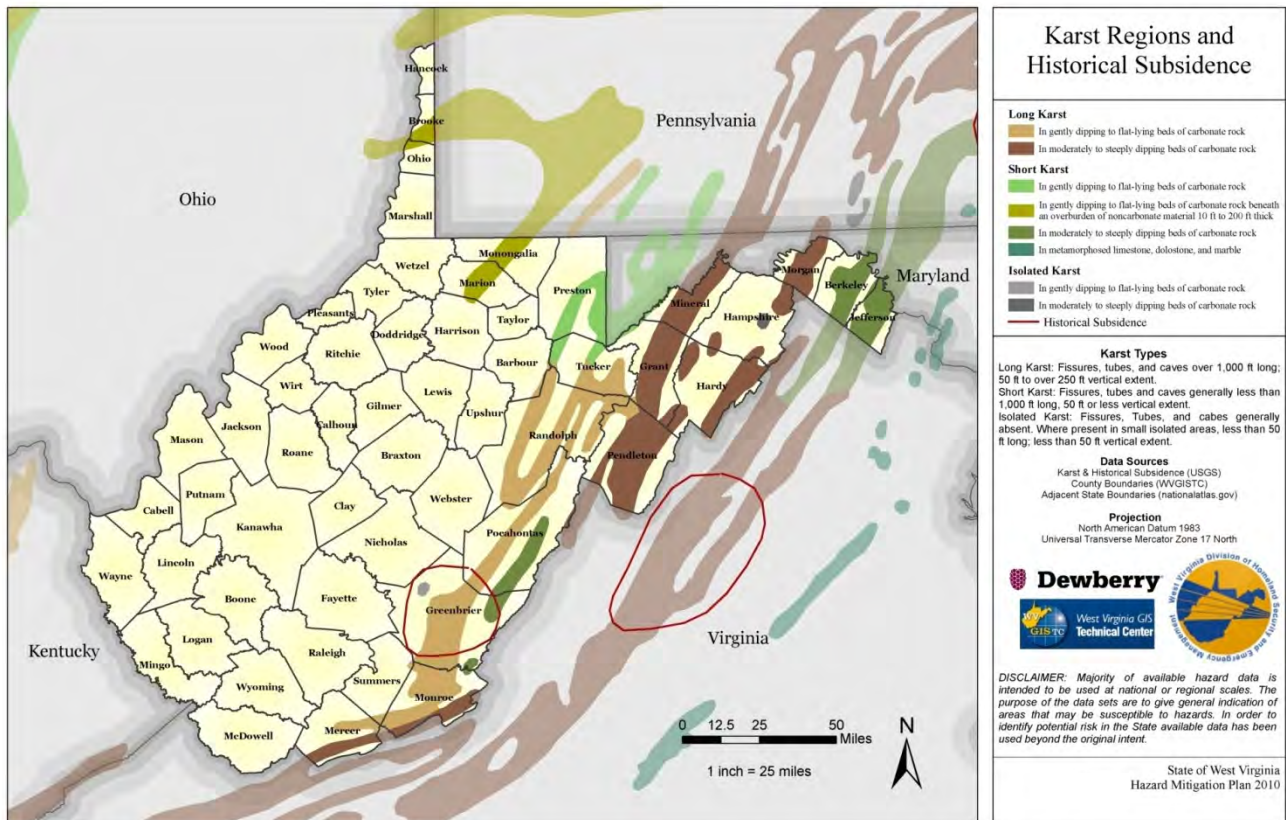


FIGURE 3-78. WEST VIRGINIA KARST REGIONS AND HISTORICAL SUBSIDENCE

## PROBABILITY

The probability of subsidence cannot be expressed in terms of a specific return period as easily as it can for other hazards. For this analysis, probability of future occurrence is examined by location of carbonate rocks and recorded occurrences of subsidence activity. Limestone formations of Cambrian, Ordovician, and Mississippian age underlie the karst regions. The simplified geologic map used for Figure 3-79 can be somewhat misleading because rocks of Cambrian, Ordovician, and Mississippian age include both carbonate and non-carbonate rock formations. A common engineering approach to identify site-specific events is to identify areas of carbonate rocks and recorded occurrences of subsidence activity. Local USGS topographic maps can then be reviewed for evidence of subsidence activity. For example, a lot of circular farm ponds or depressions noted by circular topographic contours could indicate subsidence activity. Circular topographic contours also indicate hills and knobs and do not necessarily indicate subsidence activity. Subsidence features are indicated on USGS topographic maps by hachured contour lines. The scope of the update did not include in-depth karst analysis; mitigation actions have been developed to address this data limitation.

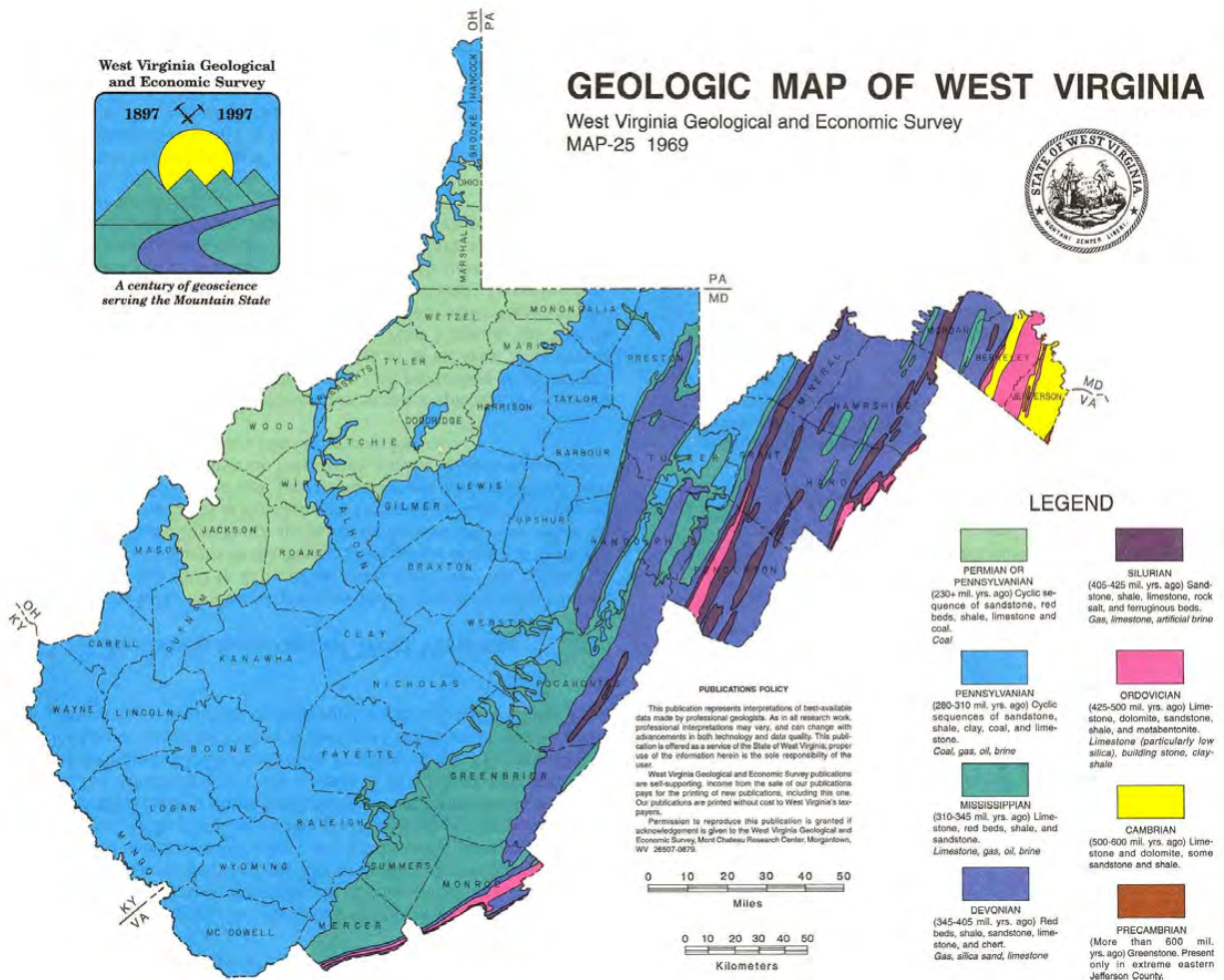


FIGURE 3-79. GEOLOGICAL MAP OF WEST VIRGINIA (WVGES, 1969)

## IMPACT AND VULNERABILITY

Subsidence can lead to damaged structures, including bridges and roadways, as well as failed water, sewer, gas, and electric lines.

## RISK

Risk, strictly defined as probability multiplied by impact, cannot be fully estimated for land subsidence due to the lack of historical data and detailed mapping. To assess risk, mapping by the USGS of karst regions in West Virginia was used as the probability of future occurrence. A high percentage of karst geology in a jurisdiction does not necessarily mean that the whole locality is at high risk for land subsidence. Without well established occurrence probabilities, true risk cannot be calculated.

This assessment focuses on areas vulnerable to collapse resulting from geologic formations prone to dissolution. It does not include areas underlain by coal, which can





be subject to abandoned mine collapse, or urban areas where failed underground infrastructure can lead to sinkholes. NCDC ranking parameters and risk mapping was not developed for karst because no events were recorded in the database. Future versions of this plan should investigate additional data sources to be used in conjunction with the NCDC ranking.

## FACILITY RISK

In order to determine which facilities are at risk for land subsidence, the State facilities were intersected with the USGS karst geology layer. *It should be noted that the data is at a national scale and is not intended for site-specific research.* The results of this analysis indicate 1,928 buildings in West Virginia are at risk for subsidence, with a combined building value at risk of over \$1.9 trillion. Table 3-76 shows the distribution based on karst type and the building value at risk for State facilities. Annualized loss estimates were not calculated for State facilities due to the scale of available karst mapping and lack of probabilities of future occurrences.

Table 3-77 highlights the facilities within karst zones by County. The top 10 State facilities that have the highest building value in a karst region have been listed in Table 3-76, by building value. The agencies listed represent over 24% of the buildings and 48% of total building value that is within a land subsidence zone.

TABLE 3-76. STATE FACILITIES AT RISK FOR LAND SUBSIDENCE

Karst Type	Number of State Facilities	Building Value at Risk
Fissures, tubes, and caves generally less than 1,000 ft (300 m) long; 50 ft (15 m) or less vertical extent; in gently dipping to flat-lying beds of carbonate rock	74	\$81,699,239
Fissures, tubes, and caves generally less than 1,000 ft (300 m) long; 50 ft (15 m) or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of noncarbonate material 10 ft (3 m) to 200 ft (60 m) thick	133	\$57,053,787
Fissures, tubes, and caves generally less than 1,000 ft (300 m) long; 50 ft (15 m) or less vertical extent; in moderately to steeply dipping beds of carbonate rock	641	\$886,876,902
Fissures, tubes, and caves generally absent; where present in small isolated areas, less than 50 ft (15 m) long; less than 50 ft (15 m) vertical extent; in moderately to steeply dipping beds of carbonate rock	1	\$100,000
Fissures, tubes, and caves over 1,000 ft (300 m) long; 50 ft (15 m) to over 250 ft (75 m) vertical extent; in gently dipping to flat-lying beds of carbonate rock	603	\$653,244,517
Fissures, tubes, and caves over 1,000 ft (300 m) long; 50 ft (15 m) to over 250 ft (75 m) vertical extent; in moderately to steeply dipping beds of carbonate rock	476	\$230,013,473
<b>Total</b>	<b>1928</b>	<b>\$1,908,987,918</b>



TABLE 3-77. STATE FACILITIES AT RISK FOR LAND SUBSIDENCE BY COUNTY

County	Number of State Facilities	Building Value at Risk	Contents Value at Risk
Barbour	1	\$4,153,899	\$6,957,359
Berkeley	36	\$28,567,050	\$4,597,713
Brooke	1503	\$1,260,060,986	\$146,600
Grant	7	\$1,216,977	\$311,000
Greenbrier	50	\$24,837,875	\$5,172,824
Hardy	6	\$7,483,828	\$1,782,522
Jefferson	6	\$4,129,151	\$910,400
Marion	3	\$11,180,636	\$2,787,712
Mercer	12	\$10,198,847	\$2,100,240
Mineral	4	\$2,825,369	\$226,022
Monongalia	1	\$5,950,260	\$1,313,008
Monroe	6	\$849,194	\$151,600
Morgan	91	\$36,818,043	\$4,737,400
Pendleton	14	\$1,669,375	\$767,900
Pocahontas	144	\$55,064,558	\$17,726,000
Preston	5	\$55,280,972	\$8,899,464
Randolph	30	\$57,273,646	\$5,943,446
Summers	2	\$39,834,967	\$3,544,050
Tucker	5	\$43,560,566	\$7,667,064

TABLE 3-78. TOP TEN STATE AGENCIES, BY BUILDING VALUE, IN A KARST REGION

Agency	Number of Buildings in Karst Zone	Building Value in Karst Zone
Shepherd University	54	\$318,747,427
West Liberty University	58	\$152,131,745
Potomac State College	42	\$110,396,427
WV School of Osteopathic Medicine	13	\$83,990,420
Concord University	37	\$78,957,251
Parks, WV State c/o Depart. of Natural Resources	231	\$49,483,742
Glenville State College	14	\$42,271,097
West Virginia University at Parkersburg	2	\$30,645,511
Division of Juvenile Services	17	\$28,142,243
Armory Board State of West Virginia	11	\$25,349,974
<b>Total</b>	<b>479</b>	<b>\$920,115,837</b>

Risk for critical facilities was calculated in the same fashion as for State facilities. Approximately 13% of critical facilities are in regions with some karst geology. Table 3-80 shows the distribution of risk, by karst type. Schools represent the majority of critical facilities in potential land subsidence areas. Loss estimates were not calculated for critical facilities due to the scale of available karst mapping, limited information on mapped critical facilities, and the lack of probabilities of future occurrences.



## JURISDICTIONAL RISK

Areas of karst occur throughout the eastern tier of counties in the State, including the Eastern Panhandle. However, Greenbrier County has been recognized by the Karst Waters Institute as one of the top 10 endangered areas. Four quadrangles in Greenbrier, Pocahontas, and Monroe Counties have been identified by the West Virginia Mapping Panel as having particular environmental significance<sup>55</sup>.

TABLE 3-79. CRITICAL FACILITIES LOCATED IN KARST ZONES BY COUNTY

County	Law Enforcement	Fire Station	Hospital	School K-12	EOC
Berkeley	4	8	1	28	1
Brooke	1	3		2	
Grant	1	2		1	
Greenbrier	4	10	1	8	1
Hardy	1	3			
Jefferson	6	4	1	13	1
Marion	3	7		3	
Mercer	8	4	1	9	1
Mineral	6	9	1	9	1
Monongalia		1		3	
Monroe	5	7		7	1
Morgan	4	3	1	5	1
Ohio	3	2		1	
Pendleton	2	4		3	1
Pocahontas	2	3		3	
Preston	3	6		4	
Randolph	3	5	1	7	
Summers	1	1			
Tucker	2	1		1	

<sup>55</sup> Plan for Geologic Mapping of West Virginia <http://www.wvgs.wvnet.edu/www/statemap/Plan02.htm>



TABLE 3-80. CRITICAL FACILITIES BY KARST ZONE

Karst Type	EOC	Fire Departments	Hospital	Law Enforcement	School	Total
Fissures, tubes, and caves generally less than 1,000 ft (300 m) long; 50 ft (15 m) or less vertical extent; in gently dipping to flat-lying beds of carbonate rock	0	7	0	3	5	15
Fissures, tubes, and caves generally less than 1,000 ft (300 m) long; 50 ft (15 m) or less vertical extent; in gently dipping to flat-lying beds of carbonate rock beneath an overburden of non-carbonate material 10 ft (3 m) to 200 ft (60 m) thick	0	13	0	7	9	29
Fissures, tubes, and caves generally less than 1,000 ft (300 m) long; 50 ft (15 m) or less vertical extent; in moderately to steeply dipping beds of carbonate rock	2	13	2	11	42	70
Fissures, tubes, and caves over 1,000 ft (300 m) long; 50 ft (15 m) to over 250 ft (75 m) vertical extent; in gently dipping to flat-lying beds of carbonate rock	2	26	2	18	23	71
Fissures, tubes, and caves over 1,000 ft (300 m) long; 50 ft (15 m) to over 250 ft (75 m) vertical extent; in moderately to steeply dipping beds of carbonate rock	4	24	3	20	28	79
<b>Total</b>	<b>8</b>	<b>83</b>	<b>7</b>	<b>59</b>	<b>107</b>	<b>264</b>



The WVGIS Map (Figure 3-79) indicates that the following counties have a higher risk of experiencing a subsidence-related event:

- Greenbrier County
- Pocahontas County
- Monroe County
- Berkeley County
- Jefferson County

Hazard ranking for karst is shown in Figure 3-80; lack of historic information has caused the hazard ranking scores to be driven by population and local plan ranking. Loss estimates were not calculated for karst due to lack of historical data for events and damages, scale of available mapping, and the lack of probabilities of future occurrences. Barbour and Gilmer County local plans have ranked land subsidence as having a higher risk compared to the statewide ranking. In lieu of probability of future occurrence, areas with more carbonate rock were assumed to be at greater risk, as shown in the Geographic Extent parameter.

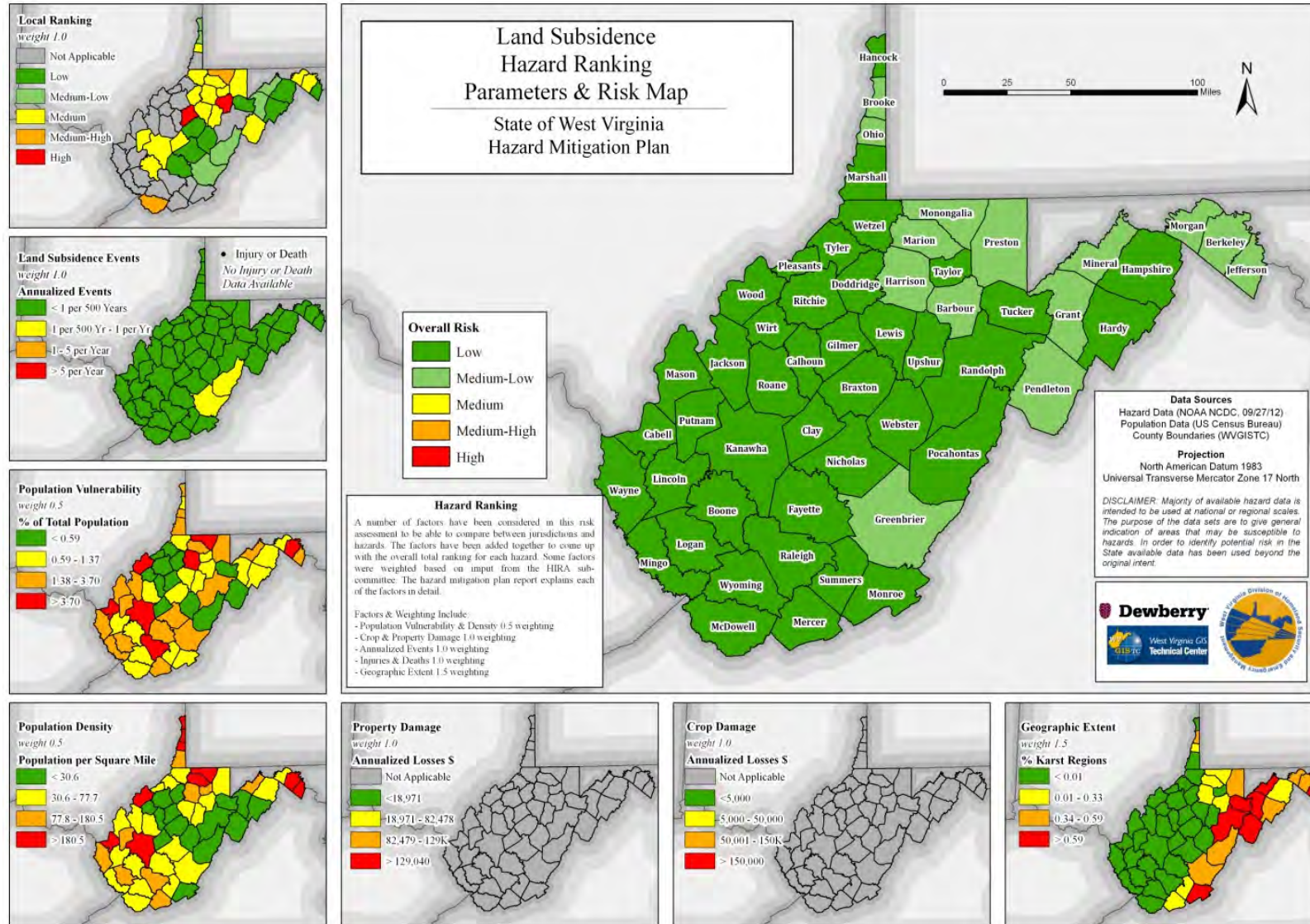


FIGURE 3-80. LAND SUBSIDENCE HAZARD RANKING PARAMETERS AND RISK MAP



## 3.15 NATURAL RESOURCE EXTRACTION PROCESSES

### 3.15.1 DESCRIPTION

More than half of the electricity generated in the United States is derived from coal, with 99% of West Virginia's generated electricity derived from it. Approximately 15% percent of the total coal production in the United States takes place in West Virginia and the State leads the nation in underground coal production (WVOMHST, 2007a). Thus coal mining in West Virginia is very important to both the State and the country. However, coal mining, especially the underground mining prevalent in West Virginia, is a relatively hazardous industry. Coal mining hazards include those facing miners working in active operations, as well as residual post-mining hazards, especially those represented by abandoned mines. Coal mining workplace hazards include cave-ins or collapses, flooding, and hazardous and toxic gas accumulations. Requirements for control of workplace hazards and the response to emergencies in the workplace are the responsibility of State and Federal agencies such as the Mine Safety and Health Administration and the Occupational Health and Safety Administration. Therefore mitigation of workplace hazards is not included in this plan.

Mining is a fundamental component of West Virginia's economy. Nearly 30,000 jobs are associated with the West Virginia mining industry, and over 144 million tons of coal was mined (WVOMHST, 2012) in 2009. West Virginia has a long history of mining the many coal deposits dispersed throughout most of the State. (Figure 3-82).

The mission of the West Virginia Division of Mining and Reclamation (WVDMR) is to regulate the mining industry in accordance with Federal and State law. Activities include issuing and renewing permits for mineral extraction sites and related facilities, inspecting facilities for compliance, monitoring water quality, tracking ownership and control, and issuing and assessing violations. Figure 3-83 shows the mining permit locations maintained by WVDMR. Active coal mining operations also create certain hazards to surrounding communities. The most significant community hazards posed by active mines are mine waste impoundment dam failures and waste pile landslides. Dam inundation/failure and landslide hazards are discussed in Sections 3.16 and 3.12, respectively.

The Surface Mining Control and Reclamation Act of 1977 (SMCRA) created the Office of Surface Mining Reclamation and Enforcement (OSMRE) within the Department of the Interior. SMCRA established a reclamation fee program that requires companies that mine coal to pay a certain amount per ton of coal extracted into an Abandoned Mine Land Reclamation Fund. Between the enactment of the SMCRA in 1977 and the



beginning of 2003, this fund provided more than \$2.9 billion in grants to States and Tribes to clean up mine sites that were abandoned before the passage of the SMCRA<sup>56</sup>.

OSMRE maintains an inventory of known Abandoned Mine Land (AML) sites throughout the United States eligible for funding by the Abandoned Mine Land Reclamation Fund. Data from this inventory can be accessed by the public online through OSMRE's Abandoned Mine Land Inventory System (AMLIS). AMLIS contains information on the location, type, and extent of AML impacts, as well as information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys conducted by State (WVDEP) and OSMRE officials. The inventory is modified as new hazardous sites are identified and existing sites are reclaimed. Figure 3-85 shows the abandoned mine locations throughout West Virginia, published in 1996. Figure 3-84 shows the extent of mining limits.

There are 17 AML site reclamation projects funded by the Abandoned Mine Land Reclamation Fund as well as the reclamation costs and State completeness. The specific problem entitled "Dangerous Impoundments," or coal waste impoundments, is detailed further in Section 3.16, Dam and Levee Failure.

West Virginia has spent approximately \$21.2 million annually to reclaim about 50 AML hazardous sites per year. By frequency of occurrence, dangerous (open) mine portals and unprotected highwalls are West Virginia's most common AML hazards. However, over half of all emergency problems abated in the State are related to abandoned mine subsidence. The most expensive AML hazard to remedy is landslides (OSMRE, 1998). Recently West Virginia has reclaimed streams affected by Acid Mine Drainage. Approximately 130 new AML sites are recorded each year in West Virginia<sup>57</sup>.

### 3.15.2 MARCELLUS SHALE

Marcellus Shale is an organic-rich shale in the Appalachians that occurs at the surface and in the subsurface from New York to eastern Tennessee. Marcellus Shale is present throughout much of West Virginia with the exception of the far eastern and western sections of the State. It varies in thickness through the State but is thicker generally from the Pennsylvania border south into the north-central portions of the State. This sedimentary rock formation was deposited over 350 million years ago. The decomposition of organic materials under high pressure and temperature has produced reserves of natural gas, which is mainly held in pore spaces and fractures in the shale.

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<sup>56</sup> OSMRE, 2003a

<sup>57</sup> OSMRE, 1998



Newly developed drilling techniques now make it profitable for energy companies to target this shale for gas exploration.

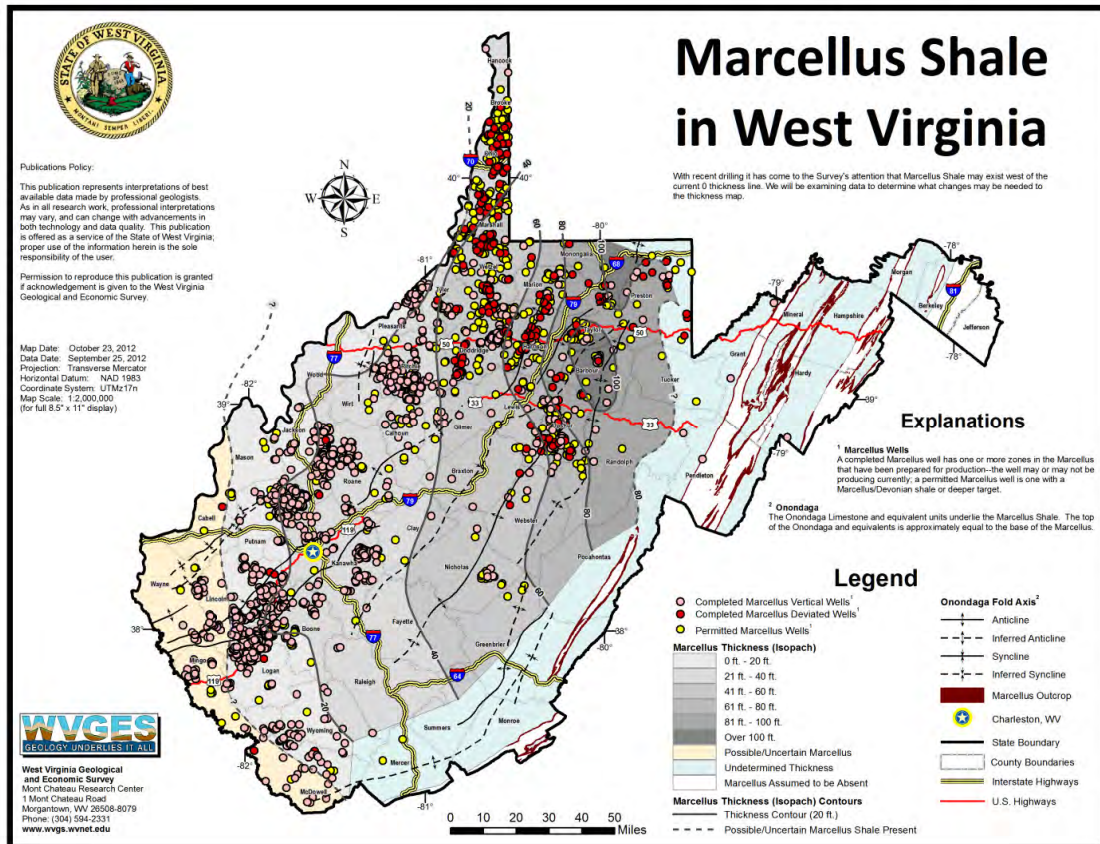


FIGURE 3-81. MARCELLUS SHALE IN WEST VIRGINIA (SOURCE: WEST VIRGINIA GEOLOGICAL AND ECONOMIC SURVEY)

A procedure called hydraulic fracturing (often called “hydrofracking” or “fracking”) is used to retrieve the natural gas deposits. This process involves the hydraulic fracturing of the shale by pumping water at high pressures into the rock to create vertical fractures in the shale layer, while at the same time introducing sand into the rock to keep the fractures open once the water is removed. Then the gas company drills horizontally through the layer of shale to intersect the vertical fractures in the rock which contain the natural gas.<sup>58</sup>

<sup>58</sup> Maryland Geological Survey, <http://www.mgs.md.gov/geo/marcellus.html> (December 2010).



Hydraulic fracturing may have negative impacts on the environment and for property owners and communities near the wells. The water that is pumped at high pressures into the well is mixed with a series of chemicals, a few of which include acids, diesel fuels, gelling agents, antibacterial agents, and corrosion inhibitors.<sup>59</sup> A portion of these chemicals may remain trapped in the ground and may leach into groundwater or surface water, and some of them qualify as hazardous materials and known carcinogens. The WVDEP published *Industry Guidance Gas Well Drilling/Completion Large Water Volume Fracture Treatments* on January 8, 2010, in an effort to minimize negative environmental consequences and to instill best management practices in these types of mining activities. The guidance discusses water use/withdrawal, site construction, and water disposal requirements and suggestions.

### 3.15.3 HISTORIC OCCURRENCE

While the public is more often exposed to hazards of abandoned mine lands, most of the available data on the impacts of mining hazards relates to emergencies or disasters at active mine operations. A mining disaster is classified by the West Virginia Office of Miners' Health Safety and Training, as "accidents fatally injuring three or more employees" (WVOMHST, 2007b). There have been three such disasters since 2000, one disaster each in Marshall County, Upshur County, and Raleigh County. Although these are the only incidents since 2000 to claim more than three lives, it should be noted that there have been many other incidents that have claimed one or two lives.

Table 3-81 summarizes the number of events and deaths per county due to mining accidents. Since 1997, there have been over 130 mine accidents that have resulted in at least one death. Raleigh County has experienced 10 events resulting in 38 fatalities. Figure 3-86 uses the data from WVOMHST for the events and deaths parameters in the hazard ranking. WVOMHST has limited records on mining accidents going back to the 1880s; the largest explosion was in December 1907 at the Monongah Mine 6&8 which resulted in 361 victims. Significant mining accidents in more recent history are summarized below.

#### **McElroy Mine**

In January 22, 2003, an explosion occurred at the bottom of a ventilation shaft being constructed for the McElroy Mine in Marshall County. Three employees of a drilling team were killed and three injured.

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<sup>59</sup> Chesapeake Energy, <http://www.hydraulicfracturing.com/Fracturing-Ingredients/Pages/information.aspx>.



## **Sago Mine**

On January 2, 2006, a methane gas explosion occurred in an inactive area of the Sago Mine in Upshur County. This explosion broke through seals put in place to separate the inactive mine from areas of active mining, trapping a total of 13 employees, 12 of whom died.

In the wake of the Sago Mine incident, Senate Bill 247 was passed in the 2006 State legislative session. This legislation established the Mine and Industrial Accident Rapid Response System Call Center. This system was developed to ensure more rapid response to emergencies. Senate Bill also addressed the provision of emergency oxygen supplies for miners, provided for wireless communication and location tracking, and established penalties for violations of the new requirements.

## **Upper Big Branch Mine**

On April 5, 2010, the worst U.S. coal mining disaster since 1970 occurred in the Upper Big Branch Mine in Montcoal in Raleigh County. An explosion at the mine killed 29 workers. It is believed that methane gas ignited, likely by a shearer cutting sandstone roof.<sup>60</sup>

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<sup>60</sup> West Virginia Office of Miners' Health, Safety and Training, Upper Big Branch Mine Disaster Investigative Report; <http://www.wvminesafety.org/PDFs/Performance/EXECUTIVE%20SUMMARY.pdf>



TABLE 3-81. MINING ACCIDENTS AND FATALITIES (1997 – NOVEMBER 2012). SOURCE: WVOMHST

County	Number of Events	Number of Deaths
Barbour County	2	2
Berkeley County	1	1
Boone County	27	28
Clay County	2	2
Fayette County	6	6
Greenbrier County	3	3
Harrison County	2	2
Kanawha County	12	12
Lincoln County	1	1
Logan County	6	7
Marion County	5	5
Marshall County	7	9
McDowell County	8	9
Mingo County	9	9
Monongalia County	5	5
Nicholas County	3	3
Preston County	2	2
Raleigh County	10	38
Randolph County	3	3
Tucker County	1	1
Upshur County	2	13
Wayne County	1	1
Webster County	2	2
Wyoming County	10	10
<b>Total</b>	<b>130</b>	<b>174</b>

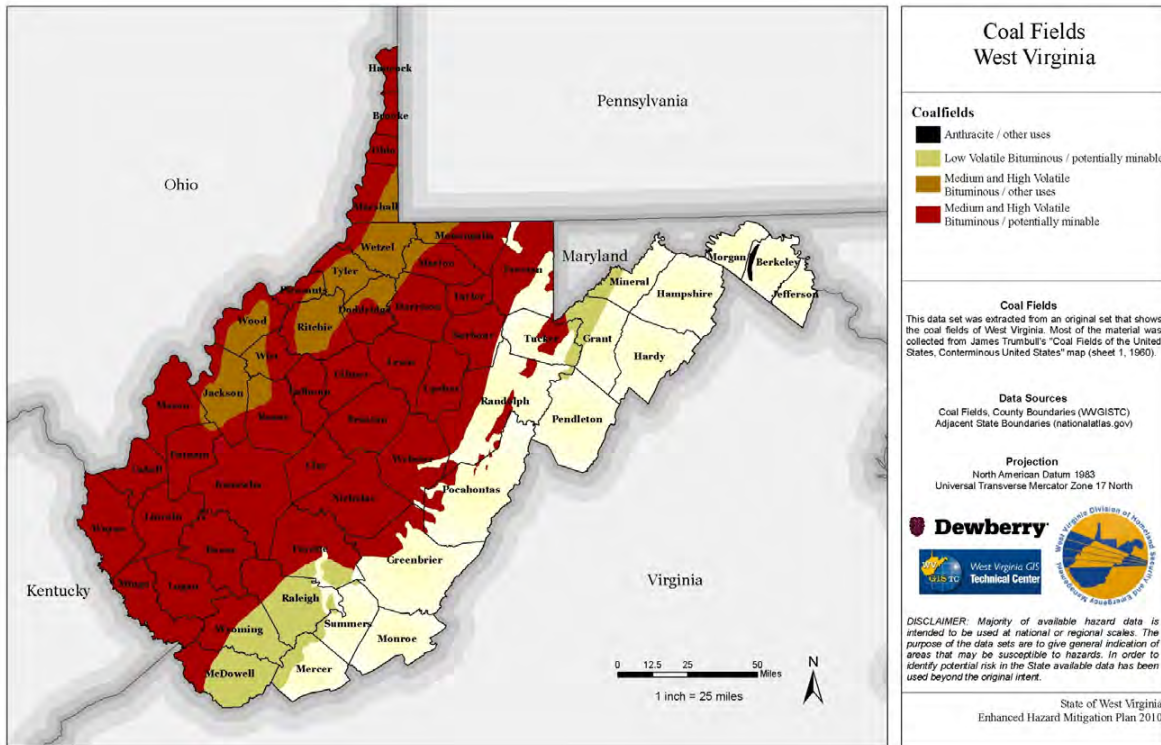


FIGURE 3-82. COAL FIELDS

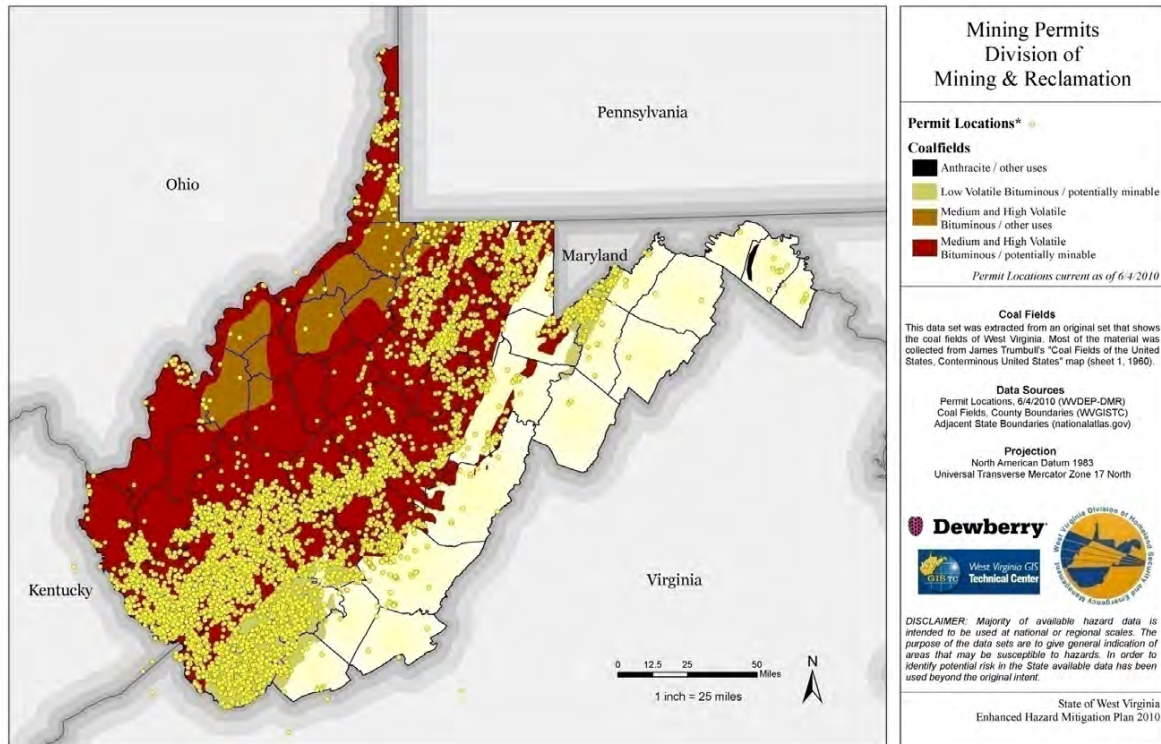


FIGURE 3-83. COALFIELDS AND MINING PERMIT LOCATIONS IN WEST VIRGINIA

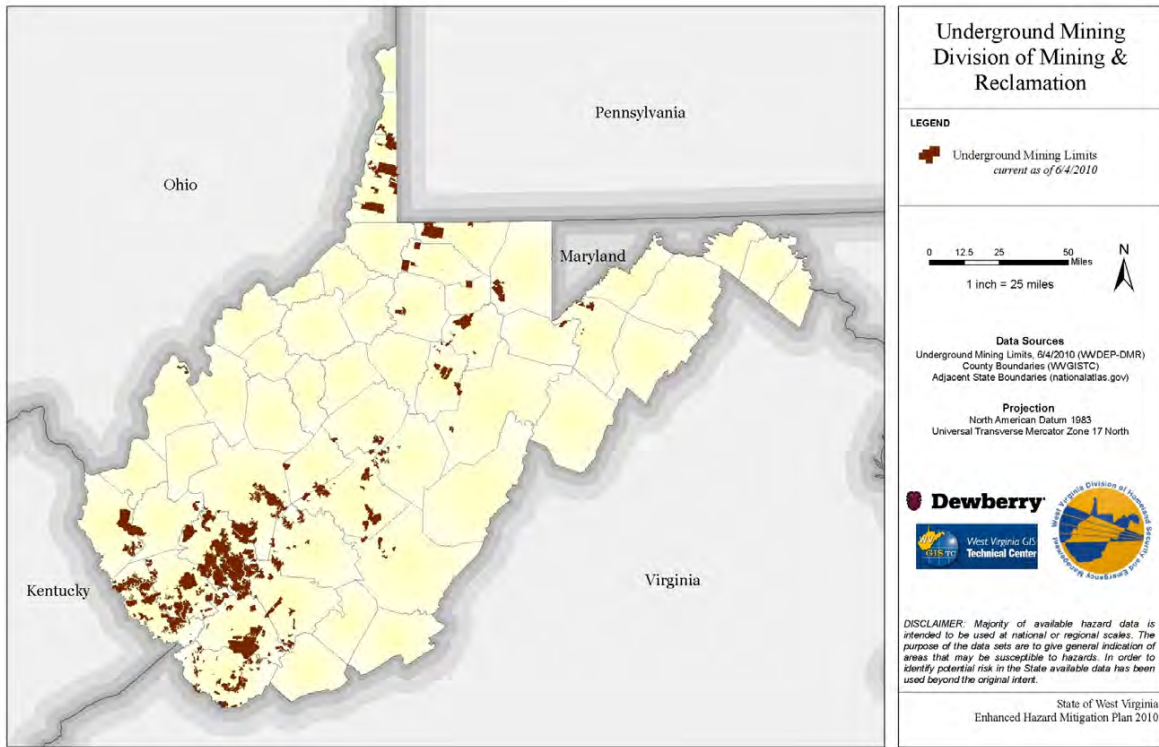


FIGURE 3-84. UNDERGROUND MINING LIMITS PERMITTED BY DIVISION OF MINING AND RECLAMATION

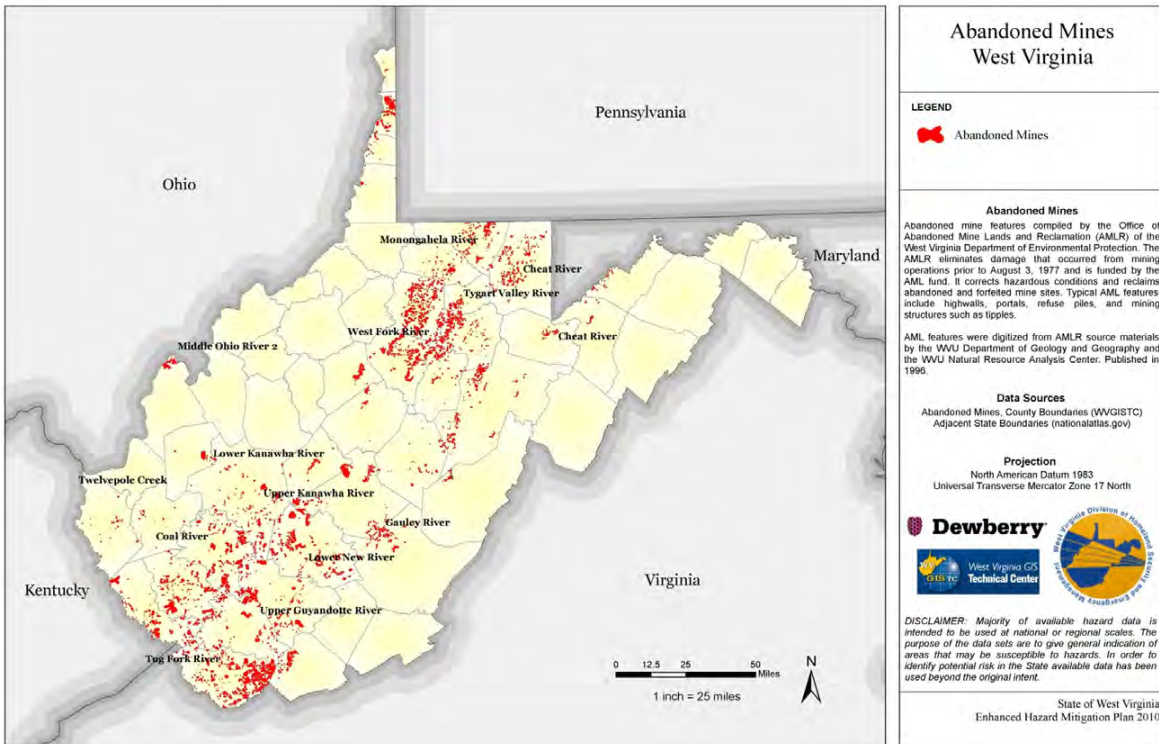


FIGURE 3-85. LOCATIONS OF ABANDONED MINES WEST VIRGINIA



TABLE 3-82 OSMRE'S ABANDONED MINE PROGRAM STATEWIDE EXPENDITURES IN WEST VIRGINIA

Problem Type*	Completed		Funded		Unfunded		Total	
	Units	Costs (\$)	Units	Costs (\$)	Units	Costs (\$)	Units	Costs (\$)
Clogged Streams	47.6	10,452,620	1	617,905	275	4,751,417	324	15,821,942
Clogged Stream Lands	160.3	5,435,852	0	0	167	1,188,625	327	6,624,477
Dangerous Highwalls	222,238	25,983,878	4,500	328,801	1,413,777	208,491,498	1,640,515	234,804,177
Dangerous Impoundments	587	12,372,180	32	696,185	634	10,359,673	1,253	23,428,038
Dangerous Piles & Embankments	4,500	102,360,038	114	3,396,842	1,177	40,258,135	5,791	146,015,015
Dangerous Slides	519.6	31,487,485	5	540,356	346	10,185,758	870	42,213,599
Gases: Hazardous/Explosive	5.3	226,796	0	0	0	0	5	226,796
Hazardous Equipment & Facilities	588.8	7,698,047	30	322,680	606	8,071,303	1,225	16,092,030
Hazardous Water Body	7.0	43,105	0	0	16	217,968	23	261,073
Industrial/Residential Waste	35.8	565,091	1.5	50,500	6	24,601	44	640,192
Portals	2,270	20,193,244	25	145,624	1,963	11,108,734	4,258	31,447,602
Polluted Water: Agri. & Indus.	54.0	12,385,415	15	1,369,282	127	81,924,761	196	95,679,458
Polluted Water: Human Consumption	9,876	41,822,900	809	3,994,783	1,870	86,591,761	12,555	132,409,444
Subsidence	303.8	28,229,048	12	1,248,678	753	50,690,090	1,068.2	80,167,816
Surface Burning	452.1	19,489,440	2.5	130,000	79	3,687,536	533.8	23,306,976
Underground Mine Fire	20.3	1,420,329	0	0	1,938	213,415,315	1,957.8	214,835,644
Vertical Opening	140.3	2,746,801	3	27,000	144	1,837,667	287.3	4,611,468
<b>Total for West Virginia</b>	<b>\$322,912,269</b>	<b>\$12,868,636</b>	<b>\$732,804,842</b>	<b>\$1,068,585,747</b>				

Notes: "Dangerous Impoundments" and "Subsidence" are detailed further in the following section (Coal Waste Impoundments).

Source: OSMRE, 2007



### 3.15.4 RISK ASSESSMENT

Prior to passage of the Surface Mining and Reclamation Act (SMRA) of 1977, mine owners frequently closed unproductive mines by ceasing operations and abandoning the location. The AML pose a complex and expensive problem in West Virginia. AMLs are generally characterized as mines that were abandoned prior to August 3, 1977, for which there is no continuing reclamation responsibility. No confident estimate can be made on the number of abandoned coal mines in West Virginia (Figure 3-85); however, it is estimated that as many as 100,000 abandoned coal mines exist throughout Appalachia.

Development in and around AMLs is exposed to an increased hazard of rapid subsidence. New construction can add loads to the roof of an abandoned tunnel or cavern that result in a collapse into the underground void. Subsidence hazards are discussed in Section 3.14.

Abandoned mines create hazards for both the current mine workers and the public at large. A significant potential hazard exists for miners who unknowingly tunnel into an unmapped abandoned mine that is filled with water. The resulting flooding of the active mine presents a serious threat to the safety of the workers.

As cities and towns grow, and more people visit remote locations, the possibility of contact with AML increases. Some of the hazards posed to people who explore or play on AML include: mine openings, often hundreds of feet deep; leftover storage buildings, mill structures and equipment; piles of tailings and waste rock; improperly disposed of oil and chemical storage drums; and underground mine fires. Shafts may be partially covered by vegetation, thus left obscured. Hikers and others often enter a mine opening unaware of deadly gases and lack of oxygen until it is too late to escape.

Conditions that increase risk associated with AMLs include:

- Inadequate mapping of AMLs and distribution of this updated mapping to public, private, and corporate agencies;
- Presence of combustible/toxic materials in AMLs;
- Lack of adequate fire suppression when fires occur within AMLs;
- Rugged terrain/lack of road access to remediate AML problems;
- Lack of periodic safety inspections for AMLs; inadequate engineering of AML facilities;
- Overload of AML facilities;
- Excessive localized rainfall in areas of AMLs;
- Lack of adequate AML barricades; and
- Increased public use of or near AMLs (e.g., hiking, biking, and fishing).





As stated previously, DMR maintains information on active mining permits in the state. Based on their records, 9,971 mine permits have been issued in West Virginia from 1961 through June 4, 2010<sup>61</sup>. More than 84% of the permits issued were made up of prospect (32.8%), coal surface mine (27.8%), and coal underground (24.3%) types. It should be noted that this includes all permits that were issued by DMR that would contain a large percentage of those that are currently inactive or abandoned.

Counties with over 500 mine permits:

1. Boone County (945)
2. Logan County (804)
3. Mingo County (699)
4. McDowell County (607)
5. Nicholas County (559)
6. Kanawha County (543)
7. Raleigh County (526)

Boone County has over 18% of land area with active mining permits for 2013–22, followed by Logan and Mingo Counties. The percent land area with active mining permits is shown as the Geographic Extent parameter in Figure 3-83.

The following counties have been ranked as Medium-High for natural resource extraction risk in West Virginia due to scores for local plan ranking, population, past events and deaths, and areas with open mining permits:

1. Harrison County
2. McDowell County
3. Monongalia County
4. Nicholas County
5. Preston County

## **FACILITY RISK**

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The State facility database has attributes for whether a structure is located in relation to mine subsidence. Less than 5% of the State facilities are located in areas near underground coal mine subsidence. Raleigh, Monongalia, and Wyoming Counties have the most facilities located near areas of subsidence. Kanawha and Raleigh Counties each represent 30% of the total value at risk.

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<sup>61</sup> West Virginia Division of Mining and Reclamation. Mining Permits, point locations. 6/4/2010.  
<http://gis.wvdep.org/data/omr.html>



The current critical facilities dataset does not contain information related to if the structure is in a mine subsidence area. Current mitigation projects proposed in this plan update address the facilities database maintenance, hazard analysis and additional data gaps.



TABLE 3-83. STATE FACILITIES LOCATED NEAR AREAS OF COAL MINE SUBSIDENCE.

County	Number of Facilities	Building Value	Contents Value	Total Value
Barbour	39	\$63,867,000	\$6,821,355	\$70,688,355
Berkeley County	1	\$5,000	\$3,000	\$8,000
Boone County	23	\$2,055,700	\$160,000	\$2,215,700
Braxton County	3	\$214,610	\$45,000	\$259,610
Brooke County	4	\$833,000	\$0	\$833,000
Clay County	1	\$7,840	\$5,000	\$12,840
Fayette County	19	\$69,167,268	\$4,908,900	\$74,076,168
Gilmer County	3	\$1,702,400	\$347,000	\$2,049,400
Grant County	11	\$422,840	\$51,150	\$473,990
Greenbrier County	1	\$100,000	\$0	\$100,000
Hampshire County	11	\$19,288,695	\$660,500	\$19,949,195
Hancock County	1	\$0	\$70,000	\$70,000
Hardy County	3	\$465,812	\$81,000	\$546,812
Harrison County	6	\$48,535,079	\$3,752,000	\$52,287,079
Jefferson County	1	\$21,000	\$0	\$21,000
Kanawha County	25	\$472,278,233	\$59,455,485	\$531,733,718
Lewis County	1	\$100,000	\$0	\$100,000
Logan County	7	\$28,885,190	\$2,595,370	\$31,480,560
Marion County	26	\$14,856,285	\$4,889,294	\$19,745,579
Marshall County	2	\$30,658,627	\$1,612,770	\$32,271,397
Mason County	2	\$50,000	\$57,000	\$107,000
McDowell County	26	\$137,191,821	\$13,899,200	\$151,091,021
Mercer County	6	\$10,636,695	\$2,031,000	\$12,667,695
Mineral County	6	\$2,622,250	\$752,300	\$3,374,550
Mingo County	38	\$42,192,135	\$5,425,242	\$47,617,377
Monongalia County	52	\$76,484,148	\$11,405,955	\$87,890,103
Monroe County	4	\$11,238,000	\$2,165,000	\$13,403,000
Nicholas County	10	\$308,930	\$37,080	\$346,010
Ohio County	43	\$54,355,770	\$8,989,649	\$63,345,419
Pendleton County	1	\$70,000	\$0	\$70,000
Preston County	3	\$193,456	\$39,000	\$232,456
Putnam County	1	\$700,000	\$16,000	\$716,000
Raleigh County	113	\$470,661,725	\$54,393,701	\$525,055,426
Randolph County	1	\$75,000	\$10,000	\$85,000
Roane County	1	\$40,000	\$40,000	\$80,000
Summers County	1	\$75,000	\$20,000	\$95,000
Taylor County	1	\$192,000	\$50,000	\$242,000
Tucker County	3	\$228,824	\$58,600	\$287,424
Upshur County	3	\$189,000	\$25,000	\$214,000
Webster County	1	\$0	\$10,000	\$10,000
Wetzel County	2	\$92,500	\$15,000	\$107,500
Wood County	4	\$423,700	\$120,000	\$543,700
Wyoming County	49	\$9,361,401	\$1,243,400	\$10,604,801
<b>Total</b>	<b>559</b>	<b>\$1,570,846,934</b>	<b>\$186,260,951</b>	<b>\$1,757,107,885</b>

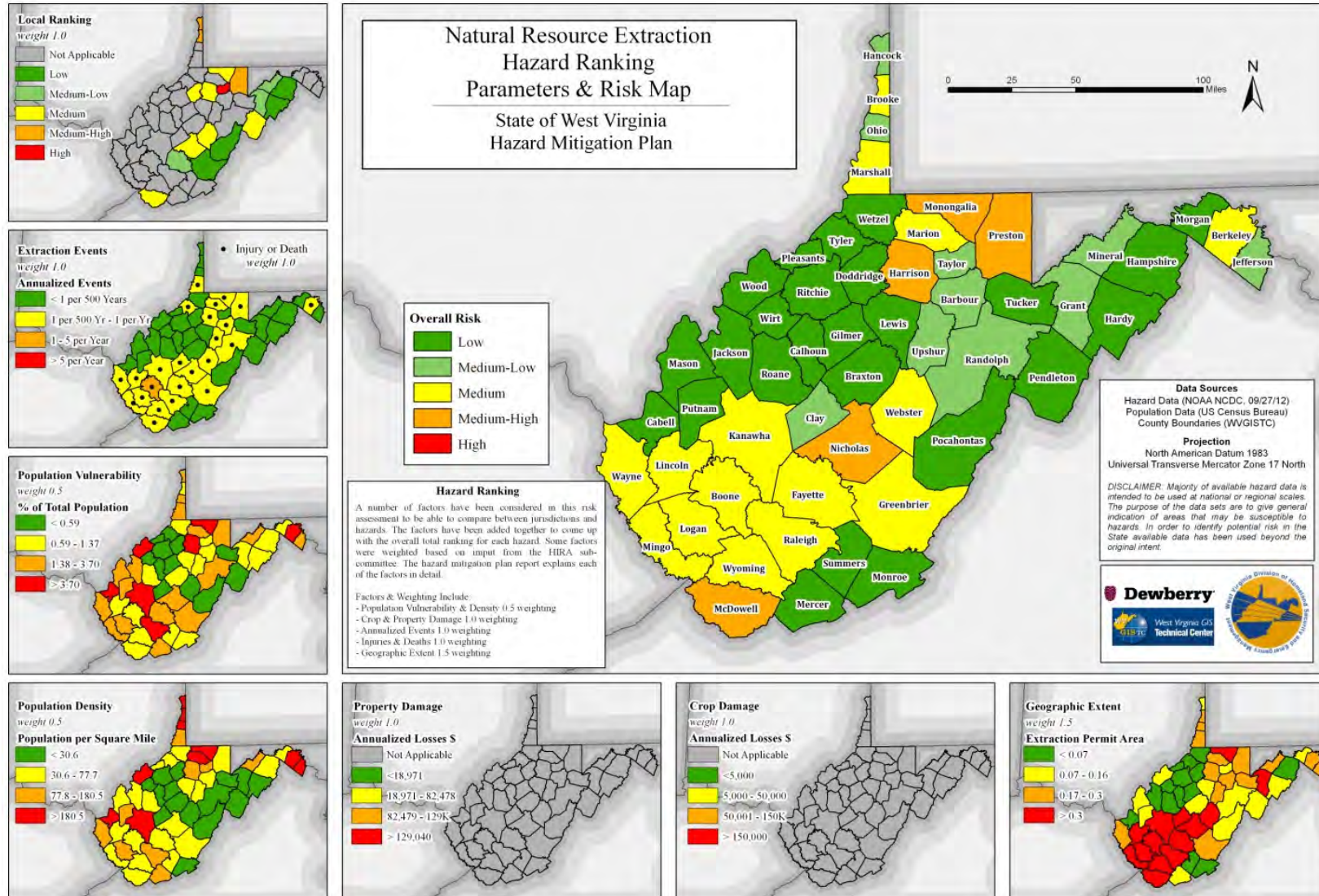


FIGURE 3-86. NATURAL RESOURCE EXTRACTION HAZARD RANKING PARAMETERS AND OVERALL RISK.

## 3.16 DAM AND LEVEE FAILURE

### 3.16.1 DESCRIPTION

The West Virginia Dam Control and Safety Act establishes regulations for dams in the State. Under the regulations dams are defined as:

*An artificial barrier or obstruction, including any works appurtenant to it and any reservoir created by it, which is or will be placed, constructed, enlarged, altered or repaired so that it does or will impound or divert water.*



JULY 19, 2002, LOGAN COUNTY, WV

Source: Association of Dam Safety Engineers

Dams are barriers constructed to impound water for storage, flood control, power generation, and/or stream navigation. Dams also are constructed to impound hydraulically transported industrial waste including spoil or mine processing waste, or coal combustions waste of fly ash. The structures can vary greatly in size based on their purpose and area topography.

Dams provide water for drinking, navigation, agricultural irrigation, hydroelectric power, low-flow augmentation for water quality, recreational opportunities, waste impoundment, and, perhaps most importantly in West Virginia, flood protection. Dams can pose a risk to communities if not designed, constructed, operated, and maintained properly. In the event of a catastrophic dam failure, the energy the water released from even a small dam is capable of causing extensive property damage, injury, and potential loss of life. This is especially true in West Virginia where many communities lie along steep (or high) gradient streams and rivers within narrow valleys.

The WVDEP Division of Water and Waste Management (DWWM) Dam Safety Program has regulatory jurisdiction over dams in West Virginia, and performs inspections of dams as necessary to enforce the provisions of the West Virginia Dam Control and Safety Act.

Regulations of the West Virginia Dam Control and Safety Act apply to a dam that:

1. is or will be twenty-five feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier and which does or can impound fifteen acre-feet or more of water; or



2. is or will be six feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier and which does or can impound fifty acre-feet or more of water.

The West Virginia Dam Control and Safety Act excludes certain dams that otherwise meet the regulatory definition. The excluded dams are:

1. any dam owned by the federal government;
2. any dam for which the operation and maintenance thereof is the responsibility of the federal government;
3. farm ponds constructed and used primarily for agricultural purposes, including, but not limited to, livestock watering, irrigation, retention of animal wastes and fish culture, and which have no potential to cause loss of human life in the event of embankment failure; or
4. road fill or other transportation structures which do not or will not impound water under normal conditions and which have a designed culvert or similar conveyance or such capacity as would be used under a state designed highway at the same location. Provided, however, that the secretary may apply the provisions of section ten of this article for road fill or other transportation structures that become a hazard to human life or property through the frequent or continuous impoundment of water.

West Virginia State Code §22-14-3:

A levee is a structure, earthen or artificial, with a primary purpose of providing protection from flooding during seasonal high water, storm surges, precipitation and other weather events. Levees are often parallel to a river or along low-lying coastlines. Although their primary function is flood protection, levees may also confine the flow of water, resulting in higher and faster flows. Similar to a dam failure, failure of a levee can result in catastrophic flooding as was seen in New Orleans on August 29, 2005, during Hurricane Katrina when the failure of levees and flood walls flooded over 80% of the city.

### 3.16.2 HISTORIC OCCURRENCE

There are no comprehensive databases of historical dam or levee failure in West Virginia. Most failures occur due to lack of maintenance of facilities in combination with major precipitation events, such as hurricanes and thunderstorms.

Since Congress passed the Disaster Relief Act in 1974 (Amended as the Robert T. Stafford Disaster Relief and Emergency Assistance Act in 1988), and the 2000 Disaster Mitigation Act., West Virginia has not experienced a Presidential Disaster Declaration resulting from a dam failure. Prior to the passage of Federal legislation, the February 26, 1972, Buffalo Creek flooding disaster occurred as a result of a catastrophic dam



break. This coal slurry dam consisted of three embankments. One embankment failed as a result of heavy rain soaking the earthen dam, causing the subsequent failure of the other two. The result was a flood wave barreling through Logan County that killed 139 people and destroyed millions of dollars worth of property<sup>62</sup>. Since the Buffalo Creek dam failure and resulting flood, West Virginia has not experienced deaths due to a dam failure. Table 3-84 below highlights several dam failures and incidents as documented by the Association of State Dam Safety Officials. There have been no significant incidents of dam failures at coal combustion waste impoundments in West Virginia.

### 3.16.3 RISK ASSESSMENT

In 1972, Congress authorized the U.S. Army Corps of Engineers (USACE) to inventory dams located in the United States through the National Dam Inspection Act. The Water Resources Development Act of 1986 authorized USACE to maintain and periodically publish an updated National Inventory of Dams (NID). The Water Resources Development Act of 1996 re-authorized periodic update of the NID by USACE, and continued a funding mechanism. This data set is the source for the general jurisdictional analysis in this plan.<sup>63</sup> West Virginia has 562 dams listed in the NID.

Dam owners in West Virginia include the National Resources Conservation Service (NRCS) (47%), other Federal Government bodies (7%), the State (12%), local government (10%), private individuals or corporations (15%), and unknown owners (9%). The landowners generally do not operate the dams. The NRCS flood control structures (of Dam Safety Act jurisdictional size) are operated and maintained by a sponsor agency such as a soil conservation district, county, or WVDNR. These sponsor agencies are organized under an umbrella agency to represent their interests in the legislature and help develop monitoring and emergency action plans. The umbrella agency is the West Virginia Conservation Agency (WVCA).

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<sup>62</sup> Steinberg, Ted. *Acts of God: the Unnatural History of Natural Disaster in America*. Oxford University Press 2000. Page 74.

<sup>63</sup> National Inventory of Dams <http://crunch.tec.army.mil/nidpublic/webpages/nid.cfm>



TABLE 3-84. ASSOCIATION OF STATE DAM SAFETY OFFICIALS DAM FAILURES AND INCIDENTS <sup>64</sup>

Date	Dam	Location	Deaths	Damages	Cause	Description
Pre-1914		Lincoln County			Catastrophic failure of a coal mine tailings dam.	
January 15, 1914	Old Stony River Dam	Grant County			Reinforced concrete dam failed during winter storm.	
August 9, 1916	Unnamed	Between Acme & Kayford, WV (Kanawha County)	60-75 from flood (unknown if related to failure)		Inflow flood	
August 9, 1916	Unnamed	Jarrolds Valley, Boone County	60-75 from flood (unknown if related to failure)		Inflow flood	
August 9, 1916	Unnamed	Cabin Creek Valley (Kanawha County)	60-75 from flood (unknown if related to failure)	>\$600,000	Inflow flood	Extensive damage; especially to rail, telephone, and coal company
February 26, 1972	Buffalo Creek	Logan County	125	\$400 Million	Coal slurry dam consisted of three embankments, one embankment failed causing the subsequent failure of the other two.	546 house destroyed and 538 houses damaged, 4,000 left homeless
October 11, 2000		Inez, KY affecting WV streams including the Big Sandy River watershed's Tug Fork		\$56 Million in clean up costs		
July 19, 2002		Logan County			During heavy rains, an upstream coal waste valley fill slid into the pond, causing it to discharge through the emergency spillway and overtop.	Dam overtopped and destroyed three houses. The dam (surface mine sediment pond) did not fail or malfunction.
April 15, 2007	Lee's Fishing Lake Dam	Hamlin, Lincoln Co., WV			2.5" of rainfall in 24 hours	Pond had been drained, and then refilled by new owner 22' high HH dam. Nearly 1,000 evacuated.

<sup>64</sup> Association of State Dam Safety Officials. Historic Dam Failures in the U.S. [www.damsafety.org](http://www.damsafety.org), 4/22/2013





In 2006, the U.S. Army Corps of Engineers revamped its Levee Safety Program; inventorying the 2,000 levee systems in its portfolio, refining its levee inspection program, and revising its levee safety policies and procedures. The American Reinvestment and Recovery Act of 2009 (ARRA) provided funds to jumpstart levee periodic inspections, a more detailed inspection conducted every 5 years. The results of USACE levee inspections determine continued eligibility for the Levee Safety Program's Rehabilitation and Inspection Program (RIP), the Corps' authority to provide Federal aid in repairing levees damaged by floods or storms. They also provide a more precise picture of levee conditions; an important step in shared efforts with State and local authorities to communicate flood risk and make informed decisions on how best to reduce it.

Title IX of the Water Resources Development Act of 2007 provides authorization for a National Levee Safety Program. This authorization allows the Corps to continue with the inventory, National Levee Database (NLD), and inspection of levees and to develop a strategic plan for implementation of the program. The Corps is working to develop a standard inspection and screening process that will incorporate risk-based analysis into the process and achieve consistency across Federal and non-Federal projects.<sup>65</sup>

## PROBABILITY

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Predicting the probability of a dam or levee failure requires a detailed, site-specific engineering analysis for each location in question. Failure may result from hydrologic and hydraulic design limitations, or from geotechnical or operational factors. The data and time necessary to perform a probabilistic failure analysis for each dam and levee in West Virginia is beyond the scope of this plan.

Failure of any one of dams or levees in West Virginia has the potential to inundate the surrounding areas, particularly those that are low-lying. Dam and levee failure can occur with little or no advance warning. There is likely to be some warning for larger dams and levees that it is being loaded by water and not performing adequately, but smaller dams in flash flood areas (or coal impoundments) would have little to no warning.

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<sup>65</sup> US Army Corps of Engineers Levee Safety Program. Baltimore District Fact Sheet.  
<http://www.nab.usace.army.mil/Media/FactSheets/FactSheetArticleView/tabid/10470/Article/9067/levee-safety-program.aspx>



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## IMPACT AND VULNERABILITY

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Failure of dams and levees may result in catastrophic localized damages. Vulnerability to dam failure is dependent on dam operation planning and the nature of downstream development. Depending on the elevation and storage volume of the impoundment, the impact of dam failure may include loss of human life, economic losses such as property damage and infrastructure disruption, and environmental impacts such as destruction of habitat. Evaluation of vulnerability and impact is highly dependent on site-specific conditions.

The WVCA is responsible for more than 150 dams in the State. For each structure, the WVCA maintains a map of the area likely to be inundated should a failure occur. For evacuation of known inundation zones like those developed by the WVCA and the approximately 115 dams listed as Coal Impoundments. The West Virginia EOP Annex E contains information on the functional responsibilities and tasks applicable in all evacuations in the State. However, the list but does not attempt to detail the procedures for all situations that may call for evacuation. The EOP is available through the WVDHSEM website. Local jurisdictions must also use the tools available to plan for evacuations that would reduce dam failure losses.

An important tool available to emergency managers for mitigating the potential risks due to dam failure is an effective Emergency Action Plan (EAP). West Virginia requires EAPs for all significant and high-hazard dams. In addition, the EAPs must meet certain minimum standards to insure their effectiveness, including periodic updates to account for changes in development and property ownership, and drills/exercises to make sure the EAP is functional.

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## RISK

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Dams of greatest concern for failure are those included on a list of deficient dams maintained by the WVDEP DWWM Dam Safety Program. A deficient dam is defined as a structure that exhibits one or more design or maintenance problems that may adversely affect the performance of the dam during a major storm, or over time, that represents a potential for loss of life or property. However, the degree of hazard within this definition can vary greatly. The dams in West Virginia are rated based on a variety of factors, including the storm capacity of the dam, spillway condition, safety, embankment condition, reservoir volume, height, downstream population, proximity to population, highway traffic, and posted speed. The scores for each of these variables are added to determine the priority rank order for deficient dams. Table 3-85 provides a list of West Virginia's deficient dams in priority order (WVDEP DWWM, 2004). Figure 3-87 shows the location and downstream hazard potential of 468 non-coal dams as maintained by the WVDEP DWWM database.



As a result of a dam failure at the coal combustion waste impoundment at the Tennessee Valley Authority’s Kingston, TN, plant in December 2008, WVDEPWWD inspected 30 coal combustion waste impoundments in 2009. Two of the impoundments were rated a “poor” based on calculated stability safety factors that were less than required by current regulations.<sup>66</sup>

Dams regulated by the State and Federal authorities are classified by their potential impacts on downstream life and property. Class 1 (High Hazard) dams are located where a failure may cause loss of life or major damage to buildings and lifelines such as highways, roads, and bridges. Class 2 (Significant Hazard) dams are located where a failure may cause minor damage to structures downstream, and is unlikely to result in loss of life. Classes 3 and 4 represent dams with lower or no potential for downstream damage. The WVDEP currently regulates 310 Class 1 and 2 dams.

There are approximately 562 dams in West Virginia based on data from the NID. The majority of dams in West Virginia are classified as High Hazard (68%); 85% of the High Hazard Potential dams have EAPs in place. Figure 3-88 shows the locations of dams and their hazard potential. Private ownership accounts for approximately 44% of the dams; more than 80% are earthen dams and nearly 32% serve as flood control structures. More than 50% of West Virginia dams were built prior to 1900 or during 1960-69.

There are approximately 18 levees West Virginia USACE National Levee Database (NLD), accounting for over 36.9 miles of protected levee area (Table 3-86). The majority of the levees were constructed by USACE and turned over to public sponsors for operations and maintenance. The USACE’s Elkins levee is still federally operated and maintained. The City of Benwood levee was locally constructed and continues to be locally operated and maintained.

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<sup>66</sup> *Fly Ash Dam/Landfill Condition Evaluation* West Virginia Department of Environmental Protection, Division of Water and Waste Water, Environmental Enforcement ,November 2009



TABLE 3-85. DEFICIENT DAMS IN WEST VIRGINIA

Priority Rank	Name of Dam	ID	Downstream Town/County
1	Lower Salem Dam	03314	Salem/Harrison
2	Upper Salem Dam	03301	Salem/Harrison
3	Lake Washington Dam	07906	Hurricane/Putnam
4	Lough Lake Dam	06115	Osgood/Monongalia
5	Burch Run Dam	05101	Wheeling/Marshall
6	Deegan Lake Dam	03322	Bridgeport/Harrison
7	B & O Dam	07715	Newburg/Preston
8	Charles Fork Dam	08705	Spencer/Roane
9	Hinkle Lake Dam	03328	Bridgeport/Harrison
10	Lynch Lake Dam	06116	Osgood/Monongalia
11	Rock Lake Dam	04917	Hammond/Marion
12	Bluewell # 2 Dam	05520	Bluewell/Mercer
13	Bluewell # 1 Dam	05519	Bluewell/Mercer
14	Old Keyser Dam	05722	Keyser/Mineral
15	Upper Smith Dam	10705	Parkersburg/Wood
16	Lake of Eden Dam	01102	Barboursville/Cabell
17	Scott Lake Dam	08304	Beverly/Randolph
18	Hurricane WS Dam	07909	Winfield/Putnam
19	Flat Top Lake Dam	08101	Ghent/Raleigh
20	Berwind Lake Dam	04702	Berwind/McDowell
21	Long Branch Dam	08903	Pipestem/Summers
22	Lake Trotter Dam	08704	Spencer/Roane
23	Poffenbarger # 1 Dam	03904	Cross Lanes/Kanawha
24	Buffalo Lake Dam	03305	Clarksburg/Harrison
25	Moncove Lake Dam	06301	Gap Mills/Monroe
26	Maple Lake Dam	03327	Bridgeport/Harrison
27	Hatfield Lake Dam	01105	Barboursville/Cabell
28	Cacapon Res Dam	06502	Sleepy Creek/Morgan
29	Bear Rock # 2 Dam	06902	Middle Creek/Ohio
30	Cherry Lake Dam	02903	New Cumberland/Hancock
31	Sun Valley Dam	08904	Pipestem/Summers
32	Old Bramwell Dam	05524	Bramwell/Mercer
33	Cacapon Park Dam	06503	Sleepy Creek/Morgan
34	Lees Fishing Dam	04301	Mahoney Creek/Lincoln
35	Bear Rock # 1 Dam	06901	Middle Creek/Ohio
36	Bear Rock # 3 Dam	06903	Middle Creek/Ohio
37	Asbury Lake Dam	09905	Dunlow/Wayne
38	New Bramwell Dam	05501	Bramwell/Mercer

Source: WVDEP DWWM

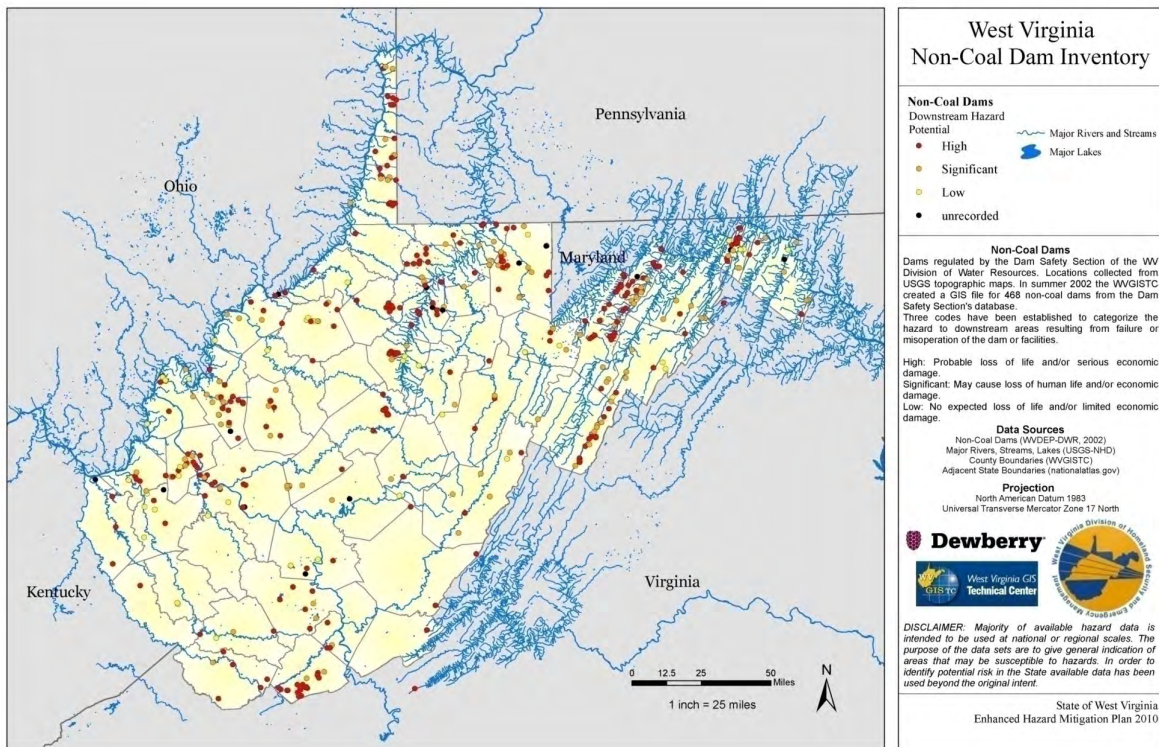


FIGURE 3-87. NON-COAL DAM INVENTORY DEVELOPED BY WVDEP DIVISION OF WATER RESOURCES

Levee inspections have been completed on all 18 levees. Ceredo-Kenova has been rated as “unacceptable.” As of March 2013, eight of the levees have been de-accredited, presumably due to lack of funding to pay for certifications<sup>67</sup>.

## FACILITY RISK

The inability to calculate probabilities for dam and levee failure limit the degree to which potential losses can be calculated. In an effort to quantify risk to facilities, limited information was available for Bluestone dam inundation areas and areas protected by levees. This information was overlaid on the facilities data to determine what facilities are at risk due to failure.

<sup>67</sup> USACE Region II PAL Tracking Sheet. 4/5/2013



TABLE 3-86. WEST VIRGINIA LEVEES. NATIONAL LEVEE DATABASE (NLD).

USACE District	Counties	System Name	Sponsors	Length (miles)	Inspection Date	Inspection Rating
HUNTINGTON	Mingo County	Williamson, WV, LPP	Mingo County Commission	0.79	8-Dec-09	MINIMALLY ACCEPTABLE
HUNTINGTON	Mingo County	West Williamson, WV, LPP	Mingo County Commission	1.15	27-Oct-09	MINIMALLY ACCEPTABLE
BALTIMORE	Grant County	West Bayard*	Town Of Bayard	0.35	1-Aug-11	MINIMALLY ACCEPTABLE
BALTIMORE	Grant County	South Petersburg*	Grant County	2.19	23-May-12	MINIMALLY ACCEPTABLE
BALTIMORE	Hardy County	South Moorefield*	Town Of Moorefield	1.73	22-May-12	MINIMALLY ACCEPTABLE
BALTIMORE	Allegany County, Mineral County	Ridgeley*	City Of Cumberland	1.49	6-Oct-11	MINIMALLY ACCEPTABLE
HUNTINGTON	Mason County	POINT PLEASANT, WV, LPP	City Of Point Pleasant	2.28	5-Apr-10	MINIMALLY ACCEPTABLE
HUNTINGTON	Wood County	PARKERSBURG, WV, LPP	City Of Parkersburg	3.8	30-Nov-09	MINIMALLY ACCEPTABLE
BALTIMORE	Grant County	North Petersburg*	Grant County	2.33	23-May-12	MINIMALLY ACCEPTABLE
BALTIMORE	Hardy County	North Moorefield*	Town Of Moorefield	2.75	22-May-12	MINIMALLY ACCEPTABLE
HUNTINGTON	Mingo County	Matewan, WV, LPP	Mingo County Commission	0.5	20-Nov-10	MINIMALLY ACCEPTABLE
HUNTINGTON	Cabell County	Huntington, WV, LPP - Guyandotte	City Of Huntington	4.07	13-Nov-09	MINIMALLY ACCEPTABLE
HUNTINGTON	Cabell County, Wayne County	Huntington, WV, LPP	City Of Huntington	7.48	13-Nov-09	MINIMALLY ACCEPTABLE
PITTSBURGH	Randolph County	Elkins, WV	Usace - Pittsburgh District	0.72	29-Jan-08	ACCEPTABLE
BALTIMORE	Grant County	East Bayard*	Town Of Bayard	0.24	1-Aug-11	MINIMALLY ACCEPTABLE
HUNTINGTON	Wayne County	Ceredo-Kenova, WV LPP	City Of Ceredo, City Of Kenova	4.33	8-Mar-10	UNACCEPTABLE
BALTIMORE	Garrett County, Mineral County	Blaine*	Town Of Kitzmiller	0.29	2-Aug-11	MINIMALLY ACCEPTABLE
PITTSBURGH	Marshall County	Benwood -Left Bank Ohio River	City Of Benwood	0.42	**	**

\*denotes March 2013 de-accreditation

\*\* Locally constructed, operated and maintained. No additional information available on inspection.

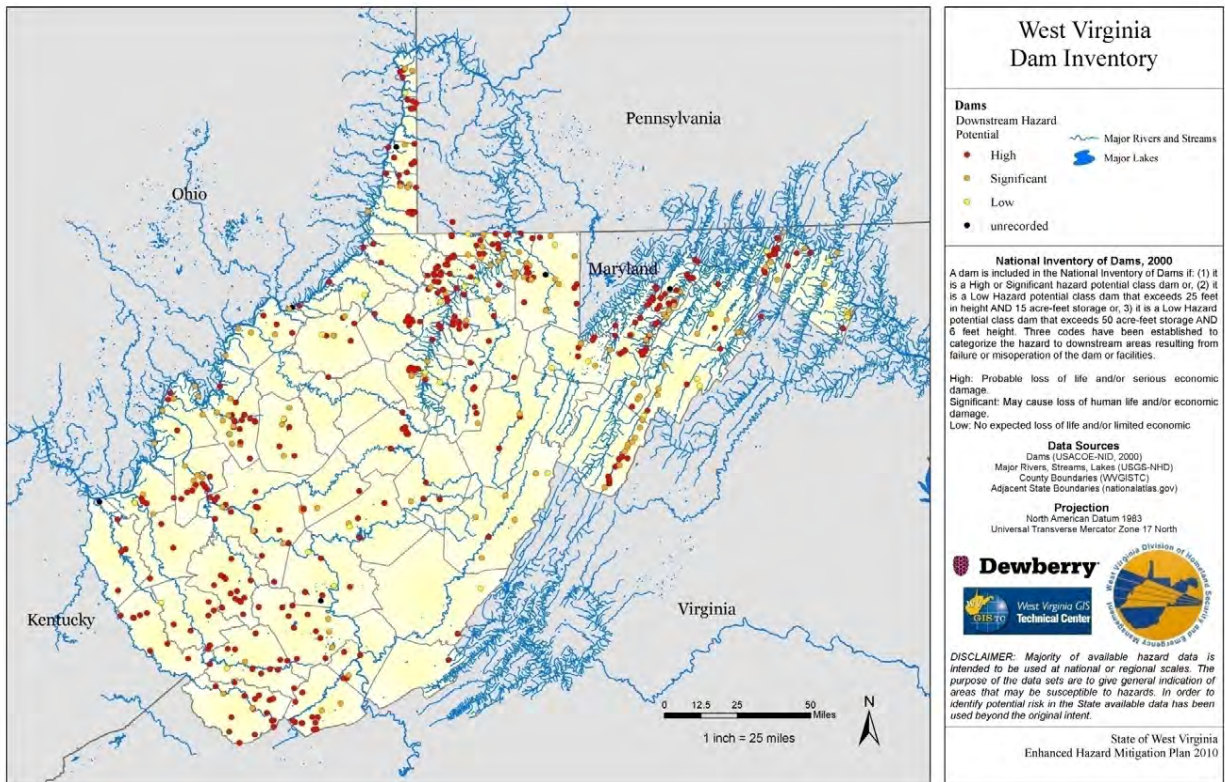


FIGURE 3-88. DAMS INCLUDED IN THE NATIONAL INVENTORY OF DAMS, 2000

Table 3-87 and Table 3-89 summarizes the state and critical facilities at risk to dam by county. Approximately 1,292 facilities are located within the Bluestone dam inundation area, with the majority being West Virginia State University facilities (78 facilities) and WVDNR facilities (100 facilities) in Summers and Kanawha Counties. Total facility exposure within the inundation area is over \$2 billion. The majority of facilities (751 of 904) in Kanawha County are classified as “building” type, followed by 82 with the classification of “all other types”.

Dam inundation was only available for the Bluestone dam; additional risk to facilities exists but has not been quantified for the remaining dams in West Virginia. Dam inundation for other areas in the state was not provided due to lack of confidence in the spatial data.

Table 3-88 summarizes the 310 state facilities within levee protected areas. Marshall University and the Division of Highways in Cabell County have the most facilities within the protected areas. Total exposure, building and contents, in the levee protected areas for West Virginia can be estimated over \$714 million. Table 3-90 highlights the critical facilities located within levee protected areas in West Virginia. Cabell County has 21 critical facilities located in levee protected areas; of which 12 are categorized as schools.



TABLE 3-87. STATE FACILITIES AT RISK TO DAM FAILURE OF THE BLUESTONE DAM.

County	Number of Facilities within inundation zone	Total Building Value at Risk	Total Contents Value at Risk
BARBOUR	1	\$0	\$367,500
BERKELEY	4	\$1,468,000	\$0
BOONE	1	\$0	\$450,000
BRAXTON	3	\$355,000	\$768,000
CABELL	12	\$4,859,673	\$250,000
CLAY	1	\$355,000	\$500,000
FAYETTE	42	\$104,910,609	\$18,227,831
GILMER	3	\$297,360	\$90,000
GRANT	1	\$355,000	\$474,000
GREENBRIER	1	\$700,000	\$0
HAMPSHIRE	1	\$380,000	\$568,500
HARDY	1	\$0	\$456,000
HARRISON	4	\$102,498	\$1,077,000
JACKSON	1	\$25,000	\$5,000
JEFFERSON	1	\$0	\$456,000
KANAWHA	904	\$1,347,405,995	\$337,003,874
LEWIS	2	\$355,000	\$560,000
LINCOLN	1	\$0	\$367,500
MARION	1	\$0	\$367,500
MARSHALL	2	\$50,000	\$1,012,500
MASON	59	\$51,321,355	\$5,751,200
MCDOWELL	2	\$125,000	\$39,302
MINGO	1	\$355,000	\$385,500
MONONGALIA	1	\$0	\$462,000
MONROE	5	\$7,917,178	\$429,655
OHIO	1	\$0	\$247,500
PENDLETON	1	\$355,000	\$474,000
PLEASANTS	4	\$5,806,500	\$3,098,000
PRESTON	5	\$3,297,000	\$1,440,500
PUTNAM	142	\$71,069,877	\$22,929,953
RALEIGH	4	\$16,221,000	\$1,728,000
RANDOLPH	1	\$305,000	\$478,000
RITCHIE	1	\$355,000	\$474,000
ROANE	2	\$105,000	\$20,000
SUMMERS	69	\$6,348,954	\$1,088,000
TAYLOR	1	\$0	\$373,500
TYLER	1	\$355,000	\$385,500
UPSHUR	1	\$0	\$367,500
WAYNE	1	\$0	\$544,500
WETZEL	2	\$0	\$50,000
WOOD	1	\$50,000	\$0
<b>Total</b>	<b>1,292</b>	<b>\$1,625,605,999</b>	<b>\$403,767,815</b>





TABLE 3-88. STATE FACILITIES AT RISK TO LEVEE FAILURE (BASED ON NLD).

County	Number of Facilities within protected area	Total Building Value at Risk	Total Contents Value at Risk
CABELL	151	\$512,840,026	\$67,887,249
GREENBRIER	1	\$60,000	\$20,000
MARION	1	\$12,000	\$15,000
MASON	22	\$8,283,410	\$1,519,000
MCDOWELL	2	\$350,000	\$25,000
MINGO	60	\$60,335,598	\$6,667,123
PUTNAM	2	\$162,660	\$20,000
UNKNOWN	1	\$25,000	\$6,000
WAYNE	42	\$36,351,844	\$6,491,660
WOOD	28	\$11,163,897	\$2,110,680
<b>Total</b>	<b>310</b>	<b>\$629,584,435</b>	<b>\$84,761,712</b>

TABLE 3-89. CRITICAL FACILITIES AT RISK TO DAM FAILURE OF THE BLUESTONE DAM.

County	Law Enforcement	Fire Station	Hospital	School K-12	EOC
Cabell	1	1		1	
Fayette	6	3	1	4	
Kanawha	32	31	8	51	2
Mason	6	2		1	
Putnam	7	6		11	1
Summers	1	2		1	

TABLE 3-90. CRITICAL FACILITIES AT RISK TO LEVEE FAILURE (BASED ON NLD).

County	Law Enforcement	Fire Station	Hospital	School K-12	EOC
Cabell	2	4	2	12	1
Mason	3	1			
Mingo	4	2		4	1
Wayne	2	3		7	
Wood	4	1	1		

## 3.17 HAZARDOUS MATERIALS

### 3.17.1 DESCRIPTION

Hazardous materials (Hazmat) are a concern for West Virginia because of the potential for a spontaneous accidental or intentional illegal release that could endanger human health and safety, property and the environment. Hazmat includes explosives, flammable and combustible substances, poisons and radioactive materials.

Hazmat incidents can include highway transport, rail transport, fixed facilities, pipelines, radioactive materials, cryogenic tanks, chemical and biological terrorism,



and illegal or clandestine drug laboratories. Each type of hazardous materials incident can cause death, serious injury, and long-lasting health effects, along with damage to buildings, homes, and other property.

**Highway Transport.** Accidents on highways involving trucks carrying hazardous materials are perhaps the most common cause of Hazmat incidents. Many of these incidents occur in heavily populated areas and may involve large quantities of Hazmat.

**Rail Transport.** Hazmat incidents involving trains are often complicated by the large amounts and numbers of materials found on a single train. These materials may chemically interact if they come in contact with one another. This creates a major risk of personal injury or property damage, further compounding the problem. Train incidents also may occur in relatively remote areas, which may limit the availability of personnel, equipment, and water.

**Fixed Facilities.** Fixed facilities include both open facilities such as bulk liquid terminals and open processing areas, and closed facilities such as manufacturing or processing plants, laboratories, warehouses, and retail establishments. In general, the quantity of material in fixed facility incidents has the potential to be very large, particularly if there are large storage containers on site. There are also likely to be several hazardous materials at specific sites.

**Pipelines.** Pipelines carry many hazardous materials. If a pipeline breaks, very large quantities of materials can be released over a short period of time. Depending upon the material, this means that the cloud, fire, or release could be very large and will continue to grow until the flow stops.

**Radioactive Materials.** There are many radioactive materials in commerce, usually in small quantities. Larger quantities may be encountered at fixed facilities. All containers, including packages, vehicles, and rail cars, containing radioactive material are required to carry a warning label or placard.

**Cryogenic Gases.** Cryogenic gases are gases shipped and stored refrigerated and under pressure. When cooled to very low temperatures (less than -150° F) and/or placed under pressure, these gases become liquids that take up less space for storage and shipment. Several of these gases are extremely flammable (hydrogen and liquid natural gas) or toxic (chlorine) and pose a significant risk to those near the release; small amounts of gas can produce large amounts of vapor.

### 3.17.2 HISTORIC OCCURRENCE

There have not been any Presidential Disaster, Federal Emergency, or State Disaster declarations for this hazard in West Virginia. The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration data indicates that there



were seven hazardous materials incidents in West Virginia that caused one or more fatalities (Table 3-91).<sup>68</sup> Rollover accidents and vehicular crashes are the dominant cause of hazardous materials release in West Virginia, resulting in over \$1.2 million in damages and 12 deaths.

TABLE 3-91. WEST VIRGINIA HAZARDOUS MATERIALS INCIDENTS. SOURCE: U.S. DEPARTMENT OF TRANSPORTATION PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION, 2013

Date	Location	Incident Route	Mode	Fatalities	Damages	Hazardous Class	Quantity Released (LGA)
4/4/1977	CHELYAN	Not Recorded	Highway	1	-	FLAMMABLE - COMBUSTIBLE LIQUID	9,000
9/12/1980	BAYARD	Not Recorded	Highway	1	-	COMBUSTIBLE LIQUID	6,000
5/11/1993	WEST HAMLIN	DAIRY RD	Highway	3	\$279,416	FLAMMABLE - COMBUSTIBLE LIQUID	8,500
10/23/1998	SALEM	50 WEST BOUND	Highway	2	\$659,000	FLAMMABLE - COMBUSTIBLE LIQUID	6,000
8/9/2004	GLENVILLE	BULL FORK ROAD	Highway	1	\$278,395	FLAMMABLE - COMBUSTIBLE LIQUID	1,970
9/3/2006	MIDDLEBOURNE	WV Rt. 180	Highway	2	\$37,703	FLAMMABLE - COMBUSTIBLE LIQUID	7,000
9/3/2006	MIDDLEBOURNE	WV Rt. 180	Highway	2	\$37,703	FLAMMABLE - COMBUSTIBLE LIQUID	1,001

### 3.17.3 RISK ASSESSMENT

On October 17, 1986, in response to concerns for safety around chemical facilities, Congress enacted the Emergency Planning and Community Right to Know Act (EPCRA), also known as Title III of the Superfund Amendments and Reauthorization Act (SARA). This provides specific plans for preparing for, preventing, and responding to the release of over 600 chemicals listed in the Toxics Release Inventory (TRI)<sup>69</sup>. The Act has had a far-reaching influence on issues relating to hazardous materials. EPCRA contains five sections, which cover issues associated with the manufacture, use, exposure, transportation and public education of hazardous materials. It is the

<sup>68</sup> US Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA). Retrieved from <http://phmsa.dot.gov/hazmat/library/data-stats/incidents> 4/23/2013

<sup>69</sup> <http://www.fema.gov/government/grant/sara.shtm>



mission of the West Virginia State Emergency Response Commission (WVSERC) and Local Emergency Planning Committees (LEPCs) to implement EPCRA and to mitigate the effects of a release or spill of hazardous materials.

## PROBABILITY

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The probability of a hazardous materials release cannot be predicted. Based on historic occurrence, Hazmat events that result in significant injury or death have taken place in West Virginia at a frequency of once every 5 years.

## IMPACT AND VULNERABILITY

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Many communities in West Virginia, both urbanized and rural, are vulnerable to the potential impacts of the release of hazardous materials. Such releases may come from accidents or releases from both fixed sources, such as a chemical plants and manufacturing or storage facilities, or from transportation sources, such as trucks, trains, boats/barges, or pipelines. West Virginia has a large transportation network consisting of major highways, airports, and railroads. With the configuration of several major highways in West Virginia, such as Interstates 64, 68, 70, 77, 79, and 81 as well as the West Virginia Turnpike, it is important to note that a major transportation accident could occur in a relatively rural area, severely stressing the capabilities of local resources to respond effectively. In addition, there is also a possibility that terrorists could select a hazardous materials site in West Virginia as a target, with the intention of criminally releasing the hazardous materials into the environment.

Legal and illegal disposal of hazardous materials is another possible source of vulnerability for West Virginia's communities. There are 98 superfund sites located within the State that are sufficiently contaminated with hazardous materials to be designated "Superfund" sites with remediation under the supervision of the U.S. Environmental Protection Agency (USEPA). Nine of the sites are located within Kanawha County, six within Putnam County, and five in Fayette and Ohio counties.

National Priorities List (NPL) is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation. The site's NPL "status" can provide more information about the site in relationship to the NPL. Of the 98 facilities:

1. Eighty-seven (87) are "Non": Superfund site not part of the NPL site list.
2. Nine are "Final": Site determined to pose a real or potential threat to human health and the environment after completion of Hazard Ranking System (HRS) screening and public solicitation of comments about the proposed site



3. Two have been “Deleted”: Site deleted from the NPL by the EPA (with state concurrence) because site cleanup goals have been met and no further response is necessary at the site.

## RISK

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The hazardous materials hazard was removed from the hazards ranking and a detailed analysis not provided for several reasons. Principally, hazardous materials are addressed thoroughly in the State EOP, which can be viewed at [http://www.wvdhsem.gov/wveop\\_1.htm](http://www.wvdhsem.gov/wveop_1.htm). Additionally, hazard mitigation stakeholders have not prioritized developing strategies to mitigate for this hazard.

Annex O of the West Virginia EOP has been prepared to provide guidance during a hazardous materials incident and protection of the citizens and environment of the state. The complete plan is available on the WVDHSEM website.

Several applicable scenarios regarding transportation accidents and hazardous materials releases have been detailed in the State THIRA and should be referenced for State capabilities.

The LEPC prepares hazardous materials emergency plans, which indicate facilities that use, produce, or store hazardous substances present in the jurisdiction. The LEPC serves as the repository for filing under Title III of the EPCRA of 1986. The LEPC directs Title III implementation activities and performs associated outreach functions to increase awareness and understanding of, and compliance with the Title III program. The Hazardous Materials Emergency Preparedness (HMEP) grant program is designed to provide financial and technical assistance to enhance State, Territorial, Tribal, and local hazardous materials emergency planning and training. The HMEP Grant Program distributes fees collected from shippers and carriers of hazardous materials to emergency responders for Hazmat training and to LEPCs for Hazmat planning.

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## 3.18 NUCLEAR ACCIDENTS

### 3.18.1 DESCRIPTION

The Nuclear Regulatory Commission (NRC) emphasizes the integration of safety, security, and emergency preparedness as the basis for the NRC's primary mission of protecting public health and safety. Under the National Response Framework, the NRC will coordinate with other Federal, State, and local emergency organizations in



response to various types of domestic events<sup>70</sup>. Radioactive materials, if handled improperly, or radiation accidentally released into the environment, can be dangerous because of the harmful effects of certain types of radiation to the body. The longer a person is exposed to radiation and the closer the person is to the radiation, the greater the risk. Protection in a nuclear emergency comes from distance (the more distance from the radiation the better), shielding (protection using heavy materials that absorb radiation), and time (radiation loses its intensity rapidly). While radiation cannot be distinguished by the human senses (sight, smell, etc.), sophisticated instruments are able to detect even the smallest levels of radiation.

If a release of harmful radiation producing materials occurs, authorities from Federal and State governments and the responsible utility will monitor the levels of radioactivity to determine the potential danger to the public. FEMA has established the Radiological Emergency Preparedness (REP) Program to ensure the public health and safety of citizens would be adequately protected in the event of radiological emergencies outside of nuclear facilities; it covers possible threats to West Virginia.

### 3.18.2 HISTORIC OCCURRENCE

There have not been any Presidential Disaster or Federal Emergency declarations, nor is there a history of any State disasters or other major incidents, for nuclear accidents in West Virginia.

### 3.18.3 RISK ASSESSMENT

The potential danger from an accident at a nuclear power plant is exposure to radiation. This exposure could come from the release of radioactive material from the plant into the environment, usually characterized by a plume (cloud-like) formation. The size of the area affected is determined by the amount of radioactive material released from the plant, wind direction and speed, and weather conditions (i.e., rain, snow, etc.), which would quickly drive the radioactive material to the ground causing increased deposition of radionuclides. Contamination could affect areas up to 50 miles from the accident site.

## PROBABILITY

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Although construction and operation of nuclear power plants are closely monitored and regulated by the NRC, an accident, though unlikely, is possible.

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<sup>70</sup> <http://www.nrc.gov/about-nrc/emerg-preparedness.html>

## IMPACT AND VULNERABILITY

While there are no nuclear power plants in West Virginia, the state is not immune to the threat of exposure from accidents involving nuclear energy. Four bordering states have nuclear power reactors (Maryland, Ohio, Pennsylvania, and Virginia); three have non-power nuclear reactors (MD, OH, and PA); and two have nuclear fuel manufacturing facilities (KY and VA) (US NRC, 2003 and US NRC, 2002). Only one of these facilities is within 50 miles of West Virginia's border: the Beaver Valley Nuclear plant in Pennsylvania. This plant is within 10 miles of Hancock County and within 50 miles of Brooke, Ohio, and Marshall Counties (Figure 3-89).

Radiological accidents can occur wherever radioactive materials are used, stored, or transported. In addition to nuclear power plants, hospitals, universities, research laboratories, industries, major highways, railroads or shipping yards could be the site of a radiological accident. In West Virginia, there are no nuclear power reactors, no non-power nuclear reactors, no nuclear fuel manufacturing facilities, and no storage facilities for nuclear waste. However, as discussed in the preceding section on Hazardous Materials, West Virginia has a large transportation network consisting of major highways, airports, waterways, and railroads. Consequently, there is risk to many in the State from a major transportation accident involving nuclear material.

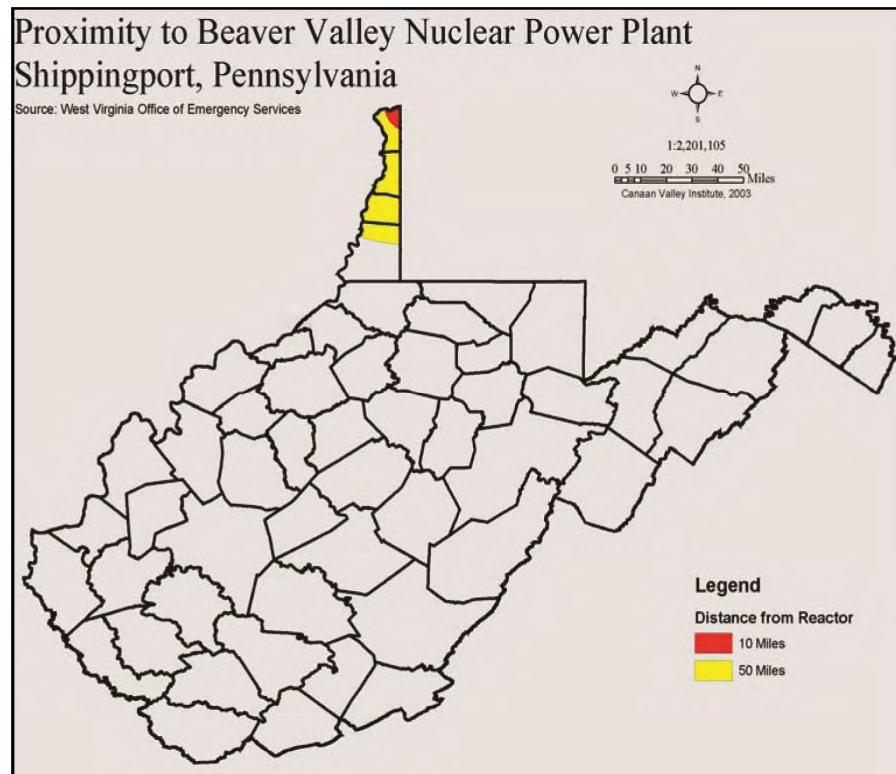


FIGURE 3-89. MAP OF PROXIMITY TO BEAVER VALLEY NUCLEAR POWER PLANT



## RISK

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The nuclear accidents hazard was removed from the hazards ranking and a detailed analysis not provided for several reasons. Principally, nuclear accidents are addressed thoroughly in the West Virginia EOP, which can be viewed at [http://www.wvdhsem.gov/wveop\\_1.htm](http://www.wvdhsem.gov/wveop_1.htm). Additionally, hazard mitigation stakeholders have not prioritized developing strategies to mitigate for this hazard.

Several applicable scenarios have been detailed in the West Virginia THIRA and should be referred to for State capabilities.

Additionally, the West Virginia EOP is available to guide response, such as emergency evacuations (Annex E). The State EOP is available through the WVDHSEM website. The state and four affected counties update their respective Radiological Emergency Preparedness Plans annually.

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### 3.19 COMPOSITE HAZARD RESULTS

#### 3.19.1 SUMMARY OF HIRA

Sections 3.7 through 3.18 discussed the probability, impacts, and risks for each of the natural hazards that have been determined to have a significant impact on the population and infrastructure in West Virginia. This final sub-section to the HIRA provides an overall assessment and summary of the individual hazard analyses.

GIS data for critical facilities and State facilities was used to the extent possible to determine risk for the infrastructure in West Virginia. Section 3.4 fully describes the datasets that were used to create the datasets that are referred to as critical facilities and states facilities.

#### 3.19.2 SUMMARY OF RISK ASSESSMENT

Vulnerability of State and critical facilities is discussed in each of the hazard sub-sections in the HIRA. The individual hazard sections highlight the results of the analysis completed for this plan. Refer to the tables in these sections to determine what facilities are at greater risk for each hazard type; analysis is based on GIS intersections of the facility data with the available hazard data. The data used for this analysis is available, through WVDHSEM, for localities to use to update their plans. This information is ideal for determining structural mitigation strategies.

#### 3.19.3 FACILITY RISK

The tables in each of the hazard specific hazard analysis sections can be used as a starting point for determining what types of mitigation actions would help to lower the





vulnerability of critical facilities. Table 3-92 summarizes the facility risk for hazards with known geographical hazard risk areas.

Section 3.4 describes the critical facility types and sources that were used for the vulnerability analysis in each of the hazard specific sections. Critical facilities point locations will be made available to localities through West Virginia BOR and can be used at the local level to determine if the spatial locations are correct. If acceptable, this analysis could be used to identify and recommend mitigation projects.

Similar to the critical facility analysis, State facilities were intersected with the available hazard data to determine which risk zone each building fell within. A summary of this data is available in each of the hazard sections in this report.

TABLE 3-92. FACILITY RISK FOR HAZARDS WITH KNOWN GEOGRAPHICAL HAZARD AREAS.

Hazard Type	Critical Facilities	State Facilities	State Facilities Total Exposure
Flooding (100-yr flood zone)	228	125	\$146,723,263
Landslide (USGS high incidence)	1,978	8,894	\$10,097,851,935
Wildfire (WVDOF priority counties)	653	4,137	\$5,653,439,158
Winter Weather (> 73.3" average annual snowfall)	N/A	819	\$413,237,651
Earthquake (1897 historic event scenario)	255	1,673	\$1,743,935,694
Land Subsidence (USGS karst zones)	264	1,928	\$1,908,987,918
Natural Resource Extraction (underground coal mine)	N/A	559	\$1,757,107,885
Dam Failure (Bluestone Dam Inundation)	N/A	1,292	\$2,029,373,814
Levee Failure (NLD Inundation)	N/A	310	\$714,346,147

### 3.19.4 COMPOSITE RANKING RESULTS

Section 3.6 describes the local plan ranking. As discussed, the local plan ranking compares agreeably to the new ranking that was developed for this report. Hazards that were considered low or negligible were included as textual descriptions in the major hazard sections. This includes mining, deer collisions, thunderstorm, lightning, hail, nuclear accidents, extreme heat, and extreme cold. Detailed analysis was not completed on human caused, hazardous materials and technological hazards in this section since WVDHSEM has separate plans that address these hazards in detail. Table 3-93 shows the composite ranking results of this plan.

To determine the composite hazard ranking, the total ranking values (RS value) for each of the hazards were separately averaged to determine what hazards should be considered the most significant in West Virginia. Section 3.5 describes the ranking parameters that were used for this analysis. Based on modifications to the ranking parameters, data processing, and committee feedback during the 2013 update, several changes to the composite hazard ranking were made for the statewide ranking. The 2010 plan ranking did not have a Medium category, in an effort to streamline the local



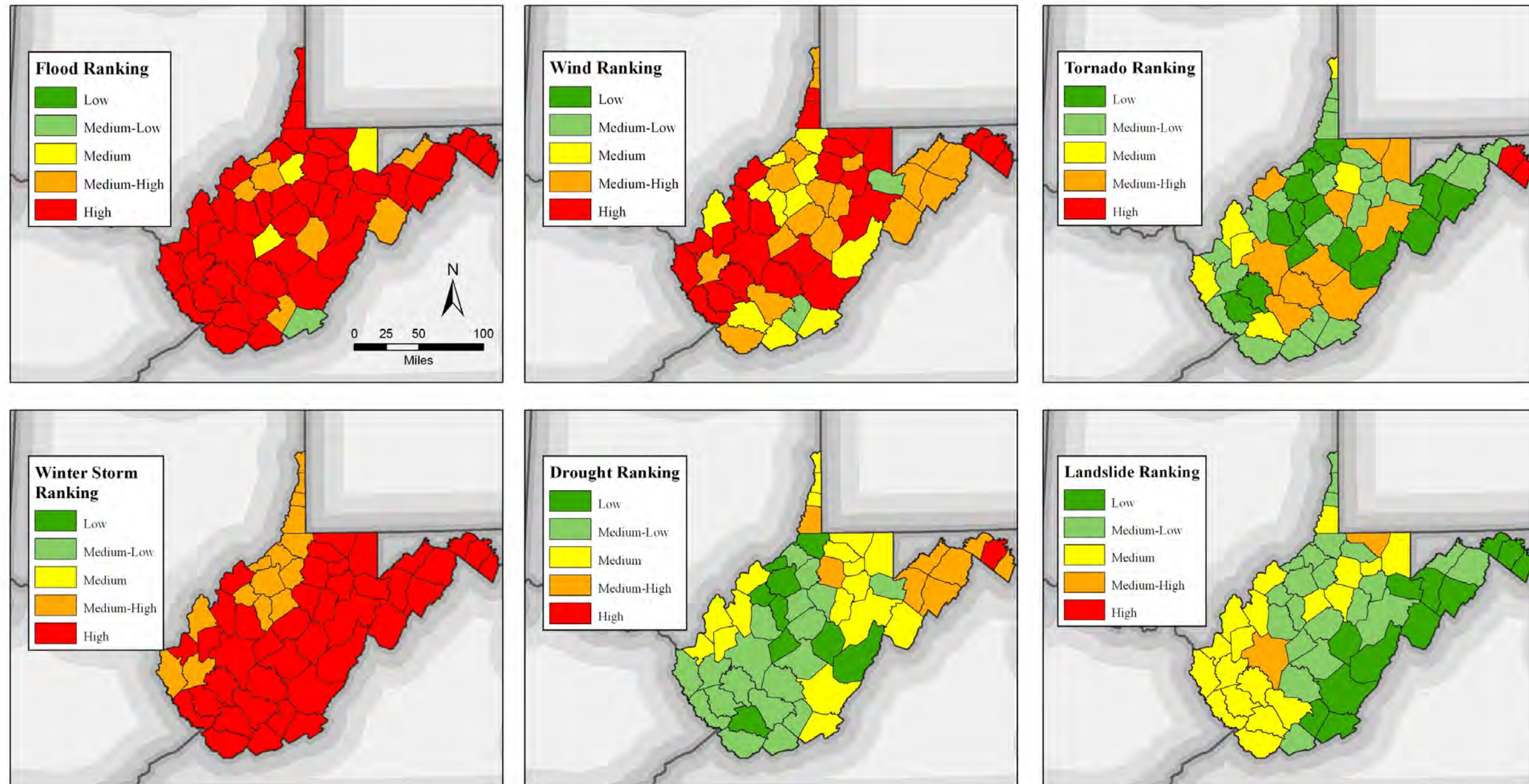
plans with the State plan this category was added for summary ranking and as a result rankings were shifted accordingly.

TABLE 3-93. COMPOSITE HAZARD RANKING BASED ON NCDC DATA

High	Medium-High	Medium	Medium-Low	Low	Assessed but Not Ranked
Flood	Wind	Wildfire	Drought	Natural Resource Extraction (Mining)	Dam & Levee Failure
Winter Weather		Tornado	Extreme Heat	Land Subsidence (Karst)	Haz-Mat
			Hail	Earthquake	Nuclear Power
			Landslide		
			Lightning		

The individual hazard sections provide information and analysis tables and maps for which counties are considered high-risk areas. Figure 3-90 and Figure 3-91 provide a summary of each of the individual hazard ranking maps. For comparison, Figure 3-92 and Figure 3-93 provide a summary of the local plan rankings.

As stated before, this analysis is only representative of the NCDC data that was used (Table 3-93). It is known that the time period of this data is small in comparison to the known historical events. The data does not fully represent geological hazards but in the absence of better data, NCDC was used to represent risk. Efforts were made to contact representatives for the geological hazards to determine if databases were available for past events. For example, WVGES has an extensive inventory of landslide quadrangle maps that have been scanned and geo-referenced but not digitized, making analysis for purposes of this plan difficult. Applicable mitigation strategies have been included for these data gaps.






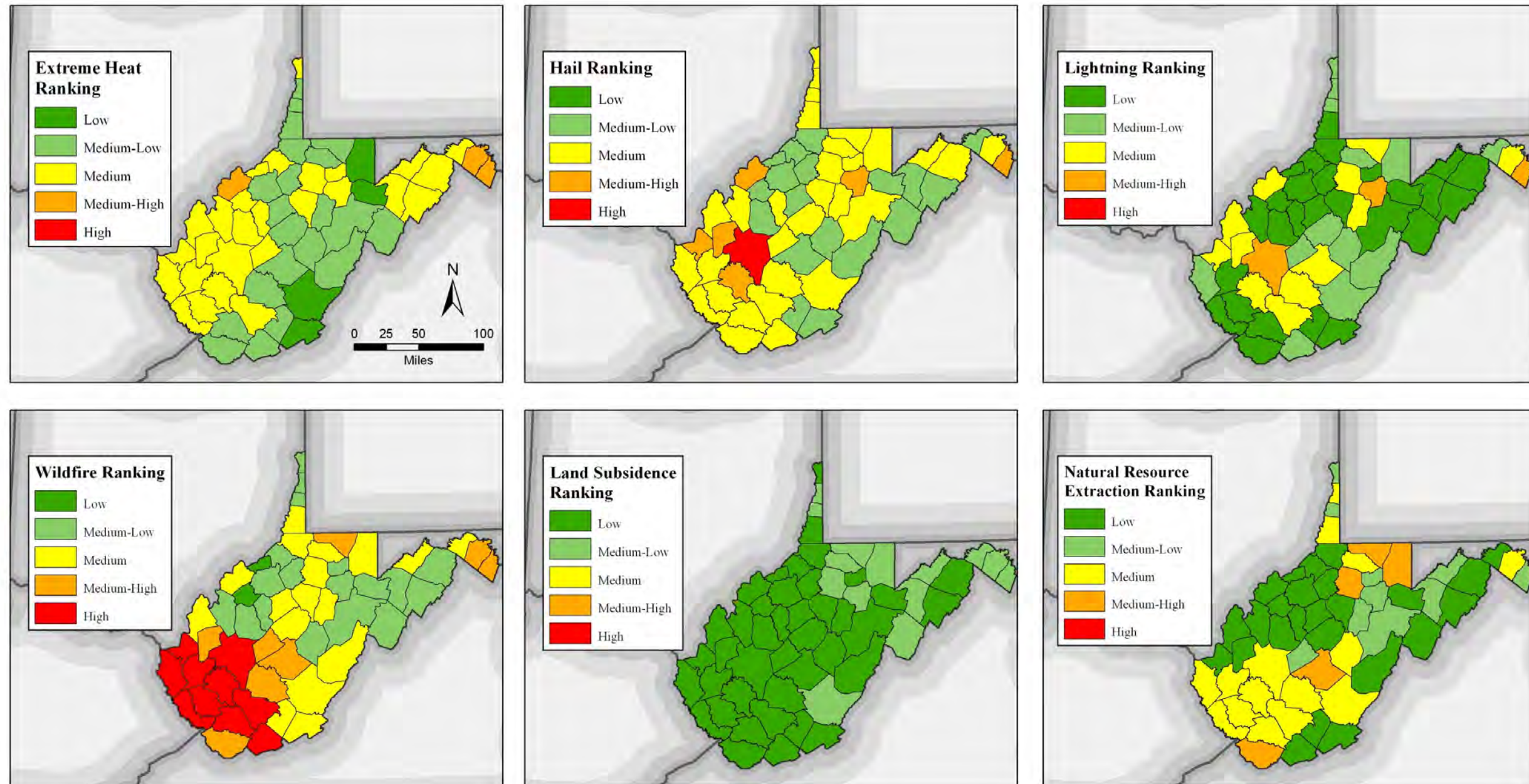
<p><b>Data Sources</b> West Virginia Approved Local Hazard Mitigation Plans County Boundaries (WCGISTC) State Boundaries (nationalatlas.gov)</p> <p><b>Projection</b> North American Datum 1983 Universal Transverse Mercator Zone 17 North</p>	<p><b>Hazard Identification &amp; Risk Assessment</b> These maps show hazard mitigation plan rankings by West Virginia county governments. Counties used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Additional information on local rankings and plans can be found in the methodology.</p>	<p><b>Hazard Ranking Risk Maps State of West Virginia</b></p>	  	<p><i>DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.</i></p> <p style="text-align: right;">State of West Virginia Hazard Mitigation Plan</p>
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FIGURE 3-90. HAZARD RANKING RISK MAPS 1






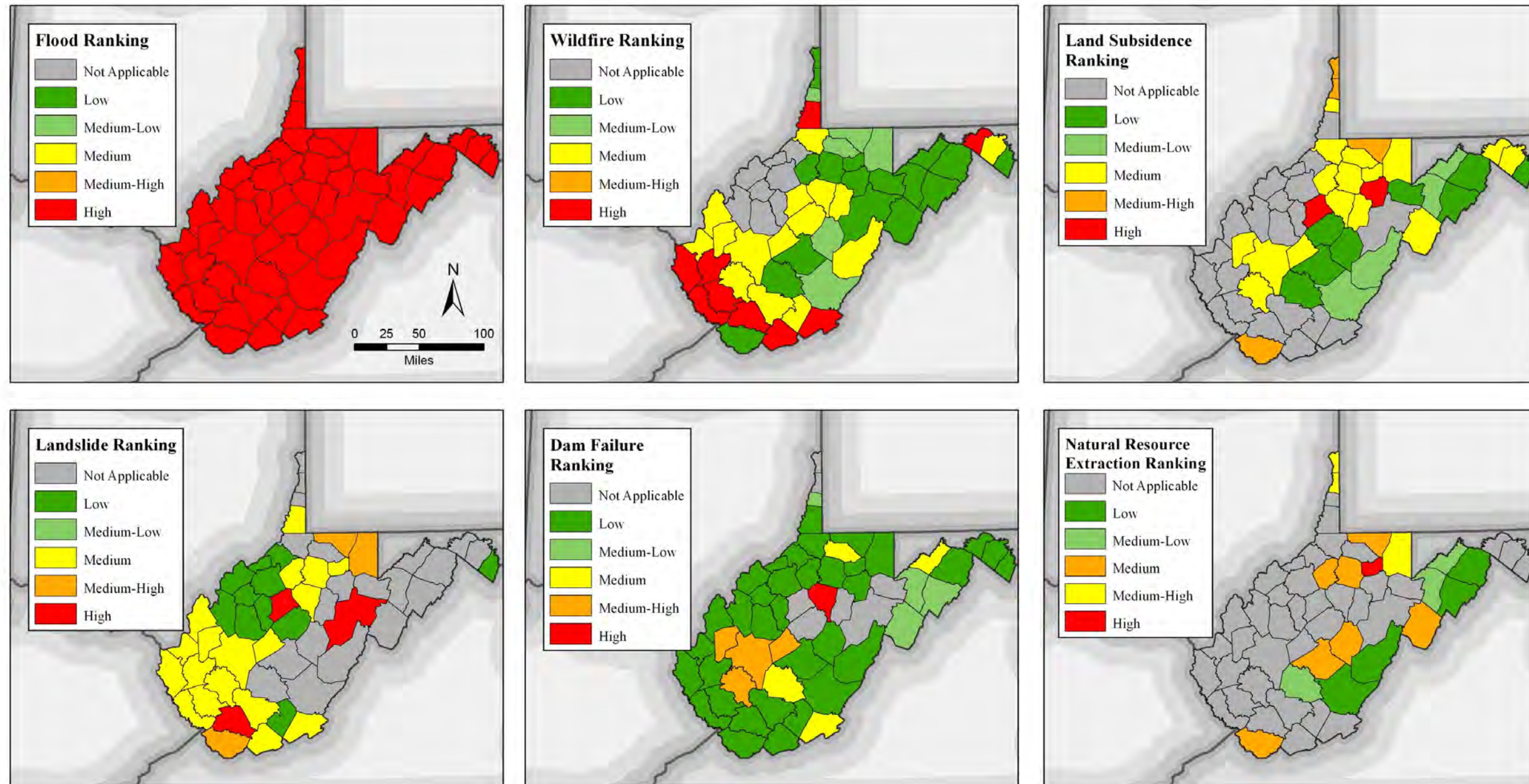
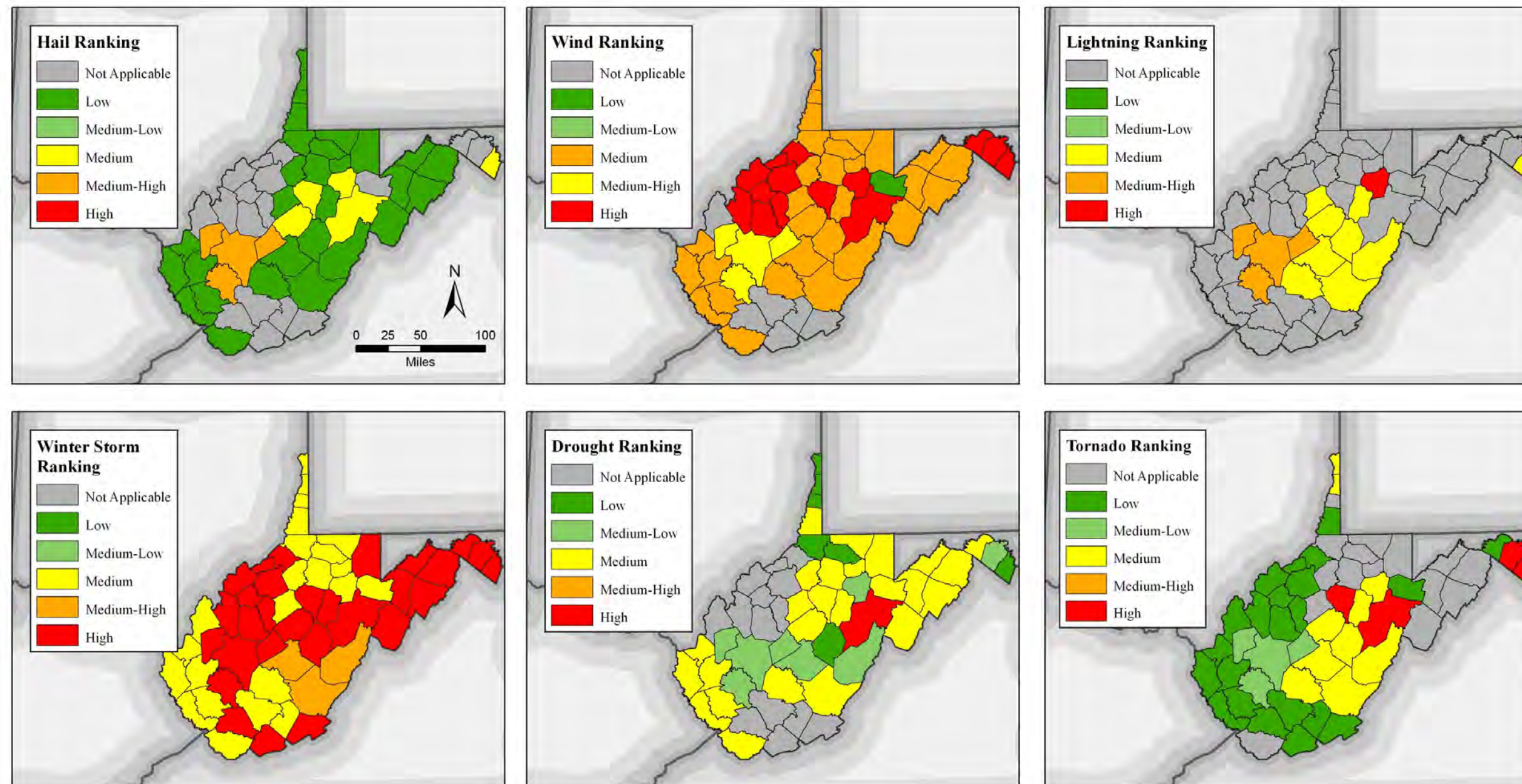
<p><b>Data Sources</b> West Virginia Approved Local Hazard Mitigation Plans County Boundaries (WCGISTC) State Boundaries (nationalatlas.gov)</p> <p><b>Projection</b> North American Datum 1983 Universal Transverse Mercator Zone 17 North</p>	<p><b>Hazard Identification &amp; Risk Assessment</b> These maps show hazard mitigation plan rankings by West Virginia county governments. Counties used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Additional information on local rankings and plans can be found in the methodology.</p>	<p><b>Hazard Ranking Risk Maps State of West Virginia</b></p>	  	<p><i>DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.</i></p> <p style="text-align: right;">State of West Virginia Hazard Mitigation Plan</p>
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FIGURE 3-91. HAZARD RANKING RISK MAPS 2



<p><b>Data Sources</b> West Virginia Approved Local Hazard Mitigation Plans County Boundaries (WCGISTC) State Boundaries (nationalatlas.gov)</p> <p><b>Projection</b> North American Datum 1983 Universal Transverse Mercator Zone 17 North</p>	<p><b>Hazard Identification &amp; Risk Assessment</b> These maps show hazard mitigation plan rankings by West Virginia county governments. Counties used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Additional information on local rankings and plans can be found in the methodology.</p>	<p>Local Plan Hazard Ranking Risk Maps State of West Virginia</p>		<p><i>DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.</i></p> <p>State of West Virginia Hazard Mitigation Plan</p>
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FIGURE 3-92. LOCAL PLAN HAZARD RANKING RISK MAPS 1



<p><b>Data Sources</b> West Virginia Approved Local Hazard Mitigation Plans County Boundaries (WCGISTC) State Boundaries (nationalatlas.gov)</p> <p><b>Projection</b> North American Datum 1983 Universal Transverse Mercator Zone 17 North</p>	<p><b>Hazard Identification &amp; Risk Assessment</b> These maps show hazard mitigation plan rankings by West Virginia county governments. Counties used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Additional information on local rankings and plans can be found in the methodology.</p>	<p>Local Plan Hazard Ranking Risk Maps State of West Virginia</p>		<p><i>DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.</i></p> <p>State of West Virginia Hazard Mitigation Plan</p>
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FIGURE 3-93. LOCAL PLAN HAZARD RANKING RISK MAPS 2



### 3.19.5 ESTIMATING POTENTIAL LOSSES

The local hazard mitigation plans were reviewed to determine if the local plan loss estimates could be summarized to create statewide loss estimates. During the review it was noted that some plans did not include complete loss estimates and others were highly variable in the methodology used to compute loss. A summary of the local plan loss estimates is provided in Section 3.6. It was decided that the variability in the local loss estimates would limit the ability to integrate them into statewide vulnerability and loss estimate. Ideally, future revisions to the local plans will include a template for loss estimation that will allow the next revision of the State plan to be a representation of all of the local plans.

Rough estimates of annualized losses can be generated based on the NCDC Storm Events database, which documents the damage costs associated with the various hazards. Supplemental annualized loss values for hurricane winds, landslides, wildfire, and earthquake have also been derived from the other sources as described in each individual hazard section. NCDC did not include any historical information about damages due to Land Subsidence (karst), and this is not included in the loss estimates. Dam Failure, Hazmat, and Nuclear Accidents were not included as part of the hazard ranking due to lack of data.

Based on information from the NCDC database, West Virginia has experienced more than \$1.4 billion in property and crop damages from the hazards profiled in this plan. The State can expect to experience approximately \$65,925,016 in annualized damages due to the multiple hazards that impact the State. As discussed in Section 3.3, this data has limitations due to the amount of historical data available. Table 3-94 also includes the annualized loss values derived from supplemental sources for high winds, earthquake, wildfire, and landslides in West Virginia. It should be noted that the HAZUS wind estimates (\$1.4 million) are for hurricanes, which are generally very rare and in a weakening phase when they occur; most significantly, they impact the southern portions of the State. NCDC wind damage (\$1.8 million) estimates combine thunderstorm wind gusts (and tropical storm created winds) that can easily be higher than hurricane force. These events can and have impacted all sections of the State.

Table 3-94 below illustrates the number of years of record for each hazard, total damages reported in 2012 dollars, and annualized loss values. Flooding and winter weather have the highest total annualized losses of the ranked hazards and together make up over 89% of the total NCDC annualized losses. Based on this analysis, flood and winter weather related mitigation strategies should be a high priority.

It should be noted that the estimates given for annualized loss are only based on the hazard categories that were determined to be significant types in West Virginia. Section 3.3 includes the NCDC categories that make up each of the established HIRA



hazard type used in this analysis. A complete listing of the NCDC categories would yield annualized loss values significantly different from what is listed in Table 3-13.

### ANNUALIZED LOSS BY JURISDICTION

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The NCDC information used to generate Table 3-94 was also used as parameters in the hazard ranking. The hazard-specific sections (3.7-3.16) include information regarding the annualized loss by county, where available. The ranking and risk parameter maps show the annualized property and crop damages as established using NCDC data. The hazards that used an established method other than sole use of NCDC loss data for calculating annualized loss (flood, hurricane winds, and earthquake) are explained in detail in those sections. Appendix O includes the ranking data for each county.

### COMPARISON WITH LOCAL RANKING

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The Local Plan Incorporation Section 3.6 shows the average ranking for the local plans and statewide analysis. Three of the hazard categories that were addressed in the local plans were not considered in the State plan; these include hazardous materials, terrorism, and biological, radiological and epidemics. The WVDHSEM has separate plans that address human-caused, radiological, and hazardous materials. Erosion, extreme heat, extreme cold, thunderstorm, lightning, hail, and tsunami have been included as textual descriptions in the major hazard sections. Of the hazards considered, the average rankings in local and State analysis are analogous.

Minor differences in the local and statewide ranking can be seen in Figure 3-90 and Figure 3-92 as well as in Table 3-20 of Section 3.6. The statewide analysis grouped the local plan categories of wind and hurricane together as severe wind since the resulting damages are the same for these hazards. Tornado, drought, and wildfire all received a local plan average ranking of Medium-Low and the statewide analysis resulted in Medium rankings. Earthquake and landslide received a local plan average ranking of Low and the statewide analysis resulted in a Medium-Low ranking. As discussed in Sections 3.1 and 3.6, detailed analysis was not completed for erosion, thunderstorm, hail, lightning, extreme heat, extreme cold, tsunami, hazmat, terrorism, and biological, radiological, and epidemic hazards.





TABLE 3-94. ANNUALIZED LOSS VALUES STATEWIDE FROM NCDC AND ADDITIONAL SOURCES

Hazard Type	NCDC Storm Events data Annualized				Supplemental Damages	
	NCDC Annualized Events	NCDC Annualized Property Damage	NCDC Annualized Crop Damage	NCDC Total Annualized Damages	Total Damages	Source
Drought	2.5	\$0	\$1,990,868	\$1,990,868		
Extreme Cold	2.0	\$415,796	\$1,540	\$417,337		
Extreme Heat	2.7	\$0	\$0	\$0		
Flooding	87.9	\$51,660,684	\$176,127	\$51,836,811	\$8,522,491 \$12,973,521	NFIP Claims (1978 – 2012) Annualized Hazus
Hail	38.1	\$589,121	\$3,112	\$592,233		
High Wind	71.3	\$1,819,475	\$20,331	\$1,839,806	\$1,468,890	Hazus
Landslide	0.6	\$23,759	\$0	\$23,759	>\$10 million	WVGES (1976)
Lightning	4.1	\$240,778	\$0	\$240,778		
Tornado	2.3	\$2,042,192	\$51,475	\$2,093,667		
Wildfire	1.6	\$3,835	\$0	\$3,835	\$13,308,015 Is this annualized?	WV DOF (1987 - 2012) \$300/acre of timber damage Annualized
Winter Weather	43.8	\$6,885,218	\$704	\$6,885,922		
Earthquake	Not Available				\$7,159,176	Hazus
Land Subsidence	Not Available					
Natural Resource Extraction	Not Available					



Local hazard mitigation plans lacked detailed information about land use and future development planning. Generalized information about land use planning has been made at the State level but really should be evaluated locally. Land use planning, completed at the local level, can reduce risk to the population and infrastructure by addressing the hazards that impact the jurisdiction. It is necessary for this to be done at the jurisdictional level since this is where planning, regulation, and taxation occur. WVDHSEM mitigation staff will be coordinating with localities to ensure that future revisions of their local plans will be standardized and can be uploaded and used in the next revision of the statewide hazard analysis.

### 3.19.6 LIMITATIONS OF DATA

It should be noted that the data sources used in this ranking/prioritization are varied in their degree of completeness, accuracy, precision, etc. The ability to accurately prioritize some of the hazards would be improved with better information about them (e.g., landslide, karst, etc.). Further discussion on the data limitations and how the data was adapted for analysis is available in Section 3.5 and in the hazard specific Sections 3.7 through 3.18.

### FUTURE REVISIONS TO HIRA

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An attempt was made to include the best available data for this revision of the hazard mitigation plan. Spatial data is constantly changing and efforts are being made to increase the accuracy of this data by many local, State and Federal agencies. As this data is made available it will be used in revisions to this plan.

### USING HIRA RESULTS IN MITIGATION STRATEGIES

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Data limitations have been fully noted throughout the HIRA section. Some of the issues can be resolved with closer coordination with Federal, State, and local institutions. Data creation and management issues will take more time and effort to resolve and incorporate into revisions of this plan. The HIRA sub-committee members are dedicated to the long-term vision of this plan and are currently working toward the next revision.



## CHAPTER 4: MITIGATION STRATEGY

### DISASTER MITIGATION ACT OF 2000

#### 44 Code of Federal Regulations

**§201.4(c)(3):** *To be effective the plan must include a) Mitigation Strategy that provides the State’s blueprint for reducing the losses identified in the risk assessment.*

**§201.4(c)(3)(i):** *The State mitigation strategy shall include a) description of State goals to guide the selection of activities to mitigate and reduce potential losses This section shall include: A description of State goals to guide the selection of activities to mitigate and reduce potential losses.”*

**§201.4(c)(3)(ii):** *A discussion of the State’s pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including: an evaluation of State laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas; a discussion of State funding capabilities for hazard mitigation projects; and a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.*

**§201.4(c)(3)(iii):** *An identification, evaluation, and prioritization of cost-effective, environmentally sound, and technically feasible mitigation actions and activities the State is considering and an explanation of how each activity contributes to the overall mitigation strategy. This section should be linked to local plans, where specific local actions and projects are identified.*

**§201.4(c)(3)(v):** *A State may request the reduced cost share authorized under §79.4(c)(2) of this chapter for the FMA and SRL programs, if it has an approved State Mitigation Plan ... that also identifies specific actions the State has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties), and specifies how the State intends to reduce the number of such repetitive loss properties. §201.4 (d): Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities and resubmitted for approval to the appropriate Regional Director every three years.*

### 4.1 PLANNING PROCESS

The West Virginia Hazard Mitigation Strategy is structured with a traditional hierarchy of goals and supporting actions. The mitigation goals outline the overall desired outcomes, while the mitigation actions details specific projects to be executed. Accomplishing the goals depends on successful implementation of supporting actions.



West Virginia's mitigation goals have transformed slightly with each plan update. The 2007 Plan Update included five mitigation goals, while for the 2010 Plan Update, the 2007 Plan goals were reviewed and consolidated into three goals. A fourth goal specific to mitigation of Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties was added after consultation with Federal Emergency Management Agency (FEMA) Region III staff.

The 2013 Mitigation Strategy reflects changes in conditions, funding levels, available resources, and occurrence of hazards since the previous plan update. At the Hazard Mitigation Council (HMC) meeting on March 22, 2013, the Council reviewed the draft Hazard Identification and Risk Assessment (HIRA), other relevant material, and the 2010 West Virginia mitigation goals and strategies. Review of this base information allowed the HMC to revise the plan goals. They were then divided into smaller subcommittees to address mitigation strategies by topic area.

The plan contains 80 mitigation strategies. Each directly supports one of the plan goals. These include strategies that were brought forward from the 2010 Plan along with new strategies. They were developed within subcommittees centered on topic areas. Those topic areas include:

- Education and Outreach
- Mitigation of High Hazard Structures
- Planning, Policy, and Funding
- Risk Assessment

The Education and Outreach subcommittee addressed informing the public and community leaders about hazards facing West Virginia and the necessity of mitigation. Mitigation of High Hazard Structures addressed the need for physical retrofits to buildings, and updates to the West Virginia Statewide Building Code. Planning, Policy, and Funding addressed integration of mitigation principles into legislation, development, and planning efforts. Risk Assessment addressed means for improving available data for evaluating and ranking hazards.

After the meeting, the draft actions were reviewed and finalized. First, actions were organized by plan goal. A conference call and Webex were then held to finalize language and complete any remaining details. The final 2013 mitigation strategies are included at the end of this chapter and are also documented in Appendix H.

Also included in Appendix H is a status update on the 2010 mitigation actions. During the 2013 update, each agency was asked to update the status of their assigned 2010 strategies. Further, the 2010 strategies were again reviewed in detail by DHSEM staff



and members of each of the represented agencies at the March 22 meeting to ensure accuracy and to determine inclusion in the 2013 Plan.

DHSEM uses a spreadsheet to track state obligated FEMA Unified Hazard Mitigation Assistance (HMA) Grant projects. This tracking tool has been in use prior to the 2010 Plan, and it will continue to be used. A screen capture of this tool can be found in Figure 4-1.

**Budget Summary**  
**FundTrac III**  
Use Entry in WHITE Areas ONLY

Federal Designation (DR#) FEM-1881-DR-WV

Period of Availability End Date

	Total Obligated					Total Unobligated
	TOTAL Awarded	Unspent	Spent	Total		
Total Award (SF 424)	\$ 681,405.00	\$ 114,804.97	\$ 267,516.03	\$ 382,323.00	\$ 299,082.00	
Federal Contribution	\$ 511,054.00	\$ 86,104.43	\$ 200,639.52	\$ 296,743.00	\$ 224,311.00	
State Contribution	\$ 170,351.00	\$ 28,700.49	\$ 66,876.51	\$ 95,598.00	\$ 74,771.00	
Amount Paid to Grantee	\$ -	\$ -	\$ -	\$ -	\$ -	
Amount Paid to Sub Grantee	\$ -	\$ -	\$ -	\$ -	\$ -	
(7%) Seven-percent monies	\$ 47,698.35					
(5%) Five-percent monies	\$ 34,070.25					

Grantee	Project Number	FPS Number	Total Award	Federal Contribution	State Contribution	Grantee	Sub Grantee
McDowell County	0001	054-58926	\$ 72,858.00	\$ 54,494.00	\$ 18,164.00	\$ -	\$ -
Total Dis Obligations			\$ -	\$ -	\$ -	\$ -	\$ -
McDowell County (Final)			\$ 72,858.00	\$ 54,494.00	\$ 18,164.00	\$ -	\$ -
Martin County	0002	054-80040	\$ 286,125.00	\$ 216,094.00	\$ 72,051.00	\$ -	\$ -
Total Dis Obligations			\$ -	\$ -	\$ -	\$ -	\$ -
Martin County (Open)			\$ 286,125.00	\$ 216,094.00	\$ 72,051.00	\$ -	\$ -
IFLWS 5%	0003	054-00000	\$ 21,540.00	\$ 16,155.00	\$ 5,385.00	\$ -	\$ -
Total Dis Obligations			\$ -	\$ -	\$ -	\$ -	\$ -
IFLWS 5% (Final)			\$ 21,540.00	\$ 16,155.00	\$ 5,385.00	\$ -	\$ -

FIGURE 4-1. WEST VIRGINIA UNIFIED HMA GRANT TRACKING WORKBOOK SCREEN CAPTURE

Status of local hazard mitigation plans (HMPs) can be found in the local HMP upload in Appendix G. This document was used to capture information from the local plans for integration into the 2013 Plan Update. It details hazard rankings, capabilities, mitigation strategies, etc. The local hazard rankings were used as one of the ranking factors for the State HIRA, while the other mitigation related capabilities and mitigation strategies were used to inform Chapter 5. Several summary screen captures of this data may be found in the local vulnerability analysis in Chapter 3 and Chapter 5. The tool has also been provided to DHSEM and FEMA Region III in digital format with submittal of the draft plan update as Appendix G. This tool will also be used for local plan tracking as plans are updated and local mitigation actions are implemented. A screenshot of the tool is shown as Figure 4-2.



FIGURE 4-2. LOCAL PLAN MITIGATION ACTIONS SUMMARY TRACKER TOOL SCREEN SHOT.

#### 4.1.1 GOALS, OBJECTIVES, AND ACTIONS

Goals, objectives, and actions are interrelated. For this project Table 4-1 defines the previously mentioned term used for this update.

TABLE 4-1. DEFINITION OF TERMS

TERM	DEFINITION
Goals	A purpose statement describing a vision for achievement
Objectives	Specific and measurable strategies necessary to achieve identified goals
Actions	More specific than an objective with identified responsible parties, timeframes, and potential funding sources

#### GOALS:

During the 2013 Update, plan goals were reviewed and revised slightly to improve clarity and reduce potential confusion. Table 4-2 illustrates the goals from 2007, 2010, and 2013. The first 2013 goal is entirely new. It expands upon the previous 2010 goal to “protect life and property,” now Goal 2. This expresses mitigation’s role in reducing the impacts of a disaster on a community, thus helping the State more likely to recover fairly quickly after an event.

The third 2013 goal, “improve understanding of risk and vulnerability for planning purposes,” was refined to provide more focused wording to more clearly identify its intended purpose.

The fourth 2013 goal is the same as the third 2010 goal.



The fifth 2013 goal is more sensitive to the communities in which flood mitigation actions occurs, in contrast to the fourth 2010 goal. In addition, the previously referenced RL and SRL programs have been moved into specific mitigation strategies within this goal. The reorganization is intended to broaden the concept of strategic resource management, while still focusing on implementation of meaningful mitigation projects through the RL and SRL programs.

TABLE 4-2. COMPARISON OF 2007, 2010 AND 2013 GOALS

	2007 GOALS	2010 GOALS	2013 GOALS
1	Promote projects, programs, and legislative action to minimize losses due to hazards.	Protect life and property	Improve Statewide Resilience
2	Enhance state’s ability to respond to disasters.	Improve understanding of risk and vulnerability	Protect life and property
3	Improve state’s ability to identify and evaluate risk from hazards.	Bolster public understanding and preparedness	Improve understanding of risk and vulnerability for planning purposes
4	Increase public understanding, support, and demand for hazard mitigation.	Maximize State mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts on Severe Repetitive and Repetitive Loss properties	Bolster public understanding and preparedness
5	Improve coordination and communication with other relevant organizations and agencies	N/A	Maximize State mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts while considering local priorities

#### 4.1.2 ACTION PRIORITIZATION

The actions were developed within the context of the statewide vulnerability assessment at the HMC meeting held on March 22, 2013. This discussion followed presentation of the draft HIRA and vulnerability analysis that gave participants an overview of State hazard vulnerability. The participants were divided into four topic-based subcommittees supported by consultant facilitators.

Mitigation actions were evaluated using the STAPLEE criterion suggested in FEMA’s Hazard Mitigation Planning How-to-Guide Series. The STAPLEE criterion addresses feasibility, cost-effectiveness, and environmental considerations, among other factors. This process varied somewhat from the 2010 Plan Update, where each action was scored based on each criterion. For the 2013 Plan Update, the HMC reviewed the STAPLEE criterion during the strategies development meeting and considered the potential impacts of the proposed action on the identified criteria. Each project, strategy, or action was then ranked as critical, high, medium, or low, based on this qualitative assessment.



ABLE 4-3. STAPLEE REVIEW AND SELECTION CRITERIA FROM FEMA

ACTIONS	SELECTION CRITERIA
<i>Social</i>	<ul style="list-style-type: none"> <li>Is the proposed action socially acceptable to residents of the State and surrounding community?</li> <li>Are there equity issues involved that would mean that one segment of the community are treated unfairly?</li> </ul>
<i>Technical</i>	<ul style="list-style-type: none"> <li>Will the proposed action work? Is it technically feasible</li> <li>Does it provide a long-term solution to the identified issue?</li> <li>Does the proposed action create secondary impacts or residual risk that is unacceptable?</li> </ul>
<i>Administrative</i>	<ul style="list-style-type: none"> <li>Is there someone to coordinate and lead the effort?</li> <li>Is there sufficient funding available?</li> <li>Can the project be sustained? Are there ongoing administrative requirements that need to be met?</li> </ul>
<i>Political</i>	<ul style="list-style-type: none"> <li>Is the action politically acceptable?</li> <li>Is there public support both to implement and to maintain the project?</li> </ul>
<i>Legal</i>	<ul style="list-style-type: none"> <li>Is the State authorized to implement the proposed action?</li> <li>Are there legal side effects? Could the activity be construed as a taking?</li> <li>Will the State be liable for action or lack of action?</li> <li>Will the activity be challenged?</li> </ul>
<i>Economic</i>	<ul style="list-style-type: none"> <li>What are the costs and benefits of this action? Do the benefits exceed the costs?</li> <li>Has funding been secured for the proposed action? If not, what are the potential funding sources (public, nonprofit, and private)?</li> <li>How will this action affect the fiscal capability of the State?</li> <li>What burden will this action place on the tax base or local economy?</li> </ul>
<i>Environmental</i>	<ul style="list-style-type: none"> <li>Will the action need environmental regulatory approvals?</li> <li>Are endangered or threatened species likely to be affected?</li> <li>Is the action consistent with Federal laws?</li> <li>Is it consistent with state environmental goals?</li> </ul>

## 4.2 MITIGATION ACTION PLAN

After the actions and objectives were defined by the HMC subcommittees, mitigation action plans were developed. All 2013 actions were identified by the HMC and include:

- ID number;
- A general description of the mitigation action;
- The hazard it is designed to mitigate (the primary hazard is denoted in bold);
- The goal it supports;
- Potential funding sources, if applicable;
- The agency assigned responsibility for carrying out the strategy (the support agency is denoted in italics);
- A target completion date;
- Interim measure of success; and
- Priority.





#### 4.2.1 ACTION IDS AND NUMBERING SCHEME

All mitigation actions include a unique ID number. ID numbers use consistent numbering systems based on the year that the action was developed and a sequential value. 2010 actions did not include ID numbers. Therefore, they were assigned sequential values for this plan update. All of the 2010 mitigation actions are included in Appendix H and provide an update on the actions taken toward their fulfillment. Many of these were brought forward into the 2013 Plan because they still remain applicable or have yet to be realized. Actions brought forward from the 2010 Plan utilize the same sequential value that they were assigned in Appendix H.

For example, the first mitigation action listed in Table 4-4 is an action brought forward from the 2010 Plan. The ID for this action is 2010-9 because that is the number that it was assigned in Appendix H. New actions developed for the 2013 Plan Update follow the numbering format 2013-x.

For the 2013 Plan Update, the actions were sorted according to their relevant goals. Each goal contains both 2010 and 2013 actions. New actions begin directly following the 2010 actions that were brought forward. Because the 2010 actions were not sorted according to relevant goals, they do not follow a sequential format. For example, the first action in Goal 1 is 2010-9, while the first action in Goal 2 is 2010-7. The new 2013 actions are numbered sequentially beginning at 2013-1 in Goal 1, and ending at 2013-30 in Goal 5.



TABLE 4-4. MITIGATION ACTION PLAN – PLANNING, POLICY AND PROGRAMS

ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Comple- tion Date	Hazard Mitigated
<b>Goal 1: Improve statewide resilience</b>							
2010-9	Work with Governor and Legislature to promulgate and issue an Executive Order and resolution respectively that direct State agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood- plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. (Similar to Federal Executive Order 11988.).	H	DHSEM, Floodplain Management Section	Agency budget	By June 2014, a legislative champion has been secured.	2016	Flood
2010-11	Distribute model Community Rating System (CRS) application that would capture points available on a statewide basis. Distribute tip sheet to assist communities with the application process.	Critical	DHSEM, Floodplain Management Section	Agency budget	By December 2013, distribute model application and tip sheet.	Ongoing	Flood
2010-12	Continue to rank communities that may achieve most benefit from CRS participation and target technical assistance to those communities.	Critical	DHSEM, Floodplain Management Section	Agency budget	Conduct annual re-ranking of communities and provide assistance to top 10%.	Ongoing	Flood
2010-17	Promote adoption and enforcement of State Building Code in communities throughout the State.	H	WV Office of the State Fire Marshal	Agency budget	By July 2014, the new State Building Code has been adopted by 50% of the local jurisdictions in the State.	Ongoing	Hurricane/Wind, Thunderstorm, Winterstorm, Flood, Tornado, Earthquake, Fire
2010-18	Work with the Fire Marshal to continue providing technical assistance to communities interested in adopting or improving enforcement of building codes.	H	DHSEM, WV State Fire Marshal's Office	Agency budget	Assistance has been offered to 33% of targeted communities by March 2014.	2015	Fire
2010-20	Ensure facility assessment checklist is part of Continuity of Operations Plan (COOP)/Hazard Vulnerability Assessment. Coordinate this action with DHSEM COOP planner.	M	DHSEM	Agency budget	By March 2014, a standard checklist has been completed by all State agencies.	2015	All, except Dam & Levee



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
2010-23	Research tax incentive structure that would encourage private sector investment in mitigation.	L	WV Department of Revenue, DHSEM	Agency budget	Initial research on best practices and statutory authorities has been completed by December 2013.	2016	All, except Dam & Levee
2010-58	Use State facilities vulnerability analysis (potential annualized losses) to prioritize State-owned facilities for mitigation project scoping.	H	DHSEM, Board of Risk and Insurance Management (BRIM)	Agency Budget	Acquire facilities vulnerability analysis from BRIM and establish project timeline	2015	All, except Dam & Levee
2010-62	Promote International Building Code (IBC) standards for all new critical facility substantial improvements, substantial damage repair, and new construction.	H	DHSEM, WV State Office of the State Fire Marshall	Agency Budget	Identify target communities	Ongoing	All, except Dam & Levee
2010-69	Seek stronger critical facilities, redundant systems, and protection measures in the Uniform Statewide Building Code.	H	DHSEM, WV State Fire Marshall's Office, legislative advocate	Agency Budget	Specify components requiring additional protection	2016	All, except Dam & Levee
2013-1	Continue to build relationships with private utilities and owners of critical facilities.	H	WV Intelligence Fusion Center	Agency Budget; DHS funding	Identify entities with which to establish relationships	Ongoing	All, except Dam & Levee
2013-2	Collaborate with local communities to utilize State hazard categories and risk assessment methodologies in order to facilitate State review and roll-up.	H	DHSEM	Staff time	Plans submitted one year after distribution of the plan standards use the new plan format.	2015	All, except Terrorism, Dam & Levee
2013-3	Define role of Regional Planning and Development Councils (PDCs) in providing technical assistance to local communities interested in joining the CRS program.	M	DHSEM	Agency budget	By March 2014, create a working group to discuss role of RPDCs in CRS technical assistance.	2014	Flood
2013-4	Determine if a portion of the money that the State receives from flood insurance fees can be used to fund local/regional hazard mitigation planning as it relates to flooding.	H	DHSEM	Agency budget	An opinion has been offered by State Attorney General by September 2013.	2015	Flood



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
<b>Goal 2: Protect life and property</b>							
2010-7	Provide financial and technical assistance for development of Community Wildfire Protection Plans.	M	WV Division of Forestry	FEMA Grant Program; U.S. Dept of Agriculture (USDA) Grant Programs; Bureau of Land Mgmt (BLM) Grant Programs	Obtain funding for one new plan by December 2013.	Ongoing	Fire
2010-8	Conduct an outreach campaign to encourage communities to join FIREWISE program.	M	WV Division of Forestry	Agency budget; USDA grants	Conduct three outreach events per year.	Ongoing	Fire
2010-16	Create advisory flood heights for all approximately detailed study A zones in the State (currently around 8,000 stream miles).	H	DHSEM, Floodplain Management Section	FEMA Risk MAP; FEMA post-disaster funding	Project schedule is on track with no changes.	2016	Flood
2010-32	Pass policy/legislation to make it a requirement for real estate agents/agencies to disclose if a property is in the floodplain (eventually all hazards).	M	Legislature	Agency budget	Draft potential bill for submittal to legislature	2016	Flood
2010-65	Explore remediation designs for coal dam impoundment structures to minimize inundation zone risks.	M	DHSEM, WV Conservation Agency (WVCA), USDA Natural Resources Conservation Service (NRCS), WV Office of Mine Reclamation and Dept. of Environmental Protection (DEP)	Agency budget	Project schedule is on-track with no changes.	2016	Flood
2010-66	Use 2013 State critical facilities risk assessment to target key State critical facilities vulnerable to loss of function due to utility outages, develop strategy for remediation.	H	DHSEM, BRIM	Agency budget	Develop list of key State critical facilities	2015	All, except Drought, Natural Resource Extraction, Hazardous Materials Release, Dan & Levee



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
2010-67	Use 2013 State critical facilities risk assessment to target key local critical facilities vulnerable to loss of function due to utility outages, provide local governments their data sets and mitigation tip sheets.	H	DHSEM	Agency budget	Develop tip sheet and communicate need to local jurisdictions	2016	All, except Drought, Dam & Levee
2010-68	Building on the local critical facilities planning outreach effort, seek mitigation project applications to address critical facilities, utilities, and redundancy issues.	H	DHSEM	Agency budget	Define criteria and State priorities to local jurisdictions	2016	All, except Drought, Dam & Levee
2013-15	Identifying wildfire hazards (burning coal seams); looking to institute mitigation measures.	H	Division of Forestry	Agency budget; USDA grants	Project schedule is on-track with no changes.	Ongoing	Fire
2013-5	Coordinate with NRCS and USACE on levee safety issues.	M	WV DEP Division of Water and Waste Management	Agency budget; Silver Jackets program	By March 2014, create a task force to address levee safety in West Virginia.	2015	Flood, Crime, Terrorism
2013-6	Evaluate state facilities exposed to wildland fire risk for potential mitigation actions.	H	WV Department of Forestry	Agency budget	Obtain state facility database on which to perform analysis.	2015	Fire
2013-7	Provide training on wildfire suppression techniques to volunteer structural fire departments and wildland firefighters.	H	WV Department of Forestry	Agency budget	Determine best format and content to include in training	Ongoing	Fire
2013-8	Assist communities with reduction of hazardous wildland fuel by creating defensible space.	M	WV Department of Forestry	Agency budget	By June 2013 conduct outreach to at-risk communities.	Ongoing	Fire
2013-9	Build on Regional Resilience Assessment Program (RRAP) to continue conducting vulnerability assessments of critical facilities and evaluate for potential new mitigation strategies.	H	WV Intelligence Fusion Center	Agency budget; DHS funding	Identify critical infrastructure sectors for assessment	Ongoing	All, except Dam & Levee
2013-10	Integrate WV Intelligence Fusion Center with Thread and Hazard Identification and Risk Assessment (THIRA) process to utilize already existing data.	H	DHSEM, WV Intelligence Fusion Center	Agency budget	Communicate needed information	Ongoing	Hazardous Materials Release, Crime, Terrorism



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
<b>Goal 3: Improve understanding of risk and vulnerability for planning purposes</b>							
2010-33	Develop digital mapping of landslide prone areas, updating current maps and making data accessible to others/all.	M	WV Geological and Economic Survey (WVGES), U.S. Army Corps of Engineers (USACE), DHSEM	Agency budget	Perform a cost estimate for mapping.	Ongoing as resources become available.	Karst/ Landslide
2010-43	Digitize hard-copy paper maps and surveys for karst topography, mine subsidence and landslide. Build on and utilize the the statewide databases for geological hazards as new information is available from WVGES.	H	WVGES, WV Geographic Information Systems Technical Center (WVGISTC), USACE, FEMA	Agency budget	WVGES completed one database for earthquake epicenters in WV and has been incorporated into HIRA update. Use HIRA results to pinpoint facilities at risk for geologic hazards and use those areas as pilot studies for developing/digitizing mapped areas	Ongoing as resources become available.	Earthquake, Karst/ Landslide
2010-44	Develop a single, standardized critical facilities, geo-coded dataset for State and local critical facilities.	H	WV GIS Technical Center, DHSEM, WV BRIM	Agency budget	Determine facility types to be included in the database and what State facility attributes should be collected.	2014	All, except Dam & Levee
2010-45	Integrate 2013 HAZUS-MH 2.1 riverine flood analysis into 2016 risk assessment update.	H	DHSEM	Agency budget	Loss estimates from Phase I have been included in HIRA. Annualized losses for Phase II will not be available for the 2013 update and should be integrated into the next plan revision	2014	Flood
2010-46	Update the RL and SRL Databases annually to reflect FEMA flood claims, Insurance Commissioner (IC) use and structure mitigation at HMA close-out or from other funding sources.	Critical	DHSEM	Agency budget	Gain access to BureauNet	Ongoing	Flood



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
2010-48	Further investigate implications for the State of climate change as it relates to potential future changes in temperature, storm track, and frequency as well as lake-effect and other winter weather processes.	M	DHSEM, National Oceanic and Atmospheric Administration (NOAA) National Weather Service, State Climatologist, BRIM, Contractual Assistance, Public Service Commission	Agency budget	USACE is leading an interagency climate change study for the Ohio River Basin to evaluate the impact of climate change on water resources and develop mitigation strategies.	2015	All, except Crime, Terrorism, Dam & Levee
2010-49	Perform a more comprehensive examination of State and critical facility vulnerability to natural hazards.	M	DHSEM, WV Geographic Information System Technical Center (WVGISTC), Contractor Support	Agency budget	Hazard data actions for data creation are in-progress	2015	Earthquake, Karst/ Landslide
2010-50	Utilize hazard data that is completed in Action 2010-41 to validate hazard ranking parameters in the next Mitigation Plan Update.	M	DHSEM, WVGISTC, Contractor Support	Agency budget	Hazard data actions for data creation are in-progress (Action 201-43)	2017	Earthquake, Karst/ Landslide
2010-51	Incorporate digitized WV landslide quadrangle maps to support landslide risk analysis for the 2013 Mitigation Plan Update.	M	WVGES, WVU, WV Dept of Transportation (WVDOT)	Agency budget	Maps have been georeferenced from the USGS reports. WVDOT Tied to 2010-43 and 2013-13 for statewide data sources.	2016	Karst/ Landslide
2010-54	Improve upon mapping of Abandoned Mine Land and distribute this updated mapping to public, private, and corporate agencies.	Critical	WV Office of Surface Mine Reclamation, DEP	Agency budget	Determine data gaps and attributes for data collection for natural hazard extraction.	2014	Natural Resource Extraction
2010-55	Prioritize dam inspections and integrate known dam locations and downstream inundation zones, in accordance with risk, with location of residential communities and critical facilities at risk into the Flood Determination Tool.	Critical	DHSEM, Floodplain Management Section, WVCA, NRCS, USACE, WVGISTC	Agency budget	Prioritize dam inspections in accordance with risk and those that do not have an EAP digitized. Upload dam failure maps into flood tool.	2014	Flood



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
2010-75	Annually perform data synthesis and update of BureauNet databases in coordination with FEMA Region III - provide RL and SRL datasets to local governments for use in their RL and SRL targeting efforts.	H	DHSEM	Agency budget	Gain access to BureauNet	2014	Flood
2010-79	Perform pilot losses-avoided study for area with contiguous mitigated properties and convey results to policy makers, local government project sponsors, and property owners.	H	DHSEM, USACE	Agency budget	Consolidate benefit-cost analysis (BCA) data into single location. USACE pilot study of losses in areas with and without nonstructural mitigation.	2016	Flood
2013-11	Collaborate with PDCs and local jurisdictions for standardization of hazard data and classifications for assessment of hazards in local mitigation plans in order to aid in future roll-up in the State Hazard Mitigation Plan (i.e., standard GIS layers).	H	DHSEM, WVGISTC	Staff time	Plans submitted one year after distribution of the data standards follow the new data format.	2015	All, except Dam & Levee
2013-12	Develop feedback loop between DHSEM and RPDCs to make recommendations to improve process for next planning cycle.	M	DHSEM	Staff time	By December 2013, conduct a survey with RPDCs to gain feedback on current planning process.	2016	All, except Dam & Levee
2013-13	Leverage the landslide inventory database and landslide rating research project. Pilot study will spatially document landslide occurrences along roadways.	M	WVDOT Program, Planning and Admin Division	Agency budget	Consolidate landslide data into single resource. Incorporate District 2 pilot study (Fall 2013) in the 2017 HIRA update.	2014	Karst/ Landslide
2013-14	Incorporate climate change data for operating reservoirs.	H	USACE, NRCS, and WVCA	N/A should be researched for incorporation	Use and review of USACE report data (climate change study in Ohio Basin)	2015	Hurricane/Wind, Thunderstorm, Winter Storm, Flood, Tornado, Drought
2013-15	Integrate Dam and Levee safety action class (class 1 - 5) for every USACE dam and levee into HIRA and THIRA.	H	USACE, FEMA	Agency budget	Obtain the rating and accreditation data for dams and levees in West Virginia.	2015	Flood





ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
2013-16	Creation of a statewide tax parcel for use in the HIRA/THIRA.	H	DHSEM, WVGISTC	Agency budget	Develop a prototype map that would consist of a pilot study to determine what would be possible if/when data was available or created.	2014 for pilot	All, except Dam & Levee
2013-17	Complete inundation/flood risk mapping on streams that do not have hydrology & hydraulics modeling.	M	NWS, USGS, USACE, WVGISTC	Agency budget	Review USGS and NWS portals for inundation mapping on stream gages. Prioritize streams that do not have modeling and install stream gauges.	2015	Flood
2013-18	Display high-water marks in public areas to increase flood risk awareness.	M	DHSEM and Local Communities	FEMA Pilot funding source	Identify potential sites and communities interested in earning CRS credit by installing a high-water marker.	2016	Flood
2013-19	Develop an inter-agency flood risk management Silver Jackets Team and approve a charter	H	DHSEM, USACE	Agency budget	Assemble a committee of interested agencies for developing the flood risk management team	2014	Flood
2013-20	Investigate the viability of developing new regional depth-damage curves for evaluation of flood damage to structures.	M	FEMA, DHSEM, USACE, USGS	Agency budget	Complete viability study on structures along high gradient streams that suffer damages at flood elevations below the standard depth-damage curves.	2016	Flood, Dam & Levee
2013-21	Develop methods to prioritize state dams and levees by risk.	M	USACE, DHSEM, WVCA	Agency budget	Identify criteria for prioritization	2014	Flood, Dam & Levee
2013-22	Geospatially map current BCA data sets in order to facilitate geographic assessment of grant applications.	M	DHSEM	Agency budget	Consolidate BCA data into single location	Ongoing	All, except Hazardous Materials Release, Crime, Terrorism, Dam & Levee
2013-23	Refine seismic Hazus runs using improved soil data	M	DHSEM	Agency budget	Work with State geologist to modify soil data to import into Hazus scenarios.	2015	Earthquake



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
<b>Goal 4: Bolster public understanding and preparedness</b>							
2010-14	Conduct annual outreach campaign to property owners identified through 911 cross-matching with Digital Flood Insurance Rate Map (FIRM) data to ensure they know that their property is located in the Special Flood Hazard Area and options regarding flood insurance and mitigation.	M	DHSEM, Floodplain Management Section	Agency budget	A draft letter is approved by June 15 of every year and a mailing is conducted in September of every year	Ongoing	Flood
2010-30	Video at schools; run preparedness demonstration videos at schools	M	Public Broadcasting	Agency budget	Develop schedule for video development	2017	All
2010-39	Interconnect all media (print, broadcast, online)	M	Public Broadcasting	Agency budget	Coordinate among State agencies for distribution of media	2016	All
2010-40	Print media (i.e., newspapers) should run stories about preparedness (i.e., during flood awareness week)	M	Governor's Office	Agency budget	Create schedule for distribution	Ongoing	All
2010-41	Produce documentaries about/on aging dam structures around endangered communities	M	Public Broadcasting	Agency budget	Develop a list of potential dams on which to focus	2018	Flood
2013-25	Continue group fire prevention programs/outreach/presentations (including homeowners groups, civic orgs, planning)	M	Division of Forestry	Agency budget; USDA grants	Organize a list of potential venues for presentations	Ongoing	Fire
2013-24	Work with logging operations to reduce soil erosion	M	Division of Forestry	Agency budget; USDA grants	Coordinate with private logging industry to identify potential remediation measures	Ongoing	Other
2013-25	Continue community outreach (public meetings) for coal dam emergency warning measures	M	DEP	Agency budget; federal funds	Determine specific venues/time periods in which to conduct outreach	Ongoing	Flood
2013-26	Continue education/outreach (DEP Public Information Office) on environmental programs that also reduce hazard risk.	M	DEP, USACE	Agency budget; Federal funds	Extreme events outreach (i.e., 1937)	Ongoing	Other
2013-27	Public broadcasting in schools; add preparedness/education/outreach component to classroom workshops	M	Public Broadcasting	Agency budget	Include as part of workshop agendas	Ongoing	All, except Dam & Levee



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
2013-28	Disseminate risk assessment information for communities near coal impoundments (i.e., news dept includes this as a regular feature)	M	Public Broadcasting	Agency budget	Develop content to include/talking points	Ongoing	Flood
2013-29	Interconnect media and State agencies; continue coordination efforts (before/during disasters) to strengthen partnerships	M	Public Broadcasting	Agency budget	Strengthen partnerships by holding discussions with media and agencies to determine ways better coordinate information dissemination	Ongoing	All, except Dam & Levee
<b>Goal 5: Maximize State mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts while considering local priorities</b>							
2010-2	Obtain funding for a dam safety revolving loan fund.	H	WV DEP- Division of Water and Waste Management	Federal grant; user fees	By March 2014, Prepare a list of deficient dams before sending the applications to interested parties	2016	Flood
2010-6	Create guidance on how to document losses due to high frequency, low impact events for use in developing BCAs.	H	DHSEM	Agency budget; USACE Silver Jackets program	By March 2014, a guidance document has been finalized and distributed to local jurisdictions for use in next grant cycle	2015	All, except Dam & Levee
2010-15	Evaluate methods IC could use to coordinate efforts to reduce flood insurance premiums in WV by informing insurance agents, citizens, and business owners of better methods to rate flood insurance focusing on Pre-FIRM and approximate A zone structures.	H	WV Offices of the Insurance Commissioner	Agency budget	By March 2014, a white paper outline has been developed	2015	Flood
2010-19	Develop prioritized list of State-owned or leased facilities at risk of flooding and conduct detailed site assessment to develop site-specific mitigation action plans.	L	DHSEM	FEMA HMGP program	By January 2014, a list of State-owned or leased facilities has been analyzed and prioritized for flood risk	2014	Flood
2010-21	Develop interagency review process for proposed tax-funded capital improvement projects and leases to ensure all hazards are being evaluated and addressed.	L	WV Department of Administration, Real Estate Division	Agency budget	A list of agencies that should be included in the review process and their responsibilities has been created by April 2014	2015	All, except Dam & Levee



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Completion Date	Hazard Mitigated
2010-22	Allocate \$1 million to a Statewide Mitigation Fund to address projects that do not meet FEMA eligibility requirements (in addition to existing funds used for match).	M	DHSEM	State appropriation	By December 2013, a legislative champion has been secured	2015	All, except Dam & Levee
2010-57	Update disaster funding levels for Public Assistance, Individuals and Households Assistance, Small Business Administration and Hazard Mitigation Grant Program (HMGP) HMA grants for the 2016 risk assessment disaster costs section.	H	DHSEM	Agency Budget, PA & HMA Grants	A tracking mechanism has been developed by January 2014	Ongoing	All, except Dam & Levee
2010-70	Initiate contact with each local government with listed SRL properties through a letter and follow-up communication to promote HMA grant programs to mitigate listed SRL and RL properties.	Critical	DHSEM	Agency Budget	Five communities have been contacted by May 2014	Ongoing	Flood
2010-71	Initiate contact with each listed SRL property owner with a letter promoting mitigation at no property owner cost through HMA grant programs.	H	DHSEM	Agency Budget	A list of SRL property owners has been compiled and a draft letter has been developed	2015	Flood
2010-72	Allocate designated HMA funds to at least three high-risk SRL properties for acquisition and demolition projects in targeted communities.	Critical	DHSEM	Agency Budget	SRL properties that meet requirements have been identified by June 2013	2015	Flood
2010-74	Prioritize mitigation of SRL and RL properties through post-disaster mitigation strategy priorities and activities along with bonus grant application scoring points for all HMA funding. Provide local project sponsors that target RL and SRL property owners for HMA funding.	H	DHSEM	Agency Budget	Project schedule is on-track with no changes	2014	Flood
2010-76	Provide priority points in Unified HMA application scoping for acquisition and demolition projects.	H	DHSEM	Agency Budget	Project schedule is on track with no changes	2015	Flood
2010-77	Support integration of local data from State vulnerability analysis into local plan updates for use in prioritizing mitigation projects.	H	DHSEM	Agency Budget	State vulnerability data has been compiled and distributed by July 2014	2015	All, except Dam & Levee



ID	Description	Priority (H, M, L)	Responsible Agency	Potential Funding Sources	Interim Measure of Success	Target Comple- tion Date	Hazard Mitigated
2013-30	Identify stable and annual funding source for future regional HMPs. Consider approaches to providing incremental funding of plan updates (e.g., fund update of one or more community's information each year). Identify opportunities to coordinate mitigation and CRS planning efforts.	H	DHSEM	FEMA HMGP; FEMA FMA; FEMA Emergency Mgmt Proformance Grants (EMPG)	One source of funding has been finalized by December 2013	2014	All, except Dam & Levee



### 4.3 REPETITIVE LOSS AND SEVERE REPETITIVE LOSS MITIGATION STRATEGIES

Addressing the State's more than 59 Severe Repetitive Loss (SRL) properties compounded with the FEMA-reported (April, 2013) 2,096 Repetitive Loss (RL) structures will require the combined efforts of agencies and organizations beyond the hazard mitigation program staff housed at DHSEM.

Achieving and working through this revised strategy will require the state to continue to reach out to others, making this a joint effort. DHSEM will continue to seek assistance to implement this strategy through close cooperation with its public and private sector partners:

- Federal Emergency Management Agency (FEMA)
- DHSEM Floodplain Management Program
- WVCA
- USACE Silver Jackets Program
- West Virginia Floodplain Managers Association
- West Virginia Public Radio and the Association of Broadcasters
- Office of the State Fire Marshall
- Local government floodplain managers and building officials

West Virginia's approach to targeting mitigation of SRL and RL is multi-tiered. Some activities must be coordinated and directed at the State level, as described in Chapter 4 – Mitigation Actions, while others require the support of the local governments that serve as HMA project sponsors, since most mitigation of high-hazard structures in the State occurs through HMA grants.

RL and SRL structures and their status have been fully analyzed through comparison analysis of all relevant property datasets. These datasets will be provided to DHSEM and FEMA Region III in digital MS Excel format in Appendix O, but they are redacted due to Privacy Act requirements. The analysis will be performed annually and provided to FEMA Region III to capture mitigation of RL or SRL properties through HMA grants, Increased Cost of Compliance (ICC), or other known means.

In acknowledgement of the importance of mitigating RL and SRL structures, several mitigation strategies have been developed to specifically address RL and SRL properties. These include:

- Annually perform data synthesis and update of BureauNet databases in coordination with FEMA Region III; provide RL and SRL datasets to local governments for use in their RL and SRL targeting efforts.



- Initiate contact with each local government with listed SRL property through a letter and follow-up communication to promote HMA grant programs to mitigate listed SRL and RL properties.
- Initiate contact with each listed SRL property owner with a letter promoting mitigation at no cost to the property owner through HMA grant programs.
- Allocate designated HMA funds to at least three high risk SRL properties for acquisition and demolition projects in targeted communities.
- Prioritize mitigation of SRL and RL properties through post-disaster mitigation strategy priorities and activities along with bonus grant application scoring points for all HMA funding. Provide local project sponsors that target RL and SRL property mitigation with priority HMA funding.

In addition, SRL properties were targeted in the Fiscal Year (FY) 2010 and FY2011 HMGP and SRL application process. West Virginia set a goal of receiving grant funding obligation awards to mitigate at least four SRL properties by January 1, 2011. This was accomplished through mitigation of Wood County SRL properties impacted by flooding during 2009 and 2010. Between 2010 and 2013, numerous additional properties were mitigated using HMA grant funding. Jurisdictions that addressed RL/SRL properties include, but are not limited to Kanawha, Logan, and Wood Counties.

Building upon this effort, West Virginia will move forward in partnership with FEMA and local governments to use southern West Virginia acquisition/demolition project marketing methods to target the next tier of priority SRL and RL property owners. With two presidentially declared flood related disasters in 2010 and two more events in 2012, it seemed highly likely during the 2010 plan update that both the SRL and RL lists will continue to grow. However, due to both actual successful mitigation of RL and SRL properties, along with the 10-year rolling census of the RL, the number of FEMA-listed RL and SRL properties has declined about 10%. WVHSEM will continue its diligence to fully use all HMA and other resources to leverage mitigation of these high-hazard properties.

DHSEM staff will continue to manage the datasets with the tools created for the 2010 Plan Update in the following manner:

- a) Maintain access to the BureauNet National Flood Insurance Program (NFIP) database of RL properties.
- b) Continue to pursue and develop clean datasets. Improve existing geo-coding by researching matches for properties with incomplete addresses and out-of-date addresses based on rural road designations that have changed.



- c) Continue to align West Virginia RL property data and SRL property data with validated FEMA NFIP RL and SRL property data, annually.
- d) Use Greatest Savings to the Fund data and amplified BCA module environmental benefits to inventory to further demonstrate the cost effectiveness of mitigation projects.
- e) Review potential acquisition projects to determine if new BCA module accelerated environmental benefits will enable these structures to be eligible for HMA grants.
- f) Update listing of completed SRL and RL mitigated properties, and use GIS or other methods to merge FEMA's RL database with West Virginia's mitigated properties database.
- g) Continue to complete FEMA Form AW-501 for each mitigated property and provide it to FEMA through the current FEMA database or submittal to Region III upon project close-out.
- h) Use GIS to merge the ICC RL database with West Virginia's mitigated properties database annually.
- i) Ensure that the latitude and longitude of each property is gathered during project close-out as well as during the sponsoring community's three-year mitigation compliance inspection for completed properties.

Creating a competitive FEMA HMA grant application can be challenging for already over-taxed local officials. Local government-to-local government mentoring can be highly effective; DHSEM and FEMA will help to facilitate this process and match experienced grant participants with those that have not participated in HMA programs. In addition to mentoring local governments, the data analysis performed for the HIRA in the 2013 Plan Update (Chapter 3 Section 3.7) will be provided to counties to assist in targeting mitigation opportunities. This will be done by:

- a) Providing State direction that each jurisdictional and multi-jurisdictional plan must include the targeting and mitigation of SRL and RL structures in the mitigation strategies section of every multi-jurisdictional or county local (§322) mitigation plan with SRL or RL properties.
- b) Examining the FEMA-DHSEM RL and SRL data sets to seek candidate properties that could potentially be mitigated through the FEMA HMA funding programs or any other available funding sources on an annual basis, or more frequently as required by disaster experience or available staffing resources. Include targeting of SRL and RL structures for mitigation in the mitigation





strategies section of every multi-jurisdictional or county §322 plan with SRL or RL properties.

- c) Develop and conduct education efforts that increase residential and business owners' knowledge and awareness of mitigation grants by conducting various outreach activities. Target these activities to SRL property owners.
- d) DHSEM staff will conduct one meeting annually in each region of the State, targeting officials in RL and SRL communities who serve as HMA grant sponsors. These meetings will provide potential applicants with mitigation options information through a presentation and question/answer forum.
- e) DHSEM staff will explore a town hall post-disaster meeting forum with local government representatives, as well as home and business owners of SRL properties, in attendance. Staff would present grant programs and their benefits as appropriate depending on the disaster and the community setting. This would capitalize on property owners' wish to finally avoid flooding and would greatly increase public awareness for those who are affected and frequently inconvenienced or displaced by flooding. The local governments would advertise the meeting in their daily or weekly publications to achieve mass media publication and public notice. This mechanism may be especially effective in a post-flood disaster scenario when property owners are most cognizant of flood impacts and HMGP funds may be available to mitigate their homes. Local government participants may include local agencies such as the local emergency management agency, planning commission, conservation district, housing and redevelopment authority, and community action agency.

For the purposes of this plan, "mitigation of high-hazard structures" is considered to be an alteration of a floodprone property or its immediate surroundings (such as a minor drainage project) that reduces or eliminates the risk from flooding. FEMA's SRL Program and the Repetitive Flood Claims (RFC) program were specifically created to reduce the impact that SRL and RL properties have on the Flood Insurance Fund. FEMA's other HMA grant programs, HMGP, PDM and the new program continue a focus on mitigating RL and SRL buildings, , as are some Department of Housing and Urban Development (HUD); Community Development Block Grant; and other State, local, and privately funded efforts. DHSEM will use these available programs, which are addressed in great detail in Appendix F - Capability Assessment, to fund mitigation of SRL and RL structures. Both pre- and post-disaster funds will be prioritized toward mitigation of targeted RL and SRL properties:

- Target SRL and RL properties for mitigation through HMA funding through prioritization during the annual HMA project review and prioritization process.



- Incorporate targeting of SRL and RL properties into FEMA-West Virginia Disaster Recovery Strategies:
  - Prioritize HMGP funds for SRL- and RL-listed properties.
  - Form partnerships with FEMA-State Joint Field Office (JFO) Mitigation team to conduct post-disaster HMGP outreach to targeted communities and properties owners. Coordinate with other Federal and State agencies to form partnerships to leverage other programs that could finance mitigation of additional structures.
  - Use available staff to update Mitigated Properties datasets with geo-coding to more accurately depict RL and SRL structures.
  - Use JFO team to develop outreach strategies and tools (such as those referenced herein) to communicate mitigation opportunities at recovery centers and town hall meetings and through media releases.



## CHAPTER 5: COORDINATION WITH LOCAL HAZARD MITIGATION PLANNING EFFORTS

### DISASTER MITIGATION ACT OF 2000

#### 44 Code of Federal Regulations

**§201.4(c)(4):** A section on the Coordination of Local Mitigation Planning that includes the following:

- (i) A description of the State process to support, through funding and technical assistance, the development of local mitigation plans; [including] whether the updated plan describes the funding and technical assistance the State has provided in the past three years to assist local jurisdictions in completing approvable mitigation plans;
- (ii) A description of the State process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan; and
- (iii) Criteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs, which should include consideration for communities with the highest risks, repetitive loss properties, and most intense development pressures. Further, that for non-planning grants, a principal criterion for prioritizing grants shall be the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated costs.

**§201.4(d):** Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities...

#### *Repetitive Loss Mitigation Strategy*

**Requirement §201.4(c)(3)(v):** A State may request the reduced cost share authorized under §79.4(c)(2) of this chapter for the FMA and SRL programs, if it has an approved State Mitigation Plan ... that also identifies specific actions the State has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties), and specifies how the State intends to reduce the number of such repetitive loss properties.

#### *Coordination with Repetitive Loss Jurisdictions*

**Requirement §201.4(c)(3)(v):** In addition, the plan must describe the strategy the State has to ensure that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including the development of local mitigation plans.

### 5.1 LOCAL HAZARD MITIGATION PLAN DEVELOPMENT

Prior to the initial 2004 West Virginia Standard State Hazard Mitigation Plan (HMP), the West Virginia Office of Emergency Management (OEM), later superseded by Department of Homeland Security and Emergency Management (DHSEM), cooperated with the Federal Emergency Management Agency (FEMA) Region III to support the



development of local HMPs. FEMA Region III provided significant technical support, financial assistance, and outreach to OEM mitigation staff. In order to meet tight deadlines for local mitigation planning, FEMA supported an aggressive campaign to initiate local mitigation plan development.

West Virginia's 55 counties were targeted to support development of local HMPs. Training was delivered to each of West Virginia's 11 Regional Planning and Development Councils (RPDCs) during 2002 through a two-part series. Training was delivered to a broad audience in July 2002 where general mitigation plan requirements and the basics of risk assessment were covered. The second workshop series, conducted during late 2002, was attended by those deeply involved in preparation of local plans. The second series of workshop focused on preparation of mitigation goals and development of local mitigation plans.

The West Virginia local planning effort was initiated prior to development and release of much of the FEMA *Mitigation Planning How-to Guide* series. As a result, FEMA and DHSEM developed an array of relevant planning materials and developed mitigation planning assistance guidance to support development of the local plans. The planning process was grouped into three phases:

1. **PHASE I.** Risk Assessment
2. **PHASE II.** Drafting of mitigation goals, strategies, and capabilities
3. **PHASE III.** Adoption of the plan by the county.

The structured system during 2002 and 2003 allowed State and Federal mitigation program planners to track plan development progress and provide technical assistance and coaching as needed. Fifty of the 55 county plans were approved by FEMA and adopted during 2004; the remaining 5 county plans were adopted in subsequent years.

The 2007 West Virginia State All-Hazards Mitigation Plan Update described a proposed process for a staggered update of local HMPs that would allow the State to support updates and reviews of 11 plans annually; thus resulting in updates for all 55 over a single 5-year planning cycle.

During the 2007 West Virginia State Plan Update, DHSEM staff provided assistance to local communities. Through State guidance, the FEMA *Mitigation Planning How-to Guide* series, and a new vision for integration of Flood Mitigation Assistance (FMA), many gaps in local plans were identified in local risk assessments, vulnerability analyses, as well as loss estimates. State mitigation staff, assisted by FEMA disaster assistance employees as available, also provided support to develop FEMA grant applications and cradle-to-grave grant management assistance.



During the 2010 Plan Update, it was decided that a regional approach to local mitigation planning would better ensure regularity in the local plan update process, as well as facilitate vertical integration of local plans into the State plan. This process was started during the 2010 State Plan Update process, and by the time of this 2013 Update all 11 PDCs had developed, approved, and adopted regional plans. Jefferson County currently maintains its own local mitigation plan, and at the time of the 2013 State Plan Update Jefferson County was in the process of updating its mitigation plan. Data from these plans was incorporated into the 2013 State Plan Update Hazard Identification and Risk Assessment (HIRA) and priority mitigation actions were consolidated.

### 5.1.1 DISTRIBUTION OF HAZARD MITIGATION PLANNING FUNDS

During summer of 2002, each of the counties was offered \$13,500 in grant funds to support the development of a local HMP. At that time, Jefferson County used Project Impact funds from FEMA to develop its plan, while other counties used the funds for contractor support or support for their own personnel. Some of the RPDCs supported development of their constituent county plans with these funds.

In support of the initiative for local plan updates, the DHSEM and the RPDCs received a 2007 FMA grant and a 2008 Pre-Disaster Mitigation (PDM) Grant. Local Planning and Development Councils (PDCs) were engaged to regionalize all local plans. At the time of the 2010 State Plan Update, one regional plan had been completed, while three were under FEMA Region III review. As noted above, by the time of the 2013 State Plan Update, all 11 PDCs had regionalized plans, while Jefferson County maintained responsibility for its own mitigation plan. The remaining regional plans were updated with 7% Hazard Mitigation Grant Program (HMGP) funds according to State priorities.

Ideally, counties would fund plan update initiatives themselves due to general lack of available State funds. When HMGP or PDM funds are available to support local plan updates, however, funds will be distributed according to State priorities. Those are:

- The expiration date of the plan
- Recent Presidential Declared areas
- Number of RL structures in the region
- Land development rates in the area
- Demonstrated need for funding

### 5.1.2 DEFINING “LOCAL PLANNING JURISDICTIONS”

One of the key issues facing any State as it starts the mitigation planning process is to define “locality” sufficiently to meet current FEMA standards. The definition of a “locality” provided in the Disaster Mitigation Act of 2000 (DMA2000) regulations was written to encompass the broad variety of community types across the United States.



As such, it was much broader than most States' political organization. The basis of the DMA2000 local government definition is the NFIP definition of a "locality". It was FEMA Region III's position that the definition of a locality responsible for development of an HMP is:

*Any area or political subdivision within the State as defined by the Code of the State that has authority to create, adopt and/or enforce land use, zoning, or subdivision ordinances and regulations for the areas within its boundaries.*

While the NFIP definition includes Native American tribes and organizations in its description, West Virginia does not currently have any federally recognized native organizations or authorized tribal organizations. As a result, those categories were excluded from the definition above. Within West Virginia, this definition encompasses the counties, cities, and incorporated recognized by the Code of West Virginia. West Virginia counties, cities, and incorporated towns have independent land use management authority within their respective boundaries. The PDCs are regional planning organizations that provide technical and planning support to the localities within their respective regions. However, while the PDCs do perform land use planning at the request of their localities, they cannot implement or enforce the plans they create for those localities. Implementation and enforcement remain the responsibility of the cities, counties, and towns for which plans were developed.

*The term "locality" means the county where the construction is to be performed, except that if there is not available in the county a sufficient number of competent skilled laborers, workmen and mechanics to perform such construction efficiently and properly, and may include one or more counties in this state adjacent to the one in which the construction is to be performed and from which such skilled laborers, workmen and mechanics may be obtained in sufficient numbers to perform the construction. With respect to construction of public improvements with the state road commission, "locality" may be construed to include one or more counties in this state adjacent to the one in which the construction or public improvement is to be performed and from which skilled laborers, workmen and mechanics may be accessible for work on such construction on public improvements. (West Virginia Code §21-5A-1.)*

West Virginia recognizes 55 counties. Incorporated cities and incorporated towns are included in county plans and are currently being uploaded into regional plans through the 11 West Virginia PDCs. Based on the DMA2000 regulations and the "locality" definition provided above, each of West Virginia's cities, counties, and towns is required to develop or take an active role in the development of an HMP for their

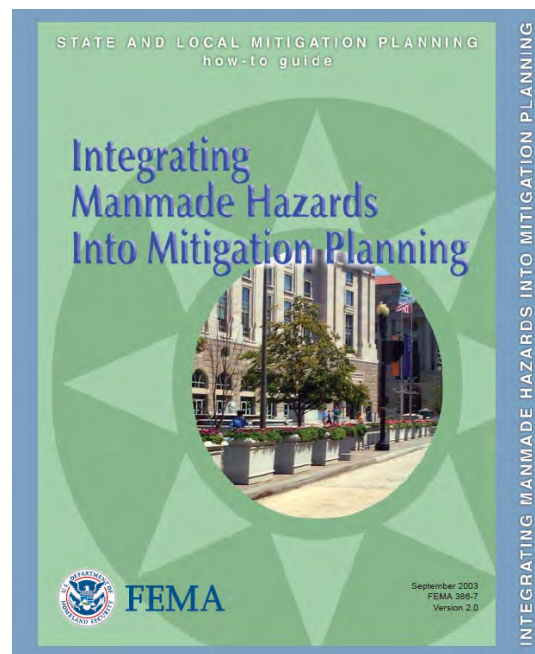
respective areas. The PDCs are not required to develop a separate HMP for their regions, as they do not have the enforcement authority of the cities, counties, and incorporated towns. However, it is the intent of West Virginia to combine as many of the mitigation plans as possible into regional, multi-jurisdictional plans using the PDCs as the planning agency for these efforts. During 2010 this was accomplished through the Region 1 Mitigation Plan Update that encompasses six southern West Virginia counties.

### 5.1.3 LOCAL HAZARD MITIGATION PLANNING WORKSHOPS

In accordance with the March 2010 Mitigation Council Guidance, the State of West Virginia offered FEMA G-318 training to interested county governments upon their request. This training provided guidance and instruction on preparing and reviewing local plans in an effort to ensure that West Virginia counties had the appropriate tools and resources to update their local plans. Consequently, two FEMA G-318 Mitigation Planning Workshop for Local Governments, were held at the Twin Falls Resort State Park in Mullens, WV during June 2010.

During 2009-10 the State held three training sessions for the PDCs to discuss the regionalization process where the basic requirements of hazard mitigation planning were covered. The meetings were held at:

- West Virginia State Police Academy Professional Development Center, Dunbar, WV (8/2009)
- Clarksburg, WV (11/2009)
- Stonewall Resort, Roanoke, WV (1/2010)



### 5.1.4 DEVELOPING LOCAL MITIGATION PLANNING ASSISTANCE GUIDES

Several training aides have been distributed to those engaged in local mitigation planning, as described below.

#### HOW TO GUIDES

The primary training aide has been the *How to Guide* Series developed by FEMA. These have been critical tools vital to plan development, in particular in hazard



identification and risk assessment. This series has been distributed widely to those engaged in local planning in printed, digital, and CD formats.

## **DIVISION OF HOMELAND SECURITY AND EMERGENCY MANAGEMENT GUIDANCE**

Occasional *Answers to Frequently Asked Questions* documents have been developed to assist those engaged in §322 planning to provide guidance and interpretation of the DMA2000 law and interim and final rules. In addition, DHSEM and FEMA staff have provided written and verbal guidance regarding Federal code requirements, plan crosswalk reviews, and specifics regarding local plan adoption.

### **5.1.5 PROVIDING TECHNICAL ASSISTANCE**

The development of plans as prescribed by the Stafford Act Section §322 (42 U.S.C. 5165) is supported by a State Hazard Mitigation Planner (SHMP) within the Mitigation Program of the DHSEM. The §322 planning support includes:

- Participation in local meetings;
- Availability by phone for consultation, trouble-shooting, and technical assistance;
- Development of draft plan outlines for use at the local and regional levels;
- Compilation of hazard data at the State level where possible for distribution to and use by PDC staff and local plan contacts (for consistency and to kick-start the hazard assessment process where possible);
- Provision of local training workshops for local plan Steering Committee members and planning agency and PDC staff;
- Crosswalk review of draft plan sections and final plan prior to submission to FEMA Region III for final approval.
- Provision of support to local jurisdictions and regional PDCs during plan implementation, monitoring, evaluation and update processes.

Through the Hazard Mitigation Technical Assistance Program (HMTAP), FEMA Region III generously supported the West Virginia local planning effort through provision of technical assistance, training workshops, and crosswalk review. This cooperative effort continued during the successful completion, approval, and adoption of local plan updates when the planning cycle evolved to regional plan updates through West Virginia's PDCs.

### **5.1.6 MEETINGS AND CONFERENCES**

Once FEMA provided States with guidance and training materials for §322 planning beginning in 2002, DHSEM and FEMA staff saturated the State with presentations on the requirements of the Stafford Act, the State's strategy to develop a state plan and the requirements of local plans. These presentations introduced the concepts of multi-





hazard planning and emphasized the relevance of proactive hazard mitigation. Since the State had experienced an active cycle of natural disasters, audiences were extraordinarily receptive to the concept of hazard mitigation planning.

During the 2013 State plan update process, DHSEM held a series of five local outreach workshops. These workshops were utilized to both solicit local and public comment on the draft plan, and to inform local planners and emergency managers about current national mitigation trends, funding availability for mitigation projects, and State priorities and policies. Complete documentation from these events can be found in Appendix Q. Event dates and locations are provided in Table 5-1.

TABLE 5-1 LOCAL OUTREACH WORKSHOPS

DATE	LOCATION	TIME
April 8, 2013	<i>Cacapon Resort State Park</i> Cacapon Lodge, Washington Fairfax Room 818 Cacapon Lodge Drive Berkeley Springs, WV 25411	1:30-3:00 PM
April 9, 2013	<i>Tygart State Park</i> Tygart Lodge, Conference Room #1 Rt 1 Box 260 Grafton, WV 26354	9:30-11:00 AM
April 10, 2013	<i>Pipestem State Park</i> McKeever Lodge, Faulconer Room 3405 Pipestem Drive Pipestem, WV 25979	9:30-11:00 AM
April 11, 2013	<i>Parkersburg City Council Chambers</i> Conference Room (2nd Floor) #1 Government Square Parkersburg, WV 26101	9:30-11:00 AM
April 12, 2013	<i>WV State Police Academy</i> Room #4 135 Academy Drive Dunbar, WV 25064	9:30-11:00 AM

## 5.2 TRANSITION FROM LOCAL TO REGIONAL MITIGATION PLANS

During May 2010, plan updates for most of the State’s counties and the PDC Region 1 were approved by DHSEM and FEMA Region III. Several other plans were in progress and were anticipated to be fully approved within six months.



### West Virginia Plan Updates As of May 24, 2010

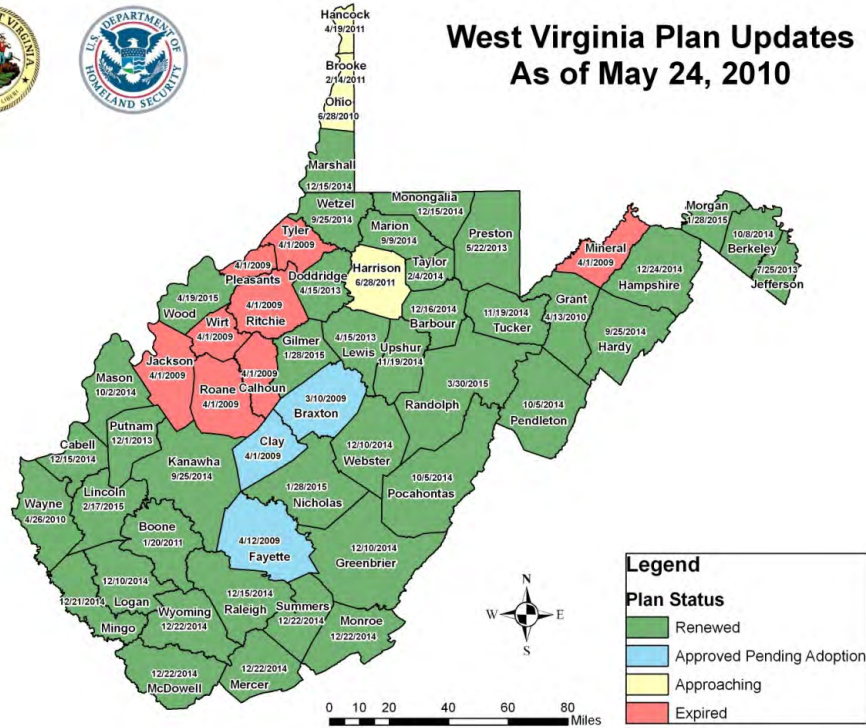


FIGURE 5-1. LOCAL MITIGATION PLAN STATUS, MAY 24, 2010

Since the 2007 State HMP Update, West Virginia has modified its approach to mitigation planning. The first effect of regionalization was visible in the 2010 Update when the first regional local HMP developed through the PDC was approved by FEMA. As of 2013 update, each of the 11 PDCs have developed a regional plan compiled from its constituent members, excluding Jefferson County which is independently developing its own mitigation plan. If they had not done this, they would most likely be grouped into Region VIII.



**2013 WEST VIRGINIA STATEWIDE STANDARD  
HAZARD MITIGATION PLAN UPDATE**

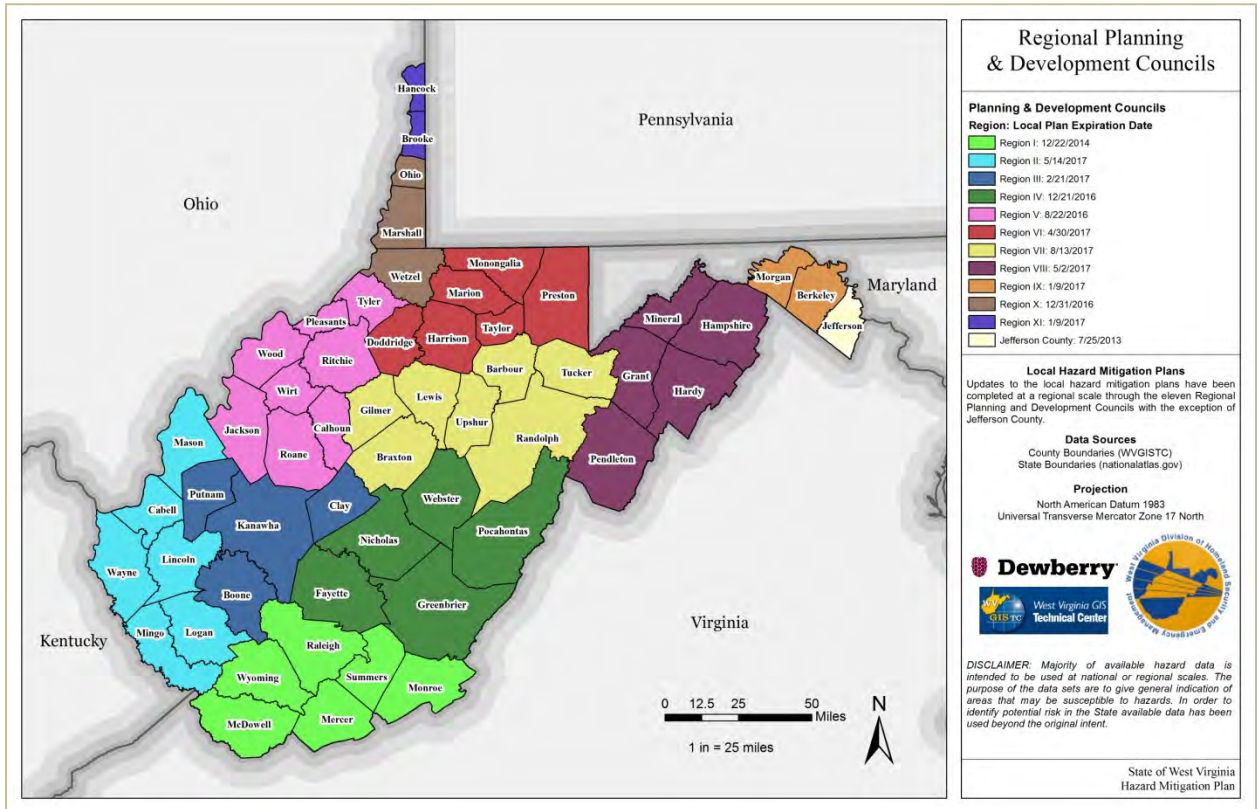
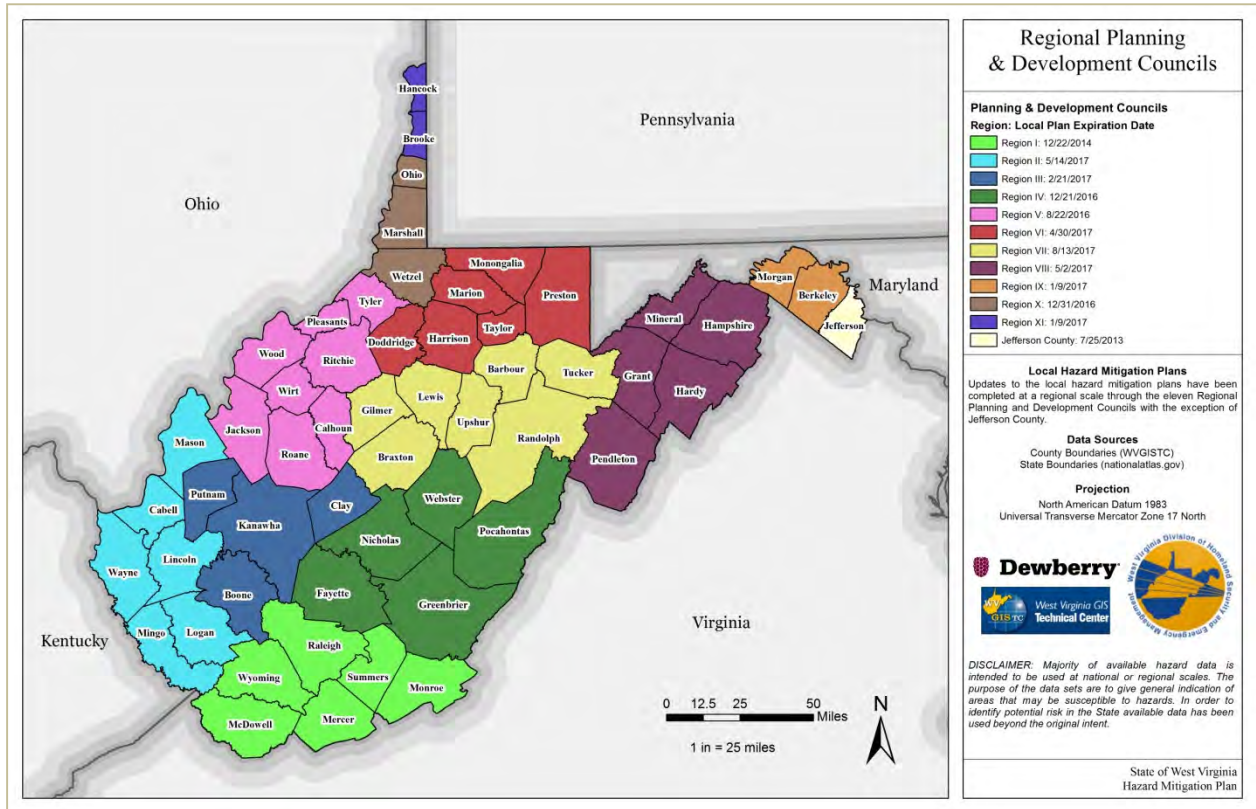


Figure 5-2 displays the effect of a regional approach for the 2013 Update. Table 5-2 provides a list of the counties and their corresponding PDC.



**2013 WEST VIRGINIA STATEWIDE STANDARD  
HAZARD MITIGATION PLAN UPDATE**



**FIGURE 5-2. WEST VIRGINIA REGIONAL PLANNING AND DEVELOPMENT COUNCILS REGIONS**

**TABLE 5-2. WEST VIRGINIA REGIONAL PLANNING AND DEVELOPMENT COUNCILS**

Regions	County	
Region I	• McDowell County	• Mercer County
	• Monroe County	• Raleigh County
	• Summers County	• Wyoming County
Region II	• Cabell County	• Lincoln County
	• Logan County	• Mingo County
	• Mason County	• Wayne County
Region III	• Boone County	• Clay County
	• Kanawha County	• Putnam County
Region IV	• Fayette County	• Greenbrier County
	• Nicholas County	• Pocahontas County
	• Webster County	
Region V	• Calhoun County	• Jackson County
	• Pleasants County	• Ritchie County
	• Roane County	• Tyler County



	• Wirt County	• Wood County
Region VI	• Doddridge County	• Harrison County
	• Marion County	• Monongalia County
	• Preston County	• Taylor County
Region VII	• Barbour County	• Braxton County
	• Gilmer County	• Lewis County
	• Randolph County	• Tucker County
	• Upshur County	
Region VIII	• Grant County	• Hampshire County
	• Hardy County	• Mineral County
	• Pendleton County	
Region IX	• Berkeley County	• Morgan County
Region X	• Marshall County	• Ohio County
	• Wetzel County	
Region XI	• Brooke County	• Hancock County
Jefferson County	• (independent plan)	

### 5.3 STATE REVIEW OF LOCAL HAZARD MITIGATION PLANS

To ensure compliance, FEMA Region III staff provides training on mitigation plan review techniques to DHSEM staff. This ensures that local §322 plan drafts meet all required elements of the DMA2000 legislation. DHSEM staff provides crosswalk reviews of the local plans prior to submitting them to FEMA Region III staff for review. This review is conducted in accordance with the crosswalk procedures outlined in the appropriate guidance. The requirements for local §322 plans are outlined in FEMA *Multi-hazard Mitigation Planning Guidance under the Disaster Mitigation Act of 2000, March 2004*. This was then updated for local plans in 2008 and 2012. Every effort has been employed to provide consistency of review between State, FEMA and HMTAP contractors and to provide this review to local plan developers as quickly as possible. It remains the goal of the State to complete each plan review within 30 days.

### 5.4 STATE SUPPORT OF LOCAL MITIGATION PROJECTS

Most local hazard mitigation projects are funded through the disaster-related HMGP. The Hazard Mitigation Administrative Plan outlines the process used to solicit and select HMGP-funded projects; it is updated annually. A copy of the current plan is provided in Appendix L - *West Virginia Hazard Mitigation Administrative Plan*. Similar procedures are used for the remaining suite of four Unified Hazard Mitigation Grant Assistance programs. To provide clarification and consistency across programs,



an Administrative Plan has been developed that combines administrative management policies and procedures into a single Administrative Plan.

With final adoption and approval of the PDC-based mitigation plans, as well as Jefferson County’s plan, the DHSEM Hazard Mitigation staff is shifting roles to provide plan implementation and grant management support. A strategy has been developed to encourage at least one or two annual Steering Committee meetings for each local mitigation plan update where plan implementation, funding, maintenance, and revision can be discussed. Some of these meetings may occur through teleconferencing or a web-based format. The DHSEM planners will attend as many meetings as is practicable to provide a stable technical resource. In addition, DHSEM will institute an occasional call-down system to call each local plan sponsor to monitor status. Special emphasis will be placed on incorporation of hazard mitigation goals and objectives, particularly those related to land use and zoning, into city, county, and town comprehensive plans as these are renewed. Finally, an annual report template is under development that will be distributed to each plan sponsor to ensure that annual progress is measured and celebrated. The annual reporting system will facilitate the initial steps of plan review and revision.

West Virginia has been proactive in supporting development of Flood Mitigation Plans to support eligibility of FMA grant projects for more than 10 years. With the inception of all-hazard mitigation planning, many local and regional §322 plans were crosswalked and approved to meet FMA plan standards per §78.5 of 44 Code of Federal Regulations- Flood Mitigation Plan Development. Since release of the new local mitigation plan guidance and crosswalk in July 2008, FMA planning requirements have been integrated into the State, local, and multi-jurisdictional plan crosswalks.

As a result of FEMA Memorandum “Cost Effectiveness Determinations for Acquisitions and Elevations in SFHA”, DHSEM has had to reconsider how it will prioritize Federal mitigation grant funds for acquisition and elevation projects. While DHSEM has not finalized any particular strategy, it is considering awarding funding on a first come first serve basis, assuming all other eligibility requirements are met, or potentially still running a BCA on the project and awarding funding based on those that are considered most cost-effective. More information will become available as DHSEM finalizes its prioritization strategy. Contact the State Hazard Mitigation Officer for complete information. See Section 1.2.3 for complete details on the FEMA Memorandum.

## 5.5 REPETITIVE FLOOD LOSS MITIGATION STRATEGIES

It is important to note while this section addresses RL/SRL properties, specific funding mechanisms for mitigation have been changed significantly by the *Biggert-Waters Flood Insurance Reform Act of 2012*. As has been noted in Section 1.2.2 and in



Appendix F, Capability Assessment, RFC and SRL mitigation grant programs, within the overarching HMA program, have been consolidated into the FMA program. For more information please refer to the previously mentioned sections.

To prepare the 2010 mitigation plan update, an extensive analysis of RL and SRL data was performed. Four data sets were provided for the data analysis:

- RL properties in West Virginia, taken from BureauNet (Rep Loss List.xls)
- SRL properties in West Virginia, taken from BureauNet (SRL List.xls)
- Mitigated properties in West Virginia, provided by the State (November-3,2009.xls)
- Properties that received Increased Cost of Compliance (ICC) funding, taken from BureauNet (ICC report.xls)

The goal of the data amelioration was to combine all four datasets to determine which RL properties were SRL properties, which have been mitigated, and which received ICC funding. The SRL data set was added into the RL data set using the VLOOKUP function in Excel, based on the unique Property Locator number assigned in BureauNet. All 59 SRL properties in West Virginia were on the RLlist.

The mitigated properties were located in the RL list manually; individual properties were searched for based on municipality, address (if available), and policy holder name. It was not possible to determine whether many of the mitigated properties were RL structures because, in many cases, street addresses were not available. A total of 56 mitigated properties were found on the RL llist.

The ICC properties were located in the RL list manually; individual properties were searched for based on municipality and street address. Policy holder names were not available for the ICC data. A total of 28 ICC properties were found on the RL List.

## 5.6 COORDINATION WITH REPETITIVE LOSS COMMUNITIES

The RL dataset analysis allowed the DHSEM mitigation staff to target mitigation of RL and SRL properties at two levels in the 2010 Plan Update. Strategies in Chapter 4 of the plan address risk assessment, mitigation of high hazard structures, and planning and policy. These actions have been completed and will be continued through the implementation of the 2013 Plan. All of these actions support a robust State program to mitigate repetitive loss and severe repetitive loss properties. This analysis process was followed to analyze and update the 2013 Plan Update. To support this, DHSEM will contact each of the West Virginia communities with RL properties in writing to inform them of the program. In addition, the State will make the initial contact with property owners and then provide technical support to local governments in development of HMA grant mitigation applications for interested property owners.



DHSEM mitigation staff will provide outreach and education support to communities interested in such mitigation projects. This highlights successful mitigation techniques employed by southern West Virginia counties.

## 5.7 INCORPORATING LOCAL MITIGATION PLAN RESULTS INTO THE STATE PLAN

As discussed in Chapter 2, DHSEM Mitigation Plan contractor has incorporated all relevant county plan risk assessment, capability assessment and mitigation goals, objectives, actions, and strategies into a spreadsheet for upload into the 2010 State Plan Update. This same process was used for the 2013 State plan update. This process was initiated because the database described in the 2007 update was not populated as local plans were updated beginning in 2009. All updated plans were incorporated into this Excel spreadsheet except those not completed and approved by June 2010 per guidance from FEMA Region III. Local plans did not have detailed or consistent approaches to HIRA development, vulnerability analysis, or capability assessment, so the results of the upload are uneven. However, the dataset serves to provide a fascinating view of how different county mitigation teams view their hazard vulnerabilities and their approaches to mitigate those hazards.

The spreadsheet is organized into six worksheets that describe in detail the content and status of each local plan:

- Simplified Hazard Rankings
- Hazard Ranking
- Loss Estimation
- Critical Facility Data
- Land Use and Development
- Capability Assessment
- Actions

The local plan update effort will support targeted technical assistance in local or regional plan comprehensive HIRA/vulnerability analysis updates for future local plan updates using the 2013 State plan datasets. Continuous review of the local mitigation actions dataset can inform FEMA-State Post-disaster Mitigation Strategies to help target disaster mitigation, HMGP, and long-term recovery activities. These strategy listings can also help DHSEM anticipate HMA grant interest as mitigation projects are prioritized in some of the local plans. The Local and Regional Mitigation Plan Strategies Database has been maintained and updated with hundreds of records that reflect the content and strategies contained within each local plan. This database is





used to inform the funding process whereby points are given in the mitigation review process to projects that are listed and prioritized in local all-hazard mitigation plans. A section of the worksheets may be found displayed in Appendix H; the complete spreadsheet has been provided to DHSEM digitally.

As described in Chapters 1 and 3, the local plan HIRA information from local and regional plans has been uploaded into the State hazard mitigation database. Special emphasis was placed on localized hazard history and listing of vulnerable critical facilities.





## CHAPTER 6: PLAN MONITORING, MAINTENANCE & REVISION

### DISASTER MITIGATION ACT OF 2000

#### 44 Code of Federal Regulations

**§201.4(c)(5)(i):** *[The Standard State Plan Maintenance Process must include an] established method and schedule for monitoring, evaluating, and updating the plan.*

- A. *Does the new or updated plan describe the method and schedule for monitoring the plan? (e.g., identifies the party responsible for monitoring, includes schedule for reports, site visits, phone calls, and/or meetings)*
- B. *Does the new or updated plan describe the method and schedule for evaluating the plan? (e.g., identifies the party responsible for evaluating the plan, includes the criteria used to evaluate the plan)*
- C. *Does the new or updated plan describe the method and schedule for updating the plan?*
- D. *Does the updated plan include an analysis of whether the previously approved plan's method and schedule worked, and what elements or processes, if any, were changed?*

**§201.4(c)(5)(ii):** *[The Standard State Plan Maintenance Process must include a] system for monitoring implementation of mitigation measures and project closeouts.*

**Requirement §201.4(c)(5)(iii):** *[The Standard State Plan Maintenance Process must include a] system for reviewing progress on achieving goals as well as activities and projects in the Mitigation Strategy.*

- A. *Does the new or updated plan describe how mitigation measures and project closeouts will be monitored?*
- B. *Does the new or updated plan identify a system for reviewing progress on achieving goals in the Mitigation Strategy?*
- C. *Does the updated plan describe any modifications, if any, to the system identified in the previously approved plan to track the initiation, status, and completion of mitigation activities?*
- A. *Does the new or updated plan identify a system for reviewing progress on implementing activities and projects of the Mitigation Strategy?*
- B. *Does the updated plan discuss if mitigation actions were implemented as planned?*

### 6.1 PLAN MONITORING PROCEDURES

The West Virginia Statewide Standard Hazard Mitigation Plan (HMP) was initially approved during the summer of 2004. The first plan update was approved on October 18, 2007, and the second plan update was approved on October 18, 2010. Approval of the plan at three-year intervals is required by 44 Code of Federal Regulations so that West Virginia will continue to be eligible for the Federal Emergency Management



Agency's (FEMA's) post-disaster Public Assistance (PA) Program and Hazard Mitigation Assistance (HMA) Programs. Based on this three-year update cycle, an updated, approved, and adopted plan would be required in 2016. However, there has been significant discussion of changing this requirement to a five-year update cycle. Were this change to occur, the next update would be projected for 2018.

Each of these plans was prepared in partnership with the State's Hazard Mitigation Council (HMC). The 2013 plan is consistent with FEMA's HMP guidance and crosswalk. As discussed in Chapter 1 (Introduction) and Chapter 2 (Planning Process), it was determined early in the plan update process that the plan would address natural hazards along with selected human-caused hazards with natural hazard implications such as levees. Further, the plan vulnerability analysis emphasizes critical facilities mitigation. Supplementing the plan was a Threats and Hazard Identification and Risk Assessment performed in accordance with CPG201 requirements. That analysis will be reviewed and updated annually as FEMA prescribes.

When considering continuity of critical operations in the context of State services and facilities, the impacts of natural hazards can be similar or identical to the potential impact of a human-caused event. For example, in the aftermath of severe floods or winter storms, tens of thousands of West Virginians can be without power, some for as long as two weeks. A human-caused event that causes failure of a power plant due to operation error or terrorism would have similar impacts on West Virginia's critical facilities. In other words, a power outage is a power outage whether caused by downed lines and transformers from debris, snow, ice or mechanical failure. While the plan does not specifically consider human-caused hazards, the "crosswalk" to continuity of critical operations demonstrates that many of the strategies and projects included in the plan also strongly support reduction of exposure to human-caused hazards.

As part of the 2013 plan update process, the progress of ongoing programs or projects was evaluated by agency personnel. Those that remain viable or reflect an ongoing program, activity, or project are included in this Plan Update in Chapter 4 - Mitigation Strategy and Appendix H. In addition, the 2013 planning process developed mitigation actions along four subject areas. These were then re-categorized according to specific goals. The development process and the final mitigation actions are documented in Chapter 4, as well as in Appendix H, along with a tracking and updating tool. New actions, strategies and projects were developed by the Department of Homeland Security and Emergency Management (DHSEM) and the West Virginia HMC during March and April 2013.

Also in Appendix H is the 2013 mitigation action tracker, which includes the updated 2013 mitigation actions. Local plan updates that have occurred since 2010 can be



found in Appendix G. As was done for the 2010 Plan Update, specific annual update targets have been established with firm due dates, as presented in the maintenance schedule that follows in section 6.1.3.

These actions include specific strategies to target RL and SRL properties for mitigation through the five Unified HMA grant programs as well as other appropriate funding sources. This plan enables West Virginia to qualify for up to 100% and 90% of Federal cost-share funding for SRL and RL properties respectively under the FMA Program. Guidance released by FEMA in 2013 clarifies these changes. Gaps and resolution of identified problems through data are included in the objectives, strategies, and projects listed in Chapter 4 – Mitigation Strategy..

### 6.1.1 TRACKING STRATEGIES AND PROJECTS

The 2013 West Virginia HMP Update provides guidance for hazard mitigation within West Virginia. Its vision is supported by five goals, numerous supporting objectives, and targeted mitigation strategies for the West Virginia State government that will reduce or prevent injury to citizens from natural hazards, reduce damage to property, and maintain operation of critical State and local facilities. The strategies and projects that support the objectives organized within the five goal groups were submitted by West Virginia State agencies, colleges, and universities along with Federal agency cooperators and related non-governmental organizations. These strategies and projects were determined during the March 22, 2013, meeting of the HMC. As described in Section 4.1.2 outlining goals, objectives, strategies, and projects, projects were prioritized by the subcommittees.

As State HMPs must be revised three years after FEMA approval, West Virginia agencies that initiated a strategy or project were asked to report on the progress and accomplishments of each strategy and project during winter 2013. They were also asked to evaluate the relevance of goals, objectives, strategies, and projects that were not accomplished due to inadequate funding or other barriers. This discussion continued at the March 2013 HMC meeting and during subcommittee conference calls.

Many of the projects identified in previous versions of the West Virginia Plan were completed. However, due to funding constraints, some additional strategies have not yet been initiated or completed.

The 2013 mitigation strategies were wholly informed by the vastly improved Vulnerability Analysis and renewed priorities of the State. The continued relevance of current goals, objectives, strategies, and projects will be evaluated during the development of the next plan revision. Agencies will continue to integrate mitigation activities with their planning efforts.



### 6.1.2 MITIGATION DATABASE MAINTENANCE

The DHSEM mitigation staff will maintain a Mitigation Strategy spreadsheet that has been developed in accordance with this plan. The West Virginia hazard mitigation program planner will be primarily responsible for this task, with redundancy provided by the State Hazard Mitigation Officer (SHMO), State Mitigation Project Officers, and contractual assistance. It is anticipated that major aspects of this task during the three- year cycle following plan approval will include:

- Continued development of protocol for local data input
- Inclusion of local §322 plan databases from local Hazard Identification and Risk Assessments (HIRAs), Capability Assessments, and local priority mitigation strategies
- Expansion of State hazard historical data
- Refinement of State agency facility inventories
- Continued expansion of databases to target critical facilities” to enhance Continuity of Operations Plans (COOPs) and human-caused vulnerability assessment

An additional need is to disperse the new HIRA and Vulnerability Analysis to regional planners and local emergency managers for use in local plan updates. It is anticipated that regional planers can use new state HIRA data in their next cycle of plan updates. As local plans are updated, their HIRA information will be uploaded into the local plan tracker tool at the time the local plan is crosswalked so that local vulnerability as characterized in local plans is continually updated. This iterative process of updating the local plan data base to reflect annual accomplishment of mitigation actions and plan update HIRA data will facilitate a much easier local plan upload process for the next update of the State HMP.

### 6.1.3 PLAN MAINTENANCE

The HMC was created to support development of the plan through an Executive Order on August 16, 2003. Although planning committees are generally limited to 20 participants or fewer, the State broadened the committee to include all who participated by attending HMC meetings, sponsored projects, provided information, and reviewed the plan draft. State staff emphasized participation in the manner that was appropriate for each agency and organization. To develop the 2013 plan mitigation strategies, a subcommittee structure was created to:

- **FACILITATE** plan implementation;
- **BROADEN** the database to include data input from local plans;
- **EXPAND** the planning process to target appropriate mitigation actions;



- **TARGET** hazard mitigation education; and
- **SUPPORT** modification of State facilities to minimize impacts from hazards.

Standing, adhoc Mitigation Sub-Committees will be convened, surveyed, or engaged periodically as necessary during the next plan implementation cycle as this method of review worked successfully for the 2010-2013 update. These subcommittees will be responsible for:

- Mitigation of High Hazard Structures
- Planning, Policy, Legislation, and Funding
- Education and Outreach
- Risk Assessment

The West Virginia DHSEM mitigation program staff, in consultation with key State agencies, Federal partners, and other organizations will continue to direct implementation of the plan. DHSEM serves as the lead coordinating agency for emergency management in West Virginia, and thus will continue to lead the mitigation planning effort, including plan maintenance.

The DHSEM will track projects identified in both the State HMP and in local plans using the tracking spreadsheets developed for the 2010 Plan Update. The State HMP spreadsheets (in Excel) list jurisdiction-specific mitigation strategies, record the type of project (i.e., elevation, zoning and land use, or education), estimated cost, potential funding sources, timeframe, and §322 and FMA plan approval dates. The projects are also identified as being in one of the four main mitigation categories of the State HMP: Policy, Planning and Funding, Mitigation of High-Hazard Structures, Risk Assessment, or Education and Outreach. Policies may need revision and in some cases legislation may be necessary to facilitate accomplishment of key mitigation strategies. Subcommittee functions will continue as necessary to support implementation efforts.

The planning process timeline will be revised continually during the next three years to ensure that the plan revision can be prepared and submitted to FEMA within the required time period. Special attention will continue to be focused on ensuring that businesses and special interest groups are included and have an input into the plan revision. The planning process will emphasize the expanded vulnerability assessment of the database of local and State critical facilities and the redevelopment of strategies for the intended purpose of continued proactive assistance to the most vulnerable citizens and assets of West Virginia. State or Federal legislative, regulatory or rule changes or additions that have occurred during the period following approval of the 2010 Plan have been integrated into the 2013 Update.



Should a specific plan element or section require revision or amendment prior to the subsequent plan revision due to State or Federal legislation or policy change, DHSEM staff will meet with all appropriate stakeholders and propose the change or addendum to FEMA as quickly as is practicable.

#### 6.1.4 REPORTING

The sponsors of projects and strategies funded through the FEMA Unified HMA Program provide quarterly progress reporting to DHSEM throughout the duration of the project. DHSEM consolidates these reports into a quarterly summary that is provided to FEMA. Projects that support specific aspects of the HMP will be tracked on the Mitigation Strategies Spreadsheet so that specific FEMA-funded initiatives are tracked to achievement of HMP strategies.

#### 6.1.5 EXPANSION OF HAZARD MITIGATION COUNCIL

The West Virginia HMC, first envisioned and convened during 2003, was composed of representatives from State agencies, State colleges and universities, partner Federal agencies, and related organizations. The 2007 HMC was essentially comprised of the same organizations. The HMC was expanded for the 2010 Plan Update and further expanded for the current plan update. West Virginia will, however, seek to expand participation in the mitigation planning process through expansion of the HMC to represent regional planners, other State agencies and non-governmental organizations. This expansion will focus on implementation of this plan update as well as to inform the next plan update. Revisions will include local plan critical facilities locations depicted in local HIRAs as well as priority local mitigation projects. Anticipated stakeholders that are to be included in future activities of the council will include local government and Planning Development Councils to ensure that local plan stakeholders are also represented.

Invitees include will also include representatives of the following organizations:

- Department of General Services;
- WV Division of Homeland Security and Emergency Management/Emergency Operations Center;
- Department of Transportation;
- Department of Corrections
- West Virginia Housing Development Fund
- State college and university representatives
- Department of Housing and Urban Development (HUD)
- Chambers of Commerce
- WV Floodplain Managers Association
- U.S. Department of Agriculture Forest Service





- WV Division of Parks

#### 6.1.6 PROJECT CLOSEOUT

Project Closeout is the process that finalizes a completed mitigation project that FEMA has funded. Project closeouts will continue to be conducted based on FEMA Region III closeout procedures in accordance with national and regional FEMA guidance along with DHSEM financial management procedures. Projects and activities funded through other Federal or State grant programs, State general funds, or that can be achieved without targeted funding will be completed as dictated by the funding source or State program with administrative oversight for the activity of the project. The following description of the closeout process comes directly from the West Virginia Administration Plan, Section XIX Closeout Procedures. This document is revised annually. The most current version at the time of this writing was revised December 10, 2012, and is available in Appendix L of this plan.



**TABLE 6-1. SCHEDULE FOR PLAN MAINTENANCE AND REVISION. (THIS TIMELINE ASSUMES A FIVE-YEAR UPDATE CYCLE.)**

<b>TASK</b>	<b>RESPONSIBILITY</b>	<b>TIME FRAME</b>
1. Refine Planning Process and timeline for new plan development	DHSEM Mitigation Staff Planning and Public Policy Sub-committee	Ongoing
2. Expand data base	Risk Assessment Sub-Committee WVU	Ongoing
3. Pursue FY 2011, 2012 and 2013 Unified HMA Grant funding for “Critical” and “High” ranked strategies and projects. Continue to match available HMGP funds to priority projects, especially to mitigate severe repetitive and repetitive loss structures	DHSEM Mitigation Staff Project sponsors	Ongoing
4. Continue working with local plan and state contacts on plan implementation – use the DHSEM Mitigation Project Spreadsheet to track projects	DHSEM Mitigation Staff Project sponsors	Ongoing
5. Use available tools and resources to apply vulnerability analysis to manmade hazard mitigation where cross-program relationships exist	DHSEM Terrorism Staff and Hazard Mitigation Staff Geospatial Information System (GIS) database Commodity flow studies Local sample Hazmat Terrorism Consequence Management Plans State Agency COOP Plans	Ongoing
6. Convene the State Steering Committee Members to discuss plan implementation, the submittal of additional mitigation activities, and to lay the groundwork for future HIRA, Vulnerability Assessment and strategy changes to the State Plan	State Emergency Coordinator DHSEM Mitigation Staff - ongoing Risk Assessment Sub-Committee Members	January 1, 2014 January 1, 2015 January 1, 2016
7. Evaluate progress on strategies and projects	DHSEM Mitigation Staff Strategy & Project Sponsors	January 1, 2014 January 1, 2015 January 1, 2016 January 1, 2017 January 1, 2018
8. Upload Local Plan Updates	DHSEM Mitigation Staff	Annually through January, 2018
9. Initiate review and revision of 2010 HIRA and Vulnerability Analysis	DHSEM Mitigation Staff	July 1, 2017
10. Review current regulatory requirements for plan revision	DHSEM Mitigation Staff	March, 2018
11. Review and Update of 2010 Mitigation Goals and Strategies	DHSEM Mitigation Staff Mitigation Council Committee Members Strategy and Project Sponsors	April 1, 2018
12. Draft Review	DHSEM Mitigation Staff Steering Committee Members	July 1, 2018
13. Submit new Revised All-Hazard Mitigation Plan to FEMA	State Emergency Coordinator	August 1, 2018

**PROJECT CLOSEOUT**

- The subgrantee will notify the State Hazard Mitigation Officer (SHMO) when a project is ready to be closed. It is recognized that, based upon performance period deadlines, the State Hazard Mitigation Officer (SHMO) may suggest project closure to FEMA.



- The seven steps to closure of a project are:
  1. Agreement between the subgrantee and the State that the project is ready to be closed. Should either not agree, the project manager or the State Hazard Mitigation Officer (SHMO) would request an extension, in writing, outlining the request's justification.
  2. The sub-grantee, the State, and FEMA will coordinate to make sure that funds advanced through the program balance with funds expended by the State and sub-grantee. If there is disagreement between the expended funds and the grant amount, FEMA and the State take steps to reconcile and adjust final project expenditures and Grantee Management Costs..
  3. The State will submit a final project report that includes:
    - Final Financial and Progress Report to FEMA (if applicable)
    - Final Letter of Credit Payment Request.
    - FEMA Form 20-18, Report of Government Property
    - Photos, Property Survey Inventory spreadsheet, etc. to validate expenditures.
  4. The State will conduct site visits for all projects to ensure the approved scope of work was completed. Will provide FEMA with a letter confirming final inspection and that all final payments have been made to project.
  5. FEMA and the State will coordinate their financial systems to record the amount and date of the final payment(s). Financial files will be closed and excess funds will be de-obligated.
  6. The State will provide FEMA with a letter requesting closure of the project. The information and enclosures:
    - Project name, Federal Project number, State identification number.
    - Financial summary of the project.
    - Certifications:
      - All eligible funds paid to subgrantee.
      - All work completed according to FEMA and State requirements.
      - All costs incurred as the result of eligible work.
      - All work completed in accordance with provisions of the FEMA/State and State/Local agreements.
      - All payments made according to Federal and State legal and regulatory requirements.
      - No bills are outstanding.



- No further requests for funding will be made for the project.

### PROGRAM CLOSEOUT

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- When all projects under a single disaster are closed, the entire program is ready for closure. The steps that comprise program closeout are as follows:
  1. Any mission assignments and technical assistance contracts will be closed out.
  2. There will be agreement between FEMA and the State on the Final Claim Amount and concurrence date. The State will submit a concurrence letter and sign FEMA Form 425.
  3. The HMGP will be closed in program and financial systems. FEMA and the State Hazard Mitigation Officer (SHMO) are responsible for ensuring that Federal and State records are available in the event of an audit.
- State specific responsibilities for the HMGP closeout process may be found in the 2010 HMA Unified Guidance Part VI, D.1, D.2 and D.2.1
- All records will be maintained for a minimum three years.



## APPENDIX A: FEDERAL HAZARD MITIGATION PLANNING REGULATIONS

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# Federal Register

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**Tuesday,  
February 26, 2002**

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**Part III**

**Federal Emergency  
Management Agency**

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**44 CFR Parts 201 and 206**

**Hazard Mitigation Planning and Hazard  
Mitigation Grant Program; Interim Final  
Rule**

**FEDERAL EMERGENCY  
MANAGEMENT AGENCY**

**44 CFR Parts 201 and 206**

RIN 3067-AD22

**Hazard Mitigation Planning and Hazard  
Mitigation Grant Program**

**AGENCY:** Federal Emergency  
Management Agency.

**ACTION:** Interim final rule.

**SUMMARY:** This rule addresses State mitigation planning, identifies new local mitigation planning requirements, authorizes Hazard Mitigation Grant Program (HMGP) funds for planning activities, and increases the amount of HMGP funds available to States that develop a comprehensive, enhanced mitigation plan. This rule also requires that repairs or construction funded by a disaster loan or grant must be carried out in accordance with applicable standards and says that FEMA may require safe land use and construction practices as a condition of grantees receiving disaster assistance under the Stafford Act.

**DATES:** *Effective Date:* February 26, 2002.

*Comment Date:* We will accept written comments through April 29, 2002.

**ADDRESSES:** Please send written comments to the Rules Docket Clerk, Office of the General Counsel, Federal Emergency Management Agency, 500 C Street, SW., room 840, Washington, DC 20472, (facsimile) 202-646-4536, or (email) [rules@fema.gov](mailto:rules@fema.gov).

**FOR FURTHER INFORMATION CONTACT:** Margaret E. Lawless, Federal Insurance and Mitigation Administration, Federal Emergency Management Agency, 500 C Street, SW., Washington, DC, 20472, 202-646-3027, (facsimile) 202-646-3104, or (email) [margaret.lawless@fema.gov](mailto:margaret.lawless@fema.gov).

**SUPPLEMENTARY INFORMATION:**

**Introduction**

Throughout the preamble and the rule the terms “we”, “our” and “us” refer to FEMA.

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act or the Act), 42 U.S.C. 5165, enacted under § 104 the Disaster Mitigation Act of 2000, (DMA 2000) P.L. 106-390, provides new and revitalized approaches to mitigation planning. This section: (1) Continues the requirement for a Standard State Mitigation plan as a condition of disaster assistance; (2) provides for States to receive an increased

percentage of HMGP funds (from 15 to 20 percent of the total estimated eligible Federal assistance) if, at the time of the declaration of a major disaster, they have in effect a FEMA-approved Enhanced State Mitigation Plan that meets the factors listed in this rule; (3) establishes a new requirement for local mitigation plans; and (4) authorizes up to 7 percent of the HMGP funds available to a State to be used for development of State, tribal, and local mitigation plans. We will give Indian tribal governments the opportunity to fulfill the requirements of § 322 either as a grantee or a subgrantee. An Indian tribal government may choose to apply for HMGP funding directly to us and would then serve as a grantee, meeting the State level responsibilities, or it may apply through the State, meeting the local government or subgrantee responsibilities.

Section 322, in concert with other sections of the Act, provides a significant opportunity to reduce the Nation’s disaster losses through mitigation planning. In addition, implementation of planned, pre-identified, cost-effective mitigation measures will streamline the disaster recovery process. The Act provides a framework for linking pre- and post-disaster mitigation planning and initiatives with public and private interests to ensure an integrated, comprehensive approach to disaster loss reduction. The language in the Act, taken as a whole, emphasizes the importance of strong State and local planning processes and comprehensive program management at the State level. The new planning criteria also support State administration of the HMGP, and contemplate a significant State commitment to mitigation activities, comprehensive State mitigation planning, and strong program management.

The planning process also provides a link between State and local mitigation programs. Both State level and local plans should address strategies for incorporating post-disaster early mitigation implementation strategies and sustainable recovery actions. We also recognize that governments are involved in a range of planning activities and that mitigation plans may be linked to or reference hazardous materials and other non-natural hazard plans. Improved mitigation planning will result in a better understanding of risks and vulnerabilities, as well as to expedite implementation of measures and activities to reduce those risks, both pre- and post-disaster.

Section 409 of the Stafford Act, 42 U.S.C. 5176, which required mitigation

plans and the use of minimum codes and standards, was repealed by the DMA 2000. These issues are now addressed in two separate sections of the law: mitigation planning is in section 322 of the Act, and minimum codes and standards are in section 323 of the Act. We previously implemented section 409 through 44 CFR Part 206, Subpart M. Since current law now distinguishes the planning from the codes and standards in separate sections, we will address them in different sections of the CFR. We address the new planning regulations in Part 201 to reflect the broader relevance of planning to all FEMA mitigation programs, while the minimum standards remain in Part 206, Federal Disaster Assistance, Subpart M. The regulations implementing the Hazard Mitigation Grant Program are in Part 206, Subpart N. This rule also contains changes to Subpart N, to reflect the new planning criteria identified in section 322 of the Act.

The administration is considering changes to FEMA’s mitigation programs in the President’s Budget for FY 2003. However, States and localities still would be required to have plans in effect, which meet the minimum requirements under this rule, as a condition of receiving mitigation assistance after November 1, 2003.

*Implementation Strategy.* States must have an approved hazard mitigation plan in order to receive Stafford Act assistance, excluding assistance provided pursuant to emergency provisions. These regulations provide criteria for the new two-tiered State mitigation plan process: Standard State Mitigation Plans, which allow a State to receive HMGP funding based on 15 percent of the total estimated eligible Stafford Act disaster assistance, and Enhanced State Mitigation Plans, which allow a State to receive HMGP funds based on 20 percent of the total estimated eligible Stafford Act disaster assistance. Enhanced State Mitigation Plans must demonstrate that the State has developed a comprehensive mitigation program, that it effectively uses available mitigation funding, and that it is capable of managing the increased funding. All State Mitigation Plans must be reviewed, revised, and re-approved by FEMA every three years. An important requirement of the legislation is that we must approve a completed enhanced plan *before* a disaster declaration, in order for the State to be eligible for the increased funding.

We will no longer require States to revise their mitigation plan after every disaster declaration, as under former

section 409 of the Act, 42 U.S.C. 5176. We recommend, however, that States consider revising their plan if a disaster or other circumstances significantly affect its mitigation priorities. States with existing mitigation plans, approved under former section 409, will continue to be eligible for the 15 percent HMGP funding until November 1, 2003, when all State mitigation plans must meet the requirements of these regulations. If State plans are not revised and approved to meet the Standard State Mitigation Plan requirements by that time, they will be ineligible for Stafford Act assistance, excluding emergency assistance.

Indian tribal governments may choose to apply directly to us for HMGP funding, and would therefore be responsible for having an approved State level mitigation plan, and would act as the grantee. If an Indian tribal government chooses to apply for HMGP grants through the State, they would be responsible for having an approved local level mitigation plan, and would serve as a subgrantee accountable to the State as grantee.

This rule also establishes local planning criteria so that these jurisdictions can actively begin the hazard mitigation planning process. This requirement is to encourage the development of comprehensive mitigation plans before disaster events. Section 322 requires local governments to have an approved local mitigation plan to be eligible to receive an HMGP project grant; however, this requirement will not fully take effect until November 1, 2003. FEMA Regional Directors may grant an exception to this requirement in extenuating circumstances. Until November 1, 2003, local governments will be able to receive HMGP project grant funds and may prepare a mitigation plan concurrently with implementation of their project grant. We anticipate that the Predisaster Mitigation program authorized by section 203 of the Act, 42 U.S.C. 5133, will also support this local mitigation planning by making funds available for the development of comprehensive local mitigation plans. Managing States that we approve under new criteria established under section 404 of the Act, 42 U.S.C. 5170c(c), as amended by section 204 of DMA 2000 will have approval authority for local mitigation plans. This provision does not apply to States that we approved under the Managing State program in effect before enactment of DMA 2000.

Our goal is for State and local governments to develop comprehensive and integrated plans that are coordinated through appropriate State,

local, and regional agencies, as well as non-governmental interest groups. To the extent feasible and practicable, we would also like to consolidate the planning requirements for different FEMA mitigation programs. This will ensure that one local plan will meet the minimum requirements for all of the different FEMA mitigation programs, such as the Flood Mitigation Assistance Program (authorized by sections 553 and 554 of the National Flood Insurance Reform Act of 1994, 42 U.S.C. 4104c and 42 U.S.C. 4104d), the Community Rating System (authorized by section 541 of the National Flood Insurance Reform Act of 1994, 42 U.S.C. 4022), the Pre-Disaster Mitigation Program (authorized by section 203 of the Stafford Act), the Hazard Mitigation Grant Program (authorized by section 404 of the Stafford Act), and the mitigation activities that are based upon the provisions of section 323 and subsections 406(b) and (e) of the Stafford Act. The mitigation plans may also serve to integrate documents and plans produced under other emergency management programs. State level plans should identify overall goals and priorities, incorporating the more specific local risk assessments, when available, and including projects identified through the local planning process.

Under section 322(d), up to 7 percent of the available HMGP funds may now be used for planning, and we encourage States to use these funds for local plan development. In a memorandum to FEMA Regional Directors dated December 21, 2000, we announced that this provision of section 322 was effective for disasters declared on or after October 30, 2000, the date on which the Disaster Mitigation Act of 2000 became law. Regional Directors are encouraging States to make these funds immediately available to local and Indian tribal governments, although the funds can be used for plan development and review at the State level as well.

As discussed earlier in this Supplementary Information, subsection 323(a) of the Stafford Act, 42 U.S.C. 5166(a), requires as a precondition to receiving disaster assistance under the Act that State and local governments, as well as eligible private nonprofit entities, must agree to carry out repair and reconstruction activities "in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications, and standards." In addition, that subsection authorizes the President (FEMA, by virtue of Executive Order 12148, as amended) to "require safe land use and construction practices,

after adequate consultation with appropriate State and local officials" in the course of the use of Federal disaster assistance by eligible applicants to repair and restore disaster-damaged facilities.

At the same time that we implement the planning mandates of section 322 of the Stafford Act, we are also implementing the Minimum Standards for Public and Private Structures provision of section 323 of the Act. This rule appears at Subpart M of Part 206 of Title 44 of the Code of Federal Regulations. As mentioned earlier, the section 322 planning regulations are in Part 201, while Part 206, Subpart M includes only the minimum codes and standards regulations mandated in § 323. The rule to implement § 323 of the Act reinforces the link between pre-disaster planning, building and construction standards, and post-disaster reconstruction efforts.

We encourage comments on this interim final rule, and we will make every effort to involve all interested parties prior to the development of the Final Rule.

#### **Justification for Interim Final Rule**

In general, FEMA publishes a rule for public comment before issuing a final rule, under the Administrative Procedure Act, 5 U.S.C. 533 and 44 CFR 1.12. The Administrative Procedure Act, however, provides an exception from that general rule where the agency for good cause finds the procedures for comment and response contrary to public interest. Section 322 of the Stafford Act allows States to receive increased post-disaster grant funding for projects designed to reduce future disaster losses. States will only be eligible for these increased funds if they have a FEMA-approved Enhanced State Mitigation Plan.

This interim final rule provides the criteria for development and approval of these plans, as well as criteria for local mitigation plans required by this legislation. In order for State and local governments to be positioned to receive these mitigation funds as soon as possible, these regulations must be in effect. The public benefit of this rule will be to assist States and communities assess their risks and identify activities to strengthen the larger community and the built environment in order to become less susceptible to disasters. Planning serves as the vital foundation to saving lives and protecting properties, having integrated plans in place can serve to both streamline recovery efforts and lessen potential future damages. Therefore, we believe it is contrary to the public interest to delay



the benefits of this rule. In accordance with the Administrative Procedure Act, 5 U.S.C. 553(d)(3), we find that there is good cause for the interim final rule to take effect immediately upon publication in the **Federal Register** in order to meet the needs of States and communities by identifying criteria for mitigation plans in order to reduce risks nationwide, establish criteria for minimum codes and standards in post-disaster reconstruction, and to allow States to adjust their mitigation plans to receive the increase in mitigation funding.

In addition, we believe that, under the circumstances, delaying the effective date of this rule until after the comment period would not further the public interest. Prior to this rulemaking, FEMA hosted a meeting where interested parties provided comments and suggestions on how we could implement these planning requirements. Participants in this meeting included representatives from the National Emergency Management Association, the Association of State Floodplain Managers, the National Governors' Association, the International Association of Emergency Managers, the National Association of Development Organizations, the American Public Works Association, the National League of Cities, the National Association of Counties, the National Conference of State Legislatures, the International City/County Management Association, and the Bureau of Indian Affairs. We took comments and suggestions provided at this meeting into account in developing this interim final rule. Therefore, we find that prior notice and comment on this rule would not further the public interest. We actively encourage and solicit comments on this interim final rule from interested parties, and we will consider them in preparing the final rule. For these reasons, we believe we have good cause to publish an interim final rule.

#### **National Environmental Policy Act**

44 CFR 10.8(d)(2)(ii) excludes this rule from the preparation of an environmental assessment or environmental impact statement, where the rule relates to actions that qualify for categorical exclusion under 44 CFR 10.8(d)(2)(iii), such as the development of plans under this section.

#### **Executive Order 12866, Regulatory Planning and Review**

We have prepared and reviewed this rule under the provisions of E.O. 12866, Regulatory Planning and Review. Under Executive Order 12866, 58 FR 51735, October 4, 1993, a significant regulatory

action is subject to OMB review and the requirements of the Executive Order. The Executive Order defines "significant regulatory action" as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The purpose of this rule is to implement section 322 of the Stafford Act which addresses mitigation planning at the State, tribal, and local levels, identifies new local planning requirements, allows Hazard Mitigation Grant Program (HMGP) funds for planning activities, and increases the amount of HMGP funds available to States that develop a comprehensive, enhanced mitigation plan. The rule identifies local mitigation planning requirements before approval of project grants, and requires our approval of an Enhanced State Mitigation plan as a condition for increased mitigation funding. The rule also implements section 323 of the Stafford Act, which requires that repairs or construction funded by disaster loans or grants must comply with applicable standards and safe land use and construction practices. As such the rule itself will not have an effect on the economy of more than \$100,000,000.

Therefore, this rule is a significant regulatory action and is not an economically significant rule under Executive Order 12866. The Office of Management and Budget (OMB) has reviewed this rule under Executive Order 12866.

#### **Executive Order 12898, Environmental Justice**

Under Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 FR 7629, February 16, 1994, we incorporate environmental justice into our policies and programs. The Executive Order requires each Federal agency to conduct its programs, policies, and activities that substantially affect human health or the

environment, in a manner that ensures that those programs, policies, and activities do not have the effect of excluding persons from participation in our programs, denying persons the benefits of our programs, or subjecting persons to discrimination because of their race, color, or national origin.

No action that we can anticipate under the final rule will have a disproportionately high or adverse human health and environmental effect on any segment of the population. Section 322 focuses specifically on mitigation planning to: Identify the natural hazards, risks, and vulnerabilities of areas in States, localities, and tribal areas; support development of local mitigation plans; provide for technical assistance to local and tribal governments for mitigation planning; and identify and prioritize mitigation actions that the State will support, as resources become available. Section 323 requires compliance with applicable codes and standards in repair and construction, and use of safe land use and construction standards. Accordingly, the requirements of Executive Order 12898 do not apply to this interim final rule.

#### **Paperwork Reduction Act of 1995**

As required by the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)) and concurrent with the publication of this interim final rule, we have submitted a request for review and approval of a new collection of information, which is contained in this interim final rule. Under the Paperwork Reduction Act of 1995, a person may not be penalized for failing to comply with an information collection that does not display a currently valid Office of Management and Budget (OMB) control number. The request was submitted to OMB for approval under the emergency processing procedures in OMB regulation 5 CFR 1320.1. OMB has approved this collection of information for use through August 31, 2002, under OMB Number 3067-0297.

We expect to follow this emergency request with a request for OMB approval to continue the use of the collection of information for a term of three years. The request will be processed under OMB's normal clearance procedures in accordance with provisions of OMB regulation 5 CFR 1320.10. To help us with the timely processing of the emergency and normal clearance submissions to OMB, we invite the general public to comment on the collection of information. This notice and request for comments complies with the provisions of the Paperwork

Reduction Act of 1995 (44 U.S.C. 3506(c)(2)(A)).

**Collection of Information**

*Title:* State/Local/Tribal Hazard Mitigation Plans under Section 322 of the Disaster Mitigation Act of 2000.

*Abstract:* Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended by Section 104 of the Disaster Mitigation Act of 2000, provides new and revitalized approaches to mitigation planning. To obtain Federal assistance, new planning provisions require that each state, local, and tribal government prepare a hazard mitigation plan to include sections that describe the planning process, an assessment of the risks, a mitigation strategy, and identification of the plan maintenance and updating process. The Act provides a framework for linking pre- and post-disaster mitigation planning and initiatives with public and

private interests to ensure an integrated, comprehensive approach to disaster loss reduction. Under Section 322 there is a two-tiered State mitigation plan process. State mitigation plans must be reviewed, revised, and submitted to us every 3 years.

(1) A *Standard State Mitigation Plan* must be approved by us in order for States to be eligible to receive Hazard Mitigation Grant Program (HGMP) funding based on 15 percent of the total estimated eligible Federal disaster assistance. This plan demonstrates the State's goals, priorities, and commitment to reduce risks from natural hazards and serves as a guide for State and local decision makers as they commit resources to reducing the effects of natural hazards.

(2) An *Enhanced State Mitigation Plan* must be approved by us for a State to be eligible to receive HMGP funds based on 20 percent of the total

estimated eligible Federal disaster assistance. This plan must be approved by us within the 3 years prior to the current major disaster declaration. It must demonstrate that a State has developed a comprehensive mitigation program, is effectively using available mitigation funding, and is capable of managing the increased funding.

To be eligible to receive HMGP project grants, *local governments* must develop Local Mitigation Plans that include a risk assessment and mitigation strategy to reduce potential losses and target resources. Plans must be reviewed, revised, and submitted to us for approval every 5 years.

To receive HMGP project grants, *tribal governments* may apply as a grantee or subgrantee, and will be required to meet the planning requirements of a State or local government.

*Estimated Total Annual Burden:*

Type of collection/forms	No. of respondents	Hours per response	Annual burden hours
Update state or tribal mitigation plans (standard state mitigation plans) .....	18	320	5,760
State review of local plans .....	500 local plans	8	4,000
States develop Enhanced State Mitigation Plans .....	7	100	700
Local or tribal governments develop mitigation plans .....	500 local plans	300	150,000
<b>Total burden</b> .....	.....	.....	<b>160,460</b>

*Comments:* We are soliciting written comments to: (a) Evaluate whether the proposed data collection is necessary for the proper performance of the agency, including whether the information shall have practical utility; (b) evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information; (c) obtain recommendations to enhance the quality, utility, and clarity of the information to be collected; and (d) evaluate the extent to which automated, electronic, mechanical, or other technological collection techniques may further reduce the respondents' burden. FEMA will accept comments through April 29, 2002.

Addressee: Interested persons should submit written comments to Muriel B. Anderson, Chief, Records Management Section, Program Services and Systems Branch, Facilities Management and Services Division, Administration and Resource Planning Directorate, Federal Emergency Management Agency, 500 C Street, Street, SW., Washington, DC 20472.

**FOR FURTHER INFORMATION CONTACT:** You may obtain copies of the OMB paperwork clearance package by

contacting Ms. Anderson at (202) 646-2625 (voice), (202) 646-3347 (facsimile), or by e-mail at [muriel.anderson@fema.gov](mailto:muriel.anderson@fema.gov).

**Executive Order 13132, Federalism**

Executive Order 13132, Federalism, dated August 4, 1999, sets forth principles and criteria that agencies must adhere to in formulating and implementing policies that have federalism implications, that is, regulations that have substantial direct effects on the States, or on the distribution of power and responsibilities among the various levels of government. Federal agencies must closely examine the statutory authority supporting any action that would limit the policymaking discretion of the States, and to the extent practicable, must consult with State and local officials before implementing any such action.

We have reviewed this rule under E.O.13132 and have concluded that the rule does not have federalism implications as defined by the Executive Order. We have determined that the rule does not significantly affect the rights, roles, and responsibilities of States, and involves no preemption of State law nor

does it limit State policymaking discretion.

However, we have consulted with State and local officials. In order to assist us in the development of this rule, we hosted a meeting to allow interested parties an opportunity to provide their perspectives on the legislation and options for implementation of § 322. Stakeholders who attended the meeting included representatives from the National Emergency Management Association, the Association of State Floodplain Managers, the National Governors' Association, the International Association of Emergency Managers, the National Association of Development Organizations, the American Public Works Association, the National League of Cities, the National Association of Counties, the National Conference of State Legislatures, the International City/County Management Association, and the Bureau of Indian Affairs. We received valuable input from all parties at the meeting, which we took into account in the development of this rule. Additionally, we actively encourage and solicit comments on this interim final rule from interested parties, and we will

consider them in preparing the final rule.

### Executive Order 13175, Consultation and Coordination With Indian Tribal Governments

We have reviewed this interim final rule under Executive Order 13175, which became effective on February 6, 2001. Under the Hazard Mitigation Grant Program (HMGP), Indian tribal governments will have the option to apply for grants directly to us and to serve as “grantee”, carrying out “State” roles. If they choose this option, tribal governments may submit either a State-level Standard Mitigation Plan for the 15 percent HMGP funding or a State-level Enhanced Mitigation Plan for 20 percent HMGP funding. In either case, Indian tribal governments would be able to spend up to 7 percent of those funds on planning. Before developing this rule, we met with representatives from State and local governments and the Bureau of Indian Affairs, to discuss the new planning opportunities and requirements of § 322 of the Stafford Act. We received valuable input from all parties, which helped us to develop this interim final rule.

In reviewing the interim final rule, we find that it does not have “tribal implications” as defined in Executive Order 13175 because it will not have a substantial direct effect on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes. Moreover, the interim final rule does not impose substantial direct compliance costs on tribal governments, nor does it preempt tribal law, impair treaty rights or limit the self-governing powers of tribal governments.

### Congressional Review of Agency Rulemaking

We have sent this interim final rule to the Congress and to the General Accounting Office under the Congressional Review of Agency Rulemaking Act, Public Law 104–121. The rule is a not “major rule” within the meaning of that Act. It is an administrative action in support of normal day-to-day mitigation planning activities required by section 322 and compliance under section 323 of the Stafford Act, as enacted in DMA 2000.

The rule will not result in a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions. It will not have “significant adverse effects” on competition, employment, investment,

productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises. This final rule is subject to the information collection requirements of the Paperwork Reduction Act, and OMB has assigned Control No. 3067–0297. The rule is not an unfunded Federal mandate within the meaning of the Unfunded Mandates Reform Act of 1995, Public Law 104–4, and any enforceable duties that we impose are a condition of Federal assistance or a duty arising from participation in a voluntary Federal program.

### List of Subjects in 44 CFR Part 201 and Part 206

Administrative practice and procedure, Disaster assistance, Grant programs, Mitigation planning, Reporting and recordkeeping requirements.

Accordingly, Amend 44 CFR, Subchapter D—Disaster Assistance, as follows:

1. Add Part 201 to read as follows:

#### PART 201—MITIGATION PLANNING

Sec.

- 201.1 Purpose.
- 201.2 Definitions.
- 201.3 Responsibilities.
- 201.4 Standard State Mitigation Plans.
- 201.5 Enhanced State Mitigation Plans.
- 201.6 Local Mitigation Plans.

**Authority:** Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121–5206; Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127, 44 FR 19367, 3 CFR, 1979 Comp., p. 376; E.O. 12148, 44 FR 43239, 3 CFR, 1979 Comp., p. 412; and E.O. 12673, 54 FR 12571, 3 CFR, 1989 Comp., p. 214.

#### § 201.1 Purpose.

(a) The purpose of this part is to provide information on the policies and procedures for mitigation planning as required by the provisions of section 322 of the Stafford Act, 42 U.S.C. 5165.

(b) The purpose of mitigation planning is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources.

#### § 201.2 Definitions.

**Grantee** means the government to which a grant is awarded, which is accountable for the use of the funds provided. The grantee is the entire legal entity even if only a particular component of the entity is designated in the grant award document. Generally,

the State is the grantee. However, after a declaration, an Indian tribal government may choose to be a grantee, or may act as a subgrantee under the State. An Indian tribal government acting as grantee will assume the responsibilities of a “state”, as described in this part, for the purposes of administering the grant.

**Hazard mitigation** means any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

**Hazard Mitigation Grant Program** means the program authorized under section 404 of the Stafford Act, 42 U.S.C. 5170c and implemented at 44 CFR Part 206, Subpart N, which authorizes funding for certain mitigation measures identified through the evaluation of natural hazards conducted under section 322 of the Stafford Act 42 U.S.C. 5165.

**Indian tribal government** means any Federally recognized governing body of an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.

**Local government** is any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

**Managing State** means a State to which FEMA has delegated the authority to administer and manage the HMGP under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c). FEMA may also delegate authority to tribal governments to administer and manage the HMGP as a Managing State.

**Regional Director** is a director of a regional office of FEMA, or his/her designated representative.

**Small and impoverished communities** means a community of 3,000 or fewer individuals that is identified by the State as a rural community, and is not a remote area within the corporate boundaries of a larger city; is economically disadvantaged, by having an average per capita annual income of residents not exceeding 80 percent of national, per capita income, based on

best available data; the local unemployment rate exceeds by one percentage point or more, the most recently reported, average yearly national unemployment rate; and any other factors identified in the State Plan in which the community is located.

*The Stafford Act* refers to the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended (42 U.S.C. 5121-5206).

*State* is any State of the United States, the District of Columbia, Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

*State Hazard Mitigation Officer* is the official representative of State government who is the primary point of contact with FEMA, other Federal agencies, and local governments in mitigation planning and implementation of mitigation programs and activities required under the Stafford Act.

*Subgrantee* means the government or other legal entity to which a subgrant is awarded and which is accountable to the grantee for the use of the funds provided. Subgrantees can be a State agency, local government, private non-profit organizations, or Indian tribal government. Indian tribal governments acting as a subgrantee are accountable to the State grantee.

### § 201.3 Responsibilities.

(a) *General*. This section identifies the key responsibilities of FEMA, States, and local/tribal governments in carrying out section 322 of the Stafford Act, 42 U.S.C. 5165.

(b) *FEMA*. The key responsibilities of the Regional Director are to:

(1) Oversee all FEMA related pre- and post-disaster hazard mitigation programs and activities;

(2) Provide technical assistance and training to State, local, and Indian tribal governments regarding the mitigation planning process;

(3) Review and approve all Standard and Enhanced State Mitigation Plans;

(4) Review and approve all local mitigation plans, unless that authority has been delegated to the State in accordance with § 201.6(d);

(5) Conduct reviews, at least once every three years, of State mitigation activities, plans, and programs to ensure that mitigation commitments are fulfilled, and when necessary, take action, including recovery of funds or denial of future funds, if mitigation commitments are not fulfilled.

(c) *State*. The key responsibilities of the State are to coordinate all State and

local activities relating to hazard evaluation and mitigation and to:

(1) Prepare and submit to FEMA a Standard State Mitigation Plan following the criteria established in § 201.4 as a condition of receiving Stafford Act assistance (except emergency assistance).

(2) In order to be considered for the 20 percent HMGP funding, prepare and submit an Enhanced State Mitigation Plan in accordance with § 201.5, which must be reviewed and updated, if necessary, every three years from the date of the approval of the previous plan.

(3) At a minimum, review and, if necessary, update the Standard State Mitigation Plan by November 1, 2003 and every three years from the date of the approval of the previous plan in order to continue program eligibility.

(4) Make available the use of up to the 7 percent of HMGP funding for planning in accordance with § 206.434.

(5) Provide technical assistance and training to local governments to assist them in applying for HMGP planning grants, and in developing local mitigation plans.

(6) For Managing States that have been approved under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c), review and approve local mitigation plans in accordance with § 201.6(d).

(d) *Local governments*. The key responsibilities of local governments are to:

(1) Prepare and adopt a jurisdiction-wide natural hazard mitigation plan as a condition of receiving project grant funds under the HMGP, in accordance with § 201.6.

(2) At a minimum, review and, if necessary, update the local mitigation plan every five years from date of plan approval to continue program eligibility.

(e) *Indian tribal governments*. Indian tribal governments will be given the option of applying directly to us for Hazard Mitigation Grant Program funding, or they may choose to apply through the State. If they apply directly to us, they will assume the responsibilities of the State, or grantee, and if they apply through the State, they will assume the responsibilities of the local government, or subgrantee.

### § 201.4 Standard State Mitigation Plans.

(a) *Plan requirement*. By November 1, 2003, States must have an approved Standard State Mitigation plan meeting the requirements of this section, in order to receive assistance under the Stafford Act, although assistance authorized under disasters declared prior to November 1, 2003 will continue

to be made available. In any case, emergency assistance provided under 42 U.S.C. 5170a, 5170b, 5173, 5174, 5177, 5179, 5180, 5182, 5183, 5184, 5192 will not be affected. The mitigation plan is the demonstration of the State's commitment to reduce risks from natural hazards and serves as a guide for State decision makers as they commit resources to reducing the effects of natural hazards. States may choose to include the requirements of the HMGP Administrative Plan in their mitigation plan.

(b) *Planning process*. An effective planning process is essential in developing and maintaining a good plan. The mitigation planning process should include coordination with other State agencies, appropriate Federal agencies, interested groups, and be integrated to the extent possible with other ongoing State planning efforts as well as other FEMA mitigation programs and initiatives.

(c) *Plan content*. To be effective the plan must include the following elements:

(1) Description of the *planning process* used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated.

(2) *Risk assessments* that provide the factual basis for activities proposed in the strategy portion of the mitigation plan. Statewide risk assessments must characterize and analyze natural hazards and risks to provide a statewide overview. This overview will allow the State to compare potential losses throughout the State and to determine their priorities for implementing mitigation measures under the strategy, and to prioritize jurisdictions for receiving technical and financial support in developing more detailed local risk and vulnerability assessments. The risk assessment shall include the following:

(i) An overview of the type and location of all natural hazards that can affect the State, including information on previous occurrences of hazard events, as well as the probability of future hazard events, using maps where appropriate;

(ii) An overview and analysis of the State's vulnerability to the hazards described in this paragraph (c)(2), based on estimates provided in local risk assessments as well as the State risk assessment. The State shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events. State owned critical or operated facilities located in the

identified hazard areas shall also be addressed;

(iii) An overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in local risk assessments as well as the State risk assessment. The State shall estimate the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas.

(3) A *Mitigation Strategy* that provides the State's blueprint for reducing the losses identified in the risk assessment. This section shall include:

(i) A description of State goals to guide the selection of activities to mitigate and reduce potential losses.

(ii) A discussion of the State's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including: an evaluation of State laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas; a discussion of State funding capabilities for hazard mitigation projects; and a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.

(iii) An identification, evaluation, and prioritization of cost-effective, environmentally sound, and technically feasible mitigation actions and activities the State is considering and an explanation of how each activity contributes to the overall mitigation strategy. This section should be linked to local plans, where specific local actions and projects are identified.

(iv) Identification of current and potential sources of Federal, State, local, or private funding to implement mitigation activities.

(4) A section on the *Coordination of Local Mitigation Planning* that includes the following:

(i) A description of the State process to support, through funding and technical assistance, the development of local mitigation plans.

(ii) A description of the State process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan.

(iii) Criteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs, which should include consideration for communities with the highest risks, repetitive loss properties, and most intense development pressures. Further, that for non-planning grants, a principal criterion for prioritizing grants shall be the extent to which benefits are maximized according

to a cost benefit review of proposed projects and their associated costs.

(5) A *Plan Maintenance Process* that includes:

(i) An established method and schedule for monitoring, evaluating, and updating the plan.

(ii) A system for monitoring implementation of mitigation measures and project closeouts.

(iii) A system for reviewing progress on achieving goals as well as activities and projects identified in the Mitigation Strategy.

(6) A *Plan Adoption Process*. The plan must be formally adopted by the State prior to submittal to us for final review and approval.

(7) *Assurances*. 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, in compliance with 44 CFR 13.11(c). The State will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

(d) *Review and updates*. Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities and resubmitted for approval to the appropriate Regional Director every three years. The Regional review will be completed within 45 days after receipt from the State, whenever possible. We also encourage a State to review its plan in the post-disaster timeframe to reflect changing priorities, but it is not required.

#### § 201.5 Enhanced State Mitigation Plans.

(a) A State with a FEMA approved Enhanced State Mitigation Plan at the time of a disaster declaration is eligible to receive increased funds under the HMGP, based on twenty percent of the total estimated eligible Stafford Act disaster assistance. The Enhanced State Mitigation Plan must demonstrate that a State has developed a comprehensive mitigation program, that the State effectively uses available mitigation funding, and that it is capable of managing the increased funding. In order for the State to be eligible for the 20 percent HMGP funding, FEMA must have approved the plan within three years prior to the disaster declaration.

(b) Enhanced State Mitigation Plans must include all elements of the Standard State Mitigation Plan identified in § 201.4, as well as document the following:

(1) Demonstration that the plan is integrated to the extent practicable with other State and/or regional planning

initiatives (comprehensive, growth management, economic development, capital improvement, land development, and/or emergency management plans) and FEMA mitigation programs and initiatives that provide guidance to State and regional agencies.

(2) Documentation of the State's project implementation capability, identifying and demonstrating the ability to implement the plan, including:

(i) Established eligibility criteria for multi-hazard mitigation measures.

(ii) A system to determine the cost effectiveness of mitigation measures, consistent with OMB Circular A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, and to rank the measures according to the State's eligibility criteria.

(iii) Demonstration that the State has the capability to effectively manage the HMGP as well as other mitigation grant programs, including a record of the following:

(A) Meeting HMGP and other mitigation grant application timeframes and submitting complete, technically feasible, and eligible project applications with appropriate supporting documentation;

(B) Preparing and submitting accurate environmental reviews and benefit-cost analyses;

(C) Submitting complete and accurate quarterly progress and financial reports on time; and

(D) Completing HMGP and other mitigation grant projects within established performance periods, including financial reconciliation.

(iv) A system and strategy by which the State will conduct an assessment of the completed mitigation actions and include a record of the effectiveness (actual cost avoidance) of each mitigation action.

(3) Demonstration that the State effectively uses existing mitigation programs to achieve its mitigation goals.

(4) Demonstration that the State is committed to a comprehensive state mitigation program, which might include any of the following:

(i) A commitment to support local mitigation planning by providing workshops and training, State planning grants, or coordinated capability development of local officials, including Emergency Management and Floodplain Management certifications.

(ii) A statewide program of hazard mitigation through the development of legislative initiatives, mitigation councils, formation of public/private

partnerships, and/or other executive actions that promote hazard mitigation.

(iii) The State provides a portion of the non-Federal match for HMGP and/or other mitigation projects.

(iv) To the extent allowed by State law, the State requires or encourages local governments to use a current version of a nationally applicable model building code or standard that addresses natural hazards as a basis for design and construction of State sponsored mitigation projects.

(v) A comprehensive, multi-year plan to mitigate the risks posed to existing buildings that have been identified as necessary for post-disaster response and recovery operations.

(vi) A comprehensive description of how the State integrates mitigation into its post-disaster recovery operations.

(c) *Review and updates.* (1) A State must review and revise its plan to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities, and resubmit it for approval to the appropriate Regional Director every three years. The Regional review will be completed within 45 days after receipt from the State, whenever possible.

(2) In order for a State to be eligible for the 20 percent HMGP funding, the Enhanced State Mitigation plan must be approved by FEMA within the three years prior to the current major disaster declaration.

#### § 201.6 Local Mitigation Plans.

The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Local plans will also serve as the basis for the State to provide technical assistance and to prioritize project funding.

(a) *Plan requirement.* (1) For disasters declared after November 1, 2003, a local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants. Until November 1, 2003, local mitigation plans may be developed concurrent with the implementation of the project grant.

(2) Regional Directors may grant an exception to the plan requirement in extraordinary circumstances, such as in a small and impoverished community, when justification is provided. In these cases, a plan will be completed within 12 months of the award of the project grant. If a plan is not provided within this timeframe, the project grant will be terminated, and any costs incurred after

notice of grant's termination will not be reimbursed by FEMA.

(3) Multi-jurisdictional plans (e.g. watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan. State-wide plans will not be accepted as multi-jurisdictional plans.

(b) *Planning process.* An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and

(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

(c) *Plan content.* The plan shall include the following:

(1) Documentation of the *planning process* used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

(2) A *risk assessment* that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards. The risk assessment shall include:

(i) A description of the type, location, and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

(ii) A description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of:

(A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

(B) An estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section

and a description of the methodology used to prepare the estimate;

(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

(iii) For multi-jurisdictional plans, the risk assessment section must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

(3) A *mitigation strategy* that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include:

(i) A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

(ii) A section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

(iii) An action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

(iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

(4) A *plan maintenance process* that includes:

(i) A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

(ii) A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

(iii) Discussion on how the community will continue public participation in the plan maintenance process.

(5) *Documentation* that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council). For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.

(d) *Plan review.* (1) Plans must be submitted to the State Hazard Mitigation Officer for initial review and coordination. The State will then send the plan to the appropriate FEMA Regional Office for formal review and approval.

(2) The Regional review will be completed within 45 days after receipt from the State, whenever possible.

(3) Plans must be reviewed, revised if appropriate, and resubmitted for approval within five years in order to continue to be eligible for HMGP project grant funding.

(4) Managing States that have been approved under the criteria established by FEMA pursuant to 42 U.S.C. 5170c(c) will be delegated approval authority for local mitigation plans, and the review will be based on the criteria in this part. Managing States will review the plans within 45 days of receipt of the plans, whenever possible, and provide a copy of the approved plans to the Regional Office.

**PART 206—FEDERAL DISASTER ASSISTANCE FOR DISASTERS DECLARED ON OR AFTER NOVEMBER 23, 1988**

2. The authority citation for part 206 is revised to read as follows:

**Authority:** Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121–5206; Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127, 44 FR 19367, 3 CFR, 1979 Comp., p. 376; E.O. 12148, 44 FR 43239, 3 CFR, 1979 Comp., p. 412; and E.O. 12673, 54 FR 12571, 3 CFR, 1989 Comp., p. 214.

2a. Revise Part 206, Subpart M to read as follows:

**Subpart M—Minimum Standards**

Sec.  
206.400 General.  
206.401 Local standards.  
206.402 Compliance.

**§ 206.400 General.**

(a) As a condition of the receipt of any disaster assistance under the Stafford Act, the applicant shall carry out any repair or construction to be financed with the disaster assistance in accordance with applicable standards of safety, decency, and sanitation and in conformity with applicable codes, specifications and standards.

(b) Applicable codes, specifications, and standards shall include any disaster resistant building code that meets the minimum requirements of the National Flood Insurance Program (NFIP) as well as being substantially equivalent to the recommended provisions of the National Earthquake Hazards Reduction

Program (NEHRP). In addition, the applicant shall comply with any requirements necessary in regards to Executive Order 11988, Floodplain Management, Executive Order 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, and any other applicable Executive orders.

(c) In situations where there are no locally applicable standards of safety, decency and sanitation, or where there are no applicable local codes, specifications and standards governing repair or construction activities, or where the Regional Director determines that otherwise applicable codes, specifications, and standards are inadequate, then the Regional Director may, after consultation with appropriate State and local officials, require the use of nationally applicable codes, specifications, and standards, as well as safe land use and construction practices in the course of repair or construction activities.

(d) The mitigation planning process that is mandated by section 322 of the Stafford Act and 44 CFR part 201 can assist State and local governments in determining where codes, specifications, and standards are inadequate, and may need to be upgraded.

**§ 206.401 Local standards.**

The cost of repairing or constructing a facility in conformity with minimum codes, specifications and standards may be eligible for reimbursement under section 406 of the Stafford Act, as long as such codes, specifications and standards meet the criteria that are listed at 44 CFR 206.226(b).

**§ 206.402 Compliance.**

A recipient of disaster assistance under the Stafford Act must document for the Regional Director its compliance with this subpart following the completion of any repair or construction activities.

**Subpart N—Hazard Mitigation Grant Program**

3. Revise § 206.431 to read as follows:

**§ 206.431 Definitions.**

*Activity* means any mitigation measure, project, or action proposed to reduce risk of future damage, hardship, loss or suffering from disasters.

*Applicant* means a State agency, local government, Indian tribal government, or eligible private nonprofit organization, submitting an application to the grantee for assistance under the HMGP.

*Enhanced State Mitigation Plan* is the hazard mitigation plan approved under 44 CFR part 201 as a condition of receiving increased funding under the HMGP.

*Grant application* means the request to FEMA for HMGP funding, as outlined in § 206.436, by a State or tribal government that will act as grantee.

*Grant award* means total of Federal and non-Federal contributions to complete the approved scope of work.

*Grantee* means the government to which a grant is awarded and which is accountable for the use of the funds provided. The grantee is the entire legal entity even if only a particular component of the entity is designated in the grant award document. Generally, the State is the grantee. However, an Indian tribal government may choose to be a grantee, or it may act as a subgrantee under the State. An Indian tribal government acting as a grantee will assume the responsibilities of a “state”, under this subpart, for the purposes of administering the grant.

*Indian tribal government* means any Federally recognized governing body of an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of Interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.

*Local Mitigation Plan* is the hazard mitigation plan required of a local or Indian tribal government acting as a subgrantee as a condition of receiving a project subgrant under the HMGP as outlined in 44 CFR 201.6.

*Standard State Mitigation Plan* is the hazard mitigation plan approved under 44 CFR part 201, as a condition of receiving Stafford Act assistance as outlined in § 201.4.

*State Administrative Plan for the Hazard Mitigation Grant Program* means the plan developed by the State to describe the procedures for administration of the HMGP.

*Subgrant* means an award of financial assistance under a grant by a grantee to an eligible subgrantee.

*Subgrant application* means the request to the grantee for HMGP funding by the eligible subgrantee, as outlined in § 206.436.

*Subgrantee* means the government or other legal entity to which a subgrant is awarded and which is accountable to the grantee for the use of the funds provided. Subgrantees can be a State agency, local government, private nonprofit organizations, or Indian tribal government as outlined in § 206.433.

Indian tribal governments acting as a subgrantee are accountable to the State grantee.

4. Revise § 206.432(b) to read as follows:

**§ 206.432 Federal grant assistance.**

\* \* \* \* \*

(b) *Amounts of assistance.* The total of Federal assistance under this subpart shall not exceed either 15 or 20 percent of the total estimated Federal assistance (excluding administrative costs) provided for a major disaster under 42 U.S.C. 5170b, 5172, 5173, 5174, 5177, 5178, 5183, and 5201 as follows:

(1) *Fifteen (15) percent.* Effective November 1, 2003, a State with an approved Standard State Mitigation Plan, which meets the requirements outlined in 44 CFR 201.4, shall be eligible for assistance under the HMGP not to exceed 15 percent of the total estimated Federal assistance described in this paragraph. Until that date, existing, approved State Mitigation Plans will be accepted.

(2) *Twenty (20) percent.* A State with an approved Enhanced State Mitigation Plan, in effect prior to the disaster declaration, which meets the requirements outlined in 44 CFR 201.5 shall be eligible for assistance under the HMGP not to exceed 20 percent of the total estimated Federal assistance described in this paragraph.

(3) The estimates of Federal assistance under this paragraph (b) shall be based on the Regional Director's estimate of all eligible costs, actual grants, and appropriate mission assignments.

\* \* \* \* \*

5. Section 206.434 is amended by redesignating paragraphs (b) through (g) as paragraphs (c) through (h), respectively; adding a new paragraph (b); revising redesignated paragraphs (c) introductory text and (c)(1); and revising redesignated paragraph (d) to read as follows:

**§ 206.434 Eligibility.**

\* \* \* \* \*

(b) *Plan requirement.* (1) For all disasters declared on or after November 1, 2003, local and tribal government applicants for subgrants, must have an approved local mitigation plan in accordance with 44 CFR 201.6 prior to receipt of HMGP subgrant funding. Until November 1, 2003, local mitigation plans may be developed concurrent with the implementation of subgrants.

(2) Regional Directors may grant an exception to this requirement in extraordinary circumstances, such as in a small and impoverished community

when justification is provided. In these cases, a plan will be completed within 12 months of the award of the project grant. If a plan is not provided within this timeframe, the project grant will be terminated, and any costs incurred after notice of grant's termination will not be reimbursed by FEMA.

(c) *Minimum project criteria.* To be eligible for the Hazard Mitigation Grant Program, a project must:

(1) Be in conformance with the State Mitigation Plan and Local Mitigation Plan approved under 44 CFR part 201;

\* \* \* \* \*

(d) *Eligible activities.* (1) *Planning.* Up to 7% of the State's HMGP grant may be used to develop State, tribal and/or local mitigation plans to meet the planning criteria outlined in 44 CFR part 201.

(2) *Types of projects.* Projects may be of any nature that will result in protection to public or private property. Eligible projects include, but are not limited to:

- (i) Structural hazard control or protection projects;
- (ii) Construction activities that will result in protection from hazards;
- (iii) Retrofitting of facilities;
- (iv) Property acquisition or relocation, as defined in paragraph (e) of this section;
- (v) Development of State or local mitigation standards;
- (vi) Development of comprehensive mitigation programs with implementation as an essential component;
- (vii) Development or improvement of warning systems.

\* \* \* \* \*

6. Revise § 206.435(a) to read as follows:

**§ 206.435 Project identification and selection criteria.**

(a) *Identification.* It is the State's responsibility to identify and select eligible hazard mitigation projects. All funded projects must be consistent with the State Mitigation Plan. Hazard Mitigation projects shall be identified and prioritized through the State, Indian tribal, and local planning process.

\* \* \* \* \*

7. Revise § 206.436 to read as follows:

**§ 206.436 Application procedures.**

(a) *General.* This section describes the procedures to be used by the grantee in submitting an application for HMGP funding. Under the HMGP, the State or Indian tribal government is the grantee and is responsible for processing subgrants to applicants in accordance with 44 CFR part 13 and this part 206. Subgrantees are accountable to the grantee.

(b) *Governor's Authorized Representative.* The Governor's Authorized Representative serves as the grant administrator for all funds provided under the Hazard Mitigation Grant Program. The Governor's Authorized Representative's responsibilities as they pertain to procedures outlined in this section include providing technical advice and assistance to eligible subgrantees, and ensuring that all potential applicants are aware of assistance available and submission of those documents necessary for grant award.

(c) *Hazard mitigation application.* Upon identification of mitigation measures, the State (Governor's Authorized Representative) will submit its Hazard Mitigation Grant Program application to the FEMA Regional Director. The application will identify one or more mitigation measures for which funding is requested. The application must include a Standard Form (SF) 424, Application for Federal Assistance, SF 424D, Assurances for Construction Programs, if appropriate, and a narrative statement. The narrative statement will contain any pertinent project management information not included in the State's administrative plan for Hazard Mitigation. The narrative statement will also serve to identify the specific mitigation measures for which funding is requested. Information required for each mitigation measure shall include the following:

- (1) Name of the subgrantee, if any;
- (2) State or local contact for the measure;
- (3) Location of the project;
- (4) Description of the measure;
- (5) Cost estimate for the measure;
- (6) Analysis of the measure's cost-effectiveness and substantial risk reduction, consistent with § 206.434(c);
- (7) Work schedule;
- (8) Justification for selection;
- (9) Alternatives considered;
- (10) Environmental information consistent with 44 CFR part 9, Floodplain Management and Protection of Wetlands, and 44 CFR part 10, Environmental Considerations.

(d) *Application submission time limit.* The State's application may be amended as the State identifies and selects local project applications to be funded. The State must submit all local HMGP applications and funding requests for the purpose of identifying new projects to the Regional Director within 12 months of the date of disaster declaration.

(e) *Extensions.* The State may request the Regional Director to extend the application time limit by 30 to 90 day



increments, not to exceed a total of 180 days. The grantee must include a justification in its request.

(f) *FEMA approval.* The application and supplement(s) will be submitted to the FEMA Regional Director for approval. FEMA has final approval authority for funding of all projects.

(g) *Indian tribal grantees.* Indian tribal governments may submit a SF 424 directly to the Regional Director.

**Subpart H—Public Assistance Eligibility**

\* \* \* \* \*

8. Revise § 206.220 to read as follows:

**§ 206.220 General.**

This subpart provides policies and procedures for determinations of eligibility of applicants for public assistance, eligibility of work, and eligibility of costs for assistance under sections 402, 403, 406, 407, 418, 419,

421(d), 502, and 503 of the Stafford Act. Assistance under this subpart must also conform to requirements of 44 CFR part 201, Mitigation Planning, and 44 CFR part 206, subparts G—Public Assistance Project Administration, I—Public Assistance Insurance Requirements, J—Coastal Barrier Resources Act, and M—Minimum Standards. Regulations under 44 CFR part 9—Floodplain Management and 44 CFR part 10—Environmental Considerations, also apply to this assistance.

9. Section 206.226 is amended by redesignating paragraphs

(b) through (j) as paragraphs (c) through (k), respectively; adding a new paragraph (b); and revising redesignated paragraph (g)(5) to read as follows:

**§ 206.226 Restoration of damaged facilities.**

\* \* \* \* \*

(b) *Mitigation planning.* In order to receive assistance under this section, as

of November 1, 2003, the State must have in place a FEMA approved State Mitigation Plan in accordance with 44 CFR part 201.

\* \* \* \* \*

(g) \* \* \*

(5) If relocation of a facility is not feasible or cost effective, the Regional Director shall disapprove Federal funding for the original location when he/she determines in accordance with 44 CFR parts 9, 10, 201, or subpart M of this part 206, that restoration in the original location is not allowed. In such cases, an alternative project may be applied for.

\* \* \* \* \*

Dated: February 19, 2002.

**Michael D. Brown,**  
*General Counsel.*

[FR Doc. 02-4321 Filed 2-25-02; 8:45 am]

**BILLING CODE 6718-05-P**





## APPENDIX B: EXECUTIVE ORDER NO. 18-03

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### B.1 SUMMARY OF EXECUTIVE ORDER NO. 18-03

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Executive Order 18-03 establishes the West Virginia Hazard Mitigation Council (HMC). This proclamation assigns the responsibility for development and implementation of the state hazard mitigation plan to the HMC. The Council is selected at the discretion of the Governor's Executive Committee and is comprised of governmental, educational, voluntary, and private sector representatives. These representatives are given the responsibility of supporting the state hazard mitigation planning effort and actual implementation of the plan.



## B.2 EXECUTIVE ORDER NO. 18-03

**STATE OF WEST VIRGINIA  
EXECUTIVE DEPARTMENT  
CHARLESTON  
EXECUTIVE ORDER NO. 18-03  
By the Governor**

**WHEREAS**, the State of West Virginia is vulnerable to the effects of natural and technological disasters including flooding and flash flooding, tornadoes, winter storms, landslides, hazardous materials accidents, and terrorism that have or could cause extensive loss of life and property, severe disruption to essential human services, and financial devastation to West Virginians, their families, and the State as a whole; and

**WHEREAS**, in the past eight years, disasters have caused loss of life, injury and illness, extensive agricultural, transportation, utility and commercial losses, and more than one billion dollars in public and private property damages; and

**WHEREAS**, the potential for additional loss of life, injury and illness remains great, and billions of dollars worth of residential, commercial and public property in West Virginia remain at risk from future disasters; and

**WHEREAS**, the Robert T. Stafford Emergency Assistance and Disaster Relief Act (P.L. 93-288) was amended by the Disaster Mitigation Action of 2000 (P.L. 106-390) which provides new and revitalized approaches to all-hazards mitigation through a system of enhanced planning and implementation efforts, pre-disaster hazard mitigation grants, greater emphasis on the need for coordination of all-hazards risk reduction activities between Federal, State and local entities, and utilization of planning to guide future development investments; and



**WHEREAS**, compliance with the amended provisions of the Robert T. Stafford Emergency Assistance and Disaster Relief Act will position the State of West Virginia to receive pre-disaster and post-disaster mitigation funding which, through partnerships with government, the private sector, and the residents of the State, can help reduce the impact of future disaster events.

**NOW THEREFORE I, BOB WISE**, pursuant to the authority vested in me as the Governor of West Virginia, do hereby **ORDER** that:

1. The Hazard Mitigation Council ("the Council") is hereby created.
2. The Council shall implement a statewide initiative to improve disaster resistance through all-hazards mitigation planning.
3. The Governor shall appoint an Executive Committee consisting of not more than six members, which shall include a representative or representatives of the West Virginia Office of Emergency Services and other entities and boards involved in emergency management. The Executive Committee may at its discretion elect a chairman and shall appoint the members of the Council in a number to be determined by the Executive Committee.
4. The Council shall be comprised of governmental, educational, voluntary agency, and private sector representatives to act as a steering committee to further develop and implement State and local all-hazards mitigation planning.
5. The Council shall work to demonstrate the benefits of taking specific, creative steps to help West Virginia communities reduce deaths, injuries and illnesses, property losses, economic losses, and human suffering caused by natural and technological disasters.
6. The West Virginia Office of Emergency Services shall be responsible and accountable for implementing actions in each of the areas listed below:



- a. Assisting in the creation of the Council.
  - b. Completing and periodically updating a statewide risk and vulnerability assessment of the State's natural and technological hazards.
  - c. Developing and maintaining a statewide all-hazards mitigation plan that takes into account the State's mitigation priorities.
  - d. Assisting the Council with developing partnerships resulting in a coordinated approach to all-hazards mitigation.
  - e. Encouraging communities to participate in the National Flood Insurance Program (NFIP).
  - f. Developing and supporting existing and future programs to increase the public's awareness of natural and technological hazards, including ways to reduce or prevent damage through a coordinated effort lead by the Council.
  - g. Encouraging the participation of industry, professional organizations, service organizations, voluntary agencies, the media, and the general public in this effort.
  - h. Identifying existing incentives and disincentives for hazard reduction planning, and developing and implementing new incentives to further this effort.
7. The Executive Committee of the Council shall prepare quarterly reports beginning December, 2003, and shall prepare an Annual Report in September, 2004, both to be submitted to the Governor and all involved entities, and outlining recommendations and assessment of all directives under this Order, and further advising of planned future phases of the project, including implementation, auditing, monitoring, and testing.



IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State of West Virginia to be affixed.



By the Governor

DONE at the Capitol, in the City of Charleston, State of West Virginia, this eighteenth day of August, in the year of our Lord, Two Thousand Three, and in the One Hundred Forty-First year of the State.

*Bob Wise*  
GOVERNOR

*Jeff Malen*  
SECRETARY OF STATE







## APPENDIX C: GLOSSARY

TERM	DEFINITION
ABANDONED MINE LANDS (AML)	Abandoned Mine Lands are generally characterized as mines that are no longer actively mined for their mineral resources. In West Virginia, mines that are included in the abandoned mine land inventory are those which were abandoned prior to August 3, 1977 for which there is no continuing reclamation responsibility.
ACID MINE DRAINAGE	Water that is discharged from mining or mine-related operations which contains high levels of dissolved iron and aluminum sulfates in conjunction with pH values less than 4.5 (acidic). It is produced when oxygen dissolved in water reacts with pyretic (iron Sulfide) materials found in association with most coal deposits.
ASSET	Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.
BASE FLOOD	Flood that has a 1% probability of being equaled or exceeded in any given year. Also known as the 100-year flood.
BASE FLOOD ELEVATION (BFE)	Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood Insurance Program.
BEDROCK	The solid rock that underlies loose material, such as soil, sand, clay, or gravel.



BUILDING	A structure that is walled and roofed, principally above ground, and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axels carry no weight.
COAL WASTE IMPOUNDMENT	A basin constructed to permanently hold waste created during the process of mining and cleaning coal. Coal refuse disposed of in the impoundment is either coarse or fine. Fine refuse, also called slurry, is a combination of silt, dust, water, bits of coal and clay particles, is the most commonly disposed of material held in an impoundment. Coarse refuse consists of larger materials such as rocks and pieces of coal. The coarse refuse is used to construct the impoundment dam, which then holds the fine refuse or slurry, along with any chemicals used to wash and treat the coal at the coal preparation plant.
COMMUNITY RATING SYSTEM (CRS)	An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.
CONTOUR	A line of equal ground elevation on a topographic (contour) map.
CRITICAL FACILITY	Facilities that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.
DEBRIS	The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.
DURATION	How long a hazard event lasts.
EARTHQUAKE	A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.
EROSION	The wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years through the action of wind, water, or other geologic processes.



EXTENT	The size of an area affected by a hazard or hazard event.
FAULT	A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.
FLASH FLOOD	A flood event occurring with little or no warning where water levels rise at an extremely fast rate.
FLOOD	A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.
FLOOD DEPTH	Height of the floodwater surface above the ground surface.
FLOOD ELEVATION	Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.
FLOOD HAZARD AREA	The area shown to be inundated by a flood of a given magnitude on a map.
FLOOD INSURANCE RATE MAP (FIRM)	Map of a community, prepared by FEMA that shows both the special flood hazard areas and the risk premium zones applicable to the community.
FLOODPLAIN	Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.
FLOODWAY	The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the 1-percent-annual-chance flood without cumulatively increasing the water surface elevation by more than a designated height.



<p>FREQUENCY</p>	<p>A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.</p>
<p>FROSTBITE</p>	<p>Damage to body tissue caused by that tissue being frozen. Frostbite has three stages of progression: frostnip, superficial frostbite, and deep frostbite.</p>
<p>FROSTNIP</p>	<p>First stage of frostbite during which the individual experiences a pins and needles sensation with the skin turning very white and soft. No blistering occurs. This stage produces no permanent damage and may be reversed by soaking in warm water or breathing warm breath on the affected area.</p>
<p>FUJITA SCALE OF TORNADO INTENSITY</p>	<p>Rates tornados with numeric values from F0 to F5 based on tornado wind speed and damage sustained. An F0 indicates light damage such as broken tree limbs or signs, while an F5 indicates incredible damage was sustained.</p>
<p>GEOGRAPHIC INFORMATION SYSTEMS (GIS)</p>	<p>A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.</p>
<p>GROUND MOTION</p>	<p>The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter; but soft soils can further amplify ground motion.</p>



HAZARD	A source of potential danger or adverse condition. Hazards in this plan are both natural and technological in origin and include: floods/flash floods, droughts, wind, thunderstorms/lightning, winter storms, tornados, hurricanes, extreme heat, landslides, earthquakes, wildfires/fires, land subsidence, mining hazards, dam failures, hazardous materials, and nuclear accidents. These events are hazards when they have the potential to harm people or property.
HAZARD EVENT	A specific occurrence of a particular type of hazard.
HAZARD IDENTIFICATION	The process of identifying hazards that threaten an area.
HAZARD MITIGATION	Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.
HAZARD PROFILE	A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.
HAZUS (HAZARDS US)	A GIS-based, nationally standardized hazard loss estimation tool developed by FEMA.
HURRICANE	An intense tropical cyclone, formed in the atmosphere over warm ocean areas, in which wind speeds reach 74-miles-per-hour or more and blow in a large spiral around a relatively calm center or “eye.” Hurricanes develop over the North Atlantic Ocean, northeast Pacific Ocean, or the South Pacific Ocean east of 160° longitude. Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
HYDROLOGY	The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.
HYPOTHERMIA	The dropping of the body temperature to 95°F or below.



INFRASTRUCTURE	Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area’s transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, railyards, depots; and waterways, canals, locks, seaports, ferries, harbors, dry-docks, piers and regional dams.
INTENSITY	A measure of the effects of a hazard event at a particular place.
LANDSLIDE	Downward movement of a slope and materials under the force of gravity.
LATERAL SPREADS	Develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies in a seismic event.
MAGNITUDE	A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.
MITIGATION PLAN	A systematic evaluation of the nature and extent of vulnerability to effects of natural hazards typically present in the state and includes a description of actions to minimize future vulnerability to hazards.
NATIONAL FLOOD INSURANCE PROGRAM (NFIP)	Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.
NATIONAL WEATHER SERVICE (NWS)	Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to federal and state entities in preparing weather and flood plans.
NEMIS	The National Emergency Management Information System (NEMIS) is an evolving agency-wide system of hardware, software, telecommunications and applications software that provides a new technology base to FEMA and its partners to perform the emergency management mission.



NOR'EASTER	An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain.
PLANNING	The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.
PRE-DISASTER MITIGATION PROGRAM	The Pre-Disaster Mitigation (PDM) Program was authorized by §203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act), 42 USC, as amended by §102 of the Disaster Mitigation Act of 2000. Funding for the program is provided through the National Pre-Disaster Mitigation Fund to assist states and local governments (to include Indian Tribal governments) in implementing cost-effective hazard mitigation activities that complement a comprehensive mitigation program.
PROBABILITY	A statistical measure of the likelihood that a hazard event will occur.
RECURRENCE INTERVAL	The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.
REPETITIVE LOSS PROPERTY	A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least \$1000 each have been paid within any 10-year period since 1978.
REPLACEMENT VALUE	The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type and quality. In this plan, replacement values are largely based on insurance estimates.
RICHTER SCALE	A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.



RISK	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.
RIVERINE	Of or produced by a river.
SCALE	A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.
SEISMICITY	Describes the likelihood of an area being subject to earthquakes.
STAFFORD ACT	The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.
STATE HAZARD MITIGATION OFFICER (SHMO)	The representative of state government who is the primary point of contact with FEMA, other state and federal agencies, and local units of government in the planning and implementation of pre- and post- disaster mitigation activities.
STRUCTURE	Something constructed.
SURFACE FAULTING	The differential movement of two sides of a fracture – in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.
TECTONIC PLATE	Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin with other plates. It is the friction between plate boundaries that cause seismic activity.





TOPOGRAPHIC	Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include manmade features.
TORNADO	A violently rotating column of air extending ground-ward.
TROPICAL CYCLONE	A generic term for a cyclonic, low-pressure system over tropical or sub-tropical waters.
TROPICAL STORM	A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.
TSUNAMI	Great sea wave produced by submarine earth movement or volcanic eruption.
VULNERABILITY	Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.
VULNERABILITY ASSESSMENT	The extent of injury and damage that may result from a hazard event of a given intensity in a given area.
WILDFIRE	An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.
ZONE	A geographic area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.





## APPENDIX D: AGENCY PROFILES

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Agency and Website	Biography	Programs
<b>Federal Agencies</b>		
<p>Department of Homeland Security/Federal Emergency Management Agency (FEMA)</p> <p><a href="http://www.fema.gov">www.fema.gov</a></p>	<p>The Federal Emergency Management Agency's (FEMA) purpose is to support citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards.</p> <ul style="list-style-type: none"> <li>• Preparedness includes plans and preparations made to save lives and property and to facilitate response operations.</li> <li>• Response includes actions taken to provide emergency assistance, save lives, minimize property damage and speed recovery immediately following a disaster.</li> <li>• Recover includes actions taken to return to a normal or improve operating condition following a disaster.</li> <li>• Mitigation includes actions taken to reduce the long-term risk of disasters. They reduce threats to the public health and safety, reduce or eliminate damages caused by disaster, and reduce the burden placed on local, state, and federal preparedness, response and recovery activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-disaster Mitigation (PDM)</li> <li>• National Dam Safety Program</li> <li>• Hazard Mitigation Assistance (HMA) grant program</li> <li>• Emergency Management Performance Grants (EMPG)</li> <li>• Community Emergency Response Teams (CERTs)</li> <li>• Community Assistance Program-State Support Services (CAP-SSSE)</li> <li>• Homeland Security Grant Program (HSGP)</li> <li>• National Flood Insurance Program (NFIP)</li> <li>• Regional Catastrophic Preparedness Grant Program (RCPG)</li> <li>• Urban Area Security Initiative (UASI)</li> <li>• Disaster Preparedness Improvement Grant</li> <li>• Educational Outreach Programs</li> <li>• Forest Fire Suppression</li> <li>• Individual and Household Assistance Program</li> <li>• Public Assistance</li> <li>• Community Disaster Loans</li> </ul>
<p>United States Department of Transportation (DOT)</p> <p><a href="http://www.dot.gov">www.dot.gov</a></p>	<p>The U.S. Department of Transportation (DOT) oversees federal highway, air, railroad, maritime, and other transportation administration functions. DOT components include the Federal Aviation Administration (FAA), Federal Highway Administration (FHWA), National Highway Traffic Safety Administration (NHTSA), Pipeline and Hazardous Material Safety Administration (PHMSA), Federal Motor Carrier Safety Administration (FMCSA), Federal Railroad Administration (FRA), Saint Lawrence Seaway Development Corporation (SLSCD), Federal Transit Administration (FTA), Surface Transportation Board (STB), and Maritime Administration (MARAD).</p> <p>The Pipeline and Hazardous Material Safety Administration's Hazardous Materials Emergency preparedness grant program provides financial and technical assistance to enhance state, territorial, tribal, and local hazardous materials emergency planning and training.</p>	<ul style="list-style-type: none"> <li>• Preparedness &amp; Response Technical Assistance</li> <li>• Hazardous Materials Emergency Preparedness (HMEP) Grant</li> </ul>

<p>United States Department of Transportation - Federal Highway Administration (FHWA)</p> <p><a href="http://www.fhwa.dot.gov">www.fhwa.dot.gov</a></p>	<p>The U.S. Department of Transportation Federal Highway Administration (FHWA) is responsible for ensuring America's roads and highways continue to be the safest and most technologically up-to-date. FHWA's annual budget, of more than \$30 billion, is funded by the highway trust fund. Approximately 90% of trust fund revenue comes from excise taxes on motor fuels.</p> <p>The budget is primarily divided between two programs: Federal-aid funding to State and local governments; and Federal Lands Highways. Congress authorizes Federal-Aid highway funds to assist the States in providing for construction, reconstruction, and improvement of highways and bridges on eligible Federal-Aid highway routes and for other special purpose programs and projects. The Federal Lands Highway Program provides funds for improving access to and within National Forests, National Parks, Indian Lands, and other public lands.</p> <p>The Emergency Relief (ER) program provides funds for repairing and reconstructing roads on the federal-aid highway system that have suffered serious damage as a result of either (1) a natural disaster over a wide area, such as a flood hurricane, tidal wave, earthquake, tornado, severe storm, or landslide; or (2) a catastrophic failure from any external cause (for example, the collapse of a bridge that is struck by a barge). Historically, the majority of ER funds has gone for repair and reconstruction following natural disasters. The ER program has a permanent annual authorization of \$100 million in contract authority to be derived from the highway trust fund.</p>	<ul style="list-style-type: none"> <li>• The Federal-aid Highway Program</li> <li>• The Federal Lands Highway (FLH) Program</li> <li>• Emergency Relief Program</li> </ul>
<p>United States Department of Housing and Urban Development (HUD)</p> <p><a href="http://www.hud.gov">www.hud.gov</a></p>	<p>U.S. Department of Housing and Urban Development's (HUD) purpose is to create strong, sustainable, inclusive communities and quality affordable homes for all. HUD works to strengthen the housing market to bolster the economy and protect consumers; meet the need for quality affordable rental homes; utilize housing as a platform for improving quality of life; and build inclusive and sustainable communities free from discrimination.</p> <p>HUD provides a variety of disaster resources and partners with Federal and state agencies to help implement disaster recovery assistance, including: reprogramming of public housing funds to address damage to public housing property caused by the disaster; disaster housing assistance to provide housing vouchers to disaster displaces; guidance on how to comply with the Fair Housing Act; and guidance on how to rehabilitate flooded homes.</p>	<ul style="list-style-type: none"> <li>• Federal Housing Administration (FHA) mortgage assistance</li> <li>• Assistance for Public and Indian Housing</li> <li>• Disaster Housing Assistance</li> <li>• Office of Fair Housing and Equal Opportunity</li> <li>• Policy Development and Research</li> <li>• Community Development and Block Grant (CDBG)</li> </ul>
<p>United States Department of Commerce – Economic Development Administration (EDA)</p> <p><a href="http://www.eda.gov">www.eda.gov</a></p>	<p>The Economic Development Administration provides grants to economically distressed communities to generate new employment and stimulate industrial and commercial growth. EDA's role in disaster recovery is to facilitate delivery of Federal economic development assistance to local governments for long-term community economic recovery planning reconstruction, redevelopment and resiliency.</p>	<ul style="list-style-type: none"> <li>• Strategic Planning and Technical Assistance</li> <li>• Infrastructure Design and Development</li> <li>• Capital for Alternative Financing</li> </ul>
<p>United States Department of Commerce - National Oceanic and Atmospheric Administration (NOAA) – National Weather Service (NWS)</p> <p><a href="http://www.noaa.gov">www.noaa.gov</a></p>	<p>The National Weather Service (NWS), a component of the National Oceanic and Atmospheric Administration (NOAA), provides weather, water, and climate data, forecasts and warnings. Each year the NWS collects nearly 76 billion observations and issues approximately 1.5 million forecasts and 50,000 warnings.</p> <p>The National Weather Service operates three specific programs related to water management. These include the River Forecast Centers and River Districts activities, the Flood and Flash Flood Warning program and the Hydrologic Services activities.</p>	<ul style="list-style-type: none"> <li>• StormReady Program</li> <li>• Integrated Flood Observing and Warning System</li> <li>• River Forecast Centers</li> <li>• River Districts activities</li> <li>• Flood and Flash Flood Warning program</li> <li>• Hydrologic Services activities.</li> </ul>

<p>United States Department of Labor - Federal Mine Safety and Health Administration</p> <p><a href="http://www.msha.gov">www.msha.gov</a></p>	<p>The Mine Safety and Health Administration (MSHA) administers the provisions of the Federal Mine Safety and Health Act (Mine Act). MSHA enforces compliance with mandatory safety and health standards in order to eliminate fatal accidents, to reduce the frequency and severity of nonfatal accidents, to minimize health hazards, and to promote improved safety and health conditions in the nation's mines at all mining and mineral processing operations in the United States</p>	<ul style="list-style-type: none"> <li>• Coal Mine Safety and Health Program</li> <li>• Metal and Nonmetal Mine Safety and Health Program</li> <li>• Educational Policy and Development Program</li> <li>• Office Assessments</li> <li>• Technical Support</li> </ul>
<p>United States Army Corps of Engineers (USACE)</p> <p><a href="http://www.usace.army.mil">www.usace.army.mil</a></p>	<p>The U.S. Army Corps of Engineers (USACE) conducts a variety of resource management activities in West Virginia through three USACE Districts: Pittsburgh, Huntington, and Baltimore. USACE planning activities for managing and developing water and related land resources are carried out through congressional authorizations.</p> <p>USACE Civil Works programs include water resource development activities that include: flood risk management, navigation, recreation, and infrastructure and environmental stewardship. Flood control measures, such as dams, floodwalls, channel modifications and non-structural measures, require a local or non-federal financial commitment for planning, design, construction, and operations and maintenance of the structures. Non-structural projects include flood proofing, and flood warning and emergency evacuations systems. Congress authorizes flood control measures through a Water Resources Development Act that is normally enacted every two years.</p> <p>The Corps of Engineers also carries emergency response activities. In any disaster, the Corps of Engineers three top priorities are: (1) Support immediate emergency response priorities, (2) Sustain lives with critical commodities, temporary emergency power and other needs, and (3) Initiate recovery efforts by assessing and restoring critical infrastructure</p>	<ul style="list-style-type: none"> <li>• General Investigations Program</li> <li>• Continuing Authorities Program (CAP)</li> <li>• Planning Assistance to States Program</li> <li>• Technical and Engineering Assistance for Stream bank Erosion</li> <li>• Emergency Flood Control Activities Disaster Assistance</li> <li>• Flood Control Clearing</li> <li>• Watershed Protection Loans</li> <li>• Drought Assistance</li> <li>• Floodplain Management</li> <li>• Silver Jackets</li> </ul>
<p>United States Department of Agriculture (USDA)</p> <p><a href="http://www.usda.gov">www.usda.gov</a></p>	<p>The U.S. Department of Agriculture (USDA) is responsible for developing and executing U.S. federal government policy on farming, agriculture, and food. The goals of the USDA are to meet the needs of farmers and ranchers, promote agricultural trade and production, work to ensure food safety, protect natural resources, foster rural communities, and end hunger in the United States and abroad.</p> <p>USDA disaster assistance programs include foods for disaster assistance, emergency food stamps (D-SNAP), housing and rental assistance, and community utility assistance.</p>	<ul style="list-style-type: none"> <li>• USDA Foods for Disaster Assistance</li> <li>• D-SNAP (Emergency Food Stamps)</li> <li>• Very Low Income Housing Repair Loans and Grants</li> <li>• Rural Housing Service Homeownership Loans</li> </ul>
<p>United States Department of Agriculture (USDA) - Forest Service</p> <p><a href="http://www.fs.fed.us">www.fs.fed.us</a></p>	<p>The Forest Service manages public lands in national forests and grasslands. It is also the largest forestry research organization in the world and provides technical and financial assistance to state and private forestry agencies.</p> <p>The Forest Service accomplishes its mission through five main activities: (1) Protection and management of natural resources on National Forest Systems lands, (2) Research on all aspects of forestry, rangeland management, and forest resource utilization, (3) Community assistance and cooperation with state and local governments, forest industries, and private landowners to help protect and manage non-Federal forest and associated range and watershed lands to improve conditions in rural areas, (4) Achieve and support an effective workforce that reflects the full range of diversity of the American people, and (5) International assistance in formulating policy and coordinating U.S. support for the protection and sound management of the world's forest resources.</p>	<ul style="list-style-type: none"> <li>• Stewardship Contracting</li> <li>• National Partnership Office</li> </ul>

<p>United States Department of Agriculture (USDA) – Natural Resources Conservation Service</p> <p><a href="http://www.nrcs.usda.gov">www.nrcs.usda.gov</a></p>	<p>The Department of Agriculture Natural Resources Conservation Service (NRCS) is the primary Federal agency that works with private landowners to help them conserve, maintain and improve their natural resources. The Agency emphasizes voluntary, science-based conservation; technical assistance; partnerships; incentive-based programs; and cooperative problem solving at the community level.</p> <p>The Watershed and Flood Prevention Operations (WFPO) Program provides technical and financial assistance to states, local government and tribes to plan and implement authorized watershed project plans for the purpose of: watershed protection, flood mitigation, water quality improvements, soil erosion reduction and rural, municipal and industrial water supply.</p> <p>The Emergency Watershed Protection (EWP) Program undertakes emergency measures, including the purchase of floodplain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the impacts of erosion on any watershed whenever fire, flood or other natural event causes or has caused a sudden impairment of the watershed.</p> <p>NRCS maintains 30 field offices across the State of West Virginia. The field office staff, which consists of engineers, conservationists, technicians, soil scientists, RC&amp;D coordinators, and volunteers, works with land users to conserve natural resources on private lands</p>	<ul style="list-style-type: none"> <li>• Technical assistance in the form of floodplain management and watershed management studies</li> <li>• Emergency Watershed Protection assistance</li> </ul>
<p>United States Department of Agriculture (USDA) – West Virginia Farm Service Agency</p> <p><a href="http://www.usda.gov/wps/portal/usda/usdahome">www.usda.gov/wps/portal/usda/usdahome</a></p>	<p>The Farm Service Agency's (FSA) provides assistance for natural disaster losses resulting from drought, flood, fire, freeze, tornadoes, pest infestation, and other calamities. In West Virginia, the FSA responds to disasters by: (1) Completing damage assessment procedures to determine the extent and type of damage and what programs may be available or requested; (2) Implementing farm programs to address the impacts of the event; and (3) Assist other agencies as necessary.</p> <p>Programs providing assistance for natural disaster losses include: (1) The Emergency Conservation Program (ECP) that rehabilitates farmlands and restores farm structures to preexisting conditions; (2) The Crop Loss Disaster Assistance Program that provides payments to help stabilize farm income; (3) Non-Insured Assistance that provides payments for qualified crop losses; and (4) Low Interest Emergency Loans that provide funds needed to maintain agricultural operations.</p>	<ul style="list-style-type: none"> <li>• Emergency Conservation Program</li> <li>• Crop Loss Disaster Assistance Program Payments</li> <li>• Non-Insured Assistance Program</li> <li>• Emergency Loans</li> </ul>
<p>United States Environmental Protection Agency (EPA)</p> <p><a href="http://www.epa.gov">www.epa.gov</a></p>	<p>The purpose of the Environmental Protection Agency is to protect human health and the environment. EPA is responsible for maintaining and enforcing national standards under U.S. environmental laws. The agency also works with industries and other Federal, state, tribal, and local governments to implement voluntary pollution prevention programs and energy conservation efforts. EPA responds to disasters that involve spills of oil, hazardous chemicals or materials that could threaten human health and the environment and conducts response actions to mitigate environmental impacts caused by disasters.</p>	<ul style="list-style-type: none"> <li>• Emergency Planning</li> <li>• Emergency Response and Cleanup Activities</li> <li>• Local Governments Reimbursement (LGR) Program</li> <li>• Brownfields Grants and Funding</li> <li>• Water Grants</li> <li>• Assess Potential Environmental Hazards</li> <li>• Superfund Amendment and Reauthorization Act (SARA) Title III</li> </ul>
<p>United States Department of Energy (DOE)</p> <p><a href="http://energy.gov">energy.gov</a></p>	<p>The U.S. Department of Energy ensures America's security and prosperity by addressing its energy, environmental and nuclear challenges through science and technology solutions. The Department is responsible for the nuclear weapons program, nuclear reactor production, energy conservation, energy-related research, radioactive waste disposal, and domestic energy production.</p>	<ul style="list-style-type: none"> <li>• Radiological Emergency Assistance</li> <li>• Disaster-Related Power Outage</li> <li>• Better Buildings Neighborhood Program</li> <li>• Building Technologies Program: Disaster Recovery and Building Reconstruction</li> </ul>

<p>United States Small Business Administration (SBA)</p> <p><a href="http://www.sba.gov">www.sba.gov</a></p>	<p>The U.S. Small Business Administration (SBA) delivers loans, loan guarantees, contracts, counseling sessions and other forms of assistance to small business. The SBA also provides disaster assistance to individuals, families and businesses in an area whose property has been damaged or destroyed following a Prudentially declared disaster.</p>	<ul style="list-style-type: none"> <li>• Home and Property Disaster Loans</li> <li>• Disaster Assistance Loans</li> <li>• Economic Injury Loans</li> <li>• Military Reservist Economic Injury Disaster Loan</li> </ul>
<p>United States Department of Health &amp; Human Services (HHS)</p> <p><a href="http://www.hhs.gov">www.hhs.gov</a></p>	<p>The U.S. Department of Health and Human Services (HHS) is the U.S. government’s principal agency for protecting the health of Americans and providing essential human services. HHS is the primary agency responsible for Public Health and Medical Services during an emergency and coordinates Federal assistance to supplement state, tribal, and local resources in meeting the public health and medical needs of victims of major disasters or public health and medical emergencies.</p>	<ul style="list-style-type: none"> <li>• USPHS Commissioned Corps teams</li> <li>• National Disaster Medical System</li> <li>• Strategic National Stockpile</li> <li>• Federal Medical Station (FMS)</li> <li>• Medical Reserve Corps</li> <li>• Contaminated Food and Drugs</li> <li>• Vector Control</li> </ul>
<p>National Oceanic and Atmospheric Administration (NOAA) /National Weather Service (NWS)</p> <p><a href="http://weather.gov">weather.gov</a></p> <p><a href="http://www.noaa.gov">www.noaa.gov</a></p>	<p>From daily weather forecasts, severe storm warnings and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality and affect more than one-third of America's gross domestic product. NOAA's dedicated scientists use cutting edge research and high-tech instrumentation to provide citizens, planners, emergency managers and other decision makers with reliable information they need when they need it. NOAA maintains a presence in every state and has emergency as an international leader on scientific and environmental matters. NOAA's mission is to protect life and property and conserve and protect natural resources.</p>	<ul style="list-style-type: none"> <li>• National Climatic Data Center</li> <li>• Current and Past Weather and Forecasts</li> <li>• Active Weather Alerts</li> <li>• Weather Safety</li> <li>• Weather Education</li> <li>• GIS data</li> </ul>
<p>United States Geologic Survey (USGS) - Water Resources Division</p> <p><a href="http://water.usgs.gov">water.usgs.gov</a></p>	<p>The USGS is a science organization that provides impartial information on the health of ecosystems and the environment, natural hazards that threaten the U.S., natural resources, the impacts of climate and land-use change, and the core science systems that help provide timely, relevant, and useable information. In 2010, the USGS realigned its organization structure around the missions identified in the USGS Science Strategy. The Natural Hazards Mission Area includes six science programs: Coastal and Marine Geology, Earthquake Hazards, Geomagnetism, Global Seismographic Network, Landslide Hazards, and Volcano Hazards. Through these programs, the USGS provides alerts and warnings of geologic hazards and supports the warning responsibilities of the National Oceanic and Atmospheric Administration (NOAA) geomagnetic storms and tsunamis.</p> <p>The USGS Site Inventory System contains and provides access to inventory information about sites at stream reaches, wells, test holes, springs, tunnels, drains, lakes, reservoirs ponds, excavations, and water-use facilities. The Site Inventory for West Virginia provides real-time and historical data related to flood stages and stream flow from 86 stream flow-gauging stations.</p> <p>USGS analyzes stream flow information from the sites to predict the magnitude and frequency of future floods. This data forms the basis of floodplain studies as well as other flood-related evaluations such as bridge and</p>	<ul style="list-style-type: none"> <li>• Cooperative Water Program</li> <li>• National Streamflow Information Program</li> <li>• National Water-Quality Assessment Program</li> <li>• Toxic Substances Hydrology (Toxics) Program</li> <li>• Groundwater Resources Program</li> <li>• Hydrologic Research and Development</li> <li>• State Water Resources Research Institute Program</li> <li>• Hydrologic Networks and Analysis</li> </ul>

**State Agencies**



<p>West Virginia Conservation Agency</p> <p><a href="http://www.wvca.us">www.wvca.us</a></p>	<p>The West Virginia Conservation Agency (WVCA) coordinates statewide conservation efforts and provides resources to local communities and land users that address conservation issues. The Emergency Watershed Protection program, activated during a State or Federal Emergency Disaster Declaration, is used to remove blockages that cause a 75% obstruction to streamflow. The Stream Protection and Restoration is used to address non-emergency situations that fall outside of the Emergency Watershed Protection program. The Watershed Dams program is responsible for the inspection and operation and maintenance of 170 watershed dams and 22 channels throughout the State.</p> <p>Educational and technical assistance are conducted through the Watershed Resource Center that provides training, information transfer, and technical assistance to local watershed associations.</p>	<ul style="list-style-type: none"> <li>• Emergency Watershed Protection</li> <li>• Stream Protection &amp; Restoration Program</li> <li>• Watershed Dams</li> <li>• Environmental Education Grants Program</li> <li>• Watershed Resource Center</li> </ul>
<p>West Virginia Department of Agriculture</p> <p><a href="http://www.wvagriculture.org/index.html">www.wvagriculture.org/index.html</a></p>	<p>The West Virginia Department of Agriculture (WVDA) promotes the state's agricultural industry and works to ensure the safety of agricultural products sold in the state.</p> <p>The responsibilities of the Department of Agriculture include: (1) Prevent, control, and eradicate animal and poultry diseases; (2) Inspect commercial slaughterhouses; (3) Regulate pesticides; (4) Detect and control plant diseases; (5) Distribute agricultural information; (6) Enforce laws to protect the public food supply; and (7) Support rural development initiatives.</p> <p>The Homeland Security Section provides training, guidance and preparation for emergency response situations. Knowledge of available physical and human resources, within the WVDA and throughout the community are important keys to response preparation.</p> <p>The WVDA works closely with the U.S. Department of Agriculture agencies on matters related to droughts and other severe weather related conditions.</p>	<ul style="list-style-type: none"> <li>• Agriculture Education Programs</li> <li>• Certification and Training Program</li> <li>• Cooperative Agricultural Pest Survey (CAPS) Program</li> <li>• Environmental Programs</li> <li>• Gypsy Moth Program</li> <li>• Homeland Security Section</li> <li>• National Animal Identification System</li> <li>• Pesticide Regulatory Programs</li> <li>• Specialty Crops Grants</li> <li>• Plant Pest Regulatory Program</li> <li>• Worker Protection Standard (WPS) Program</li> </ul>
<p>West Virginia Department of Environmental Protection – Division of Water and Waste Management</p> <p><a href="http://www.dep.wv.gov/WWE/Pages/default.aspx">www.dep.wv.gov/WWE/Pages/default.aspx</a></p>	<p>The Division of Water and Waste Management (DWWM) preserves, protects, and enhances the state's watersheds through implementing programs that control hazards waste, solid waste and surface and groundwater pollution from all sources.</p> <p>DWWM administers programs to control surface and groundwater pollution caused by industrial, municipal and stormwater discharges and conducts oversight of construction, operation and closure of hazardous and solid waste and underground storage tank sites. In addition, the DWWM works to protect, restore and enhance West Virginia's watersheds through education, technical and financial assistance, comprehensive watershed assessments, groundwater monitoring, water quality standards recommendations, wetlands preservation, inspection and enforcement of National Pollutant Discharge Elimination System (NPDES) permitted facilities, dams, hazardous and solid waste and underground storage tank sites.</p>	<ul style="list-style-type: none"> <li>• 401 Certification</li> <li>• Certified Laboratories</li> <li>• Clean Water State Revolving Fund</li> <li>• Groundwater/UIC</li> <li>• Monitoring Well Construction</li> <li>• Nonpoint Source</li> <li>• RCRA Hazardous Waste</li> <li>• Solid Waste</li> <li>• Stormwater Program</li> <li>• Water Quality Standards</li> </ul>

<p>West Virginia Department of Environmental Protection – Office of Abandoned Mine Lands &amp; Reclamation</p> <p><a href="http://www.dep.wv.gov">www.dep.wv.gov</a></p>	<p>The Office of Abandoned Mine Lands and Reclamation (AML&amp;R) protects public health, safety, and property by correcting hazardous conditions resulting from past coal mining and enhances the environment through reclamation and restoration of land and water resources.</p> <p>AML&amp;R operates through eight sections. The sections decide what sites AML&amp;R should reclaim, design the most cost-effective and practical methods used to abate the many types of abandoned mine problems, obtain right-of-entry agreements from all private property owners and lessees for AML projects, and administer construction contracts. AML&amp;R also addresses emergency problems and manages the water quality monitoring, and provides technical support for environmental quality remediation projects. All work is in conjunction with the Federal Office of Surface Mining.</p>	<ul style="list-style-type: none"> <li>• Construction monitoring and inspection on Abandoned Mine Lands (AML)</li> <li>• Prioritizes which sites should be reclaimed.</li> </ul>
<p>West Virginia Department of Revenue</p> <p><a href="http://www.wvrevenue.gov">www.wvrevenue.gov</a></p>	<p>The Department of Revenue was created in 1989 to administer and enforce West Virginia revenue laws and efficiently collect the proper amount of revenues due the State. It informs and serves the citizens of West Virginia, all in a manner that maximizes voluntary compliance, provides meaningful assistance, and builds confidence in our frugality, integrity, effectiveness, and fairness. The Department of Revenue is charged with the responsibility for the enforcement of statutes relating to certain state taxes and the collection thereof. The Department also is charged with the responsibility of preparing for the Board of Public Works tentative ad valorem property tax assessments for all public utilities operating within the State. The Department regulates the insurance industry within the State.</p>	<ul style="list-style-type: none"> <li>• Fiscal agent for all issuers of general obligation bonds issued by West Virginia counties.</li> </ul>
<p>West Virginia Development Office</p> <p><a href="http://www.wvcommerce.org/info/aboutcommerce/developmentoffice/default.aspx">www.wvcommerce.org/info/aboutcommerce/developmentoffice/default.aspx</a></p>	<p>The West Virginia Development Office (WVDO) is a State’s chief economic and community development agency. The WVDO is charged with promoting sustainable community development by providing assistance in the form of grants and loans. The Community Development Division administers state and federal programs designed to implement civic improvements and attract private sector investment.</p> <p>Eligible activities that relate to mitigation include: flood and storm drainage projects, acquisition and demolition or relocation projects, water and wastewater facilities and services projects, and community facility renovation/construction projects. The WVDO also coordinates with the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM) to ensure that infrastructure projects are not located within floodplains.</p> <p>In 2010, Block Grant funds invested in community development projects benefited West Virginia by leveraging an additional \$50 million. More than 81% of the \$7.1 million of Appalachian Regional Commission funds supported public water and sewer improvements. An additional \$6.4 million in grants funds supported local community development and infrastructure projects throughout the state.</p>	<ul style="list-style-type: none"> <li>• Community Development Division Programs</li> <li>• Appalachian Regional Commission</li> <li>• Certified Development Community Program</li> <li>• Economic Infrastructure Bond Fund</li> <li>• Flex-E-Grant Program</li> <li>• Governor’s Community Partnership Grant Program</li> <li>• Land and Water Conservation Fund</li> <li>• Local Economic Development Grant Program</li> <li>• Main Street West Virginia</li> <li>• Neighborhood Investment Program</li> <li>• Small Cities Block Grant Fund</li> </ul>
<p>West Virginia Division of Corrections</p> <p><a href="http://www.wvdoc.com">www.wvdoc.com</a></p>	<p>The West Virginia Division of Corrections (DOC) provides a safe, secure and humane correctional system for the public, staff, and offenders. The agency is currently responsible for the incarceration of adult felons in West Virginia and for those offenders who are released on parole and operates 12 correctional and work release facilities statewide.</p>	<ul style="list-style-type: none"> <li>• Department of Education- Office of Institutional Education Programs,</li> <li>• PSIMED CORRECTIONS, LLC</li> </ul>

<p>West Virginia Division of Forestry</p> <p><a href="http://www.wvforestry.com">www.wvforestry.com</a></p>	<p>The West Virginia Division of Forestry (DOF) acts as the lead agency within the State to regulate and coordinate forestry activities of private industries and landowners through partnerships emphasizing a stewardship ethic that protects, nurtures, promotes the wise utilization of and sustains the State's forest resources.</p> <p>The DOF carries out its responsibilities through six program areas: (1) Fire Protection is responsible for protection of nearly 12 million acres of state and privately owned forestland; (2) Investigative Unit investigates all violations of the state's fire laws; (3) Water Quality issues licenses to anyone who buys timber or logs for resale or who harvests timber within the state and provides logger training and certification; (4) Managed Timberland promotes sustainable forestry within the state; (5) Forest Management provides cooperative forest management programs for private non-industrial forest landowners to promote sustainable forestry practices and regulates the digging of ginseng and manages state forests and the state tree nursery; and (6) Urban and Community Forestry helps municipalities establish long-term tree care programs.</p> <p>The DOF training program includes conducting wildlife suppression training for the West Virginia National Guard and prison inmates. The DOF supervises these groups when they are called upon to assist in wildfire suppression.</p> <p>Several DOF programs can have a positive impact on land use activities, including the Forest Protection Program, the Logging Sediment Control Act, and Forest Management Plans. These programs relate to land use activities</p>	<ul style="list-style-type: none"> <li>• Forest Protection Program</li> <li>• Logging Sediment Control Act</li> <li>• Forest Management Plans</li> </ul>
<p>West Virginia Division of Highways</p> <p><a href="http://www.transportation.wv.gov">www.transportation.wv.gov</a></p>	<p>The West Virginia Department of Transportation WVDOT provides essential services in transportation, tourism and economic development. These services include: Safety and protection for citizens through modern operating standards for highways, rail and airport facilities, and licensing and permitting drivers and motor vehicles; Transportation services including public transit, railway operation and maintenance, airport and river port development and highway construction and maintenance; Community and economic development through accessible roads, rivers, railways and airports; Revenue generation through the highway trust fund; and Information and education through driver education, travel information, safety guidance, public involvement in transportation planning and continuing education.</p> <p>The WVDOT Division of Highways is responsible for planning, engineering, right-of-ways acquisition, construction, reconstruction, traffic regulation and maintenance of more than 35,000 miles of state roads. Additional duties include highway research, outdoor advertising continuous to state roads, roadside development, safety and weight enforcement, and dissemination of highway information.</p>	<ul style="list-style-type: none"> <li>• West Virginia Strategic Highway Safety Plan [PDF]</li> <li>• Statewide Transportation Improvement Program</li> <li>• ARRA (Stimulus) Funds</li> </ul>

<p>West Virginia Division of Homeland Security and Emergency Management</p> <p><a href="http://www.wvdhsem.gov">www.wvdhsem.gov</a></p>	<p>The West Virginia Division of Homeland Security and Emergency Management (WVDHSEM) protects the life and property by providing coordination, guidance, support and assistance to local emergency managers and first responders.</p> <p>The Agency manages disaster preparedness, mitigation, and response and recovery efforts throughout the state by coordinating with all responsible government agencies. In the event of a federally declared disaster, the division works closely with FEMA to administer assistance programs.</p> <p>WVDHSEM is comprised of three branches: (1) The Mitigation and Recovery Branch consists of three groups that deal with floodplain management, hazard mitigation, and individual assistance; (2) The Planning and Response Branch is responsible for the Flood Warning System, the Emergency Operations Center (EOC) and the Watch Center, as well as the SARA Title III Program, the Search and Rescue Program, the GIS section and other related planning activities; and (3) The Homeland Security Branch is made up of the Fusion Center, the Critical Infrastructure group and the State Interoperability Coordinator.</p>	<ul style="list-style-type: none"> <li>• American Red Cross</li> <li>• Centers for Disease Control and Prevention</li> <li>• Federal Emergency Management Agency</li> <li>• FEMA Mitigation Division</li> <li>• National Flood Insurance Program Web site</li> <li>• FEMA for Kids</li> <li>• National Citizen Corps Program</li> <li>• National Weather Service</li> <li>• U.S. Department of Homeland Security: Ready.gov</li> <li>• Volunteer WV</li> <li>• Look for volunteer opportunities in Disaster Preparedness</li> <li>• West Virginia Conservation Agency</li> </ul>
<p>West Virginia Division of Natural Resources</p> <p><a href="http://www.wvdnr.gov">www.wvdnr.gov</a></p>	<p>DNR's role in floodplain management lies in its authority to protect wetlands, recreation opportunities, and fish and wildlife habitats and in its exercise of the legislative mandates of the Public Land Corporation that exist in these areas. Through a Memorandum of Agreement with the Department of Environmental Protection (DEP), DNR provides comments to DEP concerning their certification for wetland fills in accordance with the Federal Fish and Wildlife Coordination Act. The Public Land Corporation authorizes private sector actions that affect publicly owned minerals in the streambeds of the State.</p> <p>DNR has developed management plans that preserve, enhance and protect floodplains on many State owned or controlled areas. DNR maintains a statewide inventory on wetlands; significant/ sensitive fisheries and wildlife habitat; rare, threatened, and endangered species; and fish and wildlife related recreation areas. It also is developing GIS capabilities to assess the vegetative conditions and uses of the State's stream bank habitats.</p> <p>The DNR provides staff to assist in maintaining the State Disaster Center, and provides law enforcement at disaster sites along with other police agencies. It should be noted that these officers are paid from federal and state hunting and fishing monies.</p> <p>The Parks and Recreation and Wildlife Resources Sections of the DNR have limited personnel and equipment,</p>	<ul style="list-style-type: none"> <li>• Wonderful WV Magazine</li> <li>• Wildlife Diversity Program Publications</li> <li>• WV Wildlife Magazine</li> <li>• WV Wildlife TV</li> <li>• Wildlife Resources Radio Report</li> <li>• DNR Annual Report</li> </ul>
<p>West Virginia Division of Tourism</p> <p><a href="http://wvtourism.com">wvtourism.com</a></p> <p><a href="http://www.wvcommerce.org">www.wvcommerce.org</a></p>	<p>The Division of Tourism in partnership with the private sector tourism industry, works to cultivate a world-class travel and tourism industry through administering programs that stimulate investment, expand current tourism business, and promote a positive state image.</p>	

<p>West Virginia Geological and Economic Survey</p> <p><a href="http://www.wvgs.wvnet.edu">www.wvgs.wvnet.edu</a></p>	<p>The West Virginia Geological and Economic Survey (WVGES) provides timely, responsive, unbiased, and credible geoscience information in order to promote thoughtful public policy; to help create prosperity; and to maintain a high level of environmental quality, economic opportunity and quality of life for West Virginians.</p> <p>The WVGES serves as the point of contact and center for West Virginia geological data; answers questions and conducts inventories on geological aspects of environmental issues such as water use, geologic hazards, facility siting, and waste disposal; provides expertise on the states fuel and non-fuel geologic resources; conducts unbiased research on natural resources and environmental issues; maps bedrock and surficial geology; disseminates scientific information; conducts outreach to schools; and looks for funding opportunities from Federal and other programs to support the goals of the agency.</p>	<ul style="list-style-type: none"> <li>• Geographic Information System (GIS)</li> <li>• Applied Coal Resources Investigations</li> <li>• Applied Oil and Gas Resources Investigations</li> <li>• General Geoscience</li> <li>• Industrial Minerals</li> <li>• Environmental Geosciences</li> <li>• Geologic Mapping</li> <li>• Advanced Geoscience Research</li> <li>• Geoscience Education</li> <li>• Information Transfer</li> <li>• Public Service Management and Administration</li> <li>• Earth Science Information Center (ESIC)</li> </ul>
<p>West Virginia Housing Development Fund</p> <p><a href="http://www.wvhdf.com">www.wvhdf.com</a></p>	<p>The West Virginia Housing Development Fund is a public body corporate and governmental organization established to increase the supply of residential housing for persons and families of low- and moderate-income and to provide construction and permanent mortgage financing to public and private sponsors of low- and moderate-income housing.</p>	<ul style="list-style-type: none"> <li>• FHA, VA, Rural Development loans accepted in addition to Private Mortgage Insurance</li> </ul>
<p>West Virginia Offices of the Insurance Commissioner</p> <p><a href="http://www.wvinsurance.gov">www.wvinsurance.gov</a></p>	<p>The West Virginia Offices of the Insurance Commissioner (WVOIC) regulates the state's insurance industry, focusing on consumers needs for available and affordable insurance products offered by financial viable companies directly or through knowledgeable producers.</p> <p>Following weather events, the WVOIC issues Emergency Order Notices that provide information to insurers, identify the counties affected, addresses the licensing of sufficient emergency adjusters, and orders that normal time frames for claim handling and settlement are suspended in affected counts for claims related to the weather events.</p>	
<p>West Virginia National Guard</p> <p><a href="http://www.wv.ngb.army.mil">www.wv.ngb.army.mil</a></p>	<p>The West Virginia National Guard Army National Guard (AWVARNG) has a three-fold mission:</p> <p>(a) Federal Mission - As a Reserve Component of the Army, maintain combat ready units and Soldiers who are available to mobilize in support of the National Military Strategy; (b) State Mission - Provide organized, trained and equipment units to protect life and property and to preserve peace, order and public safety when ordered by the governor; and (c) Community Mission - To add value to the communities in which we live, work and serve</p> <p>The WV Army National Guard has 38 units and activities stationed in 22 counties throughout West Virginia and overseas. Since September 11, 2001, nearly 15,000 Virginia National Guard personnel have mobilized on federal active duty for combat operations, peacekeeping and homeland security missions in Iraq, Afghanistan, Bosnia, Kosovo and other locations around the world.</p> <p>The Guard also plays a key role during floods, fires and other natural disasters. Following activation by the Governor, the guard help communities with food and water distribution, power generation, route clearance, clearing debris, and providing security, transportation, traffic control and communications.</p>	<ul style="list-style-type: none"> <li>• PTO Program</li> <li>• Soldier Resources</li> <li>• Soldier Care Form</li> <li>• Recruiting Assistance Program</li> </ul>

<p>West Virginia State Fire Marshall's Office <a href="http://www.firemarshal.wv.gov">www.firemarshal.wv.gov</a></p>	<p>The purpose of the West Virginia State Fire Marshal's Office is to improve the quality of life of the citizens of West Virginia through the leadership, development, and administration of fire safety programs and to reduce the loss of life and property through education, inspection, investigation, certification and licensure, building plan reviews and enforcement of fire safety laws.</p>	<ul style="list-style-type: none"> <li>• Data Collection and Analysis</li> <li>• Fire Service Training</li> <li>• Code Adoption and Enforcement</li> <li>• Licensing and Regulation of Explosives and Hazardous Materials</li> <li>• Investigation &amp; Fire Cause Determination</li> <li>• Public Fire Education</li> <li>• Research and Planning</li> <li>• Fire Service</li> </ul>
<p>West Virginia State Police <a href="http://www.wvstatepolice.com">www.wvstatepolice.com</a></p>	<p>The State Police is charged with the responsibility of general and special law enforcement and criminal investigation services with concentration in rural, unincorporated areas of the State. Troopers conduct traffic enforcement for both unincorporated areas and interstate highways, and provide security and police services throughout the state for many athletic events, fairs and festivals.</p> <p>In order to accomplish the mission of the State Police and perform the duties and responsibilities required, the Department is comprised primarily of four divisions – Executive Services, Staff Services, Field Services and Professional Standards. Personnel within Staff and Executive Services perform the administrative, accounting and executive functions necessary to operate the Department and are located primarily within Department Headquarters at South Charleston, West Virginia. Existing organizationally within Executive Services is Media Relations, Personnel and the Medical Unit. Staff Services is comprised of Accounting, Communications, Criminal Records, the Forensic Laboratory, Planning and Research, Procurement, Promotional Standards, Traffic Records, the Training Academy and Uniform Crime Reporting.</p>	
<p>West Virginia Office of GIS Coordination  <a href="http://www.gis.wv.gov/Pages/default.aspx">http://www.gis.wv.gov/Pages/default.aspx</a></p>	<p>The mission of the WV Office of GIS Coordination is to work with state agencies, West Virginia's GIS community, and regional and federal partners to provide and promote cooperative leadership, support, and innovative solutions for utilizing geospatial technology in serving the public good. The office is headed by the State GIS Coordinator.</p>	<ul style="list-style-type: none"> <li>•GIS Mapping and Data</li> <li>•GIS Policy Council</li> <li>•GIS Steering Committee</li> </ul>
<p>West Virginia Planning and Development Councils</p>	<p>The WV Regional Planning and Development Act mandated that WV be divided into 11 regions to serve as development districts to more effectively use the state's resources and maximize small communities chances of attracting federal dollars. The Councils are charged with the responsibility of preparing the Regional Development Program and implementing economic and community development projects.</p>	<ul style="list-style-type: none"> <li>•Mutli-Hazard Mitigation Plans</li> <li>•Grant Writing</li> <li>•Technical Assistance</li> <li>•Project Administration</li> <li>•Intergovernmental Coordination</li> </ul>

<p>West Virginia University Cooperative Extension Service</p> <p><a href="http://ext.wvu.edu">ext.wvu.edu</a></p>	<p>The West Virginia University Extension Service helps individuals, families, businesses, and communities apply research-based knowledge to problems. Extension helps people: protect their resources, increase their income, improve their health, and build their leadership and career skills. Through its Extension Service, WVU provides a “mini campus” in each of the state’s 55 counties. The work at these locations addresses a wide variety of community issues via a nontraditional mix of learners, faculty, staff and volunteers.</p> <p>The Extension Disaster Education Network is a collaborative multi-state effort by Extension Services across the country to improve the delivery of services to citizens affected by disasters. The site serves extension agents and educators by providing access to resources on disaster mitigation, preparedness, response and recovery, linkages with Federal, state and local agencies and organizations, and anticipation of future disaster education needs and actions.</p>	<ul style="list-style-type: none"> <li>• 4-H &amp; Youth</li> <li>• Agriculture</li> <li>• Business &amp; Workforce</li> <li>• Disaster Preparedness</li> <li>• Environmental &amp; Natural Resources</li> </ul>
<p>West Virginia University GIS Technical Center</p> <p><a href="http://wvgis.wvu.edu">wvgis.wvu.edu</a></p>	<p>The GIS Technical Center provides statewide GIS services to advance the state’s spatial data infrastructure. Services include the State Data Clearinghouse, a GIS People Director, and the MAPWV.gov web mapping portal.</p> <p>The objectives of the Technical Center are:</p> <ul style="list-style-type: none"> <li>• Reduce the duplication of data development efforts among organizations</li> <li>• Catalog and distribute GIS spatial data and information free-of-charge through the Internet</li> <li>• Coordinate acquisition of new data additions to the West Virginia Spatial Data Infrastructure</li> <li>• Assist with strategic planning, development and implementation of statewide mapping guidelines</li> <li>• Provide advisory services and training programs in the field of geographic information science</li> <li>• Conduct research and provide education towards improvement of geographic information technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Mineral Lands Mapping Program</li> <li>• Statewide Digital Orthophotography Program</li> <li>• Digital Line Graph Project</li> <li>• National Hydrographic Database</li> <li>• Statewide Addressing and Mapping Project</li> <li>• Digital Flood Insurance Rate Maps</li> <li>• High-Resolution Satellite Imagery</li> <li>• Enhanced Digital Elevation Model</li> </ul>
<p><b>Private/Community Organizations</b></p>		

<p>American Red Cross</p> <p><a href="http://www.redcross.org">www.redcross.org</a></p>	<p>The American Red Cross prevents and alleviates human suffering in emergency situations. Each year the American Red Cross responds immediately to more than 70,000 disasters, including house or apartment fires (the majority of disaster responses), hurricane, floods, earthquakes, tornadoes, hazardous materials, spills, transportation accidents, explosions, and other man-made disasters.</p> <p>Red Cross disaster relief focuses on meeting people’s immediate emergency disaster-caused needs. When a disaster threatens or strikes, the Red Cross provides shelter, food, and health and mental health services. The Red Cross also feeds emergency workers, handles inquiries from concerned family members outside the disaster area, provides blood and blood products to disaster victims, and helps those affected by disaster to access other available resources.</p> <p>The American Red Cross West Virginia Region delivers services to the entire state of West Virginia and is divided into seven areas:</p> <ul style="list-style-type: none"> <li>• Central West Virginia Chapter</li> <li>• Eastern Panhandle Chapter</li> <li>• Fayette-Nicholas Chapter</li> <li>• Greenbrier Valley Chapter</li> <li>• Mid-Ohio Valley Chapter</li> <li>• North Central West Virginia Chapter</li> <li>• River Valley Chapter</li> </ul>	<ul style="list-style-type: none"> <li>• Disaster Services</li> <li>• Disaster Services Human Resources system</li> <li>• National Response Plan</li> <li>• Service to the Armed Forces</li> </ul>
<p>Association of State Floodplain Managers (ASFPM)</p> <p><a href="http://www.floods.org">www.floods.org</a></p>	<p>ASFPM is composed of professionals in the field of natural hazard mitigation from flooding, floodplain management, the National Flood Insurance Program, and flood preparedness measures. ASFPM is involved in floodplain management advocacy and has significant influence over floodplain policy both nationally and locally. Its membership includes professionals in the field of engineering, hydrologic forecasting, emergency response, water resources, etc.</p> <p>ASFPM also administers the Certified Floodplain Manager (CFM) program. This accredited program includes a rigorous course of study regarding floodplain management principals, flood mitigation techniques, and the National Flood Insurance Program.</p>	<ul style="list-style-type: none"> <li>• Certified Floodplain Manager (CFM)</li> <li>• Ongoing policy initiatives</li> <li>• Various floodplain management courses</li> <li>• HAZUS and other GIS based tools initiatives</li> </ul>
<p>County Commissioners’ Association of West Virginia</p> <p><a href="http://www.polsci.wvu.edu/ccawv">www.polsci.wvu.edu/ccawv</a></p>	<p>The mission of the County Commissioners’ Association of WV is to "maintain a statewide agency for the purpose of promoting the interest and general welfare of local county government through a variety of communication tools; to represent county government before the West Virginia Legislature, administrative agencies, and the federal government; to educate the public about the value and need for county programs and services; and to facilitate the exchange of problems, ideas and solutions among county officials."</p> <p>Educational Programs are arranged by the Association in co-operation with the WV State Tax Department and West Virginia University County Commissioners' Continuing Educational Training Series - 2 each year</p>	<ul style="list-style-type: none"> <li>• Educational Programs</li> </ul>



<p>West Virginia Floodplain Management Association (WVFMA)</p> <p><a href="http://wvfma.org">wvfma.org</a></p>	<p>WVFMA is a local chapter of the Association of State Floodplain Managers Association. It is dedicated to the mitigation of risk and the reduction of loss of life, property, and human suffering caused by flooding. It advocates protection from flooding through and promotion of the natural beneficial function of floodplains.</p>	<ul style="list-style-type: none"> <li>• Educational and outreach programs</li> </ul>
<p>West Virginia Municipal League</p> <p><a href="http://www.wvml.org">www.wvml.org</a></p>	<p>The West Virginia Municipal League is a statewide, nonprofit, nonpartisan association of cities, towns and villages established in 1968 to assist local governments and advance the interests of the citizens who reside within. The League achieves this directive through legislative advocacy, research, education and other services for municipal elected officials. The membership includes all 232 state municipalities.</p>	<ul style="list-style-type: none"> <li>• Utility Service Partners, Inc.</li> <li>• Endorsed Property/Casualty Insurance Program</li> </ul>
<p>West Virginia Public Broadcasting</p> <p><a href="http://www.wvpubcast.org">www.wvpubcast.org</a></p>	<p>West Virginia Public Broadcasting is the largest cultural and educational service in the state. The free, non-commercial service offers a diverse range of programming for all of the state's citizens. Public broadcasting is distinguished from other media through its mission to nurture personal growth and civic responsibility, respect people's intelligence, and promote lifelong discovery. Services include West Virginia Public Radio, West Virginia PBS, Ready To Learn and WVPubcast.org.??</p> <p>West Virginia Public Broadcasting is operated by the Educational Broadcasting Authority (EBA) which is the licensee of three public television stations, nine public radio stations, and a statewide microwave interconnection system.</p>	<ul style="list-style-type: none"> <li>• West Virginia Public Radio</li> <li>• West Virginia Morning (news)</li> <li>• Inside Appalachia (news)</li> <li>• West Virginia PBS Outlook (news)</li> <li>• The Legislature Today (news)</li> </ul>



## APPENDIX E: PLANNING PROCESS DOCUMENTS

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# Agenda

August 22, 2012 9:00 – 3:00 PM  
 WV State Police Academy

**Purpose:** State Plan Kick-Off Meeting – Getting Organized, Jump-starting the Revision Process and Determining Desired Plan Outcomes

Description	Lead	Time
Welcome, Introductions and How We'll Communicate <ul style="list-style-type: none"> <li>• SharePoint Site</li> <li>• Planning Process</li> </ul>	Jimmy Gianato, WVDHSEM Director Tim Keaton, WV State Hazard Mitigation Officer Carrie Speranza, Dewberry	9:00 – 9:30
Plan Update Requirements & Data Availability <ul style="list-style-type: none"> <li>• Overview of HIRA Planning Process</li> <li>• Hazard Analysis consistent with State Hazards</li> <li>• New Hazards to Consider?</li> <li>• Data Needs               <ul style="list-style-type: none"> <li>○ Data discrepancies from previous plan, what can be improved?</li> <li>○ Critical Facilities and Assets</li> <li>○ Hazard Specific Data Sources</li> </ul> </li> <li>• Regional Hazard Mitigation Plan Incorporation</li> <li>• Review of Existing Ranking</li> </ul>	Ryan Towell, Dewberry	9:30 – 10:30  <b>Break – 10am</b>
Evaluating 2010: <ul style="list-style-type: none"> <li>• Mitigation Actions</li> <li>• Program Capacity</li> <li>• Planning Integration</li> </ul>	Ryan Towell, Dewberry	10:45– 11:00
<b>LUNCH – Provided</b>		11:00 – 12:00
THIRA <ul style="list-style-type: none"> <li>• Planning Process</li> <li>• Human-caused Hazard Identification</li> <li>• Critical Facilities Review and Identification</li> </ul>	Corinne Bartshire, Dewberry	12:00 – 2:30
Wrap Up and Future Meetings <ul style="list-style-type: none"> <li>• Project Schedule - Milestones</li> <li>• Next Mitigation Council Meeting</li> <li>• Next THIRA Council Meeting</li> <li>• Overview of Action Items</li> </ul>	Tess Grubb, FEMA Region III Carrie Speranza, Dewberry Ryan Towell, Dewberry Corinne Bartshire, Dewberry	2:30 – 3:00

**Attendees:** WV Hazard Mitigation Council; WV Division of Homeland Security and Emergency Management; FEMA Region III; Dewberry



## West Virginia Statewide Standard Hazard Mitigation Plan Update Kick-Off Meeting

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Do you have any ideas for improvements to the current 2010 West Virginia Hazard Mitigation Plan?

Are there any reports/data that we should be aware of for incorporation into the plan?

## West Virginia Statewide Standard All-Hazard Mitigation Plan Update

### Kick-Off Meeting

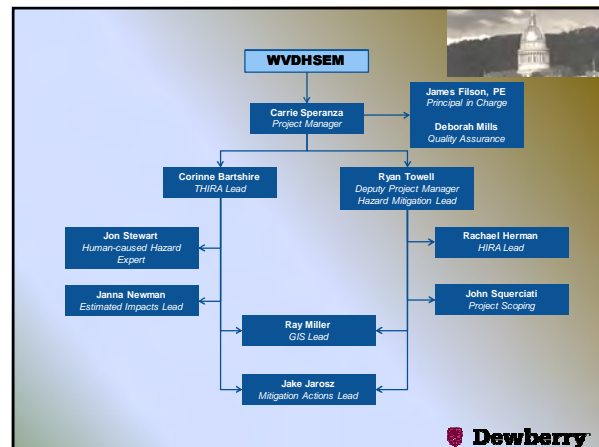
Submitted for State of West Virginia

## Meeting Agenda

- Welcome & Introductions
- Hazard Mitigation Planning Process
  - Plan Update Requirements & Data Availability
  - BREAK
  - Ranking Methodology, Risk & Vulnerability
  - Evaluating 2010 Mitigation Actions, Program Capacity, Planning Integration, Public Outreach
  - LUNCH
- THIRA Planning Process
  - Hazard Identification/Validation
  - Critical Facilities Review / Identification
- Plan Outcomes Exercise
- Wrap Up and Future Meetings

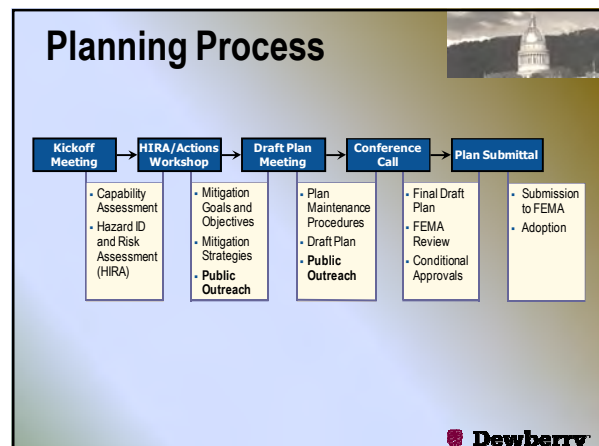
## Project Team

- WV Hazard Mitigation Council: aka "the decision makers"
- Tim Keaton and the WV Division of Homeland Security & Emergency Management Team
- David Hoag – Department of Military Affairs and Public Safety
- FEMA Region III Representative – Tess Grubb
- Carrie Speranza – Project Manager
- Ryan Towell – Deputy Project Manager
- Rachael Herman – Lead HIRA Planner
- Corinne Bartshire – Lead THIRA Planner



## Hazard Mitigation Plan Update Process

- Data Collection; 2010 Plan Evaluation
- Hazard Identification & Risk Assessment Update
- Mitigation Goals, Strategies and Projects
  - (revisions and additions)
- Project Scoping
- Capability Assessment, Plan Maintenance
- Public Outreach
- Draft Plan Submittal and Review
- Plan Adoption
- Plan Submission to WVHSEM & FEMA



## It's Your Plan!

### **We are here to:**

- ✓ Facilitate the process
- ✓ Lend technical expertise & consultation
- ✓ Do the heavy lifting

### **You need to:**

- Participate and contribute hazard information
- Make the final decisions
- Ensure a feasible plan that meets your needs



## Recommended Revisions per FEMA's Review

- 2010 Crosswalk review
  - FEMA Region III Recommended revisions
  - WVHSEM Needs and Requests
  - WV Mitigation Council Needs and Requests
- Incorporate these recommendations into the new plan



## Plan Update Requirements

- Must be updated every 3 years
- Re-assess Hazard Identification and Risk Assessment (HIRA)
  - Consider changes to hazards and vulnerability of people and assets
  - Address hazard events that have occurred since the last plan
- Incorporate Regional planning efforts with WV State Plan
- Report on progress with mitigation strategy to-date and discuss adjustments
- Address weaknesses identified in previous plan review



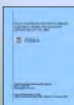
## Plan Update Requirements & Data Availability

- Overview of HIRA Planning Process
- Hazard Analysis consistent with State Hazards
- New Hazards to Consider - Levee Failure
- Data Needs:
  - Data Discrepancies from previous plans, what can be improved?
  - Critical Facilities and Assets
  - Hazard Specific Data Sources
- Regional Hazard Mitigation Plan Incorporation



## HIRA: Hazard Identification & Risk Assessment

- Purpose: Provides a factual basis for prioritizing hazard mitigation activities
- Major components:
  - Identify and profile natural hazards affecting the state
  - Describe vulnerability to jurisdictions (cities and counties), and estimate losses
  - Describe vulnerability to state owned/operated facilities and critical facilities, and estimate losses
  - Incorporate findings of local and regional plans



For more detailed explanation of plan requirements, refer to the "blue book":  
Federal Emergency Management Agency. (2008). "Multi-Hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000." Washington, D.C. Original Release March 2004, last revised January 2008.



## FEMA Guidance for HIRA

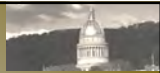
- Identify Hazards
  - Which hazards are significant enough to warrant investigation?
  - How is each hazard defined?
- Profiling Hazards
  - Identify Location (geographic areas affected) and Intensity
  - Information on Previous Occurrences
  - Probability of Future Events
- Assessing Vulnerability (of Jurisdictions, and of State /Critical Facilities)
  - Consider Local Risk Assessments, processes used...
  - Jurisdictions most threatened & vulnerable to damage and loss
  - Facilities most threatened & vulnerable to damage and loss
  - Updated plan needs to Reflect changes in development for jurisdictions in hazard prone areas
- Estimating Potential Losses (of Jurisdictions, and of State /Critical Facilities)
  - Analysis of potential losses by jurisdiction
  - Analysis of potential losses to the identified vulnerable structures
  - Potential losses (\$\$) based on estimates provided in local risk assessments and State risk assessment
  - Updated plan needs to Reflect the effects of changes in development on loss estimates



## Hazards Addressed

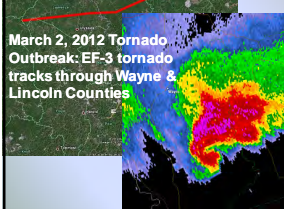
- Variety of hazards may impact West Virginia; how do we determine the ones to focus on?
  - Previous Hazard Mitigation Plan (2010)
  - Local and Regional Plans
  - Declared Disasters
  - Availability of Other Data

High	Medium-High	Medium-Low	Low	Negligible
Flood	Tornado	Wildfire	Landslide	Dam Failure
High Wind	Drought	Hail	Earthquake	Extreme Heat
Winter Storm		Lightning	Land Subsidence (Karst)	Extreme Cold
				Hazardous Materials
				Nuclear Power
				Mining

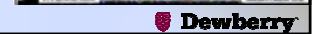
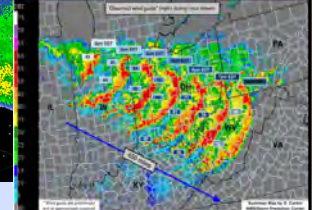


## Very active since 2010!

March 2, 2012 Tornado Outbreak: EF-3 tornado tracks through Wayne & Lincoln Counties



June 29, 2012 Midwest/Ohio Valley Derecho Radar Imagery Composite Summary 18:00 UTC +450 miles in 6 hours / Average Speed ~75 mph



## Improvements

### Discussion with Mitigation Council

- What do you like about current State plan?
- Are there other efforts currently going on that we should be aware of?
- Have the necessary people/departments been asked to participate?
- How can this plan help your agency?
- What would you like changed in this revision?



## Data Discrepancies

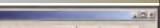
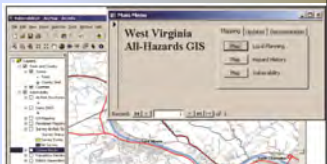
### Discussion with Mitigation Council

- What can be improved?
- Tying HIRA to specific mitigation projects/activities
- Does your locality/agency have new data sources that have been created since the 2010 plan revision?
- What types of data would you like to see in the revision?



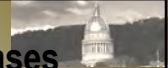
## Data Needs: Building & Critical Facilities

- State Owned or Operated Facilities (Geospatial, addresses, types)
- Local Data
  - Building Specific (year, materials, value...)
  - Infrastructure
- Critical/Essential Facilities
  - Local Facilities with Building Specific Parameters
  - HAZUS-MH default Data



## Historical Disaster Databases

- List of Federally Declared Disasters from FEMA
  - Jurisdictions declared
  - Nature of disaster
  - Type(s) of assistance provided
- NWS / National Climatic Data Center (NCDC) Storm Events Database
  - Area Impacted
  - Damages
  - Description of event
- Division of Forestry (i.e. wildfire)
- Geological and Economic Survey (i.e. earthquakes, landslide, Marcellus Shale)
- Others??



# Hazard Data Availability

- National Climatic Data Center (NCDC) Storm Events Database
  - Local meteorologists submit event reports to database, following a standard reporting protocol (what to report, and how to report it)
  - Includes location and time of event, property and crop damages, injuries and deaths
  - Data may be biased by population
  - Need to process data to assign all events/damages to specific jurisdictions
- Other Hazard-Specific Data
  - Hazard data used from 2010 Plan, National Data Sources, and sources provided by the WV Hazard Mitigation Council



HIRA Category	NCDC Categories Included
Drought	Drought Drought / Excessive Heat
Flood	Flooding Flash Flood / Minor Flooding River Flood Urban / Small Stream Flooding Coastal Flood / Storm Surge Tidal Flooding
High Wind	Wind Strong / High / Gusty Wind Thunderstorm Wind Dry / Wet Microburst High Wind and Seas Hurricane Tropical Storm
Tornado	Tornado Waterspout Funnel Cloud Land spout
Winter Storm	Blizzard Snow / Heavy Snow Ice / Ice Storm Snow / Sleet / Rain Winter Storm Winter Weather / Mix Freezing Rain
Wildfire	Wild / Forest Fire
Landslide	Mudslide Rockslide Landslide Debris Flow

### Other event types in NCDC:

- EXTREME COLD
- EXTREME COLD/WIND CHILL
- EXTREME WINDCHILL
- EXCESSIVE HEAT
- LIGHTNING
- LIGHTNING
- AGRICULTURAL FREEZE
- ASTRONOMICAL HIGH
- TIDE
- BLACK ICE
- Black Ice
- COLD
- Cold
- Cold and Frost
- COLD/WIND CHILL
- DENSE FOG
- DUST DEVIL
- EXCESSIVE FOG
- FREEZE
- FREEZING FOG
- FROST
- FROST/FREEZE
- HAL
- HAL DAMAGE
- HEAT
- HEAT WAVE
- HEAVY RAIN
- HEAVY SEAS
- HEAVY SURF
- HEAVY SURF/HIGH SURF
- HIGH SURF
- MONTHLY PRECIPITATION
- MONTHLY RAINFALL
- MONTHLY TEMPERATURE
- PROLONG COLD
- Prolong Cold
- PROLONG WARMTH
- RECORD COLD
- RECORD HEAT
- RECORD WARMTH
- Record Warmth
- RIP CURRENT
- UNSEASONABLY COLD
- UNSEASONABLY WARM
- UNUSUALLY COLD
- UNUSUALLY WARM



# Data Sources & Needs

- Demographics
  - 2010 Census Data
  - American Community Survey
- Hazard Data
  - Flood: FEMA FIRMS, FEMA Rep Loss, NCDC & HAZUS-MH
  - Tomado: NCDC & SVRGIS
  - Wind: HAZUS-MH, NCDC & SVRGIS
  - Land & Mine Subsidence: USGS & WV Sources(?)
  - Severe Thunderstorms: NCDC & SVRGIS
  - Winter Weather: NCDC
  - Earthquake: HAZUS-MH
  - Wildfire: WVDOF & NCDC
- Land Use
  - State & Local Planning Efforts (population changes and/or shifts, changes in land use activities)
  - National Land Cover Data (NLCD)



# Data Transfer to Dewberry

- Download of NCDC Database
- Regional Hazard Mitigation Plans (Transfer completed)
- GIS & Hazard Specific contacts
- Data used in previous or other planning efforts

Rachael Herman  
(585) 429-7448  
rherman@dewberry.com

\*Secure FTP site has been established for this project\*



# Regional HMP Integration

- Vulnerability and risk assessment results
- Hazard rankings incorporated into State plan hazard rankings
- Mitigation Strategies & Actions

### FEMA Guidance:

#### Assessing Vulnerability by Jurisdiction

- Does the new or updated plan describe the State's vulnerability based on estimates provided in local risk assessments as well as the State risk assessment?
- Does the updated plan explain the process used to analyze the information from the local risk assessments, as necessary?



# Ranking Methodology, Risk & Vulnerability


- Review of Existing Ranking
- Potential Methodology for Revision
- Determining Risk & Vulnerability
- Annualized Loss





## Hazard Ranking


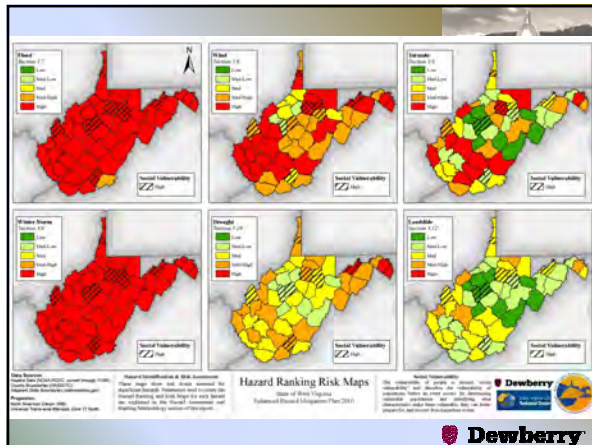
- The purpose of the hazard identification and risk assessment is to provide a factual basis for developing mitigation strategies, and in so doing, to prioritize those jurisdictions which most threatened and vulnerable to natural hazards.
- FEMA guidance indicates that the jurisdictions at greatest risk to specific hazards should be identified, considering both the characteristics of the hazard and the jurisdictions' degree of vulnerability. A variety of analysis methods may be sufficient to meet these goals; FEMA does not mandate a specific analysis method.



## 2010 Ranking Parameters

- “Semi-Quantitative” Scoring System
  - Actual Data Values grouped in categories 1-4 based on statistics
- Data with normalization (inflation ... )
  - Limitations with probability & impact data
- Parameters Used:
  - Population Vulnerability (weight 0.5)
  - Population Density (weight 0.5)
  - Annualized Events (weight 1)
  - Deaths & Injuries (weight 1)
  - Annualized Property Damage (weight 1)
  - Annualized Crop Damage (weight 1)


**Jurisdictional Risk (RS):**  
 $RS = (0.5 \cdot (PV + PD)) + EV + ID + APD + CD$

## Proposed 2013 Ranking Parameters

- “Semi-Quantitative” Scoring System
  - Actual Data Values grouped in categories 1-4 based on statistics
- Data with normalization (inflation ... )
  - Limitations with probability & impact data
- Parameters Used:
  - Population Vulnerability (weight 0.5)
  - Population Density (weight 0.5)
  - Annualized Events (weight 1)
  - Deaths & Injuries (weight 1)
  - Annualized Property Damage (weight 1)
  - Annualized Crop Damage (weight 1)
  - Regional Plan Hazard Rankings (weight 1.5)
  - Geographic Extent of Hazard (weight 1)


**Jurisdictional Risk (RS):**  
 $RS = (0.5 \cdot (PV + PD)) + EV + ID + APD + CD + (1.5 \cdot LP) + GE$



## Vulnerability Analysis & Loss Estimation

*Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate ....*


- Annualized Loss to be based on:
  - HAZUS-MH (flood, earthquake)
  - NCDC Storm Events & other available local, state and Federal data
- Building Specific Analysis for Buildings & Critical Facilities
  - Data Dependant
- Development Trends
  - In areas of high risk?



## Updates to HIRA

### Next Steps...


- Data Collection for Hazards & Critical Facilities (On-going)
- Collection of Development and Land Use planning documents
- Inclusion of disasters/events since 2010 plan
- Update Hazard & Vulnerability Analysis
  - Apply Ranking Methodology based on WV Hazard Mitigation Council Decisions & Available Data
  - Update Loss Estimations
  - Inclusion of HAZUS Flood Results from Baker
- Map generation & Report writing






## 2010 Mitigation Goals

- Goal 1: Protect life and property
- Goal 2: Improve understanding of risk and vulnerability
- Goal 3: Bolster public understanding and preparedness
- Goal 4: Maximize state mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts on Severe Repetitive and Repetitive Loss properties


## Objectives and Actions

- Divided into 4 groups:
  - Policy, Planning and Funding
  - Education and Outreach Activities
  - Risk Assessment
  - Mitigation of High Hazard Structures
- 26 Objectives in total
- 80 Mitigation Actions
- Will need to provide updates to all actions!



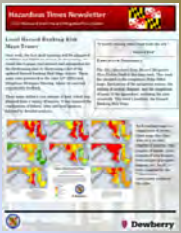



## Planning Integration

- Discusses the State's support to the locals in developing local hazard mitigation plans and also regional (PDC) hazard mitigation plans.
  - Provide an update on training conducted for locals, by the state
  - Discuss technical assistance
  - Update adoption dates
- Discuss funding availability to local jurisdictions in developing their mitigation plans.
- Discuss state support of local mitigation projects.



## Outreach

- 5 regional workshops – target local and regional participation
  - Morgantown
  - Beckley
  - Berkley Springs
  - Charleston
  - Davis
- Disaster Times monthly e-newsletter
- Plan link on HSEM website

## Lunch



11:00 – 12:00

## THIRA Development Process

Compliance with CPG 201

1. Identify the Threats and Hazards of Concern
2. Give Threats and Hazards Context
3. Examine the Core Capabilities Using the Threats and Hazards
  - Desired Outcomes
  - Estimated Impacts
4. Set Capability Targets
5. Apply the Results

## Core Capabilities

PREVENT	PROTECT	MITIGATE	RESPOND	RECOVER
Planning	Planning	Planning	Planning	Planning
Public Information and Warning	Public Information and Warning	Public Information and Warning	Public Information and Warning	Public Information and Warning
Operational Coordination	Operational Coordination	Operational Coordination	Operational Coordination	Operational Coordination
Forensics and Attribution	Access Control and Identity Verification	Community Resilience	Critical Transportation	Economic Recovery
Intelligence and Information Sharing	Cybersecurity	Long-Term Vulnerability Reduction	Environmental Response / Health and Safety	Health and Social Services
Interdiction and Disruption	Intelligence and Information Sharing	Risk and Disaster Resilience Assessment	Fatality Management Services	Housing
Screening, Search and Detection	Interdiction and Disruption	Threats and Hazard Identification	Infrastructure Systems	Infrastructure Systems
	Physical Protective Measures		Mass Care Services	Natural and Cultural Resources
	Risk Management for Protection Programs and Activities		Mass Search and Rescue Operations	
	Screening, Search and Detection		On-Scene Security and Protection	
	Supply Chain Integrity and Security		Operational Communications	
			Public and Private Services and Resources	
			Public Health and Medical Services	
			Situational Assessment	

FEMA

## Threats and Hazards

Three types of threats/hazards:

- Natural: Acts of nature, such as hurricanes, tornados, earthquakes, and disease outbreaks and epidemics
- Technological: Hazards resulting from accidents or failures of systems and structures, such as hazardous materials spills or dam failures
- Threats or human-caused: Intentional actions of an adversary (terrorism), such as a threatened or actual chemical or biological attack or cyber events

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## Threats and Hazards in 2010 SHMP

Flooding  
High Wind / Severe Storm  
Thunderstorms  
Hurricane related wind events  
Tornado  
Winter Weather  
Drought and extreme heat  
Wildfire  
Landslide  
Earthquake  
Land Subsidence (karst)  
Mining  
Dam Failure  
HazMat  
Nuclear Accidents

High	Medium-High	Medium-Low	Low	Negligible
Flood	Tornado	Wildfire	Landslide	Dam Failure
High Wind	Drought	Hail	Earthquake	Extreme Heat
Winter Storm		Lightning	Land Subsidence (Karst)	Extreme Cold
				Hazardous Materials
				Nuclear Power
				Mining

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## Human-caused Threats and Hazards

Identify technological and human-caused threats/hazards.  
Rate based on likelihood and provided rating criteria.  
Refer to handout and switch screen to worksheet.

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## Human-caused Threats and Hazards Profiles

Profile Element	Definition
Application Mode	Describing the human act(s) or unintended event(s) necessary to cause the hazard to occur.
Duration	The anticipated length of time the hazard is present on the target.
Dynamic/Static Configuration	Describing the hazard's tendency or effects to either expand, contract, or remain confined in time, magnitude, and space.
Mitigating Conditions	Characteristics of the target and its physical environment that can reduce the effects of a hazards.
Exacerbating Conditions	Characteristics that can enhance or magnify the effects of a hazard.

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## Critical Facilities

West VA State Owned and Insured Structures  
Critical facility database built from multiple sources  
Identify facilities notably vulnerable to technological and human-caused threats/hazards  
Refer to handout and switch screen to worksheet.

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## THIRA Next Steps

- Develop profiles
- Draft scenarios
- Evaluate potential impacts

THIRA Specific Questions may be directed to:  
Corinne Bartshire  
cbartshire@dewberry.com  
916.380.3776



## Wrap Up & Future Meetings

- Project Schedule – Milestones
- Next Mitigation Council Meeting
- Overview of Action Items



West Virginia Hazard Mitigation Plan Update Kick Off Meeting  
 August 22, 2012 Sign-in Sheet

Name	Department/Organization	Phone	E-mail	Secondary POC - name/email address
Lirrose M. Beach	WV DHEM	304-957-2872	Lirrose.M.Beach@wv.gov	
William Shock	WV DHEM	304-924-0650	William.M.Shock@wv.gov	
Jerry A. Beckitt	Cabe/1 County Ems/oes	304-633-7333	Jerry.Beckitt@ccems.org	
Math Blackwood	WV DA	304-558-5890	MBlackwood@wvda.us	
Tim Coleman	WV DNR Law	304-558-9184	tim.d.coleman@wv.gov	
Judith Lyons	WV Conservation Agency	304-464-6415	JLyons@wvca.us	
Tim Keaton	WV DHEM	304-957-2592	tim.w.keaton@wv.gov	
Bill Adler	WV PBS	304-556-4905	Shackel@wvpublictv.org	
Kara Breathouse	Region 3 PDC	304-744-4258	Kgbreathouse@wvregion3.org	
Rusty Joins	WV DLEF	304-558-5738	rusty.t.joins@wv.gov	
Mike Webb	Region 2 PDC	304-529-3357	mwebb@ntel.net	
Kevin Meadows	WV Development Office	304-558-2234	kevin.m.meadows@wv.gov	
Sean Roberts	Region I PDC	304-431-7225	seanroberts@regiononepdc.org	
Liane McLulloch	WV GIES	304-594-2331	lmcclulloch@GEOGRAPHY.wvnet.edu	

West Virginia Hazard Mitigation Plan Update Kick Off Meeting  
 August 22, 2012 Sign-in Sheet

Name	Department/Organization	Phone	E-mail	Secondary POC - name/email address
Greg Fuller	WV DITSEM	304 751-6180	gregg@wv.gov gregg.m.Fuller@wv.gov	greg, fuller@gmail.com
Robert Bailey	WV DHEEM	304 807-8460 304 558-5852	Roberts, D. Bailey @wv.gov RmCallister@wv.gov	RDBAILEYD@wv.gov RmCallister@wv.gov
Reynolds	WV Dept of Agriculture			
DAVID HOGE	WV DMARS	304 558 3730	david.k.hoge@wv.gov	
Clark Bennett	WV DMARS	304 558 2936	Charles.w.bennett@wv.gov	
CHRISTIAN FERNLEY	WV DMARS	304-558-2938	Gregory, C. Fernley@wv.gov	
G.K. McCabe	WOSP / DHEEM	304-766-5899	Smile@wv.gov	

Name	Department/Organization	Phone	E-mail	Secondary POC - name/email address
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AMISSA Core	WJDHSEM	304 807-5630	amissa.m.core@w.jgoc	
Mike Walker	WJDHSEM	304 807-5135	michael.e.walker@w.jgoc	
SANDY FREED	WJDHSEM	304 807-5135	SANDY.D.FREED@WDMC.MIL	
Sean Shepp	Region 6 PDD	304-473-1005	SShepp@STHEE.mil	
Rob Jacobus	Region III PDR	472-6564	bjacobus@regiii.dia.mil	
Mike Darses	WVDEP	304-926-0199 x1278	m.k.h.darses@w.v.dep	
FRED RADER	Region 5 MOVRC	304-422-4993	fredrader@movrc.org	
ANTHONY	Citizen Corps	304-558-2111	gina.l.naway@w.v.gov	
Paul S.	DHSEM	304-558-5780	paul.s.howard@w.v.gov	
RO SHORSHUNT	WNSP	304-746-5875	RShorshunt@w.v.gov	



# Agenda

October 10, 2012 9:00 – 3:00 PM

WV State Police Academy

**Purpose:** *Approve Hazards, Scenarios, Desired Outcomes, and Estimated Impacts –  
Develop Capability Target Statements*

Description	Lead	Time
Welcome – THIRA progress update	Carrie Speranza, Dewberry Corinne Bartshire, Dewberry	9:00 – 9:10
Hazards and Scenarios: <ul style="list-style-type: none"> <li>Short Overview/Discussion</li> <li>Committee Approval</li> </ul>	Corinne Bartshire, Dewberry	9:10 – 9:45
Desired Outcomes: <ul style="list-style-type: none"> <li>Short Overview/Discussion</li> <li>Committee Approval</li> </ul>	Corinne Bartshire, Dewberry	9:45– 10:30
Estimated Impacts: <ul style="list-style-type: none"> <li>Short Overview/Discussion</li> <li>Committee Approval</li> </ul>	Corinne Bartshire, Dewberry	10:30-11:30
<b>LUNCH – Provided</b>		11:30 – 12:00
Capability Target Statements <ul style="list-style-type: none"> <li>Committee Discussion</li> </ul>	Corinne Bartshire, Dewberry	12:00 – 2:30
Wrap Up <ul style="list-style-type: none"> <li>Project Schedule - Milestones</li> <li>Overview of Action Items</li> </ul>	Carrie Speranza, Dewberry Corinne Bartshire, Dewberry	2:30 – 3:00






**Attendees:** WV Hazard Mitigation Council; WV Division of Homeland Security and Emergency Management; Dewberry



## Sign In Sheet - THIRA Workshop - October 10, 2012

NAME	TITLE	AGENCY	CONTACT	EMAIL	Initials
<del>Aeker</del>		PBS		backer@wvpubcast.org	
Bailey	Area Liaison	DHSEM, Reg. V	380-9474 <i>807-3400</i>	Robert.D.Bailey@wv.gov	<i>RB</i>
Beach	Mitigation Planner	DHSEM	957-2572	Lirerose.M.Beach@wv.gov	<i>lrk</i>
Bennett	State NIMS Coord	SAA	558-2930	Charles.W.Bennett@wv.gov	<i>CS</i>
Blackwood		WVDA	552-8395	mblackwood@wvda.us	<i>MB</i>
Buchanan	Economist	USACE	399-5187	Kurt.L.Buchanan@usace.army.mil	
Coleman		DNR	558-2784	Tim.d.coleman@wv.gov	
Core	Area Liaison	DHSEM, Reg. IV	807-4016	Anyssa.M.Core@wv.gov	<i>MC</i>
Dorsey		DEP	926-0499	Mike.H.Dorsey@wv.gov	
Greathouse	Planner	PDC Reg. III	744-4258	kgreathouse@wvregion3.org	

## Sign In Sheet - THIRA Workshop - October 10, 2012

NAME	TITLE	AGENCY	CONTACT	EMAIL	Initials
Green	Area Liaison	DHSEM, Reg. III	380-9471	Sanford.H.Green@wv.gov	
Grubb	Planner	FEMA, Reg. III		Therese.Grubb@fema.dhs.gov	
Hoge	Deputy Planner	SAA	558-2930	David.K.Hoge@wv.gov	
Howard	Director-Operation	DHSEM	558-5380	Paul.S.Howard@wv.gov	
Jacobus	Dev. Sp.	PDC Reg. VII	472-6564	bjacobus@regionvii.com	
Jefferson	State Planner	DHSEM	957-2572	Roger.D.Jefferson@wv.gov	
Joins	Rusty	DEP	558-5938	Rusty.T.Joins@wv.gov	
Keaton	SHMO	DHSEM	957-2572	Tim.W.Keaton@wv.gov	
Lively	Program Mgr.	DHSEM	558-5380	Terrance.D.Lively2@wv.gov	
Lyons	Manager	WVCA	469-6415	jlyons@wvca.us	

## Sign In Sheet - THIRA Workshop - October 10, 2012

NAME	TITLE	AGENCY	CONTACT	EMAIL	Initials
McCabe	Coordinator	WVSP	766-5899	gmccabe@wvsp.state.wv.us	
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McCullough	Comm. Planner	FEMA, Reg. III	215-931-5587	Matthew.McCullough@fema.dhs.gov	
Meadows	Kevin	Commerce			
Namay	Gina	Citizen Corps	<sup>304</sup> 558-6111	gina.l.namay@wv.gov	<i>GN</i>
Penix	Brian Project Officer	DHSEM	957-2572	Brian.M.Penix@wv.gov	
Rader	Fred Planner	PDC Reg. V	422-4993	Rader.fred@gmail.com	
Roberts	Jason Planner	PDC Reg. I	431-7225	jasonroberts@regiononepdc.org	
Shook	Mike Area Liaison	DHSEM, Region I	380-9472 <del>424</del> 0650	William.M.Shook@wv.gov	<i>WS</i>

## Sign In Sheet - THIRA Workshop - October 10, 2012

NAME	TITLE	AGENCY	CONTACT	EMAIL	Initials
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Workman	Kelly	Commerce		Kelly.a.Workman@wv.gov	
Walker	MT. Pe	WV DHEM	304-807-5630	michael.e.walker@wv.gov	
SMITH	CARY	PROTECT MARKER REGION III PDC	304-472-6564	asmith@regionvii.com	
SAUNDERS	TOM	WV Dev. Office	304/558-2234	Tom.J.Saunders@wv.gov	TJS
WORLEY	MIKE	WV COOPERATION AGENCY	304 761 8368	mworley@wvca.gov	MW
FERNLEY	CHRISTIAN	Homeland Security STATE TRAINING POINT OF CONTACT	304-558-2930	gregory.c.fernley@wv.gov	CF
Hershner	William	509R oper planning WV DHEM	304-558-5360	bill.d.hershner@wv.gov	WH





## Hazard Identification and Risk Assessment (HIRA) / Mitigation Strategies Development Meeting

### Agenda

Friday, March 22, 2013 9am – 2:30pm  
WV State Police Training Center


Description	Lead	Time
<b>Welcome, Introductions and Today's Agenda</b> <ul style="list-style-type: none"><li>• Planning Process Review</li><li>• Progress to Date</li></ul>	Al Lisko, Acting WV State Hazard Mitigation Officer Ryan Towell, Dewberry	9:00 – 9:15
<b>Hazard Identification, Risk Assessment and Vulnerability Analysis by Hazard</b>	Rachael Herman, Dewberry	9:15 – 10:30
<b>BREAK</b>		10:30 – 10:45
<b>Summary of Hazard Rankings</b>	Rachael Herman, Dewberry	10:45 – 11:00
<b>Review and Validation of 2010 Plan Goals and Objectives</b>	Jake Jarosz, Dewberry	11:00 – 11:30
<b>LUNCH – Provided</b>		11:30 – 12:30
<b>Small Group Discussions: Forming Mitigation Objectives and Actions</b> <ul style="list-style-type: none"><li>• Risk Assessment</li><li>• Planning, Policy &amp; Funding</li><li>• Education &amp; Outreach</li><li>• Mitigation of Structures</li></ul>	Ryan Towell Jane Sibley Frantz Jake Jarosz Rachael Herman	12:30 – 2:00
<b>Group Summaries</b>	Jane Sibley Frantz / All	2:00 – 2:25
<b>Next Steps</b>	Ryan Towell	2:25 – 2:30

**Attendees:** WV Hazard Mitigation Council; WV Division of Homeland Security and Emergency Management; FEMA Region III and Dewberry

## West Virginia Statewide Standard All-Hazard Mitigation Plan Update


### Hazard Identification and Risk Assessment and Mitigation Strategies

3-22-2013




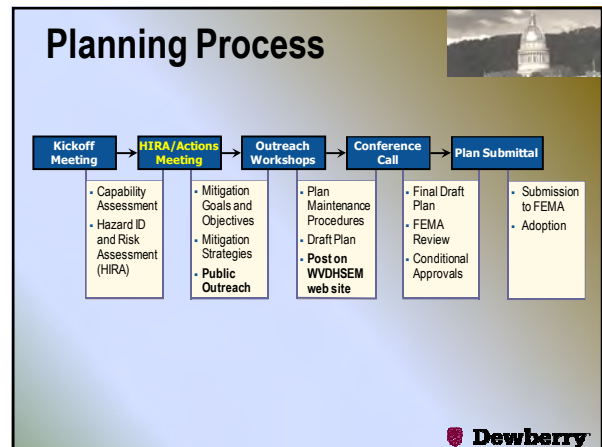

## Meeting Agenda

Description	Lead	Time
<b>Welcome, Introductions and Today's Agenda</b> <ul style="list-style-type: none"> <li>Planning Process Review</li> <li>Progress to Date</li> </ul>	Al Lisko, Acting WV State Hazard Mitigation Officer Ryan Towell, Dewberry	9:00 – 9:15
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<b>LUNCH – Provided</b>		
<b>Small Group Discussions: Forming Mitigation Objectives and Actions</b>	Ryan Towell Jane Sibbey Frantz Jake Jarosz Rachael Herman	12:30 – 2:00
<ul style="list-style-type: none"> <li>Risk Assessment</li> <li>Planning, Policy &amp; Funding</li> <li>Education &amp; Outreach</li> <li>Mitigation of Structures</li> </ul>		
<b>Group Discussion Summaries</b>	Jane Sibbey Frantz / All	2:00 – 2:25
<b>Next Steps</b>	Ryan Towell	2:25 – 2:30




## Hazard Mitigation Plan Update Process

- Data Collection; 2010 Plan Evaluation
- Hazard Identification & Risk Assessment Update
- Mitigation Goals, Strategies and Projects
  - (revisions and additions)
- Project Scoping
- Capability Assessment, Plan Maintenance
- Public Outreach
- Draft Plan Submittal and Review
- Plan Adoption
- Plan Submission to WVDHSEM & FEMA


## State Plan Update Requirements

- Must be updated every 3 years (may change to 5 years soon)
- Re-assess Hazard Identification and Risk Assessment (HIRA)
  - Consider changes to hazards and vulnerability of people and assets
  - Address hazard events that have occurred since the last plan
- Incorporate Regional planning efforts with WV State Plan
- Report on progress with mitigation strategy to-date and discuss adjustments
- Address weaknesses identified in previous plan review



## HIRA: Hazard Identification & Risk Assessment

- Purpose:** Provides a factual basis for prioritizing hazard mitigation activities
- Major components:**
  - Identify and profile natural hazards affecting the state
  - Describe vulnerability to jurisdictions (cities and counties), and estimate losses
  - Describe vulnerability to state owned/operated facilities and critical facilities, and estimate losses
  - Incorporate findings of local and regional plans



# Updated Hazard Ranking

High	Medium- High	Medium	Medium- Low	Low
Flood Winter Weather	Wind	Wildfire Tornado	Drought Extreme Heat Hail Landslide Lightning	Natural Resource Extraction Land Subsidence (Karst) Earthquake

**Other hazards considered:**

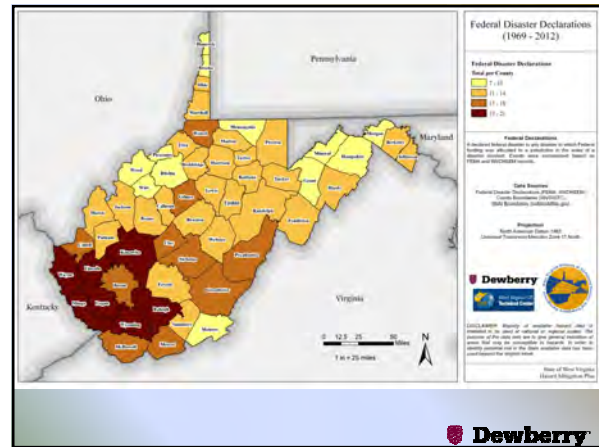
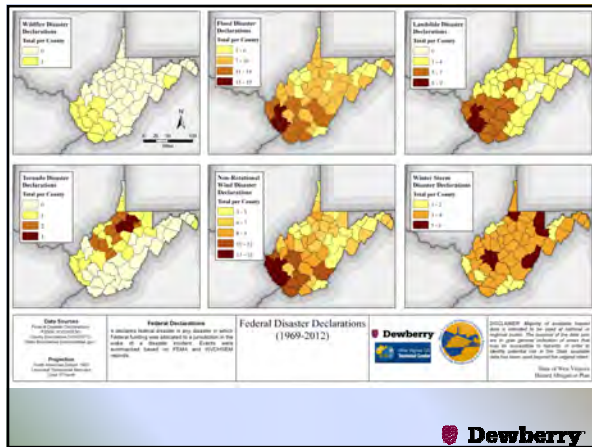
- Dam & Levee Failure
- Hazardous Materials
- Nuclear Accidents



# Federally Declared Disasters

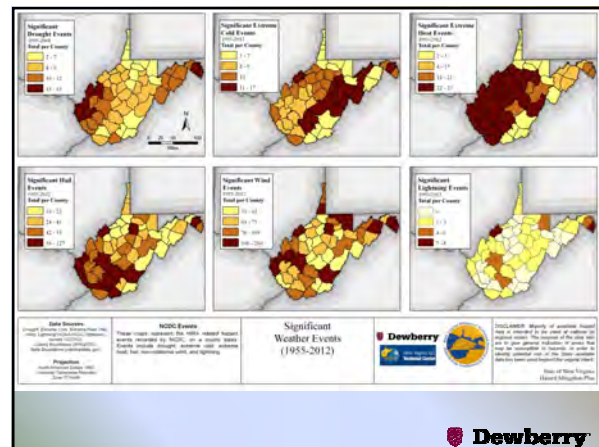
- Since 1954 there have been 57 declarations :
  - 50 major disaster declarations
  - 5 emergency declarations
  - 2 fire management assistance declarations

Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
1981	2010	18-Dec to 20-Dec	2-Mar	Severe Winter Storm and Snowstorm	15
1983	2010	12-Mar to 9-Apr	29-Mar	Severe Storms, Flooding, Mudslides, and Landslides	6
1903	2010	5-Feb to 11-Feb	23-Apr	Severe Winter Storms and Snowstorms	17
1918	2010	12-Jun to 29-Jun	24-Jun	Severe Storms, Flooding, Mudslides, and Landslides	4
4059	2012	2-Feb to 5-Mar	16-Mar	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	11
4061	2012	15-Mar to 31-Mar	22-Mar	Severe Storms, Flooding, Mudslides, and Landslides	3
4071	2012	29-Jun to 8-Jul	23-Jul	Severe Storms and Straight-line Winds	47
4093	2012	29-Oct to 8-Nov	27-Nov	Hurricane Sandy (Winter Impacts)	18

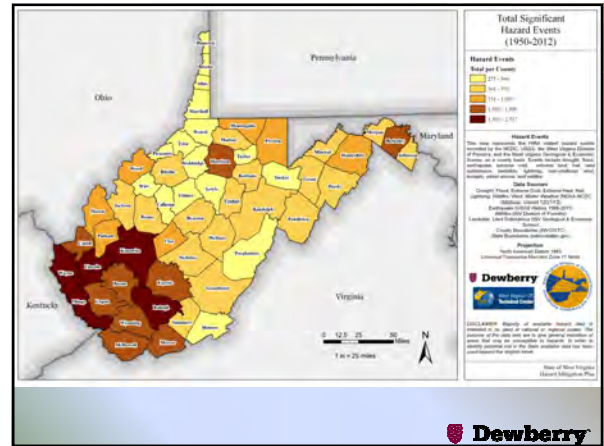
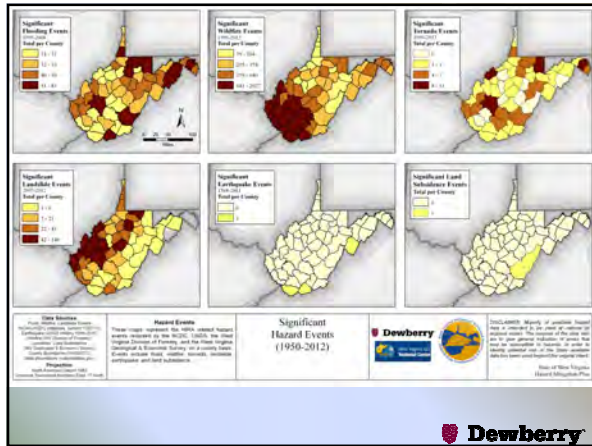


# NCDC Storm Events Data

Hazard Type	Period of Record	Total Events	Total Property Damage	Crop Damage	Injuries	Deaths
Drought	1995-2012	45	\$0	\$27,872,148	0	0
Extreme Cold	1993-2012	40	\$7,900,129	\$29,266	5	4
Extreme Heat	1993-2012	54	\$0	\$0	3	1
Flooding	1993-2012	1,757	\$1,033,213,689	\$3,522,533	13	54
Hail	1955-2012	2,212	\$34,169,000	\$180,495	3	0
High Wind	1955-2012	4,135	\$105,529,546	\$1,179,178	165	13
Landslide	2007-2012	3	\$142,554	\$0	0	0
Lightning	1993-2012	82	\$4,815,552	\$0	49	6
Tornado	1950-2012	148	\$128,658,072	\$3,242,947	114	3
Wildfire	1995-2012	28	\$30,678	\$0	0	1
Winter Weather	1993-2012	876	\$137,704,356	\$14,085	14	10
<b>Total</b>		<b>9,380</b>	<b>\$1,452,163,576</b>	<b>\$36,040,653</b>	<b>366</b>	<b>92</b>







## 2013 Hazards Addressed

- Flooding (Section 3.7)
- High Wind / Severe Storm (Section 3.8)
  - Thunderstorms
  - Hurricane-related wind events
  - Tornado
- Winter Weather (Section 3.9)
- Drought and extreme heat (Section 3.10)
- Wildfire (Section 3.11)
- Landslide (Section 3.12)
- Earthquake (Section 3.13)
- Land Subsidence (karst) (Section 3.14)
- Natural Resource Extraction (Section 3.15)
- Dam and Levee Failure (Section 3.16)
- HazMat (Section 3.17)
- Nuclear Accidents (Section 3.18)

## Regional HMP Integration

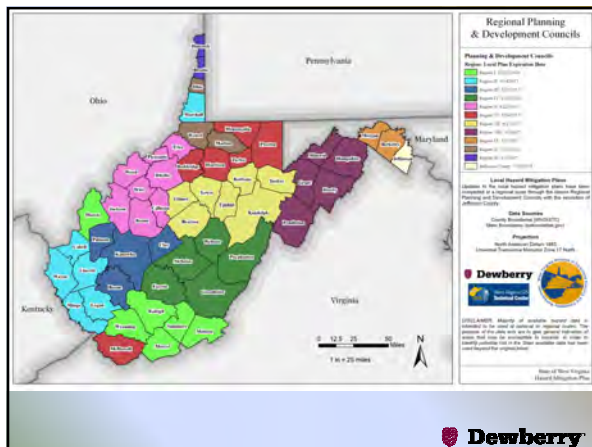
- Vulnerability and risk assessment results
- Hazard rankings incorporated into State plan hazard rankings
- Mitigation Strategies & Actions

**FEMA Guidance:**

**Assessing Vulnerability by Jurisdiction**

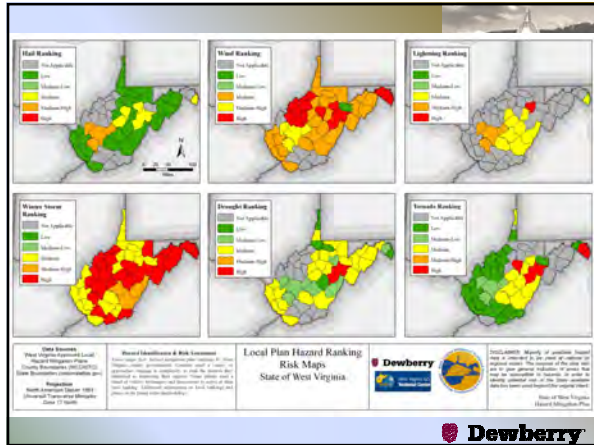
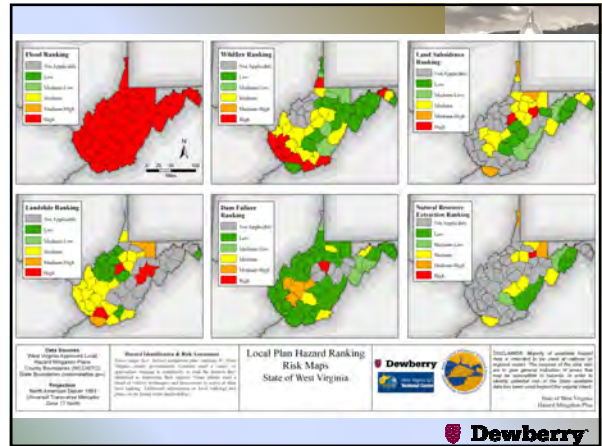
A. Does the new or updated plan describe the State's vulnerability based on estimates provided in local risk assessments as well as the State risk assessment?

C. Does the updated plan explain the process used to analyze the information from the local risk assessments, as necessary?



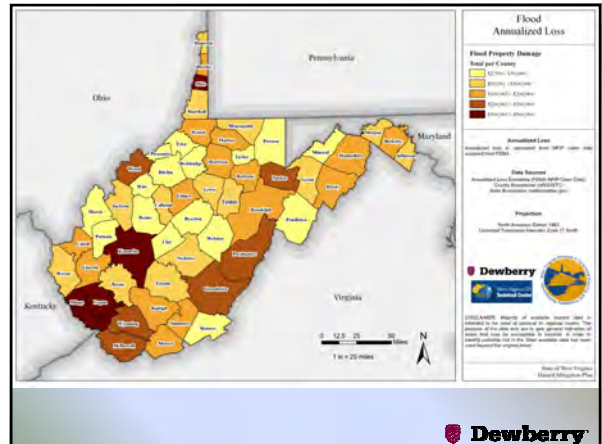
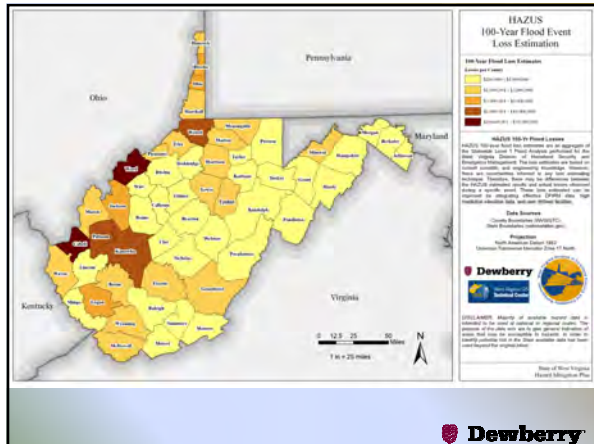
County	Flood	Wind	Tornado	Winter Storm	Drought	Wildfire	Landslide	Earthquake	Karst	Mine Subsidence	Dam
Barbour County	High	High	Medium	Medium	ML	Low	N/A	Low	High	N/A	Low
Berkeley County	High	High	High	High	ML	Medium	N/A	Low	Medium	N/A	Low
Boone County	High	MH	ML	High	ML	Medium	Medium	Low	Medium	N/A	MH
Branton County	High	Medium	Medium	High	Medium	Medium	Low	Medium	Low	N/A	N/A
Brooke County	High	Medium	Medium	Medium	Low	Low	N/A	Low	MH	MH	N/A
Calwell County	High	Medium	Low	Medium	Medium	Medium	Medium	N/A	N/A	N/A	Low
Calhoun County	High	High	Low	High	N/A	N/A	Low	Low	N/A	N/A	Low
Clay County	High	MH	ML	High	ML	Medium	Medium	Low	Medium	N/A	MH
Doddridge County	High	Medium	N/A	Medium	Medium	Low	N/A	Low	Medium	Medium	Low
Fayette County	High	Medium	Medium	Medium	Medium	Low	N/A	Low	Low	ML	Medium
Gilmer County	High	Medium	N/A	Medium	Medium	High	Low	Low	High	N/A	N/A
Grant County	High	Medium	N/A	High	Medium	Low	N/A	Low	ML	ML	ML
Greenbrier County	High	Medium	Medium	MH	Medium	ML	N/A	Low	ML	Low	Low
Hampshire County	High	Medium	N/A	High	Medium	Low	N/A	Low	Low	Low	Low
Hancock County	High	Medium	Medium	Medium	Low	Low	N/A	Low	MH	MH	N/A
Hardy County	High	Medium	N/A	High	Medium	Low	N/A	Low	Low	Low	ML
Harrison County	High	Medium	N/A	Medium	Medium	Low	Medium	Low	Medium	Medium	Low
Jackson County	High	High	Low	High	N/A	N/A	Low	Low	N/A	N/A	Low
Jefferson County	High	High	High	High	Low	Low	Low	Low	Low	N/A	Low
Kanawha County	High	High	High	High	Medium	Medium	Low	Low	Low	N/A	Low
Lincoln County	High	MH	ML	High	Low	Medium	Medium	Low	Medium	N/A	MH
Lewis County	High	High	High	High	Medium	Medium	Medium	Medium	Medium	N/A	High
Logan County	High	Medium	Low	Medium	Medium	High	Medium	N/A	N/A	N/A	Low
Mason County	High	Medium	Low	Medium	Medium	Low	Medium	Low	N/A	N/A	Low
McDowell County	High	Medium	N/A	Medium	Medium	Low	N/A	Low	Medium	N/A	Medium
Mingo County	High	Medium	Low	Medium	Medium	High	Medium	N/A	N/A	N/A	Low
Monroe County	High	N/A	Low	High	N/A	High	Medium	Low	N/A	N/A	Low
Morgan County	High	Medium	N/A	High	Medium	Low	N/A	Low	ML	ML	Medium

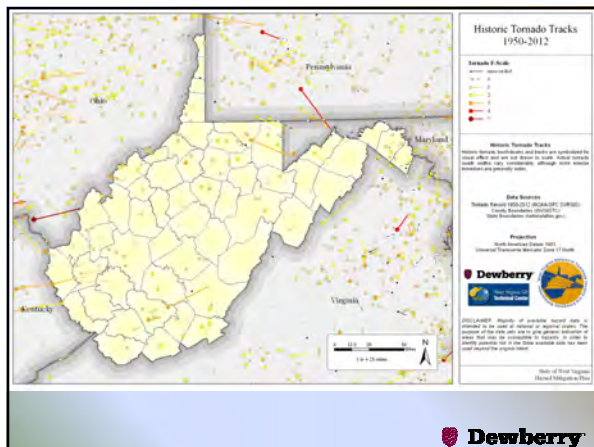
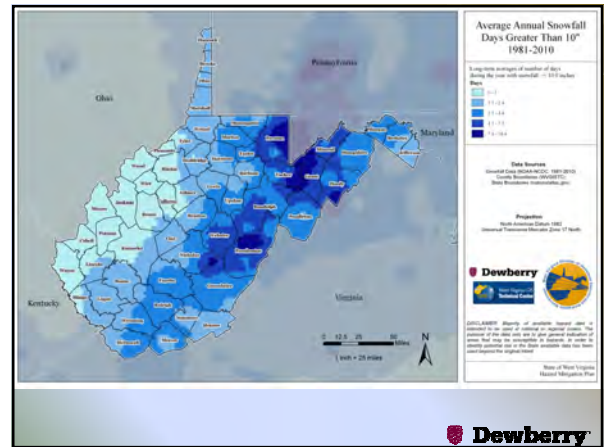
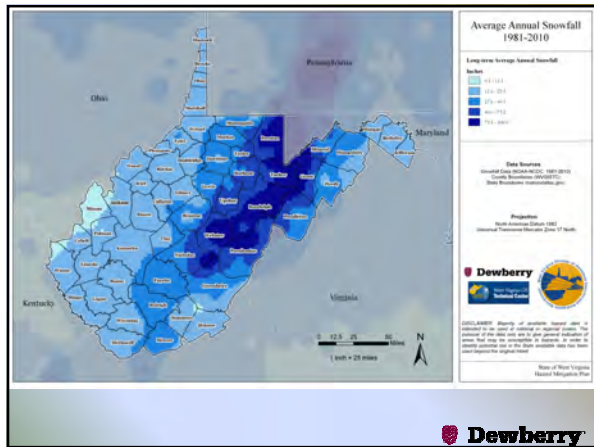
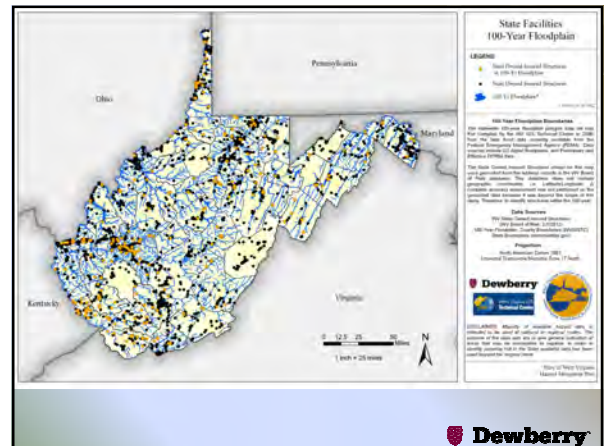
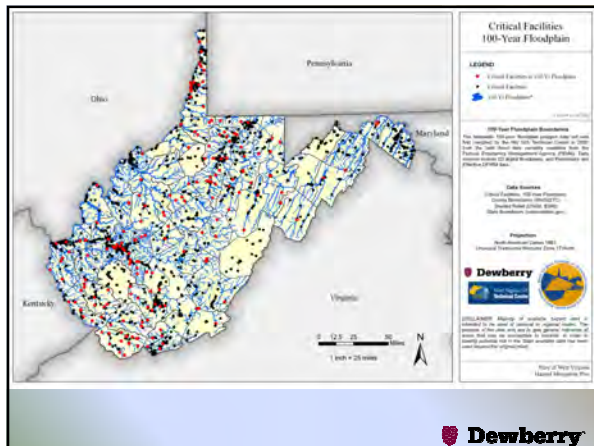
County	Flood	Wind	Tornado	Winter storm	Drought	Wildfire	Landslide	Earthquake	Karst	Mining	Dam
Monongalia County	High	Medium	N/A	Medium	Medium	Medium-Low	MH	Low	MH	Medium	Low
Monroe County	High	N/A	Low	High	N/A	High	Medium	Medium	N/A	N/A	Medium
Morgan County	High	High	Low	High	High	High	N/A	Low	Medium	N/A	Low
Nicholas County	High	Medium	Medium	MH	ML	Low	N/A	Low	Low	Medium	Low
Ohio County	High	Medium	N/A	Medium	High	Medium-Low	N/A	Low	Medium	N/A	ML
Pendleton County	High	Medium	N/A	High	Medium	Medium-Low	N/A	Low	Medium	Medium	ML
Pleasants County	High	High	Low	High	N/A	N/A	Low	Low	N/A	N/A	Low
Pocahontas County	High	Medium	Medium	MH	ML	Medium	N/A	Low	Medium-Low	Low	Low
Preston County	High	Medium	N/A	High	Medium	ML	MH	Low	Medium	MH	Low
Putnam County	High	MH	ML	High	ML	Medium	Medium	Low	Medium	N/A	MH
Raleigh County	High	N/A	Low	Medium	High	High	Medium	Low	N/A	N/A	Low
Randolph County	High	High	High	High	High	High	High	Low	N/A	N/A	N/A
Ritchie County	High	High	Low	High	N/A	N/A	Low	Low	N/A	N/A	Low
Roane County	High	High	Low	High	N/A	N/A	Low	Low	N/A	N/A	Low
Summers County	High	N/A	Low	Medium	N/A	Medium	Low	Low	N/A	N/A	Low
Taylor County	High	Medium	N/A	Medium	Medium	Low	Medium	Low	Medium	High	Low
Tucker County	High	Low	Low	Medium	Medium	Low	N/A	Low	Low	N/A	N/A
Tyler County	High	High	Low	High	N/A	N/A	Low	Low	N/A	N/A	Low
Wayne County	High	Medium	Medium	High	Medium	Medium	N/A	Low	Medium	N/A	N/A
Wayne County	High	Medium	Low	Medium	High	High	Medium	N/A	N/A	N/A	Low
Webster County	High	Medium	Medium	High	Low	ML	N/A	Low	Low	Medium	Low
Wetzel County	High	Medium	N/A	Medium	Low	Medium	N/A	Low	Medium	N/A	Low
Wirt County	High	High	Low	High	N/A	N/A	Low	Low	N/A	N/A	Low
Wood County	High	High	Low	High	N/A	N/A	Low	Low	N/A	N/A	Low
Wyoming County	High	N/A	Low	High	N/A	High	High	Low	N/A	N/A	Low
<b># of Plans Ranked</b>	<b>55</b>	<b>49</b>	<b>40</b>	<b>55</b>	<b>41</b>	<b>47</b>	<b>35</b>	<b>49</b>	<b>34</b>	<b>18</b>	<b>48</b>



### New Analysis in 2013

- Hazard Ranking: Supplemented Data
  - New Parameter: Geographic Extent
  - New Parameter: Local Plan Ranking
- New Ranking
  - Karst
  - Mining
  - Earthquake
  - Hail
  - Lightning
  - Extreme Heat
- New Analysis
  - Winter Weather
  - Wind/Tornado

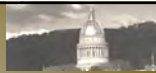




**Ranking Maps**  
2013 Update

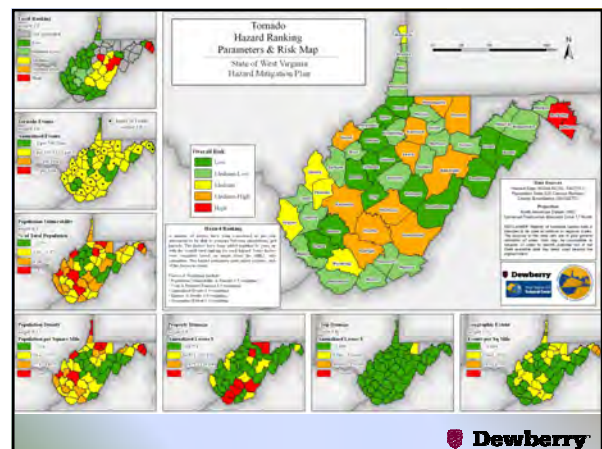
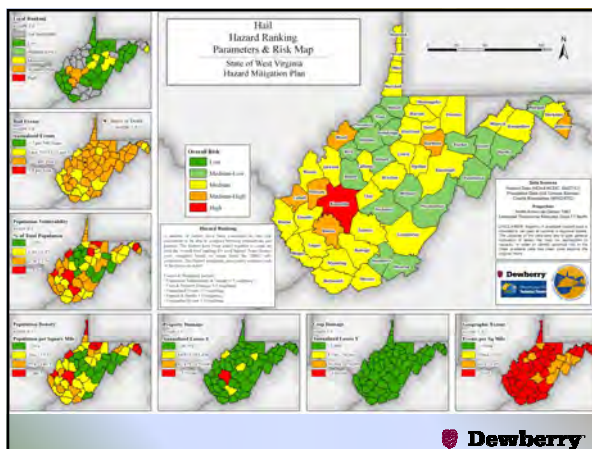
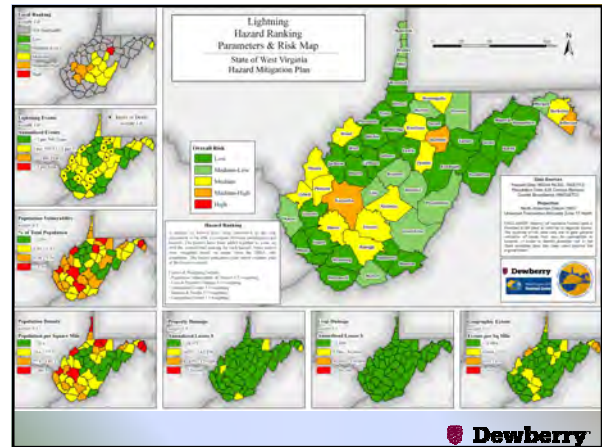
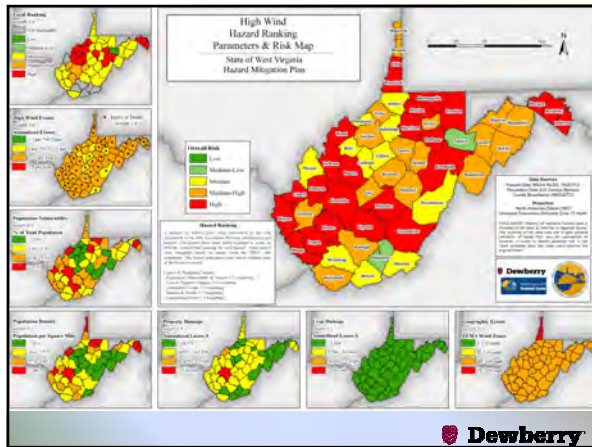
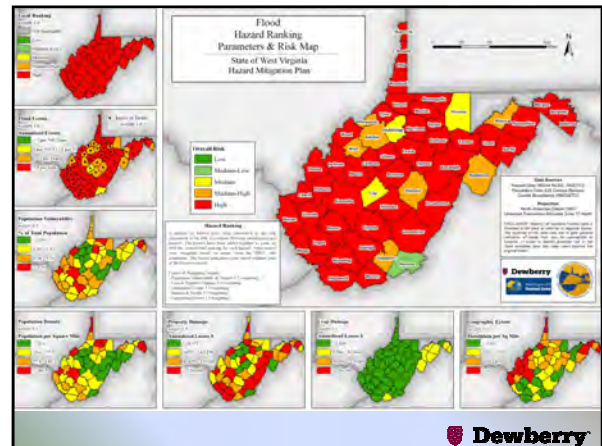
**Dewberry**

# 2013 Ranking Parameters



- “Semi-Quantitative” Scoring System
  - Actual Data Values grouped in categories 1-4 based on statistics
- Data with normalization (inflation ... )
  - Limitations with probability & impact data
- Parameters Used:
  - Population Vulnerability (weight 0.5)
  - Population Density (weight 0.5)
  - Annualized Events (weight 1)
  - Deaths & Injuries (weight 1)
  - Annualized Property Damage (weight 1)
  - Annualized Crop Damage (weight 1)
  - Regional Plan Hazard Rankings (weight 1)
  - Geographic Extent of Hazard (weight 1.5)

**Jurisdictional Risk (RS):**  
 $RS = (0.5 \cdot (PV + PD)) + EV + ID + APD + CD + LP + (GE \cdot 1.5)$









## Validation of 2010 Plan Goals

- Goal 1 - Protect life and property
- Goal 2 - Improve understanding of risk and vulnerability
- Goal 3 - Bolster public understanding and preparedness
- Goal 4 - Maximize state mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts on Severe Repetitive and Repetitive Loss properties



## 2013 Plan Goals

- Goal 1 - Improve statewide resilience
- Goal 2 - Protect life and property
- Goal 3 - Improve understanding of risk and vulnerability for planning purposes
- Goal 4 - Bolster public understanding and preparedness
- Goal 5 - Maximize state mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts while considering local priorities



## Small Break-out Group Assignments

- **Risk Assessment**
  - This room (Classroom 4) / Rachael
- **Education & Outreach**
  - Classroom 1 / Ryan
- **Planning, Policy, Funding & Legislation**
  - Classroom 2 / Jane
- **Structures**
  - Classroom 3 / Jake

Group name signs on classroom doors



## Instructions:

1. Proceed to assigned small group
2. Review hazard rankings
3. Review 2010 mitigation actions
4. Discuss potential new actions and strategies
  1. Ideas
  2. Responsible Agency/Organization
5. Report back to main group room at 2pm



## Next steps

- Finalize HIRA
- Finalize capability assessment
- Finalize mitigation actions and objectives
- April 8-12 Outreach Workshops
- Finalize updated plan draft; submit to WVDHSEM for review
- Submit to FEMA





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## Mitigation Strategies Development

March 22, 2013

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### Terms

- **Goal** – general guideline that describes what the State would like to achieve
  - **Objective** – specific and measurable strategies that must be implemented to achieve the identified goals.
  - **Action/Strategy** – more specific than an objective with identified responsible parties, timeframes and potential funding sources
- 

### Types of Mitigation Actions

- General Multi-Hazard Mitigation Actions
- Hazard-Specific Actions

#### 1. Prevention

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Shoreline / riverine / fault zone setbacks

#### 2. Property Protection

- Acquisition/Demolition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (e.g., windproofing, floodproofing, seismic design techniques, etc.)
- Safe rooms, shutters, shatter-resistant glass
- Insurance
- Back-wiring for generators
- Anchoring for communications towers, other critical facilities

#### 3. Natural Resource Protection

- Floodplain protection
- Watershed management
- Beach and dune preservation
- Riparian buffers
- Forest/vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

#### 4. Structural Projects

- Reservoirs
- Dams / levees / dikes / floodwalls / seawalls
- Diversions / detention / retention
- Channel modification
- Beach nourishment
- Storm sewers





## 5. Emergency Services

- Warning systems
- Evacuation planning
- Emergency response training
- Exercises
- Sandbagging
- Installing temporary shutters for wind protection

## 6. Public Education and Awareness

- Outreach projects
  - Speaker series / demonstration events
  - Hazard map information
  - Real estate disclosure
  - Library materials
  - School children educational programs
  - Hazard expositions
- 

## Prioritizing Alternatives

- Consider **STAPLEE**:
  - Social
  - Technical
  - Administrative
  - Political
  - Legal
  - Economic
  - Environmental

West Virginia Hazard Identification and Risk Assessment / Mitigation Strategies Development Meeting  
 March 22, 2013 Sign-in Sheet

Name	Agency/Organization	Phone	E-mail	Secondary POC - name/email address
Lirerose M. Beach	WVDHSEM	304-957-2572	lirerose.m.beach@wv.gov	
Roger Mungold	"	304-957-3571	roger.mungold@wv.gov	
Al Lisko	WVDHSEM	304-957-2573	Al.M.Lisko@wv.gov	
Paul Howard	"	304-552-5380	paul.s.howard@wv.gov	
Mike Shook	"	"	William.M.Shook@wv.gov	
Amyssa Core	"	304-807-4016	amyssa.m.core@wv.gov	
Jane McColloch	WVGES	304-594-2331	janemc@geosov.wvnet.edu	
Tom SAUNDERS	WV Dev. Office	304 558 2234	Tom.J.SAUNDERS@wv.gov	
CRIG LAMHAM	WV Educational Broadcast	304-254-7896	CLANHAM@WVPUBCAST.ORG	
H. Tim Coleman	WV DNR-Law	304-558-2784	tim.d.coleman@wv.gov	
Kurt Buchanan	Corps of Engineers	304-399-5187	Kurt.L.Buchanan@usace.army.mil	
Jerry L. Beckett	Cabell County EMS/SES	304 633-7333	Jerry.beckett@ccems.org	
Rusty Joins	WUDEP	3045585438	Rusty.T.Joins@wv.gov	
CAITIE NEIDIG	USGS	304-347-5130	caitiej@usgs.gov	

Name	Agency/Organization	Phone	E-mail	Secondary POC - name/email address
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Fred Rader	Mio-Ohio Valley Reg. Council	304 422-4993	fred.rader@mivrc.org	
Mike Walker	WV DHSEM	304-807-5630	michael.e.walker@wv.gov	
Sandy <del>Greer</del>	WV DHSEM	304 887 5135	sandy.h.greer@wv.gov	
DAVID HOGE	WV DMARS	304 558-2990	david.k.hoge@wv.gov	
WALT JACKSON	FORESTRY	558-2788	WALT.G.JACKSON@WV.GOV	
Bob Jacobus	Region VII PDC	472-6564	bjacobus@RegionVII.com	
Ray McCallister	WV Dept. of Agriculture	558 5892	Rmccallister@wv.gov	
Ryan Mumpul	WV DHSEM	557-2571 557	ryan.mumpul@wv.gov	
Rachael Fenneman	Dewberry			
Jane Frantz	Dewberry			
Jake Jarosz	Dewberry			
Ryan Towell	Dewberry			

Planning, Policy & Funding Group  
 March 22, 2013 Sign-in Sheet

Name	Agency/Organization	Phone	E-mail	Secondary POC - name/email address
Bob Jacobus	Region VII FDC	304-477-6564	bjacobus@RegionVII.org	
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Tom Saunders	WVDO	304-558-2234	Tom.J.Saunders@wv.gov	
Mike Walker	WUDHSEM	304-807-5630	Michael.E.Walker@wv.gov	
GREG TUDER	WUDHSEM	304 751-6180	gregory.m.fulbee@wv.gov	
Paul Howan	"	(304) 558-5380	Paul.S.Howard@wv.gov	
Liriose M. Beach	"	304-558-5380	Liriose.M.Beach@wv.gov	





## APPENDIX F: 2013 WEST VIRGINIA STATE CAPABILITY ASSESSMENT

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### F.1 INTRODUCTION

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A comprehensive state capability assessment includes an examination of the administrative, political, and financial support. Through a series of stakeholder meetings, agency interviews, and a review of both local mitigation plans and other state and local plans, a number of projects, programs, and policies were documented.

This appendix provides considerable information regarding the West Virginia's ongoing programs. A robust capability assessment provides planners with pertinent information that will shape how they structure and design mitigation strategies. The development of this capability assessment has been developed with the following goals in mind:

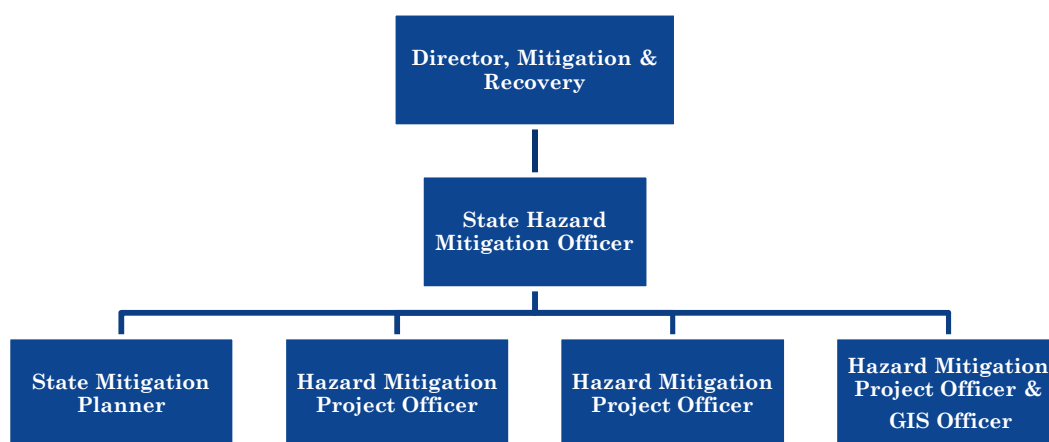
- Prevent duplication of programs that may already address specific hazards.
- Identify potential gaps in capabilities.
- Identify potential resources for implementing additional mitigation strategies.
- Provide an understanding of how the State can better support local mitigation activities.

This appendix is laid out in a manner that intends to provide the most meaningful information regarding mitigation related programs first. First, DHSEM's organizational structure is described, as DHSEM serves as the primary agency responsible for implementation of mitigation related activities. Then, narrative descriptions of various State and local mitigation related programs provides details on the activities of each program. This includes accomplishment, changes, and challenges since the 2010 Plan was adopted. These descriptions are not comprehensive, but provide the most detail on WV's mitigation related activities. Then, in Section F-6, comprehensive tables provide the reader with a complete summary of the programs and resources that serve or could potentially serve to mitigate WV communities from the impacts of disasters. Finally, a detailed description of the Federal programs and potential funding sources available to WV as resources for implementation of new programs and strategies is provided.

## F.2 WEST VIRGINIA DIVISION OF HOMELAND SECURITY AND EMERGENCY MANAGEMENT:

The agency with primary responsibility for this plan is the DHSEM. The organization of the mitigation and recovery section of the DHSEM is described in Figure 1. The Director is the principal officer in charge of the mitigation section. The State Mitigation Planner is responsible for state and local mitigation planning. The State Hazard Mitigation Officer (SHMO) is responsible for mitigation project implementation.

FIGURE 1: Organizational Structure of the WVDHSEM Mitigation and Recovery Section



### F.2.1 STATE LEGISLATION

The initiatives recommended in this plan are supported by the *WV State Code § 15-5-1, et. seq.* and *Executive Order No. 18-03*<sup>1</sup>. Section §15-5-20 directs the governor to take “steps that could be taken to prevent or reduce the harmful consequences of disasters.” Under this proclamation, the Governor is required to consider actions that mitigate or eliminate the loss of life and property throughout the State of West Virginia. While ultimate direction and control of these actions rest with the Governor, Section § 15-5-1 establishes the DHSEM as the agency responsible for ensuring the enactment of these provisions.

Executive Order 18-03 establishes the West Virginia Hazard Mitigation Council (HMC). This proclamation assigns the responsibility for development and implementation of the state hazard mitigation plan to the HMC. The Council is

<sup>1</sup> WV Code Chapter 15. Public Safety. Article 5. Division of Homeland Security and Emergency Management. (§15-5). Retrieved January 2013 from: <http://www.dhsem.wv.gov/resources/Pages/WVCodeChapter15-5.aspx>



selected at the discretion of the Governor’s Executive Committee and is comprised of governmental, educational, voluntary, and private sector representatives. These representatives are given the responsibility of supporting the state hazard mitigation planning effort and actual implementation of the plan. For more information on Executive Order 18-03, please refer to Appendix B of this plan.

### F.3 IMPLEMENTATION OF MITIGATION STRATEGIES

Since the last plan update, the state has had successes in implementation, an aspect of the ability of a state to accomplish goals. This section represents the capability of the State to implement those significant accomplishments as they have occurred. More complete information on the status of the West Virginia 2010 Mitigation Strategy can be found in Appendix H.

West Virginia continuously implements policies, programs and actions aimed at mitigating losses from future disasters. Mitigation strategies developed for this mitigation plan are built upon these other programs and activities. This appendix documents those programs aimed at mitigation.

It is with great pride, however, that WV continues to implement meaningful mitigation strategies as detailed in this plan. This section aims at addressing, in a general sense, the approach WV takes toward implementation of this plan. For further details regarding the specific programs that these strategies are built upon, please refer to the later sections of this appendix. They are documented in a narrative form first, then in comprehensive tables below.

#### IMPLEMENTATION OF MITIGATION STRATEGIES

West Virginia has traditionally funded the entire 25 percent match required for pre- and post-disaster FEMA mitigation grant projects. Typically, in other states, the local community is required to contribute between five and ten percent of the state’s share. However, this is difficult if not impossible for most of West Virginia’s impoverished communities. By picking up the local share of the match, the state has demonstrated the state’s commitment to its citizens.

To date, 211 mitigation projects totaling \$86.4 million dollars in federal and state monies have been implemented in West Virginia. Most of these projects have been implemented with FEMA-HMGP (Hazard Mitigation Grant Program) funding that became available after the floods that occurred between 2001 and 2005. Details on projects initiated since the 2010 plan update are in Appendix P (redacted). A brief summary of accomplishments can be found in this Appendix on the pages that immediately follow.





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## IMPLEMENTATION OF THE 2010 WEST VIRGINIA STATE ALL-HAZARDS PLAN

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The success of the State Plan and the strategies presented rely on the continued support and effort of a wide range of stakeholders. Stakeholders were directed to participate in the mitigation planning process through the Hazard Mitigation Council and Executive Committee meetings. The Hazard Mitigation Council consisted of 44 representatives of various State and federal agencies. These representatives were responsible for implementation of the State's 80 mitigation strategies developed for the 2010 Mitigation Plan. The majority of the 2010 mitigation strategies were successfully implemented or are currently being implemented. Complete details regarding these strategies are available in Appendix H.

Similar to the 2013 mitigation planning process, the 2010 mitigation strategies were developed at a meeting of the HMC, and centered around four different topic areas. Members of the HMC with special expertise within each topic area contributed to the development of each strategy. Most of these strategies were successfully implemented, while others encountered challenges in implementation. These four topic areas consisted of:

- Planning, Policy and Programs;
- Education and Outreach;
- Risk Assessment; and
- Mitigation of High Hazard Structures.

The Planning, Policy and Programs group developed strategies focused on advocacy of legislative policies, new programs, and plans that would further mitigate hazards in WV. For example, this group developed strategies aimed at development of a levee maintenance and certification program, development of a dam safety revolving loan fund, advocated for changes in the local mitigation planning process, conducting outreach to encourage local communities to join the FIREWISE program, and developing legislation or an Executive Order which directs State agencies to avoid building in the floodplain. As mentioned above, the majority of these were successfully implemented, others are in progress, some were canceled due to political or financial challenges, and others are currently underway. For example, DHSEM has restructured much of the local mitigation planning process and has greatly improved the local mitigation plan roll up process described in Chapters 3 and 4; WV Department of Forestry (WVDOP) has worked with many local communities to become better prepared for wildfires, however has found many challenges in assisting communities become recognized FIREWISE communities; DHSEM has worked with the legislature and the governor to pass the aforementioned legislation, but has been thus far unsuccessful; and the WV Department of Environmental Protection has established the aforementioned revolving fund and is currently collecting money to fund projects.



The Education and Outreach program worked to reach out to members of the local WV community to educate homeowners and public officials about hazards they may face. These activities ranged from advocating that communities join either the NFIP or the CRS programs, to running stories about personal preparedness on the Public Broadcasting Station.

The Risk Assessment group focused on data deficiencies, scientific studies, and information that would provide decision makers with a sound basis on which to invest funding and resources. This group consisted of representatives from WV GIS Technical Center, WV University, WVDEP, USACE, WVGES, etc. Strategies included examining state and critical facility data for identification of vulnerabilities, digitizing WV landslide quadrangles, geo-coding critical facilities datasets, and identification of additional abandoned mines, and identifying downstream dam inundation zones.

Mitigation of High Hazard Structures focused on brick and mortar type projects that would involve structural mitigation measures. Such strategies included acquisition and demolition of RL and SRL properties, as identified by the NFIP, exploring remediation designs for coal dam impoundment structures, and promoting the Statewide building code to local communities. Complete details regarding the status of each of these projects can be found in Appendix H.

Implementation of the 2010 mitigation strategies may be hampered for any number of reasons. Lead agencies could experience a shift in priorities, fiscal constraints, or changes in personnel. Labor resources and funds are always in short supply and create temporary barriers to success. In order to mitigate the problems related to resource availability, the Governor's Executive Order 18-03 conferred upon state agencies the authority and responsibility to participate in hazard mitigation activities. Stakeholders were directed to participate through the Hazard Mitigation Council and Executive Committee meetings. During the planning meetings, the Council recognized that state agency representatives must be allowed time away from other duties in order to be available to serve on the Hazard Mitigation Council, to be able to share information, to monitor progress with the strategies and to report on their progress for annual reports and State Plan revisions.

However, a lack of funding support hinders the implementation of any plan. Therefore, the Council understands and supports the idea that it is collectively responsible for promoting hazard mitigation activities and will continually seek funding for short-listed mitigation projects. The Council will also actively seek to implement mitigation projects with non-FEMA funds in order to optimize the hazard mitigation capabilities of the state.



Several challenges to the state’s capability arose during the implementation of the 2010 Mitigation Plan. These challenges were related to the agencies involved, the projects proposed, and scarcity of resources. Mitigation projects cannot be implemented without sufficient human and financial resources. Throughout the planning process, emphasis was placed on stakeholder involvement and ownership of the plan. As such, several stakeholders have expressed a strong commitment to implementing the mitigation strategies. Through its advisory committees, the Hazard Mitigation Council and DHSEM involved stakeholders and attempted to ensure sufficient resources to support the state’s mitigation initiatives. However, during an economic downturn when state and local financial resources are tight, many activities were put on hold or delayed. Financial resources can come from federal, state, or private entities. A number of potential federal and state funding sources and supportive programs are documented in the tables that follow.

Other potential challenges relate to the seven criteria used to evaluate the mitigation strategies namely, Social, Technical, Administrative, Political, Legal, Economic and Environmental. Each project will likely be implemented under one or more of these constraints. DHSEM will evaluate proposed projects based upon a consideration of several of these factors including a benefit-cost analysis. Overcoming some or all of these constraints using a strategic approach is the intended target of the mitigation strategies. For example, the residents of a community may be psychologically predisposed against stricter building code legislation. Implementation of this strategy will then require targeted education initiatives aimed at changing psychological attitudes and improving social support and gaining public opinion.

The state’s capability to manage and implement mitigation actions is being enhanced through the addition of new mechanisms to improve areas of project planning, project selection, project implementation and program management.

A significant planning challenge since the 2004 and 2007 Plans have been the different formats of the local multi-jurisdictional plans submitted to the state for review. This has made the local plan reviewing process very difficult. To remedy this situation, the State Planner has standardized the format of the local plans and adopted a regional approach to local mitigation planning, thereby increasing their clarity and streamlining the process of their review and approval. As of the 2013 plan update, all local jurisdictions, with the exception of Jefferson County, participated in a regional mitigation plan, led by the State PDCs. For more information on this process, refer to Chapter 5.

Despite these changes, however, the 2013 State plan update still encountered issues with local plan integration. Each of the PDCs utilized different approaches to defining,



categorizing, grouping, assessing, and ranking hazards. These inconsistencies impeded the reliability and accuracy of the data and made uniform statewide assessments challenging and cumbersome. Mitigation strategies were developed to attempt to address these challenges for the next State plan update.

Yet another challenge discovered during the planning process was the recognition that potential property acquisitions located adjacent to existing highways could hinder future highway improvements because of the requirement to maintain the land as perpetual open space. Therefore, a better method to coordinate with other agencies is being developed to prevent duplication of efforts or negative impacts to projects planned by other agencies, particularly WVDOH and USACE. The state is currently considering a “zoning” mechanism that would identify areas where other mitigation activities would be preferable to acquisition. This is particularly important to WVDOH as properties mitigated via acquisition/ demolition can prevent road construction and maintenance activities due to use restrictions enacted by FEMA.

## MITIGATED STRUCTURES

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West Virginia has worked to provide mitigation of RL properties since the inception of FEMA HMA grant programs during the past two decades. Since 2008, emphasis has been placed on delivering mitigation to the RL properties. The 205 mitigated RL properties experienced a total of 509 flood related events resulting in \$7,983,156 claims paid.

The WVDHSEM administers DHS/FEMA flood mitigation grants. Funding has been used to mitigate flooding through acquiring and converting the properties into open space; elevating structures above the base flood elevation level; or building infrastructure that improved local drainage problems. Theoretically, these structures will no longer require payments for flood loss claims from the NFIF. WVDHSEM has completed mitigation of more than 938 structures<sup>2</sup>. Most of these projects have been funded through post-disaster Hazard Mitigation Grant Program (HMGP) funds available from 2001 to the present. Most projects involved acquiring and demolishing floodprone residences.

Information on past use of mitigation funds can be used to assess loss avoidance as a result of implementing mitigation projects. To help with this assessment, WVDHSEM has developed a *Mitigation Action Assessment Form*. After a mitigation project is completed, the community that performed the mitigation action will complete and submit this form after a subsequent event occurs that impacted that site. For instance, water depths on each property, provided by the community, will be combined with the

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<sup>2</sup> WVDHSEM Deedbook 1/15/2013



appraised value of the property that existed prior to mitigation, to estimate the losses avoided.

In addition to Executive Order 18-03 and WV Code § 15-5-4, other legislative initiatives have been promulgated to fulfill the goals and strategies of the State Mitigation Plan, including flood loss prevention. An example of flood-related legislation that has passed includes Senate Bill 635 (2006), which requires county BOEs to carry flood insurance on certain buildings and their contents.

This information can also be found in Section 3.7.5 of the base plan.

#### F.4 STATE MITIGATION RELATED PROGRAMS

The programs described in this section represent some of the notable successes and challenges encountered in the effort to reduce loss of life and property throughout the state of West Virginia. These are ongoing programs that have significantly reduced the state's exposure to risk. Of the programs described, they range from Federal, private, not-for-profit, and voluntary agencies. Not all of programs are unique to West Virginia, and their full potential may yet have to be realized. They have been listed in the hopes that resources and assets that they offer may be incorporated into West Virginia's already significant portfolio.

The following tables describe programs, plans, policies, regulations, funding sources, and practices that support three phases of the mitigation process: 1) pre-disaster; 2) response, recovery, preparedness; and 3) during/post- disaster declaration. Each capability is marked based on its ability to support or facilitate loss reduction from a natural disaster and/or if it has the possibility to be a source of funding for mitigation.

For the 2013 Plan Update, the tables were reorganized to streamline information. The 2010 tables, were previously organized around response period (pre-disaster, response, and recovery). Many of the programs had significant overlap between each of these phases, causing redundancy. For the 2013 Plan, the tables were instead divided by federal programs, State programs, and private/non-profit programs, and include a column indicating what phase of the disaster would be addressed.

#### FLOODPLAIN MANAGEMENT IN WEST VIRGINIA

Provisions for development within the regulated floodplain have typically been addressed by stand-alone ordinances adopted for voluntary participation in the NFIP, established in 1968. Revised floodplain ordinance provisions were recently incorporated



into comprehensive zoning ordinances when localities adopt, revise, or re-codify zoning ordinances.

The West Virginia General Assembly enacted the West Virginia Flood Damage Reduction Act of 1989 to comply with the NFIP. This legislation was motivated by the damages incurred by several floods and storm events between 1969 and 1985. In 1987, to improve West Virginia’s flood protection programs and consolidate similar programs in one agency, coordination of all State floodplain programs was transferred from the Water Control Board to the DHSEM.

According to FEMA’s NFIP Community Status Book, as of September, 2013, 277 of WV’s 282 communities participate in the NFIP. This means that they have voluntarily adopted and are enforcing local floodplain management ordinances. There are only 5 communities that do not participate.

The DHSEM Floodplain Management Section has made significant strides in assisting communities’ adoption of floodplain management ordinances and encouraging them to adopt more stringent ordinances. DHSEM supports communities in floodplain management through the provision of model floodplain management regulations. Of the 277 communities that participate in the NFIP, the majority of these adopted the State model floodplain ordinance. This ordinance has been available to communities since February 14, 2011 and exceeds the minimum requirements laid out by the NFIP. For example, the WV model floodplain ordinance includes 2’ of freeboard as an additional measure of flood protection. Table F-1 highlights those standards prescribed in WV’s model floodplain ordinance that exceed NFIP minimums. The majority of communities who have adopted this model ordinance have done so without modification.

TABLE F-1. WV FLOODPLAIN ORDINANCE STANDARDS THAT EXCEED NFIP MINIMUMS

TOPIC AREA	NFIP MINIMUM	WV MODEL
Elevation	44 CFR 60.3(c): At or above BFE	Section 5.6: BFE + 2ft
Setbacks	None	Section 5.6: All new development must be sited 25’ from SFHA boundary
Subdivisions	44 CFR 60.3(a)(4): Must minimize flood damage through clustering and adequate drainage	Appendix 5.5: All lots shall have 3,000 square feet of buildable area outside the SFHA
Manufactured Homes	44 CFR 60.3(c)(6): Manufactured homes built in the floodplain must be anchored and built to BFE	Appendix 6.1(B): Manufactured homes shall not be sited within the SFHA
Manufactured Homes	44 CFR 60.3(c)(12): Excludes existing manufactured home parks from requiring new manufactured homes from elevating to BFE	Appendix 6.1(B): Removes 44 CFR 60.3(c)(12) exclusion of existing manufactured home parks from meeting minimum BFE



It is important to note that FEMA’s Map Modernization progress has nearly been completed in WV, and has an estimated completion date of spring 2013. As of September 2013 only two jurisdictions remain to be completed under this program. These new maps aim to serve several purposes, which includes reducing reliance on paper map products and updating maps with revised mapping data and development trends. The new maps should help WV communities more accurately identify at-risk communities.

West Virginia supports local floodplain management activities in many other ways as well. Through the 2012 1<sup>st</sup> Special Session, §15-5-20a of the WV Code was updated by the WV Congress. §15-5-20a: Floodplain Manager Training requires all local floodplain managers within the state to annually complete six hours of training in floodplain management and to maintain good standing with DHSEM. Failure to meet this requirement results in suspension of the floodplain manager from their responsibilities until the training requirement is met. Communities with floodplain managers who are suspended of their duties are then required to transfer floodplain management responsibilities and fees to another jurisdiction with floodplain managers in good standing. DHSEM has been working with communities to develop cooperative agreements that would help facilitate transfer of responsibilities should such an event occur. This requirement became effective July 1, 2012.

In order to assist communities meet this training requirement and to help local floodplain managers further augment their skill sets, DHSEM’s Floodplain Management Section annually offers a multitude of training opportunities. These are offered throughout the year and throughout the State. Table F-2 lists floodplain management course offerings dating from 2010 through September 2013:

TABLE F-2. FLOODPLAIN MANAGEMENT COURSES IN WV

DATE	COURSE NAME	LOCATION
August 30, 2010	L-273: Managing Floodplain Development Through the NFIP	Pipestem Resort State Park, WV
October 05, 2010	1-Day Floodplain Managers Training	Institute, WV
January 28, 2011	1-Day Floodplain Managers Training	Jefferson County, WV
February 2011	4 Hrs training	WV Society of Professional Surveyors Convention, Morgantown, WV
July 27, 2011	1-Day Floodplain Managers Training	City of Morgantown, WV
February 2012	4 Hrs training	WV Society of Professional Surveyors Convention, Morgantown, WV
March, 2012	L-273: Managing Floodplain Development Through the NFIP	Canaan Valley, WV
October 18, 2012	1-Day Floodplain Managers Training	Hampshire County, WV



DATE	COURSE NAME	LOCATION
August 31, 2012	1-Day Floodplain Managers Training	City of Moundsville, WV
February 7, 2013	1-Day Floodplain Managers Training	Institute, WV
February 2013	4 Hrs training	WV Society of Professional Surveyors Convention, Morgantown, WV
May 17, 2013	1-Day Floodplain Managers Training	Town of Alderson, WV
July 11, 2013	1-Day Floodplain Managers Training	Town of Flatwoods, WV
September 5, 2013	1-Day Floodplain Managers Training	Boone County
September 23, 2013	L-273: Managing Floodplain Development Through the NFIP	North Bend State Park, WV

In order to encourage higher levels of flood protection, the NFIP instituted the Community Rating System (CRS). CRS is a voluntary incentive programs that encourages community floodplain activities that exceed the minimum NFIP floodplain management regulations. The State NFIP Coordinators also regularly encourage communities to join the CRS Program. West Virginia has five communities (Berkeley County, City of Buckhannon, City of Charleston, Jefferson County, and City of Philippi) that have qualified for CRS benefits, which includes lower flood insurance premium rates.<sup>3</sup> Two of these communities, Berkeley County and City of Charleston, were new to the CRS Program since the adoption of the 2010 State Plan. The City of Buckhannon, Jefferson County, and the City of Philippi remain members of the CRS program and are all in Class 8. Berkeley County has received a Class 7 rating and the City of Charleston Class 9.

While no new communities joined the CRS program between 2010 and 2013, the passing of the Biggert-Waters Act, described in Chapter 1, has dramatically increased interest in the program as a means of lowering communities' flood insurance premiums. There is a high probability that by the time of the next State Plan Update numerous additional communities will have joined the CRS program.

The success of the Certified Floodplain Manager (CFM) program in West Virginia since the 2004 Plan deserves special mention. Due to the efforts of the State NFIP Coordinator and his team that comprise DHSEM's Floodplain Management Section, the number of CFMs increased from approximately 5 in 2004, to 36 in 2007, to 45 in 2010, to 72 in 2013.<sup>4</sup> Several new CFMs are local community floodplain managers.

<sup>3</sup> Federal Emergency Management Agency (FEMA). Community Rating System (CRS) Communities and their Classes. Retrieved June 25, 2013 from <http://www.fema.gov/library/viewRecord.do?id=3629>

<sup>4</sup> Association of State Floodplain Managers. Madison, WI. Retrieved June 2013 from: <http://www.floods.org/Certification/certlist.asp#WV>





This demonstrates that flood hazard awareness among community officials is growing which in turn will influence decision making at the local level and translate to better floodplain management choices for those communities. The increase in the number of CFMs is a notable success in terms of pre-disaster mitigation. Additionally, the West Virginia Floodplain Management Association (WVFMA) offers free membership.<sup>5</sup>

As part of DHSEMs responsibilities under the NFIP, regular visits and presentations to local community offices are helping them become better informed and better prepared. More information on community participation in the NFIP and State support of local hazard mitigation can be found in Section 3.7.5 and Chapter 5 of the base plan.

## WV GEOLOGICAL AND ECONOMIC SURVEY

The Coal Section's *Coal Bed Mapping Program* develops various products that depicts known parameters concerning the coal beds of the State. Several of these parameters can be used by other agencies to mitigate potential hazards, including mine subsidence, mine explosions, location of abandoned coal mines, and possible landslides associated with valley fills and surface mine reclamation. Data about all known mines in West Virginia can be searched through the Survey's Mine Information Database System (MIDS). MIDS contains records of every mine map, is publicly available and contains more than 45,000 documents depicting more than 71,000 mines. This on-line resource is constantly updated as new mine maps become available.

The Coal Section has compiled all available surface and underground mine maps, by seam, and serves this data through the Survey's website. The Coal Section continues to post new information when available. The various mined area maps are routinely used to determine whether a site has been undermined and could be subject to subsidence damage. Oil and gas well drillers need information about the distribution of underground mines to prevent accidental explosions caused by unknowingly drilling into methane-filled abandoned mines. These data are available through MIDS, as described above. The availability of data on the distribution of abandoned mines allows a coal mining company to check on the possibility of nearby coal mines. This knowledge could prevent inadvertent mining into long-closed mines filled with methane or water, wither off which could be problematic to coal miners.

In addition to publication of coal mapping and documentation, the WVGES conducts geologic mapping, geotechnical and geochemical studies, and evaluation of various geologic hazards. These services further mitigation through science based decision

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<sup>5</sup> West Virginia Floodplain Managers Association (WVFMA). Retrieved January 2013 from: <http://wvfma.org/Membership.php>



making, policy development and identification of targeted mitigation strategies. WVGES mapping services consist of two major components: the direct acquisition of new geological information through field reconnaissance and the digital conversion of existing geological information from hard copy (paper, mylar, etc.) This program creates new, detailed geologic maps used for resource assessment, environmental studies, and land use determinations. Geologic maps at a scale of 1:24,000 have been produced for approximately 122 quadrangles in the state; work is currently underway on 9 additional quadrangles.

The WVGES conducts Environmental and Geochemical studies that provide technical expertise on environmental geology issues regarding the state's geologic hazards, water resources, and geochemistry. Work at WVGES deals primarily with the evaluation of geologic site characteristics for UIC permits under West Virginia State Code §22-11-11; the assembly of a database of selected metals content of the State's rock formations; and answering inquiries regarding geology, geologic hazards, surface water, groundwater, and bedrock chemistry.

## READY WV

Through funding from the DHSEM and coordination with Volunteer West Virginia, ReadyWV is a communications campaign and an online tool that helps West Virginians know what to do before, during, and after an emergency. They provide personal preparedness information, business continuity information, volunteer opportunities, training opportunities, preparedness checklists, kids' activities, etc. through their website. The ReadyWV provides families, neighborhoods and local communities in West Virginia with easy access to basic information on how to prepare for emergencies. The ReadyWV website serves as a communications campaign and online tool that helps West Virginians know what to do before, during, and after an emergency. Some of these services include:

- ReadyWV Family Emergency Guide booklet
- ReadyWV bookmarks
- Relevant trainings from around the state
- News updates
- Contact information for local CERT/Citizen Corps programs
- Supports State VOAD

ReadyWV serves as the statewide coordinator for the WV Citizen Corps (CC). In this capacity, ReadyWV manages the distribution of grant funding to localities, public training announcements, and maintains a State CC Council. The State CC Council is composed of state and local government representatives, private and non-profit organization representatives. They meet three times per year to discuss priorities and



funding streams. Federal funding for the CC programs in FY2014 is being eliminated, and as a result the CC Council has been pursuing alternative funding streams.

CC trainings managed and facilitated at the local level. Ready WV works with locals to provide them with training materials and to publicize the events. On average, there are approximately 12 CC training courses per year throughout the State. This includes both the basic training and the Train-The-Trainer courses. Between January 1, 2013 and September 2013, fourteen CC courses have been offered statewide.

Ready WV also publicizes course offerings being held by other State agencies such as DHSEM and the WV Department of Military Affairs and Public Safety (DMAPS). These courses vary year to year but often include courses focused on all aspects of Emergency Management, including the Incident Command System (ICS) and Emergency Operations Center (EOC) operations.

Finally, ReadyWV and the CC often hold public outreach events. Most of these are held at the local level, but ReadyWV offered outreach and preparedness events at two events in 2013, including the Emergency Preparedness Conference for Deaf and Hard of Hearing on June 8, 2013 in Charleston, WV, and the WV State Emergency Response Commission (SERC) Conference in Charleston, WV on August 26, 2013.

## **GEOGRAPHIC INFORMATION SYSTEM**

Geographic Information System (GIS) funding from FEMA led to a comprehensive map modernization program that continued through 2008. The program then transitioned into the Risk Mapping Assessment and Planning program (Risk MAP). The WV Floodplain Management Program (FMP) partnered with WVU to develop a system to enable easier access to current flood maps online. The project worked to overcome the limited number of flood studies in West Virginia through implementation of the State's Map Modernization Business Plan. This tool incorporates data such as: Hazus risk assessment outputs, NFIP flood maps, locations of mitigated structures, etc., which required digitization of revised FIRMs. In July 2011, this online tool launched. It is currently maintained by the West Virginia GIS Technical Center (WVGISTC), housed in the Department of Geology and Geography at WVU. Figure F-1 provides a sample depiction of the tool's output.

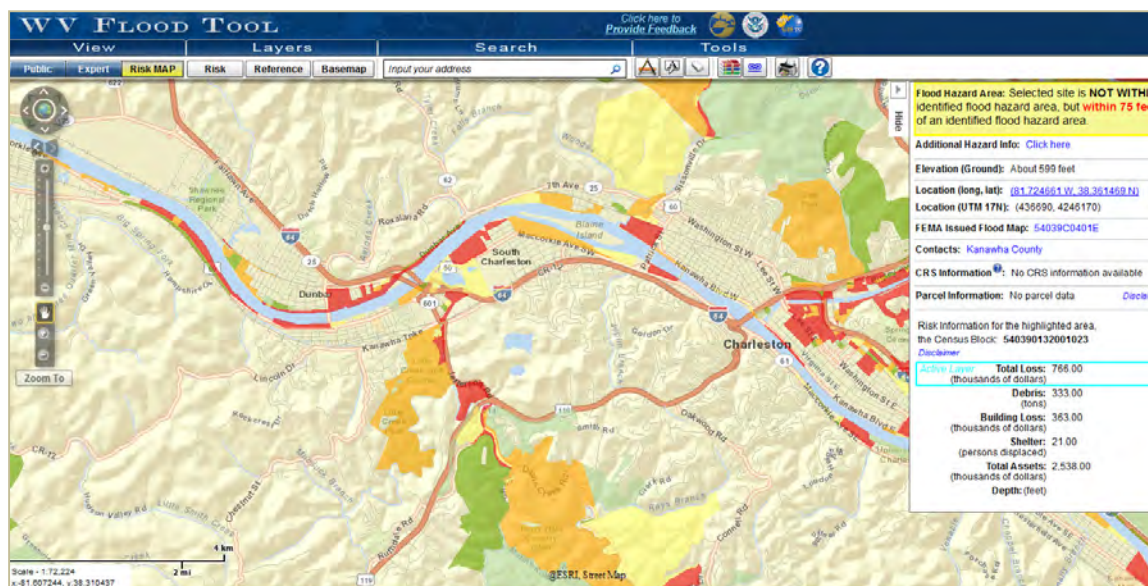


FIGURE F-1. WEST VIRGINIA FLOOD TOOL<sup>6</sup>

The WVGISTC supports digital data conversion, data development, and coordination with Federal geospatial data initiatives, statewide mapping programs, and local (county, municipal) data producers. The center collaborates with the Statewide Addressing and Mapping Board, U.S. Geological Survey, and other partners to create high-resolution digital maps for West Virginia.

The West Virginia FMP continues to work with partners to improve the map tool, including the development of LiDAR data, bridge and culvert data, and information that will enhance the analysis of approximate Zone A flood elevations. As noted in the section above on floodplain management, the Map Modernization program has nearly completed its updating of the WV flood maps. As of September 2013, only two jurisdictions were left to be completed. As each new map is completed and adopted, the Flood Tool incorporates the new data.

## EMERGENCY MANAGEMENT TRAINING OPPORTUNITIES

DHSEMS offers a variety of training opportunities throughout the year. Eligibility criteria varies, depending on the course, but generally any State, Tribal, local government, community official, or volunteer is eligible to attend. Courses are often Federally funded and the curriculum is based on Federal courses offered by the Emergency Management Institute (EMI). Below is a list of courses held in FY 2011 and 2012.

<sup>6</sup> West Virginia University. WV Flood Tool. [www.mapwv.gov](http://www.mapwv.gov)



DATE	COURSE NAME	LOCATION
2/15/2011 – 2/16/2011	G250.7, Workshop: Local Rapid Needs Assessments	Hawks Nest State Park
3/22/2011 – 3/23/2011	G108: Community Mass Care Management	North Bend State Park
4/26/2011 – 4/28/2011	G408: Homeland Security Planning	Twin Falls Resort
5/17/2011 – 4/18/2011	G358: Evacuation and Re-entry Planning course	Cacapon Resort
5/31/2011 – 6/4/2011	G406: Hazard Mitigation	Tygart Lake State Park
6/14/2011 – 6/16/2011	G110: Emergency Management Operations Course (EMOC) for Local Governments	North Bend State Park
7/20/2011 – 7/21/2011	G775: Emergency Operations Center (EOC) Management and Operations	Blackwater Falls State Park
8/23/2011 – 8/24/2011	G385: Mass Fatalities	Pipestem
9/20/2011 – 9/22/2011	G202: Debris Management	Chief Logan Lodge
2/21/2012 – 2/23/2012	G366: Planning for the Needs of Children in Disaster	Hawks Nest State Park
3/20/2012 – 3/21/2013	G364: Multi-Hazard Planning for Schools	North Bend State Park
4/24/2012 – 4/26/2012	G393: Mitigation for Emergency Managers	Twin Falls Resort
5/22/2012 – 5/23/2012	G191: Incident Command System/Emergency Operations Center Interface	Blackwater Falls
6/5/2012 – 6/7/2012	G371: PA Eligibility Program	North Bend State Park
6/19/2012 – 6/20/2012	G288: Donations Management Workshop	Cacapon State Park
7/17/2012 – 7/18/2012	G775: Emergency Operations Center (EOC) Management and Operations	Tygart Lake State Park
8/21/2012 – 8/23-2012	G290: Basic Public Information Officers	Pipestem State Park
9/11/2012 – 9/13/2012	G197: Emergency Planning and Special Needs Populations	Chief Logan Lodge
2/19/2013 – 2/20/2013	G 250.7: Rapid Assessment Workshop	Hawks Nest State Park
3/26/2013 – 3/27/2013	G270.4: Recovery from Disaster, the Local Government Role	North Bend State Park
6/17/2013 – 6/19/2013	G393: Mitigation for Emergency Managers	Cacapon State Park
7/16/2013 – 7/17/2013	G776: Emergency Operations Center Management and Operations	Pipestem State Park
8/20/2013 – 8/21/2013	G191: Incident Command System/Emergency Operations Center Interface	Tygart Lake State Park
9/17/2013 – 9/19/2013	L371: PA Eligibility Program	Chief Logan Lodge

In May and June 2013, DHSEM was forced to cancel two classes due to lack of enrollment, as well as Federal sequestration, which resulted in the lack of funding to hold the training. These trainings included G384: Multi-Hazard Planning for Schools, and G202: Debris Management.

In addition to the courses offered by DHSEM, DMAPs also provides its own set of training based around counter-terrorism, law enforcement, and emergency response.



## F.5 PLANNING EFFORTS BY STATE AND LOCAL AGENCIES

Essential to mitigation is its integration with other planning and development efforts throughout the State. Established planning and development efforts often wield significant resources and hold the potential for implementation of strong mitigation-related activities. These plans provide opportunities for integration of mitigation-related principles in current work and future projects, so acknowledgement and consideration is important for the development of the State plan Update.

Local jurisdictions control land use through plans, ordinances, and codes in ways that can reduce natural hazard impacts. Programs are enabled through State law and regulation and like the many State programs described in this chapter, contribute significantly to mitigation of natural hazards. These programs were not directly considered during development of the 2013 Update because the plan targets critical State facilities determined to be at risk following analysis of the vulnerability of State facilities to natural hazards. In addition, hazards were considered broadly in terms of State impact. However, these efforts are extremely relevant as State agencies generally manage State facilities in a manner that is consistent with and complementary of local comprehensive planning and zoning.

### COMPREHENSIVE PLANS

Comprehensive Plans are prepared by planning commissions to address the physical development of land within a jurisdiction's boundaries to achieve a goal or series of goals. The *West Virginia Hazard Mitigation Plan 2013 Update* is a comprehensive plan with the intended purpose of reducing loss during natural hazards. The Code of West Virginia defines a comprehensive plan:

*A comprehensive plan is a process through which citizen participation and thorough analysis are used to develop a set of strategies that establish as clearly and practically as possible the best and most appropriate future development of the area under the jurisdiction of the planning commission. A comprehensive plan aids the planning commission in designing and recommending to the governing body ordinances that result in preserving and enhancing the unique quality of life and culture in that community and in adapting to future changes of use of an economic, physical or social nature. A comprehensive plan guides the planning commission in the performance of its duties to help achieve sound planning (§ 8A-3-1(b), Code of West Virginia).*



Most plans evaluate and provide guidance for both land use and the environment. Planning depends on informed decision making. In preparation of a comprehensive plan, a planning commission, both at the state and local level, must consider land use, characteristics and conditions of existing development, natural resources, local and regional geography, environmental and economic factors, infrastructure, and other demographic information. Much of the background information includes Federal, State, and local programs, policies, and statutes. Those that pertain to natural hazards are listed in detail in the Capability section of this plan, located in the appendixes.

Most State planning and development is regulated under Chapter 8A: Land Use Planning under the West Virginia Code. This section provides general provisions, planning commissions, comprehensive plan, subdivisions and land development, methods of security, zoning ordinances, appeals, and enforcement of provisions.

These all serve as resources and guides to development of local comprehensive plans. Local municipalities are not required but are encouraged by the State to develop these plans. While these State resources do guide local plans, localities having jurisdiction can develop and organize the plans however they believe would provide them with the greatest level of utility. Thus those comprehensive plans vary greatly in scope and detail from jurisdiction to jurisdiction.

Since comprehensive plans are not regulated or approved by the State, there is no comprehensive list of jurisdictions that have developed and adopted these. As a result, each jurisdiction would have to be contacted individually to obtain this information. Further, there are 282 individual communities in WV, which makes it impossible to obtain this information. DHSEM Region III, however, can be considered representative of the State, as the jurisdictions in that region range from rural to Urban. Thus, Region III was used to obtain a sample of the jurisdictions that maintain comprehensive plans:

Within these jurisdictions are incorporated towns and villages, which may or may not maintain codes and ordinances. For example, the City of Petersburg is within Grant County. While the County does not have a zoning Ordinance, the City of Petersburg does. With over 280 individual communities in WV, there can be wide variations in adoption of zoning and land use ordinances, but based on the small sample of counties within the State, most, if not all, of the counties should have Comprehensive Plans, and about half should have Zoning Ordinances. See the Local Planning and Development Summary section below for this table.

## ZONING ORDINANCES

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Zoning ordinances serve the general purpose of promoting health, safety, and general public welfare. Zoning districts may consider: Adequate light, air, convenience of access, and safety from fire, flood, crime, and other dangers. They provide adequate



police and fire protection, disaster evacuation, water, sewerage, flood protection, and other public requirements. They also protect against loss of life, health, or property from fire, flood, panic, or other dangers.

More information on the State zoning ordinance can be located in the Code of West Virginia in Chapter 8A, Article 7 (CWV § 8A-7).

## LAND SUBDIVISION AND DEVELOPMENT ORDINANCES

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Land subdivision and development ordinances are prescribed statutes and restrictions for plats, utilities, streets and other related building activities. They address issues such as flood control or population density to allow for safer communities. Chapter 8A, Article four of the Code of West Virginia elaborates on the State laws governing these actions (CWV § 8A-4).

## STATE BUILDING CODE

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The West Virginia State Building Code (SBC) is a set of model codes managed under the authority of the State Fire Commission under West Virginia Code §29-3-5b. As of March 2010, Title 87 Code of State Rules (87CSR4), the SBC incorporated the International Building Code (IBC) 2009 (CSR §87-4-4). The IBC guidance serves as a building code developed by the International Code Council (ICC). It is an international standard that has been adopted by most of the United States and supports mitigation of damages due to hazards, including, but not limited to wind, snow, seismic, and fire. The SBC provides WV communities with a set of life safety building standards that they can voluntarily adopt.

In addition to fire, wind and load bearing standards, the IBC, and thereby the SBC, incorporates many aspects of the National Flood Insurance Program (NFIP) regulations. By doing so, the IBC aligns NFIP requirements and building code into local laws. While these regulations do not satisfactorily meet the requirements of the NFIP or qualify the jurisdiction for participation, these regulations do communities that have adopted the WV statewide building code with some level of flood protection.

State-sponsored construction adheres to the SBC that incorporates the IBC. At the time of the 2010 West Virginia State mitigation plan update, only 10 counties had adopted the State Building Code. Now in 2013, according to the WV Office of the State Fire Marshall, 55 West Virginia communities have adopted the code<sup>7</sup>. Those communities are:

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<sup>7</sup> International Code Council: West Virginia State Adoptions. <http://www.iccsafe.org/gr/Pages/WV.aspx> (May 2013)





**Counties**

- Berkeley
- McDowell

**County Commissions:**

- Fayette
- Greenbrier
- Hampshire
- Harrison
- Jefferson
- Raleigh

**Cities:**

- Charles Town
- Beckley
- Benwood
- Bluefield
- Bridgeport
- Charleston
- Clarksburg
- Dunbar
- Elkins

- Fairmont
- Grafton
- Huntington
- Hurricane
- Lewisburg
- Logan
- Mannington
- Martinsburg
- Martinsville
- Morgantown
- Moundsville
- Nitro
- Petersburg
- Philippi
- Pleasantville
- Princeton
- Ranson
- Richwood
- Ripley
- Salem
- Shinnston

- South Charleston
- Albans
- Stonewood
- Summersville
- Vienna
- Weirton
- Westover
- Wheeling
- Williamson
- Williamstown
- Westover

**Towns:**

- Granville
- Lumberport
- Marlinton
- Northfork
- Star City

**Villages:**

- Barboursville

**F.1.1 LOCAL PLANNING AND DEVELOPMENT SUMMARY**

Local jurisdictions in West Virginia address some hazards in the planning and development process, primarily through the building code, which includes provisions requiring new buildings and structures to be designed to resist certain flood, wind, snow, and seismic loads. The State Building Code, which includes the IBC 2009, has very specific provisions addressing fire hazards and safety of occupants.

TABLE F-3. ZONING AND COMPREHENSIVE PLAN SAMPLE FROM DHSEM REGION III

JURISDICTION	ZONING ORDINANCE	COMPREHENSIVE PLAN
Berkeley County	No	Yes
Jefferson County	Yes	Yes
Morgan County	No	Yes
Hampshire County	No	Yes
Hardy County	Yes	Yes
Mineral County	No	Yes
Grant County	No	Yes



TABLE F-4. EXISTING LOCAL LAND-USE POLICIES

Policy	Description	Applicability	Effectiveness
Building Codes	The State has adopted a building code and local governments are required to adopt and enforce this code.	The adoption and enforcement of building codes relates the design and construction of structures to standards established for withstanding high winds and flooding.	All structures built after 1999 comply with the new building code, which includes special provisions for building in the floodplain.
Zoning	Laws and ordinances regulate development by dividing the community into zones and by setting development criteria for each zone.	Zoning can keep inappropriate development out of hazard-prone areas and can designate certain areas for such things as conservation, public use, or agriculture. Zoning can also be used to control construction by dedicating areas for cluster development or planned unit development. The State is currently working with local governments on implementing these last two policies.	-Some have passed open space ordinances that have preserved over 20% percent of hazard-prone and environmentally sensitive areas (wetlands, aquifer recharge zones, and hillsides) in the State. These ordinances are based on local land use plans.
Land Use Planning	Comprehensive land use planning provides a mechanism to prevent development in hazardous areas or allows development in a manner that minimizes damage from hazards. Land use planning gives local governments “the big picture” of what is happening in their jurisdiction.	Local governments can use land use planning to identify those areas subject to damage from hazards and work to keep inappropriate development out of these areas. Land use planning can also be used for a more regional approach when local governments work together.	Under the new local planning legislation, new development can be minimized in identified hazard areas.
Subdivision Regulations	Sets construction and location standards for subdivision layout and infrastructure.	Contains standards for such things as storm water management and erosion control.	New subdivisions in flood hazard areas will be required to cluster homes outside of the floodplain, and will be given more flexibility in using varied densities within the subdivision.
Capital Improvements Planning	Identifies where major public expenditures will be made over the next 5 to 10 years.	Capital Improvement Plans can secure hazard-prone areas for low-risk uses; identify roads or utilities that need strengthening, replacement, or realignment; and prescribe standards for the design and construction of new facilities.	Realigned utilities in highest earthquake risk area.



### F.5.2 EMERGENCY RESPONSE AND RECOVERY

Response to natural hazard events is coordinated through local emergency management agencies. Most local agencies are responsible for preparing for and training to respond to disasters, whether natural or technological in origin. Recovery, especially from major events, may involve other local agencies, such as housing, water/wastewater, and parks and recreation. Local agencies prepare local emergency management plans that direct their response and recovery operations.

## F.6 WV MITIGATION RELATED PROGRAMS

The following tables describe the programs and resources available to WV that reduce risk and vulnerability to hazards addressed in this plan. For a complete description of these hazards please refer back to Chapter 3. The tables describe the agency mission, specific programs, plans, policies, regulations, funding, and practices implemented by each respective agencies.

The tables are broken out by Federal, State, and private/non-profit organizations. Many of these programs work closely with one another, and specific responsibilities may cross organizational lines. For example, the NFIP is a Federal program, however DHSEM is responsible for monitoring, outreach, and implementation of that program. The narrative descriptions above are intended to provide detailed descriptions of mitigation related activities, while the tables below are intended to give a general overview of each program and practice.



TABLE F-5. FEDERAL MITIGATION PROGRAMS AND CAPABILITIES

Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
US Army Corps of Engineers	Flood Control Projects	√			√		√	Design and construction of local flood control projects not specifically authorized by Congress.  State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.
	Riverbank Protection	√			√	√	√	Design & construction of stream and river bank protection projects to safeguard highways, highway bridges, essential public works, churches, hospitals, schools and other non-profit public critical facilities endangered by flood-caused erosion.  State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.
	Flood Control Clearing	√			√	√	√	Design and construction of snagging and clearing projects for navigable waters and their tributaries to reduce potential flood damage  State, political subdivisions and other local agencies established within state law with full authority and ability to undertake required legal and financial responsibilities.



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Floodplain Management	√			√	√		<p>Technical assistance in identification of flood-prone areas, potential losses and the flood hazard of proposed building sites; guidance in land use management to prevent flood damage. Funding limitations set by District Office.</p> <p>State, political subdivisions and other public organizations.</p>
	Drought Assistance	√		√			√	<p>Coordinate the development of drought plans and procedures for lakes and dams within the State under the jurisdiction of the Corps of Engineers.</p> <p>Provide information and reports as needed.</p> <p>Coordinate USACOE drought related activities.</p> <p>Provide water from USACOE reservoirs and dams, as available during emergencies.</p>
U.S. Department of Agriculture	Watershed Protection Loans	√			√	√	√	<p>Loans to assist local sponsors provide the local share of the cost of watershed improvements for flood prevention, irrigation, drainage, water quality management, sediment control, fish and wildlife management, public water supplies and water storage.</p> <p>Sponsoring local organizations such as soil and water conservation districts with authority under state law to obtain give security for and raise revenues to repay loans.</p>



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Emergency Watershed Protection	√			√	√		<p>Technical services to determine eligibility and to plan needed measures. Financial assistance to construct approved measures.</p> <p>Any state agency, county (or group of counties), municipality, town, soil and water conservation district, flood prevention or control district or any other non-profit agency with authority under state law to carry out, maintain and operate watershed improvement works.</p>
	Resource Conservation & Development	√			√	√	√	<p>Grants and technical assistance to aid public agencies in implementing long-range resource conservation and development programs, including flood control projects.</p> <p>Public agencies and non-profit organizations having legal authority to plan, install, operate and maintain community projects benefiting the public.</p>
	Forest Land Flood Prevention	√			√	√		<p>Technical assistance in planning and application of measures to protect public health and safety, reduce flood hazards and control sedimentation from forest and related lands when existing local, state and federal programs do not provide adequate facilities and funds for immediate protective action.</p> <p>Provides assistance in preparing requests for Section 216 funds for emergency treatment of watersheds impaired by fire, flood, earthquake or other natural disasters.</p> <p>State and local governments</p>



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Rural Housing Service (RHS) Homeownership Loans			√	√	√	√	Loans for the purchase, construction, rehabilitation or relocation of a dwelling and related facilities for low or moderate-income persons in rural areas. RHS can help subsidize monthly mortgage payments, limiting these costs to no more than 30 percent of the adjusted monthly income of the applicant.
	Very Low Income Housing Repair Loans and Grants: USDA Rural Development			√	√	√	√	Home improvement and repair loans and grants enable very-low and low-income rural homeowners to remove health and safety hazards from their homes and to make homes accessible for people with disabilities. Grants are available for people 62 years old and older who cannot afford to repay the part of the assistance received as a loan.  An applicant must own and occupy a home in a rural area, be without sufficient income to qualify for a Section 502 loan, have sufficient income to repay the loan, and be a citizen of the U.S. or reside in the U.S. after having been legally admitted for permanent residence.
	Farm Service Agency Drought Assistance			√	√	√	√	Provide assessments of drought damages.  Coordinate requests for drought related Presidential Declaration of Drought Emergency.  Recommend federal drought assistance declaration to the Governor through Department of Emergency Management.  Implement federal drought assistance programs.  Administer drought-related relief in coordination with the West Virginia Department of Agriculture



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Emergency Food Stamp Program			√	√	√	√	Provides emergency food stamps to disaster victims  Coordinated with West Virginia Department of Health and Human Resources and the West Virginia Department of Agriculture
	Disaster Assistance			√	√	√	√	Emergency Conservation program shares with agricultural producers the cost of rehabilitating eligible farmlands damaged by natural disaster. .  Farm Service Agency provides emergency loans to assist producers recover from production and physical losses due to drought, flooding, other natural disasters or quarantine.  Natural Resources Conservation Service’s Emergency Watershed Protection Program (EWP) provides emergency measures, including purchase of floodplain easements for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on the watershed.  Food and Nutrition Service’s Food Distribution division has the primary responsibility of supplying food to disaster relief organizations.
FEMA	National Flood Insurance Program (NFIP)	√			√	√	√	Insurance at a reasonable rate is provided to properties within communities participating in the National Flood Insurance Program. In West Virginia, 270 cities, counties and towns participated in the NFIP as of July 1, 2004.  Property owners in communities participating in the National Flood Insurance Program.





Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Hazard Mitigation Assistance (HMA)	√		√	√	√	√	<p>The HMA program consists of three separate grant programs: Hazard Mitigation Grant Program (HMGP); Flood Mitigation Assistance (FMA) and Pre-Disaster Mitigation (PDM). FMA and PDM may be used to enhance State mitigation planning. HMGP, FMA and PDM may be used to implement structural flood mitigation programs to directly assist communities to reduce flood losses.</p> <p>Three NFIP-funded flood mitigation programs, SRL, and FMA were combined through the Biggert-Waters National Flood Insurance Reform Act of 2012, signed into law by President Barack Obama on July 6, 2012. Specific program guidance on the newly combined mitigation programs was released by FEMA during mid-July, 2013. It combines the former Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL) programs into one newly merged Flood Mitigation Assistance program.</p> <p>State or communities can receive financial and technical support for flood mitigation planning and implementation of flood mitigation projects. FMA, RFC and SRL must be used for repetitive loss properties that are covered through the NFIP.</p> <p>HMGP funding levels are dependent upon a Presidential Disaster Declaration and the amount of funding provided through Public Assistance. Grants are provided to state and local governments to support hazard mitigation projects per the disaster-specific Mitigation Strategy state priorities. Projects included incentive projects at up to 5% of the total HMGP allocation, planning projects at up to 7% of the allocation and structural projects that are cost-beneficial at &gt;88% of the allocation.</p>



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Community Assistance Program – State Support Services Element (CAP-SSSE)	√			√	√	√	Identify, prevent, resolve floodplain management issues and reduce flood hazards  Communities participating in the National Flood Insurance Program are supported by the state NFIP coordinator’s office.
	National Dam Safety Program (NDSP)		√		√	√	√	Grants to reduce the risks to life and property from dam failure, through the establishment and maintenance of an effective dam safety program.  States with new and existing impoundment structures
	Homeland Security Grant Program		√		√	√	√	The State Homeland Security Program (SHSP) enhances capabilities through planning, equipment, and training and exercise activities.  The Citizen Corps Program engages citizens in personal preparedness, exercises, ongoing volunteer programs, and surge capacity response.  Part of the Citizen Corps Program is the Community Emergency Response Team (CERT) program. Provides grant funding to volunteer organizations that make local communities safe and prepare to respond to any emergency situation. CERT trains people to respond to communities in their own local communities
	Regional Catastrophic Preparedness Grant Program (RCPGP)		√				√	Provides funding to support coordination of regional all-hazard planning for catastrophic events, including the development of integrated planning communities, plans, protocols, and procedures



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Preparedness Grants (formerly known as the Infrastructure Protection Program)		√				√	Supports specific activities to strengthen security at ports and enhance transit, trucking and intercity bus systems
	Emergency Management Performance Grants (EMPG)		√		√	√	√	Helps state and local governments to sustain and enhance their emergency management programs' effectiveness
	Disaster Preparedness Improvement Grant (DPIG)		√		√	√	√	Grants to encourage the maintenance and improvement of disaster preparedness plans and activities. For State and local governments
	Educational outreach programs		√		√			Educational materials for preventing injury are readily available at the FEMA website. (FEMA, 2003c)
	Disaster Housing			√	√	√	√	Residents within Presidentially declared areas are eligible for temporary housing assistance. The FEMA Administrator or their designee determines that other circumstances necessitate temporary housing assistance.  Home Repair Program: Home repairs may be provided to those eligible applicants who are owner-occupants of the primary residence to be made habitable and whose property can be made habitable by repairs to the essential living area within 30 days following feasibility determination. The FEMA Region III Director may extend this period.



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Forest Fire Suppression			√			√	Federal assistance under Section 420 of the Act is provided in accordance with continuing Federal-State agreement for Fire Suppression (the Agreement) signed by the Governor and Regional Director. The Agreement contains the necessary terms and conditions consistent with the provisions of applicable laws, Executive orders, and regulations, as the Associate Director may require and specifies the type and extent of Federal Assistance
	Individual and Households Assistance Program (IFGP)			√	√	√	√	<p>Federal law authorizes grants to disaster victims with disaster related expenses and needs that cannot be met through other available governmental disaster assistance programs.</p> <p>The Federal share of a grant to an individual family under this program shall be equal to 75% of the actual cost of meeting such an expense or need and shall be made only on condition that the remaining 25% of such costs is paid to the individual or family from funds made available by the State. No individual or family shall receive any grant or grants under this program aggregating more than a maximum amount established by Federal regulation with respect to any one major disaster.</p> <p>The State:</p> <p>Maintains an Individual and Family Grant Program Administrative Plan</p> <p>Coordinates administration of the Individual and Family Grant Program through DHSEM supervised by the State Coordinating Officer.</p>



Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
	Public Assistance			√	√	√	√	<p>If damage sites have been surveyed during the Pre-disaster Damage Assessment, eligible applicants may apply for Immediate Needs Funding (INF) within days of the disaster to support repair or replacement of qualifying public infrastructure. INF may be up to 50% of the Federal share of the PDA estimate for emergency work (Categories A and B). Any up-front funds received by an applicant will be offset later against actual emergency work projects as they are received. The State provides a 25% match to federal fund.</p> <p>Subsequent to a disaster declaration by the President, FEMA provides assistance to state agencies, local governments and some private non-profit organizations for the repair and restoration of damaged public facilities. A grant is made to the state, which then authorizes sub-grants to eligible applicants. Funding is then provided on a cost share basis with percentages established in the FEMA-State Agreement, but requiring a federal share of no less than 75%. The purpose of this Public Assistance Administrative Plan Annex is to identify the roles and responsibilities of the State in administering the Public Assistance program and to outline staffing requirements and the policies and procedures to be used.</p> <p>Though section 406, mitigation is available to damaged elements of certain structures and can be mitigated if the project is eligible and proven cost-beneficial.</p>
	Community Disaster Loans			√	√	√	√	Disaster-related expenses during the year of occurrence and the three succeeding fiscal years.



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
U.S. Department of Commerce	Fire Accident Analysis				√	√		<p>Detailed on-site studies of uncontrolled fires or the remains of fires by teams of experienced fire investigators, scientists and engineers to determine the causes, character of and ways of avoiding serious fire accidents.</p> <p>Elected or appointed state and local officials concerned with fire disasters and authorized to request such assistance.</p>
U.S. Department of Energy	Disaster-related Power Outage			√			√	Implements emergency related functions under the Federal Response Plan.
	Radiological Emergency Assistance			√		√	√	<p>Provision of specialized services, advisory services, counseling and dissemination of technical information to assist in responding to incidents involving loss of control of radioactive materials and supporting efforts to protect public health and safety.</p> <p>For any person or organization with knowledge of an incident believed to involve ionizing radiation or radioactive material hazardous to health and safety.</p>
US Department of Transportation	Hazardous Materials Emergency Preparedness (HMEP) Grant Program			√		√	√	Used by DHSEM/State Emergency Response Commission to grants to active Local Emergency Planning Committees for education and training to public sector employees for the purpose of responding to chemical accidents/incidents.



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
Environmental Protection Agency	Superfund Amendment and Reauthorization Act (SARA), Title III			√	√	√		Support programs that are designed to improve emergency planning, preparedness, mitigation, response and recovery capabilities with special emphasis on emergencies associated with hazardous materials.  For state and local governments and university-sponsored programs.
Federal Bureau of Investigation	Victim Identification			√	√	√	√	Fingerprint identification of disaster victims  For any authorized state or local law enforcement agency
U.S. Department of Health and Human Services, Public	Contaminated Food and Drugs			√	√	√	√	Through coordinated planning, advice, technical information, assistance and expertise can be provided to establish public health controls and to protect citizens from contaminated and unsafe food and drugs.  Assists state and local agencies through the Department of Agriculture and Consumer Services and the Department of Health.
	Emergency Health Assistance			√			√	Provide emergency health care assistance as required and requested by the West Virginia Bureau for Public Health
	Vector Control			√			√	Advice and technical assistance to prevent the spread of communicable diseases by disease-carrying animals or insects in the aftermath of a disaster.  State and local public health authorities coordinated by the West Virginia Department of Health



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
U.S. Department of Housing and Urban Development	Comprehensive Planning Assistance		√		√	√		<p>Grants to strengthen planning and decision-making capabilities of chief executives of state, regional and local agencies to promote more effective use of natural, economic and physical resources. Disaster mitigation and recovery planning are eligible activities.</p> <p>For state agencies designated by the Governor; counties, cities, regional and local planning agencies, local development districts, economic development districts and localities that suffered a major disaster</p>
	Community Block Development Grants		√		√	√	√	Grants to entitlement communities. Preferred use of funding is for long-term needs but may be used for emergency response activities.
	CDBG Disaster Recovery Assistance			√	√	√	√	<p>In response to disasters, Congress may appropriate additional funding for the CDBG program as Disaster Recovery grants to rebuild the affected areas and provide seed money to start the recovery process.</p> <p>Grantees may use DCBG Disaster Recovery funds for recovery efforts involving housing, economic development, infrastructure and prevention of further damage to affected areas. Funds may not duplicate funding available from FEMA, SBA, or USACE.</p>
	Mortgage Insurance for Disaster Victims							The program provides mortgage insurance to qualified disaster victims if their homes are located in an area that was designated by the President as a disaster area and if their homes were destroyed or damaged to such an extent that reconstruction or replacement is necessary.





Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, & Preparedness	Declaration	Support	Facilitate	Funding	
National Oceanic and Atmospheric Administration (NOAA)	NOAA National Weather Service Forecasts and Warnings		√		√	√	√	<p>Public forecasts and warnings of hazardous weather phenomena and floods, and training programs on disaster safety rules. These are available to agencies and the public.</p> <p>Educational materials for preventing injury are readily available at the NOAA website and news of impending heat conditions, including expected intensity are broadcast on local radio, NOAA Weather Radio, and television stations.</p>
Small Business Administration	Emergency Loans			√	√	√	√	<p>The SBA offers three types of loans:</p> <p><b>Home Disaster Loans</b> for homeowners and tenants to repair or replace disaster damages to real estate and/or personal property. Tenants are eligible for personal property losses only.</p> <p><b>Business Physical Disaster Loans</b> are for businesses to repair or replace disaster damages to property owned by the business. These losses could be to real estate, machinery and equipment, leasehold improvements, inventory and supplies. Businesses of any size are eligible to apply.</p> <p><b>Economic Injury Disaster Loans</b> are working capital loans for small businesses and small agricultural cooperatives to assist them through the disaster recovery period. These loans are available to applicants without credit available elsewhere.</p>



TABLE F-6. WEST VIRGINIA STATE PROGRAMS AND MITIGATION CAPABILITIES.

Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
West Virginia Department of Agriculture	Homeland Security Section		√					The Homeland Security Section provides training, guidance and preparation for emergency response situations. Knowledge of available physical and human resources, within the WVDA and throughout the community are important keys to response preparation.
West Virginia Conservation Agency	Emergency Watershed Protection						√	The Emergency Watershed Protection program, activated during a State or Federal Emergency Disaster Declaration, is used to remove blockages that cause a 75% obstruction to streamflow.
	Stream Protection & Restoration Program		√					The Stream Protection and Restoration Program is used to address non-emergency situations that fall outside of the Emergency Watershed Protection program.
	Watershed Dams	√	√					The Watershed Dams program is responsible for the inspection and operation and maintenance of 170 watershed dams and 22 channels throughout the State.
West Virginia Department of Environmental Protection	Clean Water State Revolving Fund		√				√	The Clean Water State Revolving Fund is a funding program to address water quality problems through wastewater facility construction, upgrades, or expansions. The Fund currently has three financial assistance programs available: (1) Low Interest Loan Program (for construction of municipal wastewater treatment works); (2) Agriculture Water Quality Loan Program, and (3) On-site Systems Loan Program.
	Water Resource Management and Protection Act							Purpose of the 2004 Act was to gather information on the quantity and use of state surface and groundwater resources. In 2008, the Act was amended to require the development of a water resources management plan for the state by



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
								2013.
	Groundwater/UIC Program		√					<p>The Division of Water and Waste Management's Groundwater/UIC Program coordinates the groundwater protection efforts of the Bureau for Public Health, the Department of Agriculture, and various DEP programs. The program has 7 main responsibilities:</p> <ul style="list-style-type: none"> <li>Underground Injection Control</li> <li>Groundwater Remediation</li> <li>Groundwater Protection Plans</li> <li>Groundwater Variances</li> <li>Program Contacts</li> <li>Septic Tank Seal Registration</li> <li>Monitoring Well Driller Certification</li> <li>Monitoring Well Construction/Abandonment</li> <li>Groundwater Guidance Documents and Forms</li> </ul>
	Dam Safety Monitoring and Emergency Action Plans (EAP)		√					<p>The Dam Safety Section maintains an inventory of non-coal related dams in WV and contributes information to the National Inventory of Dams. Owners of High Hazard Potential Dams are required to develop and EAP. The monitoring portion of the plan sets forth a frequency of owner inspections that varies according to weather conditions. As heavy rainfall occurs, the inspection frequency increases. If an imminent danger is identified, the EAP is designed to notify downstream persons to evacuate to safe areas. The Dam Safety Section provides an example EAP to dam owners for guidance in developing emergency procedures and assists the owners in coordinating with county authorities.</p>
	Hazardous Waste		√					<p>The Hazardous Waste Section promotes compliance by providing assistance and/or enforcing regulatory requirements of hazardous waste generators and</p>



Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
								hazardous waste treatment, storage, and disposal facilities. This section works to advance the safe management of hazardous waste to protect human health and the environment. Duties and responsibilities include inspections, enforcement, and spills and emergency response.
	Office of Oil and Gas		√					Responsible for monitoring and regulating all action related to the exploration, drilling, storage, production of oil and natural gas. This includes maintaining records of active and inactive oil and gas wells, managing the Abandoned Well Plugging and Reclamation Program, and ensuring surface/groundwater is protected from oil and gas activities. The Office also developed an Erosion and Sediment Control Manual that presents best management practices for controlling erosion and sedimentation from soil-disturbing operations conducted during oil and gas industry activities.
	Environmental Enforcement							Promotes compliance with the Solid Waste Management Act, Water Pollution Control Act, Groundwater Protection Act, Hazardous Waste Management Act, Underground Storage Tank Act, and Dam Safety Act by providing assistance, inspecting regulated sites, and enforcing conditions required by these acts.
	Office of Explosives and Blasting							<p>The mission of the Office of Explosives and Blasting is to administer and enforce the surface mine blasting laws in a manner that protects the public and their property from harmful effects of surface mine blasting. Responsibilities include:</p> <ul style="list-style-type: none"> <li>Training, examining, and certifying all surface coal mining blasters</li> <li>Administering claims and arbitration for persons seeking relief from blasting damage</li> <li>Conducting research to develop scientific data on the effects of blasting</li> </ul>



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
								<p>Review of all coal mine blast plans</p> <p>Inspection of surface coal mine blasting operations, investigating blast complaints and claims of damage complaints</p> <p>Administering a pre-blast survey process and training of pre-blast surveyors</p>
	Abandoned Mine Lands and Reclamation		√					AML&R addresses emergency problems and manages the water quality monitoring, and provides technical support for environmental quality remediation projects. All work is in conjunction with the Federal Office of Surface Mining.
West Virginia Development Office	Community Development Grants and Loans		√				√	The West Virginia Development Office (WVDO) is the state's chief economic and community development agency. Mitigation activities include: flood and storm drainage projects, acquisition and demolition or relocation projects, water and wastewater facilities and services projects, and community facility renovation/construction projects. The WVDO also coordinates with the West Virginia Division of Homeland Security and Emergency Management (DHSEM) to ensure that infrastructure projects are not located within floodplains.
West Virginia Office of Emergency Medical Services			√					Goal is to increase the quality of prehospital care for West Virginia citizens by providing EMS workforce development assistance programs, reasonable provider regulations, and increased operation awareness throughout the State.
West Virginia State Fire Commission and the WV State Fire Marshall's Office	Statewide Building Code which includes International Building Code, 2009	√			√	√		Through the 2003 International Building Code, adopted by the state and 10 local governments, along with the provisions of local floodplain management ordinances, buildings that are substantially damaged, i.e. repair costs are equal to or exceed 50% of the current appraised value of the structure, must be re-constructed or repaired to be compliant to current code requirements. The state



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
								<p>floodplain management program, in partnership with the Division of Homeland Security and Emergency Management and the West Virginia Fire Marshall's Office along with FEMA, has increased visibility of NFIP and building code requirements following disasters through aggressive contacts and educational programs directed to building officials, the insurance industry and contractors. While the code provisions and program requirements are adequate, future mitigation plans should address strengthening of educational efforts to ensure that every opportunity is used to strengthen structures through the substantial damage / substantial improvement element of the building code and NFIP.</p> <p>The continued weakness of the program is the International Building Code's reliance of manufacturer's installation guidelines to ensure proper installation of manufactured homes in regulated floodplains or velocity zones. In addition, protective measures in areas with high winds rely on manufacturer's manuals, not state law or the 2003 International Building Code.</p>
West Virginia Division of Forestry	Firewise-West Virginia Program		√		√			<p>Developed and maintains a state wildfire mitigation plan.</p> <p>This program promotes the development of local Community Wildfire Protection Plans (CWPPs). The state's first CWPP was completed in 2004 for a development in Morgan County. As of 2010, there have been 18 plans written for various communities in a 10-county area of the eastern panhandle and the adjacent Potomac Highlands. These counties include: Berkeley, Jefferson, Morgan, Hampshire, Mineral, Hardy, Grant, Tucker, Pendleton, and Pocahontas.</p>
	WV Statewide Forest Resource Assessment and Strategy		√		√			<p>Provides a general overview of forestry, forests, and related natural resources in the state. It identifies major issues and priority landscapes, as well as strategies to be undertaken in addressing these issues. One issue discussed in the Assessment is Wildfire Management, Resource Protection, and Public Safety.</p>



Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
								This Assessment and Strategy were last updated in 2010 and is scheduled to be updated again in 2015.
	Training Program		√					The DOF training program includes conducting wildlife suppression training for the West Virginia National Guard and prison inmates. The DOF supervises these groups when they are called upon to assist in wildfire suppression
	Land Use Programs		√					Several DOF programs can have a positive impact on land use activities, including the Forest Protection Program, the Logging Sediment Control Act, and Forest Management Plans. These programs relate to land use activities and help ensure those activities reduce or eliminate soil erosion and the movement of soil to state waters.
West Virginia Flood Protection Task Force	West Virginia Statewide Flood Protection Plan		√		√			Adopted in 2002, the Plan was developed by the Task Force to: Reduce the unnecessary loss of lives due to flooding Reduce private and public property damages due to flooding Develop technical and administrative tools to manage flood loss reduction and floodplain management Promote technical and legislative tools that will reduce excessive runoff from land-conversion activities Reduce personal and economic loss due to flooding while supporting State economic growth Protect the State's waterways and floodplain environments



Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
West Virginia Geological and Economic Survey	GIS Services, geologic research							The agency maintains online mapping, GIS data, and geologic information/publications on topics such as Marcellus shale, earthquakes/seismic activity, oil and gas, and mountaintop removal mining.
West Virginia Department of Emergency Management and Homeland Security (DHSEM)	Emergency Operations Plan		√		√	√		Directs emergency operations in response to any large-scale disaster impacting the State. It assigns duties and responsibilities to agencies and supports organizations for disaster preparedness, response, recovery and mitigation. Funding is achieved through appropriations in the biennial budget development process orchestrated by the West Virginia Legislature, and is supplemented in response to disaster declarations through sum-sufficient provisions that can provide state match to federal funding for individual assistance, public assistance and mitigation programs.
	Disaster Recovery Programs			√	√	√	√	The West Virginia Department of Homeland Security and Emergency Management (DHSEM) was established as the agency responsible for the management and administration of disaster relief for the State. The Governor appoints its director, the State Coordinator for Emergency Services. During a Presidentially declared major disaster, the Governor's Authorized Representative (GAR) is designated by the Governor as the official responsible for administration of the disaster recovery effort, to include Human Services, Public Assistance and Mitigation. The Governor's Authorized Representative serves as the State Coordinating Officer (SCO) for the disaster. The following efforts are coordinated by the SCO and implemented by DHSEM staff and reservists, cooperating state agencies and organizations
	State Public Assistance		√		√	√	√	When the threshold of damage to public infrastructure is not reached to qualify for FEMA Public Assistance, the State Emergency Relief for Localities program





Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
	Program							<p>can provide reimbursement to local governments. This program can be used for localized major disasters or emergencies that do not result in sufficient total damages to warrant a Presidential disaster declaration.</p> <p>Cities, counties and towns are eligible to reimbursement of costs incurred; State agencies are not eligible.</p> <p>There are thresholds of costs incurred per capita, insurance must be maintained and each locality must certify that they have not other means to cover disaster-related costs.</p>
	ReadyWV		√					<p>A communications campaign and online tool that helps West Virginians know what to do before, during, and after an emergency. The site strives to provide basic information on how to prepare for emergencies. The site also shows potential hazards by geographic region and provides readiness checklists.</p>
	Integrated Flood Observation and Warning System		√					<p>The purpose of the Integrated Flood Observation and Warning System (IFLOWS) is to reduce the annual loss of life from flash floods, reduce property damage, and reduce disruption of commerce and human activities. Sensors, totaling 322 and measuring rainfall and temperature, are positioned throughout the state. The data is sent to the DHSEM and other government agencies responsible for public safety. The data is used to identify potential flood situations and to monitor flood incidents. The State's IFLOWS is a cooperative venture with the National Weather Service.</p>
	Floodplain Management	√	√	√				<p>The West Virginia National Flood Insurance Program State Coordinator's office advises communities on specific provisions of the NFIP, provides technical assistance to communities, monitors community programs, and coordinate</p>



Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
								between communities an the NFIP.
West Virginia Office of Insurance Commissioner	Emergency Order Notices			√				Following weather events, the WVOIC issues Emergency Order Notices that provide information to insurers, identify the counties affected, address the licensing of sufficient emergency adjusters, and orders that normal time frames for claim handling and settlement are suspended in affected counts for claims related to the weather events.
West Virginia National Guard	Disaster Assistance		√					The Guard also plays a key role during floods, fires and other natural disasters. Following activation by the Governor, the Guard helps communities with food and water distribution, power generation, route clearance, clearing debris, and providing security, transportation, traffic control and communications.
West Virginia Department of Natural Resources	Floodplain Management Plans		√					DNR develops management plans that preserve, enhance, and protect floodplains on State owned or controlled areas. It is also developing GIS capabilities to access the vegetative conditions and uses of the State's stream bank habitats.
	Disaster Assistance		√					DNR provides staff to assist in maintaining the State Disaster Center and provides law enforcement at disaster sites along with other police agencies. These officers are paid from federal and state hunting and fishing monies.
	Disaster Housing – Emergency Personnel		√					DNR has park facilities that may be used to house law enforcement and other disaster personnel during emergency events.
West Virginia University Cooperative	Disaster Education		√					The Extension Disaster Education Network is a collaborative multi-state effort by Extension Services across the country to improve the delivery of services to



Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
Extension Services	Network							citizens affected by disasters. The site serves extension agents and educators by providing access to resources on disaster mitigation, preparedness, response and recovery, linkages with federal, state and local agencies and organizations, and anticipation of future disaster education needs and actions.
West Virginia University GIS Technical Center	GIS Services		√		√			The GIS Technical Center provides statewide GIS services to advance the state's spatial data infrastructure. Major State GIS initiatives include: Mineral Lands Mapping Program Statewide Digital Orthophotography Program Digital Line Graph Project National Hydrographic Database Statewide Addressing and Mapping Project Digital Flood Insurance Rate Maps High-Resolution Satellite Imagery Enhanced Digital Elevation Model
The Mine Safety and Technical Review Committee								Responsibilities include: Review and development of a variety of mine safety programs to improve mine safety within the state Review of requests purporting to modify the application of mandatory mine safety standards Granting safety modification requests, after thorough review, and conclusion that the request will not diminish mine safety Recommendation of proposed rules and regulations to the State Board of Coal Mine Health and Safety
West Virginia Public Broadcast		√						The Educational Broadcasting Authority was established by the West Virginia Legislature in 1963 as a public benefit corporation on behalf of noncommercial



Agency	Programs, Plans, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
								<p>educational radio, television and related media as it may consider to be in the best interest of the state.</p> <p>The Authority holds the licenses for all the West Virginia Public Radio and West Virginia PBS stations in the state. The statute is under West Virginia Code 10-5.</p>
DHSEM State Emergency Response Commission (SERC)	SERC Grants		√				√	<p>SERC Grants are provided to LEPCs to assist in the operation of LEPCs and their activities.</p> <p>The LEPC develops and implements comprehensive emergency response plans; reviews plans and standard operating procedures; processes information requests from the public; conducts exercises and drills; and conducts public awareness campaigns in their communities.</p>
West Virginia Statewide Interoperable Executive Committee (SIEC)	State Interoperable Radio Network (SIRN)		√		√			<p>The SIEC advises the Governor, state Homeland Security Advisor, and the Statewide Interoperable Coordinator on statewide priorities related to interoperable communications, provides day-to-day governance of the SIRN, serves as the primary mechanism for updating policies, procedures, and guidelines, identifies new and developing technologies and standards, and enhances the coordination of all available resources for public safety interoperable communications in WV.</p>
West Virginia Office of Miners' Health Safety and Training	Mine Inspection		√					<p>The agency consists of approximately 140 employees, employing inspectors, safety instructors, and administrative support personnel. They inspectors are responsible for inspecting over 642 mines, quarries, and coal handling facilities as well as approximately 2,500 independent contracting companies. The inspection staff conducts regular inspections and investigates all serious mining accidents. Safety instructors provide industry training, review safety programs for all facilities, and certification examinations. The agency also maintains trained and</p>



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Technical Support	Facilitate	Funding	
								equipped mine rescue teams.
West Virginia Water Development Authority	Financing	√	√				√	The WV Water Development Authority (WDA) serves as a revenue bond bank that provides financing for construction of wastewater and water facilities to Local Governmental Agencies. The WDA's mission is to provide communities in WV financial assistance for development of wastewater, water and economic infrastructure that will protect the streams of the State, improve drinking water quality, protect public health, and encourage economic growth.

TABLE F-7. PRIVATE AND NON-PROFIT PROGRAMS AND MITIGATION CAPABILITIES.

Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Support	Facilitate	Funding	
Department of Social Services, Red Cross, Salvation Army, VOAD	Counseling			√		√	√	Crisis intervention counseling designed to assist disasters victims and responders in coping with their situation to avoid serious psychological impairment



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Support	Facilitate	Funding	
American Red Cross, Salvation Army, West Virginia Volunteer Organizations Active in Disaster (VOAD)	Collection and Distribution of Donated Goods			√		√	√	Establish and manage centers for receipts and distribution of donated goods such as food, clothing, furniture, medical supplies, building materials, cleaning supplies, bedding, utensils and tools. This is usually organized with a designated distribution center
American Red Cross, Salvation Army, Department of Agriculture and Consumer Services, VOAD, food banks, Meals-on-Wheels	Food			√			√	<p>Food can be provided to disaster victims and workers in several ways:</p> <p>Direct provision of foodstuffs donated by individuals and groups to disaster victims through distribution centers as described above.</p> <p>Direct grants for food purchase or food stamp allotments (through section 409) provided to disaster victims (described earlier in the Federal Assistance section).</p> <p>Meals provided at feeding centers or from mobile distribution canteens.</p> <p>Through section 410, provision of food stocks for emergency mass feeding or distribution to an area suffering a major disaster or emergency</p>
VOAD, Department of Health, AmeriCorps, NGOs	Homes Repair			√	√	√	√	Aid to homeowners to repair their homes in the absence of or to supplement FEMA's Minimal Repair Program. The ability of the listed agencies to provide assistance may vary for each event and is tied to the income level and demonstrated need of each victim



Agency	Programs, Plans, Policies, Regulations, Funding and Practices	Phase			Support			Description
		Pre-Disaster	Response, Recovery, Preparedness	Declaration	Support	Facilitate	Funding	
VOAD, West Virginia Guard, AmeriCorps, Others	Personnel			√	√	√	√	Provision of personnel to supplement the labor necessary to respond to emergency disaster events, especially for clean-up and damaged home repair.



## F.7 POTENTIAL FUNDING SOURCES

Since the initial adoption of the *West Virginia State Hazard Mitigation Plan* in 2004, federal as well as state sources of funding have been used to implement mitigation strategies, as detailed in Appendix H.

The DHSEM Mitigation Program team has established a new project implementation process that will continue to track projects, properties and grant close outs using the MS Excel tools found in Appendix P. In addition, the Repetitive Loss and Severe Repetitive Loss property data sets found in Appendix O will also be updated at least annually to reflect additional properties being added to the RL and SRL list as well as to document mitigated RL and SRL properties. The DHSEM mitigation team in consultation with the Council will review all potential sources of funding to implement the short-listed projects.

### F.7.1 TRADITIONAL FUNDING PROGRAMS

#### FEMA HAZARD MITIGATION ASSISTANCE (HMA) GRANT PROGRAMS

The following section describes FEMA's five hazard mitigation grant programs, known collectively as the Hazard Mitigation Assistance (HMA) programs. Per the July 2013 HMA Unified Guidance, the HMA program:

*Provide[s] funding for eligible activities that are consistent with the National Mitigation Framework's Long-term Vulnerability Reduction capability. HMA programs reduce community vulnerability to disasters and their effects, promote individual and community safety and resilience, and promote community vitality after an incident. Furthermore, HMA programs reduce response and recovery resource requirements in the wake of a disaster or incident, which results in a safer community that is less reliant on external financial assistance.*

The HMA programs are composed of three separate funding streams. Each program aims at addressing its own set of priorities, encompasses its own set of eligibility requirements, and revenue sources. These programs include:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)

*These programs provide significant opportunities to reduce or eliminate potential losses to State, Indian Tribal government, and local assets*





*through hazard mitigation planning and project grant funding. Each HMA program was authorized by separate legislative action, and as such, each program differs slightly in scope and intent.*

In 2012 and 2013, Congress passed new legislation in reaction to recent events that changed these programs very significantly. These pieces of legislation include the Beggert-Waters Flood Insurance Reform and Modernization Act of 2012 and the Sandy Recovery Improvement Act of 2013. Specific details on this legislation can be found in Section 1.2.3 of the base plan.

Following these congressional changes, FEMA issued the 2013 HMA Unified Guidance. This document serves as the official guidance for the HMA grants programs. It interprets the legislation and formally incorporates it into its guidance for potential grant applicants. Changes incorporated into the 2013 version of the 2013 HMA Unified Guidance includes consolidation of the Repetitive Flood Claims (RFC) and Sever Repetitive Loss (SRL) programs into the Flood Mitigation Assistance (FMA) program; changes to the application process; formal allowance of industry cost guides for project cost estimate development; and changes to mitigation planning related activities. The descriptions of the programs below incorporate the new legislation as they are interpreted by the guidance document and will provide more detail on each program.

Table F-9, from FEMA’s HMA Unified Guidance and provides a summary of hazard mitigation activities eligible for funding through these programs. Many of these activities track to the more than 80 Mitigation Actions listed in Chapter 4 – Mitigation Actions of the 2010 Mitigation Plan Update.

TABLE F-8. FEMA GRANT PROGRAM ELIGIBLE ACTIVITIES

Activities	HMGP	PDM	FMA
<b>1. Mitigation Projects</b>	√	√	√
Property Acquisition and Structure Demolition	√	√	√
Property Acquisition and Structure Relocation	√	√	√
Structure Elevation	√	√	√
Mitigation Reconstruction			√
Dry Flood proofing of Historic Residential Structures	√	√	√
Dry Flood proofing of Non-residential Structures	√	√	√
Minor Localized Flood Reduction Projects	√	√	√
Structural Retrofitting of Existing Buildings	√	√	
Non-structural Retrofitting of Existing Buildings and Facilities	√	√	√
Safe Room Construction	√	√	
Wind Retrofit for One- and Two-Family Residences	√	√	
Infrastructure Retrofit	√	√	√
Soil Stabilization	√	√	√



Activities	HMGF	PDM	FMA
Wildfire Mitigation	√	√	
Post-Disaster Code Enforcement	√		
Generators	√	√	
5% Initiative Projects	√		
Advance Assistance	√		
<b>2. Hazard Mitigation Planning</b>	√	√	√
<b>3. Management Costs</b>	√	√	√

### FLOOD MITIGATION ASSISTANCE (FMA) PROGRAM

The FMA program is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). The *Biggert-Waters Flood Insurance Reform Act of 2012* restructured this program through the consolidation of SRL and RFC Programs into the FMA program. In so doing, the FMA program acquired several of the SRL and RFC programmatic elements. A major component of these changes is to the flexibility of Federal cost shares. Per this new guidance, Repetitive Loss and Severe Repetitive Loss properties, as defined by the NFIP, are eligible for funding under the FMA program with increased Federal cost shares. The cost shares for these activities are broken out as follows:

- Up to 100% Federal cost share for SRL properties
- Up to 90% Federal cost share for RL properties
- Up to 75% Federal cost share for NFIP insured properties

Funds under this program are allocated to each state based on the total number of NFIP insurance policies and the total number of repetitive loss properties within the state. States may apply for funding in excess of their allocations; additional funds are awarded on a competitive basis pending availability of funds. The National Flood Insurance Fund (NFIF) provides the funding for the FMA program. The FMA programs are subject to the availability of appropriation funding, as well as any program-specific directive or restriction made with respect to such funds.

Projects have been funded in West Virginia through the FMA program since 2007. Historically, grant funds have been used for planning and technical assistance. Given the recent changes to the HMA programs, funds under this program are likely to be used in new ways by the State.



## HAZARD MITIGATION GRANT PROGRAM (HMGP)

HMGP is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, U.S. Code (U.S.C.) 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor.

The HMGP has become the most widely known grant program that provides grant funding to address at-risk development. While the program's primary emphasis has been to remove homes through acquisition or to elevate them above predicted flood levels, HMGP funds have also been used on a wide variety of projects to increase resistance to nearly all-natural hazards. Since 1989, more than over \$1.5 billion has been invested nationwide in mitigation through HMGP. Funds for this program become available only after a disaster declaration; recipients must meet certain eligibility criteria; projects must also be feasible and cost effective. Many of the projects identified within the Structural Mitigation goal element of the plan could be funded through HMGP. As stated in the 2013 HMA Unified Guidance:

*The amount of HMGP funding available to the Applicant is based upon the estimated total of Federal assistance, subject to the sliding scale formula outlined in 44 CFR Section 206.432(b) that FEMA provides for disaster recovery under the Presidential major disaster declaration. The formula provides for up to 15 percent of the first \$2 billion of estimated aggregate amounts of disaster assistance, up to 10 percent for amounts between \$2 billion and \$10 billion, and up to 7.5 percent for amounts between \$10 billion and \$35.333 billion. For States with enhanced plans, the eligible assistance is up to 20 percent for estimated aggregate amounts of disaster assistance not to exceed \$35.333 billion.*

Mitigation project funding for declared disasters since the 2010 plan update are summarized below. The state received four federal disaster declarations all of which occurred in 2012 since the 2010 plan update.



TABLE F-9 WEST VIRGINIA DECLARED DISASTERS AND HMGP FUNDING AMOUNTS SINCE 2010

YEAR	DISASTER NUMBER	DISASTER TYPES	AMOUNT AVAILABLE FOR HMGP	ELIGIBLE COUNTIES	OPEN PERIOD OF AVAILABILITY
2012	4093	West Virginia Hurricane Sandy	No funds yet allocated	All	12 months from Declaration
2012	4071	Severe Storms and Straight-Line Winds	\$2,604,767	All	12 months from Declaration
2012	4061	Severe Storms, Flooding, Mudslides, and Landslides	\$1,081,488	All	12 months from Declaration
2012	4059	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	\$1,352,757	All	12 months from Declaration

### PRE-DISASTER MITIGATION (PDM) PROGRAM

The PDM Program is authorized by Section 203 of the Stafford Act, 42 U.S.C. 5133. The Program is designed to assist States, Territories, Indian Tribal governments, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. In the late 1990s, FEMA’s *Project Impact* initiative was created to promote the concept of disaster resistant communities through public-private partnerships. The program was eliminated following the Stafford Act revision in 2000. This law created the requirement to develop all-hazard mitigation plans. The Pre-disaster Mitigation Program was created to fund common-sense, damage-reduction approaches, based on planning developed with three principles:

1. preventive actions must be decided at the local level;
2. private sector participation is vital; and
3. long-term efforts and investments in prevention measures are essential.

Projects identified in Chapter 4 that meet this criteria will pursue PDM funding as FEMA releases Requests for Proposals for this program. Local governments are currently eligible for this program as well as they have all prepared local hazard mitigation plans under the regional mitigation planning concept.

It is important to note that funding under this program is competitive. This is unique from the other programs under HMA, which are eligibility based. As part of the annual Congressional appropriations process, state allocations and Congressionally-directed funds (also known as earmarks) have occurred at varying levels. Congressionally directed funds for this program have been scarce over the past few funding cycles.



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## RESPONSE & RECOVERY – PUBLIC ASSISTANCE (PA)

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Immediately following the declaration of a major disaster, FEMA and state implement procedures to assess damage, estimate the cost of restoration, and allocate funds for recovery. Public Assistance program focuses on restoration of certain non-profit and public buildings, public utility and transportation infrastructure that covers a portion of the costs to respond and recover from the event. Under certain circumstances, mitigation measures can be factored into recovery of public buildings and facilities in order to minimize the potential for future losses from comparable events through use of the 406 program. Use of this program to strengthen structures impacted by disasters as part of the repair and recovery process will be pursued as disasters occur that provide federal Public Assistance funding for eligible structures. DHSEM is responsible for coordinating response and recovery efforts with FEMA and local jurisdictions. Additional information is available on FEMA’s website at [www.fema.gov/r-n-r/pa/index.htm](http://www.fema.gov/r-n-r/pa/index.htm).

According to the FEMA website, through the PA Program, FEMA provides assistance for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. Section 406 of the Stafford Act provides a funding source for cost-effective hazard mitigation measures that would reduce or eliminate the threat of future damage to a facility damaged during the disaster. The measures must apply only to the damaged elements of a facility rather than to other, undamaged parts of the facility or to the entire system. Section 406 mitigation measures are considered part of the total eligible cost of repair, restoration, reconstruction, or replacement of a facility. They are limited to measures of permanent work, and the Applicant may not apply mitigation funding to alternate projects or improved projects if a new replacement facility is involved. Upgrades required to meet applicable codes and standards are not “mitigation measures” because these measures are part of eligible restoration work.

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## RESPONSE & RECOVERY – INDIVIDUAL ASSISTANCE (IA)

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Also implemented jointly immediately following a major disaster declaration for events which impacts citizens, the IA program provides funds for temporary housing, basic housing repairs, and replacement of essential household items. Contact DHSEM for additional information and check FEMA’s website at <http://www.fema.gov/R-N-R/iNassist.htm>.



## F.8 STATE AND FEDERAL PROGRAMS, PLANS & AGENCIES

While much discussion has been had throughout the plan and in Appendix D – Agency Profiles regarding the various partner agencies involved in the planning process and the existing plans and programs that are in place, some additional discussion is also appropriate here. Below are narrative descriptions of some of the regarding roles and responsibilities of various State and Federal agencies, their programs, and related policies and programs. These provide important resources to mitigation planners to coordinate and collaborate on potential mitigation strategies.

### F.8.1 WEST VIRGINIA STATE AGENCIES

#### WEST VIRGINIA DIVISION OF HOMELAND SECURITY AND EMERGENCY MANAGEMENT

DHSEM's primary mission is to protect the lives and property of West Virginia's citizens from emergencies and disasters by coordinating state emergency preparedness, response, recovery and mitigation programs. The responsibility of DHSEM is to ensure a comprehensive, efficient and effective response to emergencies and disasters throughout West Virginia, including provision of assistance in the absence of events for which federal aid is made available. DHSEM is charged with supporting mitigation planning and administers Hazard Mitigation Grant Programs that provides grants to eligible entities to implement cost effective mitigation projects in post-disaster periods. DHSEM also administers the Flood Mitigation Assistance Program, the Pre-Disaster Mitigation Program, the Repetitive Flood Claims Program and the Severe Repetitive Loss Program. DHSEM also houses the state and federal Public Assistance Programs, which provide disaster assistance to state agencies, local jurisdictions, and certain private nonprofit entities to repair and restore damaged facilities. Damaged facilities must be repaired in a manner that is compliant with existing codes and standards. DHSEM manages the National Weather Service's Integrated Flood Observing and Warning System (IFLOWS) statewide IFLOWS improves local flash flood warnings through a linked wide area monitoring and communications network. Working with other state agencies and local jurisdictions, DHSEM coordinates sheltering and the full suite of emergency preparedness, response and recovery programs.

It must be noted and emphasized, the context of the planning effort, particularly with the initial 2004 Standard Plan twenty objectives and the supplemented objectives in the 2007 update, was maintenance of eligibility of essential disaster recovery and hazard mitigation grant programs. This eligibility included eligibility for the following programs as authorized in 44CFR:

- Public Assistance Program Grants



- Hazard Mitigation Grant Program
- Pre-Disaster Mitigation Program

By the 2007 Standard State Plan update, 55 local (county) mitigation plans had been developed, approved and adopted, providing full mitigation grant eligibility throughout West Virginia.

## WEST VIRGINIA CONSERVATION AGENCY

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The West Virginia Conservation Agency is proud of its "Conservation Partnership" with the following entities: WV Association of Conservation Districts, WV Association of Conservation Districts Auxiliary, WV Soil & Water Conservation Society, WV Association of Professional Soil Scientists, WV Resource Conservation & Development Association, WV Conservation Districts, WV Conservation Agency, USDA Natural Resources Conservation Service, USDA Farm Service Agency. Through the guidance of this agency and its partnership, also including six RC&D councils, resources are brought to local communities and land users to address a broad range of priority conservation issues. This cooperative, grass roots approach is proving to be an effective method for solving the natural resource management issues faced in West Virginia. The West Virginia Conservation Agency (WVCA) coordinates statewide conservation efforts. The West Virginia State Code charges the WVCA (in Chapter 19-21A-2) to conserve natural resources, control floods, prevent impairment of dams and reservoirs, assist in maintaining the navigability of rivers and harbors, conserve wildlife, protect the tax base, protect public lands and protect and promote the health, safety and general welfare of the people (Source: <http://www.wvca.us/>)

## WEST VIRGINIA HOUSING DEVELOPMENT FUND

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(WVHDF). The WVHDF is a public body corporate, and governmental instrumentality of the State of West Virginia, established to develop and improve housing opportunities for its residents. Three key aspects of its broad responsibilities merit particular attention: Several funding programs can support local mitigation measures, including the Community Development Block Grant program and other federally funded programs. Recently, the fund's executive director issued the following statement:

This program is offers a new mortgage program for state residents that includes a 30-year fixed rate loan at 3.5 percent for qualifying home buyers. This is a historic program and the Fund has issued \$35 million in bonds to provide West Virginians with an opportunity to have safe and affordable housing. Since 1968, we have been working hard to ensure that residents of our state have a home to call their own. We know that



an essential part of the American Dream is homeownership, and with this new program, it will provide more West Virginians the opportunity to own a home.

Combined with federal Housing and Urban Development Community Development and Block Grant (CDGB) programs, the new WVHDF poses new opportunities for state residents to reside in disaster resilient structures through development of more robust housing.

### **WV DEPARTMENT OF NATURAL RESOURCES - DIVISION OF FORESTRY**

Is responsible for protecting nearly 12 million acres of state and privately owned forestland across West Virginia, providing protection and management for forest fire, insects, and disease. The Division is directly responsible for suppression of forest fires and supports response to natural disasters. Full-time and part-time wildland firefighters are trained and qualified in fire control tactics and the Incident Command System. The division has initiated statewide wildland fire risk assessments that are maintained in a geographic information database system. This data was used to support the wildfire section of the plan update HIRA and Vulnerability Assessment. An emerging issue has been the increased urban-wildland interface, where forest fire occurrence is greater due to the interaction of human activity in highly flammable woodlands.

### **WEST VIRGINIA DEPARTMENT OF TRANSPORTATION - DIVISION OF HIGHWAYS**

The Division of Highways is responsible for planning, engineering, right-of-ways acquisition, construction, reconstruction, traffic regulation and maintenance of more than 34,000 miles of state roads. Additional duties include highway research, outdoor advertising contiguous to state roads, roadside development, safety and weight enforcement and dissemination of highway information.

Traversing mountains, valleys, wild rivers and rolling countryside, the roadways maintained by the Division of Highways include: 38,452 miles of public roads; 34,726 miles of state owned highways, 88 miles of West Virginia Turnpike, 835 miles of federally owned roads and 2,866 miles of municipally owned roads; 549 miles of Interstate highway; 1,824 miles included in the National Highway System, 23 miles of which are connectors to other modes of transportation such as airports, trains and buses; 6,710 bridges of which 32 percent are more than 100 feet in length; 2 national and 8 state scenic byways.





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## DATA CENTER (NCDC), OFFICE OF EMERGENCE SERVICES (OES) AND THE WV DEPARTMENT OF AGRICULTURE (WVDA)

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Each use different systems for drought declaration. Mapping the history of these declarations serves primarily to illustrate inconsistency in the states' current capacity to evaluate and address water scarcity problems. OES and NCDC droughts are mapped (Figures 10 & 11) for period of record (POR). NCDC declarations are based on a variety of information sources including weather reports, local calls and newspaper stories. OES drought declarations are based only on events that require FEMA payments. WVDA drought declaration history is based on payments made to farmers due to agricultural droughts declared by WV, bordering states, or the Federal Department of Agriculture. Data on these droughts are available in discontinuous intervals over the past two decades making a mapped analysis unreliable.

Source:[http://www.dep.wv.gov/WWE/wateruse/Documents/9761\\_RevisedJan2006WaterUseReport.pdf](http://www.dep.wv.gov/WWE/wateruse/Documents/9761_RevisedJan2006WaterUseReport.pdf) pg. 37

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## WEST VIRGINIA GEOLOGICAL AND ECONOMIC SURVEY (WVGES)

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Coal accounts for between 20 and 25 percent of the total energy used and more than 50 percent of the electricity generated in the United States. Coal from Appalachian Basin fields in West Virginia is a major resource for the Nation. Assessment of potential coal development recognizes both physical constraints and societal restrictions on mining. Since 1988, the USGS, in cooperation with the West Virginia Geological and Economic Survey has identified these restrictions as part of a national effort to analyze the relation between mining restrictions and potential coal availability.

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## WEST VIRGINIA DEPARTMENT OF COMMERCE.

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The West Virginia Department of Commerce was established in its present form in the 2005 Special Session of the West Virginia Legislature (SB 1002). The Business and Industrial Development Division (BID) supports existing businesses and new industries by actively marketing and promoting the state to gain business startups, retention and expansion of existing industry, and the attraction of new industry: (<http://www.wvcommerce.org/info/aboutcommerce/default.aspx>)

### F.8.2 RELATED PLANS AND DOCUMENTS

There are several state plans and documents related to mitigation planning in West Virginia see Appendix F. for more detailed information. Existing state plans and



documents that most affect mitigation were reviewed in detail, and are summarized below.

### **THE STATE OF WEST VIRGINIA EMERGENCY OPERATIONS PLAN (STATE EOP)**

The EOP presents an overview of the state's response organization and policies. It provides for state-level emergency operations in response to any type of disaster or large-scale affecting West Virginia. It assumes duties and responsibilities to departments, agencies, and support organizations for disaster preparedness, response and recovery, and mitigation. It also provides the needed framework within which more detailed emergency plans and procedures can be developed and maintained by both state agencies and local governments.

### **FLOODPLAIN MANAGEMENT PLAN FOR THE STATE OF WEST VIRGINIA (2005).**

This document contains valuable information on flood hazards and risks, and defines the state's role in floodplain management. It contains a modest action agenda, which is reflective of concerns about reductions in program staff and resources in the early 1990s. A Five-Year Plan Summary of the status of the action agenda set forth in the Plan is included. A review of the Plan, on file with the DHSEM, recommends that the *Floodplain Management Program (HMP)* form the technical basis for the flood-related actions set forth in this Hazard Mitigation Plan. However, delay of revision of the *State Floodplain Management Plan* precluded its use in developing the hazard and risk analysis for this plan. It was completed in March, 2005 and serves as an annex to the state Hazard Mitigation Plan.

Source: [www.fema.gov/library/file?type=publishedFile&file=westvirginia](http://www.fema.gov/library/file?type=publishedFile&file=westvirginia).

### **MITIGATION STRATEGIES.**

Prepared by the West Virginia and FEMA immediately following establishment of a Disaster Field Office to respond to each presidential declared disaster, the Mitigation Strategy focuses mitigation priorities specific to recovery from that disaster. In conjunction with the state's mitigation goals and vision statement, the Mitigation Strategy priorities are determined to support recovery operations for the specific disaster event. These priorities can include education, support of local officials in administration of floodplain ordinance requirements, targeted technical training and development of specific mitigation messages for affected residents, businesses and local governments. The Strategy outlines priorities for implementing Hazard Mitigation Grant Program funding that is determined as 15% of eligible program expenditures for



the disaster. Immediate recovery priorities are outlined to guide eligible HMGP applicants; these priorities are used to rank and select HMGP project applications.

### F.8.3 FEDERAL AGENCIES & PROGRAMS

The following list of federal programs is intended to focus on those that are most applicable to the hazards that have occurred recently in West Virginia. After each declared disaster, federal resources that may support recovery are identified. Some federal programs can be accessed in an ongoing capacity to support local initiatives. More detailed information on these programs and others can be found in *Federal Programs Offering Flood Recovery and Floodplain Management Alternatives* (Office of Management and Budget, 1998). As with local and state programs, these programs were in the background of the development of this plan, but were not specifically integrated into the final West Virginia *Standard State Hazard Mitigation Plan Update* because the plan primarily addresses state facilities determined to be at risk following analysis of vulnerability of state facilities to natural hazards. As implementation of the plan ensues, every opportunity to integrate existing federal programs into hazard mitigation will be explored.

#### **FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA)**

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As the nation's emergency management agency, FEMA's programs focus mainly on supporting state and local initiatives that will reduce the impacts of disasters. The programs provide technical assistance, regulatory standards and financial assistance. Additional information is available online at [www.fema.gov](http://www.fema.gov). Some programs are activated only after a disaster is declared; others are ongoing:

#### **NATIONAL FLOOD INSURANCE PROGRAM (NFIP)**

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The NFIP offers flood insurance to residents who reside in local jurisdictions that adopt and enforce certain provisions that will help to minimize future flood losses. The measures apply to all activities proposed within special flood hazard areas that are designated on maps provided by FEMA. All development must be designed and constructed to withstand damage (from water and wind-related hazards) and must not create any adverse impacts on other properties. The National Flood Insurance Program (NFIP) was created by Congress in 1968 to protect lives and property and to reduce the financial burden of providing disaster assistance. The NFIP is administered by the Federal Emergency Management Agency. Nationwide, over 20,000 communities participate in the NFIP — including, as of August 2009, all of West Virginia's flood-



prone communities with effective FEMA flood maps. The single most effective measure (other than building outside of flood-prone areas) is to elevate buildings above the base flood elevation. Additional information is available through the DHSEM ([http://www.wvdhsem.gov/floodplain\\_docs/WVQG%20Print.pdf](http://www.wvdhsem.gov/floodplain_docs/WVQG%20Print.pdf)) or on FEMA's website at [www.fema.gov/nfip](http://www.fema.gov/nfip).

*Map Modernization Program.* Flood Map Modernization (Map Mod) is FEMA's approach to updating the Nation's flood hazard maps. Over the years, many of the government's flood insurance maps have become obsolete due to urban growth, changes to river flows and coastlines, and even flood mitigation efforts like drainage systems and levees. The *Multi-Year Flood Hazard Identification Plan (MHIP)* details FEMA's 5-year plan for providing updated digital flood hazard data and maps for areas with flood risk. Map Mod will transform flood maps into a more reliable, easier-to-use, and readily available product. To accomplish this task, FEMA has developed the *Mapping Information Platform (MIP)* for all floodplain mapping professionals. Updated, digital flood maps will become the platform for identifying multiple hazards-not just floods. **Since the inception of the NFIP, FEMA has used several different map formats to depict flood hazards and show flood hazard zone information. Through time map formats have changed replacing previous formats for many communities. Within the next several years all West Virginia flood maps will be Digital Flood Insurance Rate Maps (DFIRMs), but as of 2009 many communities have older map formats as effective FIRMs (source: [http://www.wvdhsem.gov/floodplain\\_docs/WVQG%20Print.pdf](http://www.wvdhsem.gov/floodplain_docs/WVQG%20Print.pdf)).** In the United States, flooding claims approximately 94 human lives each year and costs the nation about \$2.41 billion annually in damages (for additional information check: <http://drought.unl.edu/risk/us/compare.htm>). By accurately identifying flood prone areas, floodplain mapping reduces property damage along with human casualties and fatalities.

*Risk MAP.* The next generation of FEMA flood hazard mapping will be conducted through a five year effort called the Risk Mapping, Assessment and Planning Program, which strives to link hazard mapping to sustainable reduction of a community's flood hazards. West Virginia has not been targeted for initial FY 2010 Risk Map initiatives as final Map Modernization digital flood insurance rate maps and Flood Insurance Studies are still in production. It is anticipated that West Virginia will receive some updated mapping products in later Risk MAP funding cycles.

*Cooperating Technical Partners (CTP).* With over 20,000 communities in the National Flood Insurance Program (NFIP), maintaining current maps is a daunting task. The current map modernization effort is a collaborative process which spans all levels of government as well as a multitude of other organizations. This collaborative process



results in partnerships among state, regional, and local stakeholders. As a Cooperative Technical Partner, West Virginia serves as an advocate for its communities to leverage state resources to increase federal mapping resources in the state.

*Community Rating System (CRS).* The CRS is an incentive program that rewards communities that exceed NFIP regulations in ways that reduce damage and improve safety. The CRS has been developed to provide incentives for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. The incentive is a reduction in the cost of flood insurance premiums to every NFIP policy holder in the CRS community. Communities must apply, annually certify their programs, and undergo periodic audits. The Community Rating System (CRS) is a voluntary program for NFIP-participating communities. The goals of the CRS are to reduce flood losses, to facilitate accurate insurance rating, and to promote the awareness of flood insurance.

Currently there are three local governments who have joined the CRS program. Those local governments are Phillippi, Buckhannon and Jefferson County. Currently there are many counties and communities in the state who are working towards their submission into the CRS program.

*National Earthquake Program (NEP).* The National Earthquake Program, coordinated by FEMA, has four basic goals directly related to the mitigation of seismic related hazards: (1) promote understanding of earthquakes and their effects; (2) work to better identify earthquake risk; (3) improve earthquake-resistant design and construction techniques; and (4) encourage the use of earthquake-safe policies and planning practices.

*National Hurricane Program (MHP).* FEMA funding is provided to hurricane-prone states to establish, enhance and maintain basic levels of preparedness and mitigation capabilities, to promote effective mitigation measures, to conduct hazard identification and evacuation studies, to conduct post-storm analyses of mitigation measures, to conduct training, and to promote public awareness and education of hurricane safety and preparedness. State's participation is limited but West Virginia has experienced severe flooding from deteriorating tropical systems, including hurricanes.

*National Dam Safety Program (NDSP).* FEMA coordinates the NDSP among federal agencies and state partners. In addition to maintaining a dam inventory, encouraging research, and promoting the implementation of state programs, the program also provides training and funds. West Virginia's participation is coordinated within the WV Department of Environmental Protection Division of Water and Waste Management Dam Safety Section ([www.dep.wv.gov/damsafety](http://www.dep.wv.gov/damsafety)).



Responsibility for the dam safety program lies with the West Virginia Department of Environmental Protection. Powers and duties of the department (and its director) are listed in Section 22-14-4 of the Dam Control & Safety Act, and include the following:

- To exercise regulatory jurisdiction over dams;
- To review applications for certificates of approval, and to grant, modify, amend, revoke, restrict, or deny such certificates;
- To adopt, modify, repeal and enforce rules, and to issue orders;
- To take any lawful action necessary for the enforcement of the provisions of the statutes;
- To establish fees for application review and certificate issuance;
- To make any investigation or inspection necessary implement and enforce the law, including the right of entry upon public or private property of any owner; and
- To prepare and publish criteria for the design, construction, repair, inspection, and maintenance of jurisdictional dams.

Source: <http://www.damsafety.org/media/Documents/PDF/WV.pdf>

*Hazards U.S. (Hazus)*. Hazus is a computer program that utilizes a set of Geographic Information System (GIS)-based mapping tools that help to estimate losses associated with earthquakes, floods, and wind. Developed in partnership with the National Institutes for Building Safety, Hazus can be used to model event scenarios useful to compare risks between regions as well as evaluate effects of certain mitigation measures. Each state receives a copy of the software and certain baseline data. Recent improvements were made in the quality of data that characterize building types and locations, significantly improving analysis results. This plan update included Hazus-MH runs performed using version 4 for earthquake and wind. Through a separate contract, Hazus-MH riverine module runs using version 3.0.

## **U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)**

HUD programs are administered through the West Virginia Housing Development Fund and offer several programs to support local efforts to address hazards and implement mitigation measures. The following are some of the more active programs used to minimize flood hazards:

*Community Development Block Grant (CDBG)*. CDBG funds are available to support activities which meet one of the three National Objectives criteria established by HUD:

- benefits low and moderate income persons;



- prevents or eliminates slum and blight conditions; or
- meets other community development needs having a particularly urgency due to existing conditions posing a serious and immediate threat to the health and welfare of the community, and where other financial resources are not available.

CDGB funds are routinely used in disaster-impacted areas for repair, elevation and acquisition/demolition of damaged structures, particularly residents that qualify for the program.

*HOME Housing Partnerships Program.* HOME program funds give communities the flexibility to undertake a broad range of affordable housing activities, including the acquisition of property, construction of new housing for rent or homeownership, rehabilitation of rental or owner-occupied housing, improvement of sites or demolition of dilapidated homes, relocation costs for households displaced by HOME program activities, financial assistance to low-income homeowners and new homebuyers, and tenant-based rental assistance for low-income renters. The West Virginia Housing Development Fund coordinates the HOME program.

#### **U.S. DEPARTMENT OF COMMERCE, ECONOMIC DEVELOPMENT ADMINISTRATION (EDA).**

EDA supports economic recovery strategies, in part by providing cost-shared funds for planning and technical assistance, emergency infrastructure grants, construction grants and a Revolving Loan Fund to assist communities and quasi-public entities such as local development corporations and public or private non-profit organizations. EDA funds have been used to retrofit or relocate public water supply or wastewater treatment facilities. After disasters, some communities use EDA long-term recovery funding to help businesses move to safer locations.

#### **U.S. ARMY CORPS OF ENGINEERS.**

In addition to managing several large dams, levee protection projects and beach nourishment projects, the Corps supports state and local floodplain management and mitigation through the following programs:

*Floodplain Management Services (FPMS).* Under FPMS, the Corps provides a full range of technical services and planning guidance support for state and local efforts. The same services are available to non-governmental entities, including individuals, on a reimbursable basis. The Corps can provide information on flooding, estimates of potential flood losses, and guidance for managing floods hazard areas. Under FPMS, the Corps investigates methods to prevent and reduce flood damage, including retrofit and other flood proofing methods



*Planning Assistance to States (Section 22).* Assistance and planning guidance to state, regional and local governments is provided on a cost-shared basis and can address a variety of water resources issues, including floodplain management, flood damage reduction, dam safety, water supply, water quality, coastal zone management, wetlands management and environmental conservation and preservation.

*Silver Jackets Program.* Piloted in several states and now integrated into many US Army Corps of Engineers District offices, the Silver Jackets Program is designed to support post-disaster community recovery through integration of available federal, state, local and non-governmental resources. The Huntington District has a Silver Jackets Program lead who supports West Virginia following flooding disasters.

### **U.S. DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE (NRCS).**

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The NRCS is dedicated to the conservation of soil and water and related resources. Technical assistance is provided to individuals, groups, organizations and government agencies through conservation districts. West Virginia's Departments of Agriculture and Consumer Services and Department of Conservation and Recreation are the state's contacts for NRCS programs:

Under authority in Public Law 566, numerous flood reduction projects were constructed to address problems in small watersheds. NRCS supports river basin and watershed planning initiatives undertaken by local jurisdictions.

*The Emergency Watershed Protection Program.* This program can provide technical and financial assistance to communities to repair and restore clogged and damaged waterways to pre-disaster conditions.

*The Emergency Conservation Program.* This program is coordinated with the USDA Farm Services Agency, provides technical assistance to the agricultural community after disasters.

*Wetland Reserve Program.* This program provides technical and financial support to help landowners implement wetland restoration, conservation and wildlife practices.

NRCS most frequently works with disaster recovery and mitigation in a post-disaster setting in the State addressing stream and river flooding issues through the EWP program. This has been used extensively in western mountain flood events in the 1990's and this decade.





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## U.S. DEPARTMENT OF AGRICULTURE, OTHER PROGRAMS.

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USDA has a number of loan and grant programs that may support mitigation initiatives and post-disaster recovery. Additional information may be obtained from the U.S. Department of Agriculture or on-line at [www.usda.gov](http://www.usda.gov):

*Rural Business-Cooperative Development Service Business and Industrial Loans.* These loans and grants help create jobs and stimulate rural economies by backing rural businesses.

*Rural Housing Service Community Facilities Loans and Grants.* These loans and grants can be used to construct, enlarge or improve community services for health care, public safety, and public services.

*Water and Waste Grants and Loans.* These loans and grants are used to develop, replace, or repair water and waste disposal (including storm drainage) systems in rural areas and small towns.

*Farm Service Agency Emergency Conservation Program.* This program assistance can be used to rehabilitate certain farmland damaged by floods or other disasters.

*Farm Service Agency Tree Assistance.* This program provides cost-shared payments to orchardists, maple sugar producers, greenhouse operators and vineyard growers who incur losses due to damaging weather.

*Federal Multi-Peril Crop Insurance.* This program implements insurance policies against losses due to natural causes such as drought, excessive moisture, hail, wind, frost, insects and disease.

*Non-insured Crop Disaster Assistance Program.* This program helps growers of crops for which crop insurance is not available.

Farm Service Agency Flood Risk Reduction allows farmers to voluntarily enter into contracts to receive payments on lands with high flood potential in return for foregoing certain USDA program benefits.

*Conservation Reserve Program.* This program helps landowners conserve and improve soil, water and wildlife resources by converting environmentally sensitive acreage to long-term approved cover.

*Emergency Conserve Program.* This program provides funding to address new conservation problems created by disaster that, if not treated, would impair or endanger the land. Funds can be used to rehabilitate farmland damaged by wind erosion, floods, hurricanes, or other natural disasters and to carry out water conservation measures during drought.



### **U.S. GEOLOGICAL SURVEY (USGS).**

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The safety, health, and economic well being of West Virginia's citizens are important to the U.S. Geological Survey (USGS), which is involved in water, resource, mapping, and land-use issues in many parts of the State. Through cooperative programs with many State and local agencies, the USGS is studying coal extraction and its effects and assessing water quality and mineral potential. Through national programs, citizens of West Virginia have access to the thousands of map, book, and digital products of the USGS.

### **U.S. SMALL BUSINESS ADMINISTRATION (SBA).**

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The SBA has the authority to declare disaster areas based on the number of homes and businesses that are affected, even if the event does not warrant a declaration by the President. SBA provides low-interest loans, and can authorize loan amounts up to 20% above the costs of restoration if the applicant agrees to implement mitigation measures. Individuals and businesses can use SBA funds to pay for the non-federal share of HMGP and FMA projects to elevate-in-place, relocate, or flood-proof buildings in flood hazard areas. The West Virginia Department of Business Assistance is one source of information, and the SBA is on-line at [www.sba.gov](http://www.sba.gov):

*SBA Business Physical Damage Loan Program.* Available to help businesses and nonprofit organizations repair or replace uninsured damaged property such as real estate, machinery and equipment, inventory, and supplies. SBA requires borrowers to obtain and maintain appropriate insurance, especially if located in a flood hazard area.

*SBA Economic Injury Disaster Loan.* These loans of “last resort” provide working capital to small businesses and small agricultural cooperatives to help them through the recovery period.

*SBA Disaster Assistance Program Loans.* These loans are available to eligible homeowners through the Robert T. Stafford Act as part of the Individual Assistance Program. The loans can include mitigation measures such as drainage improvement, flood proofing and hurricane shutter installation. This program provides an opportunity for citizens within declared jurisdictions to work independently of a traditional grant program to assume responsibility for mitigation of their disaster-prone property.



The initiatives recommended in this plan are supported by the *WV State Code § 15-5-1, et. seq.* and *Executive Order No. 18-03*<sup>8</sup>. Section §15-5-20 directs the governor to take “steps that could be taken to prevent or reduce the harmful consequences of disasters.” Under this proclamation, the Governor is required to consider actions that mitigate or eliminate the loss of life and property throughout the State of West Virginia. While ultimate direction and control of these actions rest with the Governor, Section 15-5-1 establishes the West Virginia Division of Homeland Security and Emergency Management (DHSEM) as the agency responsible for ensuring the enactment of these provisions.

Executive Order 18-03 establishes the West Virginia Hazard Mitigation Council (HMC). This proclamation assigns the responsibility for development and implementation of the state hazard mitigation plan to the HMC. The Council is selected at the discretion of the Governor’s Executive Committee and is comprised of governmental, educational, voluntary, and private sector representatives. These representatives are given the responsibility of supporting the state hazard mitigation planning effort and actual implementation of the plan. For more information on Executive Order 18-03, please refer to Appendix B of this plan.

In addition to these two sources of information, this section, Appendix F: Capability Assessment, provides considerable information regarding the State’s ongoing programs. A robust Capability Assessment is an important part of a Hazard Mitigation Plan. It provides planners with pertinent information that will shape how they structure and design mitigation strategies. The development of this Capability Assessment has been developed with the following goals in mind:

- Prevent duplication of programs that may already address specific hazards,
- Identify potential gaps in capabilities;
- Identify potential resources for implementing additional mitigation strategies; and
- Provide an understanding of how the State can better support local mitigation activities.

The programs described in this section represent some of the notable successes and challenges encountered in the effort to reduce loss of life and property throughout the State. Many of the programs described in this section are ongoing programs that have significantly reduced the State’s exposure to risk. Several of the programs described here include programs offered by Federal, private, not-for-profit, and voluntary

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<sup>8</sup> WV Code Chapter 15. Public Safety. Article 5. Division of Homeland Security and Emergency Management. (§15-5). Retrieved January 2013 from: <http://www.dhsem.wv.gov/resources/Pages/WVCodeChapter15-5.aspx>



agencies. Some of these programs are not unique to West Virginia, and their full potential may not yet have been fully realized in within the State. They have been listed here in the hopes that resources and assets that they may offer may be more fully incorporated into West Virginia’s already significant portfolio.





## APPENDIX G: LOCAL REGIONAL PLAN UPLOAD WORKBOOKS

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This appendix is redacted. Please contact the State Hazard Mitigation Officer for Review of Contents.





## APPENDIX H: 2010 MITIGATION ACTION PROGRESS REPORT AND 2013 TRACKER

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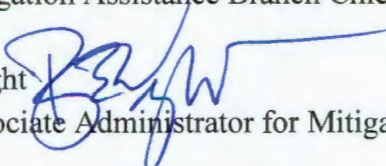


**FEMA**

**AUG 15 2013**

MEMORANDUM FOR: Regional Administrators  
Regions I-X

ATTENTION: Regional Mitigation Division Directors  
Hazard Mitigation Assistance Branch Chiefs

FROM: Roy E. Wright   
Deputy Associate Administrator for Mitigation

SUBJECT: Cost Effectiveness Determinations for Acquisitions and Elevations  
in Special Flood Hazard Areas

Projects that are eligible for funding under the Hazard Mitigation Assistance (HMA) programs must be cost effective, i.e., have a Benefit Cost Ratio (BCR) equal to or greater than 1.0. The Risk Reduction Division has completed an analysis of 11,000 acquisition and elevation projects and determined that the average benefits for each type of project were \$276,000 and \$175,000 respectively. Therefore, FEMA has determined that the acquisition or elevation of a structure located in the 100-year floodplain (as delineated on the Flood Insurance Rate Map or based on best available data) that costs less than or equal to the amount of benefits listed above is considered cost effective. For projects that contain multiple structures, the average cost of all structures in the project must meet the stated criterion. There is no need for applicants to conduct a separate benefit cost analysis for a structure that meets this criterion.

Additionally, the specific geographic location of structures can greatly increase acquisition and elevation costs. The amount of benefits identified above may be adjusted by the applicant or subapplicant using locality multipliers that are included in industry accepted cost and pricing guides for construction. If a multiplier is used, a copy of the source document must be included as part of the grant application for review and the methodology demonstrated for the increase of benefits. Also, the applicant or subapplicant should use the most up-to-date locality multiplier at the time of application.

To qualify for these pre-calculated benefits, applicants must provide maps with the structure footprint clearly identified and the 100-year Special Flood Hazard Area (SFHA) delineated (Flood Insurance Rate Map or best available data) as part of the grant application. If the structure or any part of the structure lies in the 100-year SFHA, the structure can utilize the pre-

AUG 15 2013

calculated benefits. Alternatively, first floor elevations (FFE) can be included for each structure as well as the base flood elevation (BFE) for that location. If the FFE is less than BFE, structures can use the pre-calculated benefits. No other detailed analysis will be required. These pre-calculated benefits can be used for structures in 100-year floodplains in riverine and coastal areas that meet the stated criterion.

This methodology satisfies the cost-effective requirements for the Flood Mitigation Assistance program, any disasters with an open grant application period as of the date of this memorandum, and future disasters. We will discuss the methodology used in the analysis in a future call with the HMA Branch Chiefs.

This determination advances FEMA's commitment to streamline the HMA programs by eliminating the need to perform a complete benefit cost analysis for each structure; reducing time involved in data collection, application development and review; and assisting communities in recovering from disaster more quickly. This memorandum does not replace or supersede the substantial damage benefit cost analysis waiver memorandum.

If you have any questions, please contact me directly at (202) 646-3461, or Kayed Lakhia, Deputy Director, Risk Reduction Division at (202) 646-3458.









**West Virginia 2010 Mitigation Strategies Update**

						<b>Details</b>	
<b>ID</b>	<b>Priority</b>	<b>Strategy Description</b>	<b>Responsible Agency</b>	<b>Status</b>	Please provide details regarding the status of this project. If canceled or incomplete, why?	<b>Bring Forward to 2013 Plan?</b>	
<i>Planning, Policy and Programs</i>							
2010-1	M	Develop statewide program to address levee maintenance and certification and ensure consistency in implementation of safety measures.	WV Department of Environmental Protection - Division of Water and Waste Management	Canceled	DEP stated that levees are not regulated by WVDEP but by NRCS and USACE. Strategy will be rewritten for inclusion in 2013 plan.	No	
2010-2	Unranked	Obtain funding for a dam safety revolving loan fund.	WV Department of Environmental Protection - Division of Water and Waste Management	In progress	WVDEP DWWM Dam Safety has a revolving fund and is currently collecting money to potentially fund projects. Meeting to be held week of 3/25/2013 to continue development of the fund.	Yes	
2010-3	H	Develop standard hazard mitigation plan format for use by local communities to facilitate state review and roll-up.	WVDHSEM	Completed	FEMA has also provided a new review tool last year. New strategy to address rollout and implementation of the standard plan format will be included in 2013 plan.	No	
2010-4	M	Create data standards for local hazard mitigation plans to aid in future roll-up in the state hazard mitigation plan (i.e. standard GIS layers).	WVDHSEM, GIS Technical Center	Completed	New strategy to address rollout and implementation of the data standards will be included in 2013 plan.	No	
2010-5	M	Assess regional approach to local hazard mitigation planning and make recommendations to improve process for next planning cycle.	WVDHSEM	Completed	WVDHSEM believes regional approach has proven better than individual local hazard mitigation plan approach as it allows for more local participation for broader input. New strategy will address feedback loop between WVDHSEM and Regional Planning and Development Councils (RPDCs) on the process.	No	
2010-6	H	Create guidance on how to document losses due to high frequency, low impact events for use in developing Benefit-Cost Analyses.	WVDHSEM	Not Started	Not done due to federal guidelines changes.	Yes	
2010-7	M	Provide financial and technical assistance for development of Community Wildfire Protection Plans.	WV Division of Forestry	In Progress	Started and ongoing. This action will continue for the 2013 plan.	Yes	
2010-8	M	Conduct an outreach campaign to encourage communities to join FIREWISE program.	WV Division of Forestry	In Progress	Started and ongoing. This action will continue for the 2013 plan.	Yes	
2010-9	H	Work with Governor and Legislature to promulgate and issue an Executive Order and resolution respectively, which directs state agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. (Similar to Federal E.O. 11988)	WVDHSEM, Floodplain Management Section	Not Started	Not done because there were too many changes in government to make it feasible to make progress.	Yes	
2010-10	H	Amend State code to encourage local governments to exceed the minimum floodplain standards established by the NFIP.	WVDHSEM, Floodplain Management Section	Completed	Completed	No	
2010-11	M	Develop model Community Rating System (CRS) application that would capture points available on a statewide basis. Create tip sheet to assist communities with the application process.	WVDHSEM, Floodplain Management Section	In progress	Model application is in progress.	Yes	
2010-12	Critical	Rank communities that may achieve most benefit from CRS participation and target technical assistance to those communities.	WVDHSEM, Floodplain Management Section	Ongoing	Initial ranking completed. Will continue as on-going action in 2013 plan.	Yes	
2010-13	Critical	Cross-reference 911 addressing initiative data with flood hazard data to identify property owners that are located in the Special Flood Hazard Area.	WVDHSEM	Completed	Please see the WV Flood Determination Tool ( <a href="http://www.mapwv.gov/flood/">http://www.mapwv.gov/flood/</a> )	No	
2010-14	M	Conduct outreach campaign to property owners identified in Action 13 to ensure they know that their property is located in the Special Flood Hazard Area and options regarding flood insurance and mitigation.	WVDHSEM, Floodplain Management Section	Completed	Initial outreach completed. Will continue as annual activity in 2013 plan.	Yes	
2010-15	Critical	Evaluate methods Insurance Commission could use to coordinate efforts to reduce Flood Insurance Premiums in WV by informing insurance agents, citizens, and business owners of better methods to rate flood insurance focusing on Pre-FIRM and approximate A zone structures.	WV Offices of the Insurance Commissioner	In progress	As part of Biggart-Waters Act implementation, policies are being re-rated.	Yes	
2010-16	Unranked	Create advisory flood heights for all approximately detailed study A zones in state (currently around 8,000 stream miles).	WVDHSEM, Floodplain Management Section	In progress	Approximately 50% of thw work has been completed.	Yes	
2010-17	Critical	Promote adoption and enforcement of State Building Code in communities throughout the state.	WV State Fire Marshall's Office	Ongoing	State Marshal is active in promoting adoption and enforcement of building	Yes	
2010-18	Critical	Work with the Fire Marshall to provide technical assistance to communities interested in adopting or improving enforcement of building codes.	WVDHSEM, WV State Fire Marshall's Office	In progress	This activity is in progress.	Yes	
2010-19	L	Develop prioritized list of state-owned or leased facilities at risk to flood and conduct detailed site assessment to develop site-specific mitigation action plans.	WVDHSEM	Not Started	Lack of staff resources prevented this action from being started.	Yes	

**West Virginia 2010 Mitigation Strategies Update**

ID	Priority	Strategy Description	Responsible Agency	Status	Details	Bring Forward to 2013 Plan?
					Please provide details regarding the status of this project. If canceled or incomplete, why?	
2010-20	Critical	Develop facility assessment checklist to be used as part of a Continuity of Operations/Hazard Vulnerability Assessment. Coordinate this action with HSEM COOP planner.	WVDHSEM	In progress	A checklist is being included as part of COOP planning education.	Yes
2010-21	L	Develop interagency review process for proposed tax-funded capital improvement projects and leases to ensure all hazards are being evaluated and addressed.	WVDHSEM	Not Started	Lack of staff resources prevented this action from being formally introduced; should be re-assigned to Department of Administration/Real Estate Division.	Yes
2010-22	M	Allocate one million dollars to a Statewide Mitigation Fund to address projects that do not meet FEMA eligibility requirements (in addition to existing funds used for match).	WVDHSEM	Not Started	Impact of weak economy has caused state to have budget issues that have prevented a separate fund from being established.	Yes
2010-23	L	Research tax incentive structure that would encourage private sector investment in mitigation.	WV Department of Revenue, WVDHSEM	Not Started	Lack of staff resources prevented this action from being started.	Yes
2010-24	M	Work with West Virginia University School of Agriculture and Forestry to research optimal deer herd size and make appropriate management recommendations.	WV Offices of the Insurance Commissioner	Canceled	Lack of funding	No
2010-25	Critical	Evaluate annually high impact areas for deer/vehicle collision and adapt herd management techniques in those areas as needed.	WV Offices of the Insurance Commissioner, WV Division of Natural Resources	Canceled	Lack of funding	No
<b>Education and Outreach</b>						
2010-26	M	Develop educational information and training about hazards (i.e. areas downstream of dams; wildfire/urban)	WVU Cooperative Extension Service - county agent	Canceled	Lack of funding	No
2010-27	H	Educate the public on flood insurance and mitigation grants	Local government; WVDHSEM	Completed	Completed.	No
2010-28	H	Statewide education outreach - elementary/middle school levels - a presentation that the kids could buy into. (all hazards briefing) (researching Project WET)	DHSEM/NOAA	Canceled	Canceled. Presentation was developed but Political and legal barriers regarding "No Child Left Behind" prevents the school system from allowing.	No
2010-29	H	Educate the public through outreach events such as at the State Fair and by giving away trinkets.	WVDHSEM	Completed	done bur no trinkets	No
2010-30	M	Video at schools; Run preparedness demonstration videos at schools	Public Broadcasting	Not Started	Not started; resources were not available.	Yes
2010-31	H	Require hazard mitigation training for all city (community) and county officials	WVDHSEM	Canceled	IMPOSSIBLE- can't require but can offer/provide	No
2010-32	M	There needs to be policy/legislation to make it a real requirement for real estate agents/agencies to disclose if a property is in the floodplain (eventually all hazards)	Legislature	Not Started	Attempted to pass proposed legislation, however legislature decided against it	Yes
2010-33	H	Perform a cost estimate for developing digital mapping of landslide prone areas, updating current maps and making data accessible to others/all	US Geological Survey	Not Started	Lack of funding	Yes
2010-34	H	Perform a cost estimate for developing digital mapping of Karst	Geological Survey	Canceled	Duplicative with another action addressed in the Risk Assessment group	No
2010-35	L	Get the parcel data (dams, mining, flooding) (most important)	WVDHSEM, Floodplain Management Section	In Progress	in progress	No
2010-36	Critical	Place stream gauges on streams and create a public database/website showing real-time water levels from the gauges.	WVDHSEM IFLOWS, USGS	Completed	Done (rainfall.net)	No
2010-37	L	Storm warnings/text warnings - make it more widely available; this should be available when people buy their phone.	NOAA	Canceled	Duplicative with another action addressed in the Risk Assessment group	No
2010-38	H	The State's website should include state and local hazard mitigation plans and declared disasters.	WVDHSEM	Completed	Completed	No
2010-39	M	Interconnect all media (print, broadcast, online)	Public Broadcasting, DHS, Governor's Office	In progress	Started; Public Broadcasting is taken on the role of being the disseminator of state news and information; coordinates with state agencies and other media outlets.	Yes
2010-40	H	Print media (i.e. newspapers) should run stories about preparedness (i.e. during flood awareness week)	Governor's Office	Completed	Governor's Office issues both print media as well as TV adds periodically throughout the year.	Yes
2010-41	L	Produce documentaries about/on aging dam structures around endangered communities	Public Broadcasting, DEP, USACE	In progress	Started; Public Broadcasting produced a documentary about rivers that included dams; interested in producing additional videos.	Yes
2010-42	H	Improve the process for getting the status/survey from State, county, location of FEMA IS courses taken.	WVDHSEM	Ongoing	Maintains a database	No



**West Virginia 2010 Mitigation Strategies Update**

<b>West Virginia 2010 Mitigation Strategies Update</b>						
<b>ID</b>	<b>Priority</b>	<b>Strategy Description</b>	<b>Responsible Agency</b>	<b>Status</b>	<b>Details</b>	<b>Bring Forward to 2013 Plan?</b>
					Please provide details regarding the status of this project. If canceled or incomplete, why?	
<b>Risk Assessment</b>						
2010-43	H	Develop statewide databases for geological hazards including earthquake, karst, topography and landslide.	WVGES, WV GIS Technical Center, USACOE, FEMA	In Progress	Completed one database for earthquake epicenters in WV.	Yes
2010-44	H	Develop a single, standardized critical facilities, geo-coded dataset for State and Local critical facilities as defined by CIKA.	WV GIS Technical Center, WVDHSEM, WV BRIM	In Progress	WVBRIM is currently updating state facility attributes.	Yes
2010-45	H	Integrate 2010 HAZUS-MH 3 riverine flood analysis into 2013 risk assessment update.	WVDHSEM	In Progress	Loss estimates from Phase I have been included in HIRA. Annualized losses for Phase II will not be available for the 2013 update and should be intergrated into the next plan revision.	Yes
2010-46	Critical	Update the Repetitive Loss and Severe Repetitive Loss Databases annually to reflect FEMA flood claims, IC use and structure mitigation at HMA close out or from other funding sources.	WVDHSEM	Not Started	Continuing to apply for access to BureauNet. Currently no access.	Yes
2010-47	H	Develop more detailed Social Vulnerability Analysis (SoVI) using Census 2010 data in the 2013 plan update.	WVDHSEM contractor	Completed	Social vulnerability has been updated based on 2010 census data in the 2013 plan update.	No
2010-48	H	Further investigate implications of climate change as it relates to potential future changes in temperature, storm track and frequency as well as lake-effect and other winter weather processes on the State.	WVDHSEM, NOAA Weather Service, State Climatologist, Contractual Assistance	In Progress	USACE is doing climate change study in the Ohio basin.	Yes
2010-49	M	Perform a more comprehensive examination of state and critical facility vulnerability to winter storms.	WVDHSEM, NOAA Weather Service, State Climatologist, BRIM, Contractual Assistance	In Progress	State facilities data is currently being updated and revised by BRIM.	Yes
2010-50	M	Reassess the availability of other hazard data sources (such as geologic hazards like Karst topography and landslide) to validate hazard ranking parameters.	WDHSEM, WVU GIS Technical Center, Contractor Support	In Progress	Hazard data actions for data creation are in-progress and needed to complete this action.	Yes
2010-51	M	Seek funding to digitize WV landslide quadrangle maps to support landslide risk analysis for the 2013 mitigation plan update.	WVGES, WVU	In Progress	Maps have been georeferenced from the USGS reports. Limited funding and manpower are limiting factors for digitizing, Action is also tied to Action 2010-43 for statewide data sources.	Yes
2010-52	L	Determine areas where roads experience sinkholes to improve on subsidence incidence reporting to transportation infrastructure.	WVDOT, WVGES	Canceled	No joint projects exist between WVGES and WVDOT.	No
2010-53	L	Investigate additional land subsidence data sources to be used in conjunction with the NCDC ranking to better assessment karst topography risk.	WVGES	Canceled	This action is already covered by 2010-43 and 2010-49.	No
2010-54	Critical	Improve upon inadequate mapping of Abandoned Mine Land and distribute this updated mapping to public, private, and corporate agencies.	WV Office of Surface Mine Reclamation, DEP	In Progress	WVGES and WV Mine Safety & Training have digitized all footprints of mines in the state.	Yes
2010-55	Critical	Integrate known dam locations and downstream inundation zones with location of residential communities and critical facilities at risk.	WVDHSEM, Floodplain Management Section, WV Conservation Agency, NRCS, USACOE	In progress	(Flood Determination Tool) Dam failure maps are not in the flood tool. Some progress has been made but still a lot of dams need EAP (digital)	Yes
<b>Mitigation of High Hazard Structures</b>						
2010-56	M	Determine fire risk for "unknown" State facilities in the BRIM facilities database.	WV Division of Forestry, BRIM, WVDHSEM	Completed	Completed	No
2010-57	H	Update Disaster funding levels for Public Assistance, Individuals and Households Assistance, SBA and HMGP HMA grants for the 2013 risk assessment disaster costs section.	WVDHSEM	Completed	Completed	Yes
2010-58	H	Use state facilities vulnerability analysis (potential annualized losses) to prioritize state-owned facilities for mitigation project scoping.	WVDHSEM, BRIM	Completed	Completed	Yes
2010-59	H	Seek funding for Charleston Area Medical Facilities scoped as an element of this plan (Section 4.6)	WVDHSEM, CAMF	Completed	Completed	No
2010-60	H	Provide state and local critical facilities vulnerability analysis data to counties and regional planning development commissions for inclusion in their critical facilities mitigation strategies.	WVDHSEM	Completed	Completed. Participated in DHS Regional Resilience Assesment Program. DHS sponsored program to evaluate critical infrastructure vulnerabilities. Specific focus on chemical and energy sectors, water and transportation. Voluntary participants from industry allowed specialists to conduct assessments. As risk identified, discussed potential means of addressing	No
2010-61	H	Develop tip sheet describing critical facility mitigation	WVDHSEM, BRIM	Completed	See details to strategy 2010-60.	No

**West Virginia 2010 Mitigation Strategies Update**

ID	Priority	Strategy Description	Responsible Agency	Status	Details	
					Please provide details regarding the status of this project. If canceled or incomplete, why?	Bring Forward to 2013 Plan?
2010-62	H	Promote IBC standards for all new critical facility substantial improvements, substantial damage repair and new construction.	WVDHSEM, WV State Fire Marshall's Office	Completed	Completed. The WV State Code is updated periodically to reflect changing conditions and standards. The current code became effective in 2010 and incorporates the 2009 IBC.	Yes
2010-63	H	Coordinate with the Huntington District USACE to assess potential structural mitigation measures; providing political and technical support as appropriate to support funding efforts.	US Army Corps of Engineers, Huntington District, WVDHSEM, WV congressional delegation	Completed	Completed	No
2010-64	H	Upon completion of new risk assessment incorporating dam inundation zones, prioritize acquisition and demolition projects in high hazard inundation zones.	WVDHSEM, WV Conservation Service, USDA NRCS	Completed	Completed	No
2010-65	M	Explore remediation designs for coal dam impoundment structures to minimize inundation zone risks.	WVDHSEM, WV Conservation Service, USDA NRCS, WV Office of Mine Reclamation and DEP	Completed	Currently DEP works with and has MOU's with Federal partners for design, approval and inspections. There are no known current initiatives for design changes.	Yes
2010-66	H	Use 2010 state critical facilities risk assessment to target key state critical facilities vulnerable to loss of function due to utility outages - develop strategy for remediation.	WVDHSEM, BRIM	Completed	Intelligence Fusion Center develops relationships with private utilities and critical infrastructure to conduct assessments and recommend mitigation strategies.	Yes
2010-67	H	Use 2010 state critical facilities risk assessment to target key local critical facilities vulnerable to loss of function due to utility outages - provide local governments their data sets and mitigation tip sheets.	WVDHSEM	Completed	Intelligence Fusion Center develops relationships with private utilities and critical infrastructure to conduct assessments and recommend mitigation strategies.	Yes
2010-68	H	Building on the local critical facilities planning outreach effort, seek mitigation project applications to address critical facilities utilities and redundancy issues.	WVDHSEM	Canceled	Utility providers being private organizations impedes implementation of this project, however Fusion center works with utilities to provide assessments and recommended actions.	Yes
2010-69	H	Seek stronger critical facilities redundant systems and protection measures in the Uniform Statewide Building Code.	WVDHSEM, WV State Fire Marshall's Office, legislative advocate	Ongoing	Building code Standards continually being revised and updated. Currently no separate standard for critical facilities.	Yes
2010-70	Critical	Initiate contact with each local government with a listed severe repetitive loss property through a letter and follow-up communication to promote HMA grant programs to mitigate listed SRL and RL properties.	WVDHSEM	Completed	Completed	Yes
2010-71	H	Initiate contact with each listed severe repetitive loss property owner with a letter promoting mitigation at no property owner cost through HMA grant programs.	WVDHSEM	Completed	Completed	Yes
2010-72	Critical	Allocate designated HMA SRL funds to at least three high risk SRL properties for acquisition and demolition projects in targeted communities (Wheeling, Logan County, and Kanawha County)	WVDHSEM	Completed	Completed. Acquired 3 SRL properties in these jurisdictions	Yes
2010-73	H	Prioritize second tier of potential SRL properties for mitigation - work with communities to implement successful SW West Virginia local government applicant targeting skills.	WVDHSEM	Completed	Completed	No
2010-74	H	Prioritize mitigation of SRL and Repetitive Loss properties through post-disaster mitigation strategy priorities and activities along with bonus grant application scoring points for all HMA funding. Provide local project sponsors that target RL and SRL property mitigation priority HMA funding.	WVDHSEM	Completed	Completed	Yes
2010-75	H	Annually perform data synthesis and update of Bureau Net databases in coordination with FEMA Region III - provide RL and SRL datasets to local governments for use in their RL and SRL targeting efforts.	WVDHSEM	In Progress	Continuing to apply for access to BureauNet. Currently no access.	Yes
2010-76	H	Provide priority points in Unified HMA application scoping for acquisition and demolition projects	WVDHSEM	Completed	Completed	Yes
2010-77	H	Support integration of state vulnerability analysis local data into local plan updates for use in prioritizing mitigation projects.	WVDHSEM	Completed	Completed	Yes
2010-78	Critical	Facilitate demolition and acquisition/elevation, relocation and non-residential flood proofing mitigation projects for three new local government applications through provision of technical assistance and other support.	WVDHSEM	Completed	Completed	No

West Virginia 2010 Mitigation Strategies Update

West Virginia 2010 Mitigation Strategies Update						
ID	Priority	Strategy Description	Responsible Agency	Status	Details	Bring Forward to 2013 Plan?
					Please provide details regarding the status of this project. If canceled or incomplete, why?	
2010-79	L	Perform pilot losses avoided study for area with contiguous mitigated properties - convey results to policy makers, local government project sponsors and property owners.	WVDHSEM	Not Started	Not started due to funding and resource challenges.	No
2010-80	L	Obtain prior BCA grant application data set from FEMA to begin a pilot loss avoidance study.	WVDHSEM	Not Started	Not started due to funding and resource challenges.	No



## APPENDIX I: PROJECT SCOPING SHEETS

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This appendix is redacted. Please contact State Hazard Mitigation Officer for Review of Contents.





## APPENDIX J: HAZARD MITIGATION COUNCIL AND PLAN CONTRIBUTORS

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### Hazard Mitigation Council and Plan Contributors

Last Name	First Name	Title	Organization/ Affiliation
Beckett	Jerry		Cabell County Emergency Medical Services/Office of Emergency Services
Sikora	John		National Oceanic and Atmospheric Administration
Buchanan	Kurt	Economist	United States Army Corps of Engineers
Neidig	Craig		United States Geological Survey
Workman	Kelly	Comm. Dev. Spec.	West Virginia Development Office
Dorsey	Mike		West Virginia Department of Environmental Protection
Joins	Rusty		West Virginia Department of Environmental Protection
Lyons	Judith	Manager	West Virginia Conservation Agency
Worley	Mike	Asst Dir. CHF OM&R	West Virginia Conservation Agency
Namay	Gina		West Virginia Citizens Corps
McCallister	Roy		West Virginia Department of Agriculture
Blackwood	Matthew		West Virginia Department of Agriculture
Fuller	Greg	Area Liaison	West Virginia Division of Homeland Security and Emergency Management
Kershner	William	SAR Ops Planning	West Virginia Division of Homeland Security and Emergency Management
Lisko	Al		West Virginia Division of Homeland Security and Emergency Management
Mumphard	Robyn		West Virginia Division of Homeland Security and Emergency Management
Simental	Maria	GIS Program Analyst II	West Virginia Division of Homeland Security and Emergency Management
Walker	Mike		West Virginia Division of Homeland Security and Emergency Management
Beach	Lirerose	Mitigation Planner	West Virginia Division of Homeland Security and Emergency Management
Howard	Paul	Director-Operation	West Virginia Division of Homeland Security and Emergency Management
Jefferson	Roger	State Planner	West Virginia Division of Homeland Security and Emergency Management
Keaton	Tim	SHMO	West Virginia Division of Homeland Security and Emergency Management

Lively	T.D.	Program Mgr.	West Virginia Division of Homeland Security and Emergency Management
Penix	Brian	Project Officer	West Virginia Division of Homeland Security and Emergency Management
Shook	Mike	Area Liaison	West Virginia Division of Homeland Security and Emergency Management
Green	Sanford	Area Liaison	West Virginia Division of Homeland Security and Emergency Management
Core	Anyssa	Area Liaison	West Virginia Division of Homeland Security and Emergency Management
Bailey	Robert	Area Liaison	West Virginia Division of Homeland Security and Emergency Management
Bennett	Charles (Chuck)	State NIMS Coord	West Virginia Department of Military Affairs and Public Safety
Fernley	Christian	Home HS State Training POC	West Virginia Department of Military Affairs and Public Safety
Hoge	David	Deputy Planner	West Virginia Department of Military Affairs and Public Safety
Coleman	Tim		West Virginia Department of Natural Resources
Meadows	Kevin	Commerce	West Virginia Development Office
Saunders	Tom	Community Development Rep	West Virginia Development Office
Jackson	Walt	Assistant State Forester - Forest Protection State Fire Supervisor	West Virginia Division of Forestry
McColloch	Jane	Sr. Geologist	West Virginia Geological and Economic Survey
Simental	Tony	State GIS Coordinator	West Virginia Geological and Economic Survey
Acker	Bill		West Virginia Public Broadcasting Service
Lanham	Craig	TV Programming	West Virginia Public Broadcasting Service
Roberts	Jason	Planner	West Virginia Planning and Development Council
Webb	Mike	Project Adm.	West Virginia Planning and Development Council
Greathouse	Kara	Planner	West Virginia Planning and Development Council
Rader	Fred	Planner	West Virginia Planning and Development Council
Sharp	Sean		West Virginia Planning and Development Council
Smith	Cary	Project Manager	West Virginia Planning and Development Council
Jacobus	Robert	Dev. Sp.	West Virginia Planning and Development Council
Stonestreet	Raymond	Capt.	West Virginia State Police
McCabe	G.E.	Coordinator	West Virginia State Police





## APPENDIX K: PLAN REVIEW CROSSWALK

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**Instructions for Using the Plan Review Crosswalk for Review of Standard State Hazard Mitigation Plans**

Attached is a Plan Review Crosswalk based on the *Multi-Hazard Mitigation Planning Guidance Under the Disaster Mitigation Act of 2000*, published by FEMA, with revisions dated November 2006. This Plan Review Crosswalk is consistent with the *Disaster Mitigation Act of 2000* (P.L. 106-390), enacted October 30, 2000 and *44 CFR Part 201 – Mitigation Planning, Interim Final Rule* (the Rule), published February 26, 2002.

**SCORING SYSTEM**

**N – Needs Improvement:** The plan does not meet the minimum for the requirement. Reviewer’s comments must be provided.

**S – Satisfactory:** The plan meets the minimum for the requirement. Reviewer’s comments are encouraged, but not required.

Each requirement includes separate elements. All elements of a requirement must be rated “Satisfactory” in order for the requirement to be fulfilled and receive a summary score of “Satisfactory.” A “Needs Improvement” score on elements shaded in gray (recommended but not required) will not preclude the plan from passing.

Optional matrices for assisting in the review of sections on profiling hazards and assessing vulnerability are found at the end of the Plan Review Crosswalk.

The example below illustrates how to fill in the Plan Review Crosswalk.

**Example**

**Assessing Vulnerability by Jurisdiction**

**Requirement §201.4(c)(2)(ii):** *[The State risk assessment shall include an] overview and analysis of the State’s vulnerability to the hazards described in this paragraph (c)(2), based on estimates provided in local risk assessments ... . The State shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard event.*

Element	Location in the Plan (section or annex and page #)	Reviewer’s Comments	SCORE	
			N	S
A. Does the plan describe the State’s vulnerability based on information from the local risk assessments?	Section III, pp. 12-28	The plan includes a description of local vulnerable structures. The plan presented a vulnerability summary by regions in the state. This information was collected from the approved plans on file.		✓
B. Does the plan present information on those jurisdictions that face the most risk?	Section III, pp. 30-36	The vulnerability description did not indicate which jurisdictions were the most vulnerable.  <b>Required Revisions:</b> <ul style="list-style-type: none"> <li>Use the information provided in the summaries to determine which jurisdictions are most threatened by the identified hazards.</li> <li>Identify which jurisdictions have suffered or are likely to suffer the most losses.</li> <li>If data are not readily available, note these data limitations in the plan. Include actions in the mitigation strategy to obtain these data for the plan update.</li> </ul>	✓	
<b>SUMMARY SCORE</b>			✓	

State: **West Virginia**

Date of Plan:

**Standard State Hazard Mitigation Plan Review and Approval Status**

<b>State Point of Contact:</b> Brian Penix	<b>Address:</b>
<b>Title:</b> State Hazard Mitigation Officer	
<b>Agency:</b> WV Division of Homeland Security and Emergency Management	
<b>Phone Number:</b> (304) 957-2572	<b>E-Mail:</b>

<b>FEMA Reviewer:</b>	<b>Title:</b>	<b>Date:</b>
<b>Date Received in FEMA Region [Insert #]</b>		
<b>Plan Not Approved</b>		
<b>Plan Approved</b>		
<b>Date Approved</b>		

STANDARD STATE HAZARD MITIGATION PLAN SUMMARY CROSSWALK

The plan cannot be approved if the plan has not been formally adopted.

Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a "Needs Improvement" score.

SCORING SYSTEM

Please check one of the following for each requirement.

**N – Needs Improvement:** The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

**S – Satisfactory:** The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Prerequisite

Adoption by the State: §201.4(c)(6) and §201.4(c)(7)

NOT MET	MET

Planning Process

Documentation of the Planning Process: §201.4(c)(1)

Coordination Among Agencies: §201.4(b)

Program Integration: §201.4(b)

N	S

Risk Assessment

Identifying Hazards: §201.4(c)(2)(i)

Profiling Hazards: §201.4(c)(2)(i)

Assessing Vulnerability by Jurisdiction: §201.4(c)(2)(ii)

Assessing Vulnerability of State Facilities: §201.4(c)(2)(ii)

Estimating Potential Losses by Jurisdiction: §201.4(c)(2)(iii)

Estimating Potential Losses of State Facilities: §201.4(c)(2)(iii)

N	S

Mitigation Strategy

Hazard Mitigation Goals: §201.4(c)(3)(i)

State Capability Assessment: §201.4(c)(3)(ii)

Local Capability Assessment: §201.4(c)(3)(ii)

Mitigation Actions: §201.4(c)(3)(iii)

Funding Sources: §201.4(c)(3)(iv)

N	S

Coordination of Local Mitigation Planning

Local Funding and Technical Assistance: §201.4(c)(4)(i)

Local Plan Integration: §201.4(c)(4)(ii)

Prioritizing Local Assistance: §201.4(c)(4)(iii)

N	S

Severe Repetitive Loss Mitigation Strategy (only required for 90/10 under FMA & SRL)

Repetitive Loss Mitigation Strategy: §201.4(c)(3)(v)

Coordination with Repetitive Loss Jurisdictions §201.4(c)(3)(v)

N	S

Plan Maintenance Process

Monitoring, Evaluating, and Updating the Plan: §201.4(c)(5)(i)

Monitoring Progress of Mitigation Activities: §201.4(c)(5)(ii) and (iii)

N	S

STANDARD STATE HAZARD MITIGATION PLAN APPROVAL STATUS

PLAN NOT APPROVED

PLAN APPROVED


See Reviewer's Comments

**PREREQUISITE**

**Adoption by the State**

**Requirement §201.4(c)(6):** The plan **must** be formally adopted by the State prior to submittal to [FEMA] for final review and approval.

**Requirement §201.4(c)(7):** 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, in compliance with 44 CFR 13.11(c). The State will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Has the State formally adopted the <b>new or updated</b> plan?	Section 1-5 (Pg 1-12)	Pending FEMA approval		
B. Does the plan provide assurances that the State will <b>continue to</b> comply with all applicable Federal statutes and regulations during the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c), and will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d)?	Section 1-5 (Pg 1-12)			
<b>SUMMARY SCORE</b>				

**PLANNING PROCESS:** §201.4(b): *An effective planning process is essential in developing and maintaining a good plan.*

**Documentation of the Planning Process**

**Requirement §201.4(c)(1):** *[The State plan must include a] description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the plan provide a narrative description of how the <b>new or updated</b> plan was prepared?	Section 2-4 (Pg 2-11)			
B. Does the <b>new or updated</b> plan indicate who was involved in the <b>current</b> planning process?	Section 2-5 (Pg 2-14), and Appendix J			
C. Does the <b>new or updated</b> plan indicate how other agencies participated in the <b>current</b> planning process?	Section 2-5 (Pg 2-14), and 2-6 (Pg 2-16)			
<b>D. Does the updated plan document how the planning team reviewed and analyzed each section of the plan?</b>	Section 2-6 (Pg 2-16)			
<b>E. Does the updated plan indicate for each section whether or not it was revised as part of the update process?</b>	Pg 2-2, 3-1, 4-2, 5-3, 6-1			
<b>SUMMARY SCORE</b>				

**Coordination Among Agencies**

**Requirement §201.4(b):** *The [State] mitigation planning process should include coordination with other State agencies, appropriate Federal agencies, interested groups, and ... .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe how Federal and State agencies were involved in the <b>current</b> planning process?	Section 2-5 (Pg 2-13)	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>		
B. Does the <b>new or updated</b> plan describe how interested groups (e.g., businesses, non-profit organizations, and other interested parties) were involved in the <b>current</b> planning process?	Section 2.5.3 (Pg 2-15) and Section 2.7 (Page 2-17)	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>		
<b>C. Does the updated plan discuss how coordination among Federal and State agencies changed since approval of the previous plan?</b>	Section 2.5.1 and 2.5.2 (Pgs 2-13 and 2.14)			
<b>SUMMARY SCORE</b>				

**Program Integration**

**Requirement §201.4(b):** [The State mitigation planning process **should**] be integrated to the extent possible with other ongoing State planning efforts as well as other FEMA mitigation programs and initiatives.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe how the State mitigation planning process is integrated with other ongoing State planning efforts?	Sections 1.3 (Pg 1-7), 1-4 (Pg 1-8), 2-2 (Pg 2-2), 2-3 (Pg 2-4), Appendix F	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>		
B. Does the <b>new or updated</b> plan describe how the State mitigation planning process is integrated with FEMA mitigation programs and initiatives?	Sections 1.3 (Pg 1-7), 1-4 (Pg 1-8), 2-2 (Pg 2-2), 2-3 (Pg 2-4), Appendix F	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>		
<b>SUMMARY SCORE</b>				

**RISK ASSESSMENT:** §201.4(c)(2): *[The State plan must include a risk assessment] that provides the factual basis for activities proposed in the strategy portion of the mitigation plan. Statewide risk assessments must characterize and analyze natural hazards and risks to provide a statewide overview. This overview will allow the State to compare potential losses throughout the State and to determine their priorities for implementing mitigation measures under the strategy, and to prioritize jurisdictions for receiving technical and financial support in developing more detailed local risk and vulnerability assessments.*

**Identifying Hazards**

**Requirement §201.4(c)(2)(i):** *[The State risk assessment shall include an] overview of the type ... of all natural hazards that can affect the State ... .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan provide a description of the type of <b>all natural hazards</b> that can affect the State? If the hazard identification omits (without explanation) any hazards commonly recognized as threats to the State, this part of the plan cannot receive a Satisfactory score.	Sections 3-7 – 3-17 (Pgs 3-72—3-251)			
<b>SUMMARY SCORE</b>				

**Profiling Hazards**

**Requirement §201.4(c)(2)(i):** *[The State risk assessment shall include an overview of the] location of all natural hazards that can affect the State, including information on previous occurrences of hazard events, as well as the probability of future hazard events, using maps where appropriate ... .*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the risk assessment identify the <b>location</b> (i.e., geographic area affected) of each natural hazards addressed in the <b>new or updated</b> plan?	Sections 3-7 – 3-17 (Pgs 3-72—3-251)			
B. Does the <b>new or updated</b> plan provide information on <b>previous occurrences</b> of each hazard addressed in the plan?	Sections 3-7 – 3-17 (Pgs 3-72—3-251)			
C. Does the <b>new or updated</b> plan include the <b>probability of future events</b> (i.e., chance of occurrence) for each hazard addressed in the plan?	Sections 3-7 – 3-17 (Pgs 3-72—3-251)			
<b>SUMMARY SCORE</b>				

**Assessing Vulnerability**

**Requirement §201.4(c)(2)(ii):** *[The State risk assessment shall include an] overview and analysis of the State’s vulnerability to the hazards described in this paragraph (c)(2), based on estimates provided in local risk assessments as well as the State risk assessment. The State shall describe vulnerability in terms of the jurisdictions most threatened by the identified hazards, and most vulnerable to damage and loss associated with hazard events. State owned critical or operated facilities located in the identified hazard areas shall also be addressed ... .*

**Requirement §201.4(d):** *Plan must be reviewed and revised to reflect changes in development...*



**Assessing Vulnerability by Jurisdiction**

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe the State's vulnerability based on estimates provided in local risk assessments as well as the State risk assessment?	Section 3.6 (Pg 3-63)			
B. Does the <b>new or updated</b> plan describe the State's vulnerability in terms of the jurisdictions most threatened and most vulnerable to damage and loss associated with hazard event(s)?	Sections 3-7 – 3-17 (Pgs 3-72—3-251)	All hazard sections		
<b>C. Does the updated plan explain the process used to analyze the information from the local risk assessments, as necessary?</b>	Section 3.6 (Pg 3-63)			
<b>D. Does the updated plan reflect changes in development for jurisdictions in hazard prone areas?</b>	Section 3-2, I(3-29), Section 3.6 (Pg 3-63)	All hazard sections		
<b>SUMMARY SCORE</b>				

**Assessing Vulnerability of State Facilities**

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe the types of State owned or operated critical facilities located in the identified hazard areas?	Section 3-4 (Pg 3-50)			
<b>SUMMARY SCORE</b>				

**Estimating Potential Losses**

**Requirement §201.4(c)(2)(iii):** *[The State risk assessment shall include an] overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in local risk assessments as well as the State risk assessment. The State shall estimate the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas.*

**Requirement §201.4(d):** *Plan must be reviewed and revised to reflect changes in development...*

**Estimating Potential Losses by Jurisdiction**

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan present an overview and analysis of the potential losses to the identified vulnerable structures?	Sections 3-7 – 3-17 (Pgs 3-72—3-251)	All hazard sections		

State: West Virginia

Date of Plan:

B. Are the potential losses based on estimates provided in local risk assessments as well as the State risk assessment?	Sections 3-7 – 3-17 (Pgs 3-72—3-251)	All hazard sections		
<b>C. Does the updated plan reflect the effects of changes in development on loss estimates?</b>	Sections 3-7 – 3-17 (Pgs 3-72—3-251)	All hazard sections		
<b>SUMMARY SCORE</b>				

**Estimating Potential Losses of State Facilities**

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan present an estimate of the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities in the identified hazard areas?	Sections 3-7 – 3-17 (Pgs 3-72—3-251)	All hazard sections		
<b>SUMMARY SCORE</b>				

**MITIGATION STRATEGY:** §201.4(c)(3) [To be effective the plan must include a] Mitigation Strategy that provides the State’s blueprint for reducing the losses identified in the risk assessment.

**Hazard Mitigation Goals**

**Requirement §201.4(c)(3)(i):** [The State mitigation strategy **shall** include a] description of State goals to guide the selection of activities to mitigate and reduce potential losses.

**Requirement §201.4(d):** Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities...

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan provide a description of State mitigation <b>goals</b> that guide the selection of mitigation activities?	Section 4-1 (Pg. 4-4)			
<b>B. Does the updated plan demonstrate that the goals were assessed and either remain valid or have been revised?</b>	Section 4-1 (Pg. 4-4)			
<b>SUMMARY SCORE</b>				

**State Capability Assessment Requirement §201.4(c)(3)(ii):** [The State mitigation strategy **shall** include a] discussion of the State’s pre-and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including: an evaluation of State laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas [and] a discussion of State funding capabilities for hazard mitigation projects ... .

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan include an evaluation of the State’s <b>pre-disaster</b> hazard management policies, programs, and capabilities?	Appendix F			
B. Does the <b>new or updated</b> plan include an evaluation of the State’s <b>post-disaster</b> hazard management policies, programs, and capabilities?	Appendix F			
C. Does the <b>new or updated</b> plan include an evaluation of the State’s policies related to <b>development in hazard prone areas</b> ?	Appendix F			
D. Does the <b>new or updated</b> plan include a discussion of State <b>funding capabilities</b> for hazard mitigation projects?	Appendix F			
<b>E. Does the updated plan address any hazard management capabilities of the State that have changed since</b>	Appendix F Appendix L			

<a href="#">approval of the previous plan?</a>			
<b>SUMMARY SCORE</b>			

**Local Capability Assessment**

**Requirement §201.4(c)(3)(ii):** *[The State mitigation strategy shall include] a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan present a general description of the local mitigation policies, programs, and capabilities?	Appendix G Appendix F Section 4-3 (Pg 4-20)			
B. Does the <b>new or updated</b> plan provide a general analysis of the effectiveness of local mitigation policies, programs, and capabilities?	Appendix G Appendix F Section 4-3 (Pg 4-20)			
<b>SUMMARY SCORE</b>				

**Mitigation Actions**

**Requirement §201.4(c)(3)(iii):** *[State plans shall include an] identification, evaluation, and prioritization of cost-effective, environmentally sound, and technically feasible mitigation actions and activities the State is considering and an explanation of how each activity contributes to the overall mitigation strategy. This section should be linked to local plans, where specific local actions and projects are identified.*

**Requirement §201.4(d):** *Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities...*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan identify cost-effective, environmentally sound, and technically feasible mitigation actions and activities the State is considering?	Section 4-2 (Pg 4-5), Appendix H.			
B. Does the <b>new or updated</b> plan evaluate these actions and activities?	Section 4.1.2 (Pg 4-5), Section 4.2 (Pg 4-6) Appendix H.			
C. Does the <b>new or updated</b> plan prioritize these actions and activities?	Section 4.1.2 (Pg 4-5), Section 4.2 (Pg 4-6) Appendix H.			

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D. Does the <b>new or updated</b> plan explain how each activity contributes to the overall State mitigation strategy?	Section 4.1.2 (Pg 4-5), Section 4.2 (Pg 4-6) Appendix H.			
E. Does the mitigation strategy <b>in the new or updated</b> section reflect actions and projects identified in local plans?	Section 4.3 (Pg 4-20), Chapter 5	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>		
<b>SUMMARY SCORE</b>				

**Funding Sources**

**Requirement §201.4(c)(3)(iv):** [The State mitigation strategy **shall** include an] identification of current and potential sources of Federal, State, local, or private funding to implement mitigation activities.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan identify <b>current</b> sources of Federal, State, local, or private funding to implement mitigation activities?	Section 4.2 (Pg 4-6), Appendix F			
B. Does the <b>new or updated</b> plan identify <b>potential</b> sources of Federal, State, local, or private funding to implement mitigation activities?	Section 4.2 (Pg 4-6), Appendix F			
<b>C. Does the updated plan identify the sources of mitigation funding used to implement activities in the mitigation strategy since approval of the previous plan?</b>	Section 4.2 (Pg 4-6), Appendix F			
<b>SUMMARY SCORE</b>				

**COORDINATION OF LOCAL MITIGATION PLANNING**

**Local Funding and Technical Assistance**

*Requirement §201.4(c)(4)(i): [The section on the Coordination of Local Mitigation Planning **must** include a] description of the State process to support, through funding and technical assistance, the development of local mitigation plans.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan provide a description of the State process to support, through funding and technical assistance, the development of local mitigation plans?	Section 5.1 (Pg. 5-1)			
B. Does the <b>updated plan describe the funding and technical assistance the State has provided in the past three years to assist local jurisdictions in completing approvable mitigation plans?</b>	Section 5.1 (Pg. 5-1)			
<b>SUMMARY SCORE</b>				

**Local Plan Integration**

*Requirement §201.4(c)(4)(ii): [The section on the Coordination of Local Mitigation Planning **must** include a] description of the State process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan.*

*Requirement §201.4(d): **Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities...***

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan provide a description of the <b>process and timeframe</b> the State established to <b>review</b> local plans?	Section 5.3 (Pg. 5-10)			
B. Does the <b>new or updated</b> plan provide a description of the <b>process and timeframe</b> the State established to <b>coordinate and link</b> local plans to the State Mitigation Plan?	Section 5.3 (Pg 5-12)			
<b>SUMMARY SCORE</b>				

**Prioritizing Local Assistance**

**Requirement §201.4(c)(4)(iii):** [The section on the Coordination of Local Mitigation Planning **must** include] criteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs, which **should** include consideration for communities with the highest risks, repetitive loss properties, and most intense development pressures.

Further, that for non-planning grants, a principal criterion for prioritizing grants **shall** be the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated costs.

**Requirement §201.4(d):** Plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities...

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan provide a description of the criteria for prioritizing those communities and local jurisdictions that would receive planning and project grants under available mitigation funding programs?	Section 5.1.1 (Pg. 5-3), Appendix L			
B. <b>For the new or updated plan, do</b> the prioritization criteria include, for non-planning grants, the consideration of the extent to which benefits are maximized according to a cost benefit review of proposed projects and their associated cost?	Section 5.1.1 (Pg. 5-3),			
C. <b>For the new or updated plan, do</b> the criteria include considerations for communities with the highest risk?	Section 5.1.1 (Pg. 5-3),	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>		
D. <b>For the new or updated plan, do</b> the criteria include considerations for repetitive loss properties?	Section 5.1.1 (Pg. 5-3),	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>		
E. <b>For the new or updated plan, do</b> the criteria include considerations for communities with the most intense development pressures?	Section 5.1.1 (Pg. 5-3),	<i>Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.</i>		
<b>SUMMARY SCORE</b>				

**PLAN MAINTENANCE PROCESS**

**Monitoring, Evaluating, and Updating the Plan Requirement §201.4(c)(5)(i):** *[The Standard State Plan Maintenance Process **must** include an] established method and schedule for monitoring, evaluating, and updating the plan.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe the method and schedule for monitoring the plan? (e.g., identifies the party responsible for <b>monitoring</b> , includes schedule for reports, site visits, phone calls, and/or meetings)	Section 6.1.3 (Pg 6-1)			
B. Does the <b>new or updated</b> plan describe the method and schedule for <b>evaluating</b> the plan? (e.g., identifies the party responsible for evaluating the plan, includes the criteria used to evaluate the plan)	Section 6.1.3 (Pg 6-4)			
C. Does the <b>new or updated</b> plan describe the method and schedule for <b>updating</b> the plan?	Section 6.1.3 (Pg 6-4)			
<b>D. Does the updated plan include an analysis of whether the previously approved plan's method and schedule worked, and what elements or processes, if any, were changed?</b>	Section 6.1.3 (Pg 6-4), Section 6.1.4 (Pg 6-6)			
<b>SUMMARY SCORE</b>				

**Monitoring Progress of Mitigation Activities Requirement §201.4(c)(5)(ii):** *[The Standard State Plan Maintenance Process **must** include a] system for monitoring implementation of mitigation measures and project closeouts. Requirement §201.4(c)(5)(iii):* *[The Standard State Plan Maintenance Process **must** include a] system for reviewing progress on achieving goals as well as activities and projects in the Mitigation Strategy.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the <b>new or updated</b> plan describe how mitigation measures and project closeouts will be monitored?	Section 6.1.6 (Pg 6-5)			
B. Does the <b>new or updated</b> plan identify a system for reviewing progress on achieving goals in the Mitigation Strategy?	Section 6.1.1 (Pg 6-3)			
<b>C. Does the updated plan describe any modifications, if any, to the system identified in the previously approved plan to track the initiation, status, and completion of mitigation activities?</b>	Section 6.1 (Pg 6)			
D. Does the <b>new or updated</b> plan identify a system for reviewing progress on implementing activities and projects of the Mitigation Strategy?	Section 6.1.1 (Pg 6-3), Section 6.1.2 (Pg 6-4)			
<b>E. Does the updated plan discuss if mitigation actions were implemented as planned?</b>	Appendix H	<i>Note: Related to §201.4 (c)(3)(iii)</i>		



State: West Virginia

Date of Plan:

SUMMARY SCORE

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**SEVERE REPETITIVE LOSS STRATEGY** (*only required for 90/10 under FMA & SRL*)

**Repetitive Loss Mitigation Strategy**

**Requirement §201.4(c)(3)(v):** A State may request the reduced cost share authorized under §79.4(c)(2) of this chapter for the FMA and SRL programs, if it has an approved State Mitigation Plan ... that also identifies specific actions the State has taken to reduce the number of repetitive loss properties (which **must** include severe repetitive loss properties), and specifies how the State intends to reduce the number of such repetitive loss properties.

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Does the new or updated plan describe State mitigation goals that support the selection of mitigation activities for repetitive loss properties (see also Part 201.4(c)(3)(i))?	Section 3.7.5 (Pg 3-79), Section 4.2 (Pg 4-6), Section 4.3 (Pg 4-20) Appendix F	<i>[Note: Only required for SRL 90/10 under FMA &amp; SRL]</i>		
B. Does the new or updated plan consider repetitive loss properties in its evaluation of the State's hazard management policies, programs, and capabilities and its general description of the local mitigation capabilities (see also Part 201.4(c)(3)(ii))?	Section 3.7.5 (Pg 3-79), Section 4.3 (Pg 4-20) Appendix F	<i>[Note: Only required for SRL 90/10 under FMA &amp; SRL]</i>		
C. Does the new or updated plan address repetitive loss properties in its risk assessment (see also Part 201.4(c)(2))?	Section 3.7.5 (Pg 3-79)	<i>[Note: Only required for SRL 90/10 under FMA &amp; SRL]</i>		
D. Does the new or updated plan identify, evaluate and prioritize cost-effective, environmentally sound, and technically feasible mitigation actions for repetitive loss properties (see also Part 201.4(c)(3)(iii))?	Section 4.2 (Pg 4-6), Section 4.3 (Pg 4-20)	<i>[Note: Only required for SRL 90/10 under FMA &amp; SRL]</i>		
E. Does the new or updated plan describe specific actions that have been implemented to mitigate repetitive loss properties, including actions taken to reduce the number of severe repetitive loss properties?	Section 4.2 (Pg 4-6), Section 4.3 (Pg 4-20)	<i>[Note: Only required for SRL 90/10 under FMA &amp; SRL]</i>		
F. Does the new or updated plan identify current and potential sources of Federal, State, local, or private funding to implement mitigation activities for repetitive loss properties (see also Part 201.4(c)(3)(iv))?	Appendix F	<i>[Note: Only required for SRL 90/10 under FMA &amp; SRL]</i>		
<b>SUMMARY SCORE</b>				

**Coordination with Repetitive Loss Jurisdictions**

*Requirement §201.4(c)(3)(v): In addition, the plan **must** describe the strategy the State has to ensure that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including the development of local mitigation plans.*

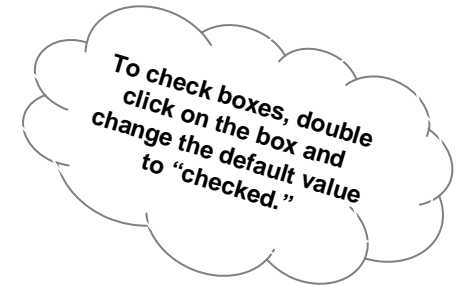
Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan provide a description of the State process to support, through funding and technical assistance, the development of local mitigation plans in communities with severe repetitive loss properties (see also Part 201.4(c)(4)(i))?	Section 4.3 (Pg 4-20)	[Note: Only required for SRL 90/10 under FMA & SRL]		
B. Does the new or updated plan include considerations for repetitive loss properties in its criteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available mitigation funding programs (see also Part 201.4(c)(3)(iii))?	Section 4.3 (Pg 4-20) Section 5.1.2 (Pg 5-3)	[Note: Only required for SRL 90/10 under FMA & SRL]		
<b>SUMMARY SCORE</b>				

**Matrix A: Profiling Hazards**

This matrix can assist FEMA in scoring each hazard. States may find the matrix useful to ensure that their plan addresses each natural hazard that can affect the State. **Completing the matrix is not required.**

*Note: First, check which hazards are identified in requirement §201.4(c)(2)(i). Then, place a checkmark in either the N or S box for each applicable hazard. An “N” for any element of any identified hazard will result in a “Needs Improvement” score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*

Hazard Type	Hazards Identified Per Requirement §201.4(c)(2)(i)	A. Location		B. Previous Occurrences		C. Probability of Future Events	
	Yes	N	S	N	S	N	S
Avalanche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dam Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Earthquake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expansive Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extreme Heat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hailstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hurricane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land Subsidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Levee Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe Winter Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tornado	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tsunami	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Volcano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Windstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**Legend:**

§201.4(c)(2)(i) Profiling Hazards

A. Does the risk assessment identify the location (i.e., geographic area affected) of each natural hazard addressed in the **new or updated** plan?

B. Does the plan provide information on previous occurrences of each hazard addressed in the **new or updated** plan?

C. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the **new or updated** plan?

**Matrix B: Assessing Vulnerability**

This matrix can assist FEMA in scoring each hazard. States may find the matrix useful to ensure that their plan addresses each requirement. Note that this matrix only includes items for Requirements §201.4(c)(2)(ii) and §201.4(c)(2)(iii) that are related to specific natural hazards that can affect the State. **Completing the matrix is not required.**

*Note: First, check which hazards are identified in requirement §201.4(c)(2)(i). Then, place a checkmark in either the N or S box for each applicable hazard. An “N” for any element of any identified hazard will result in a “Needs Improvement” score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*



Hazard Type	Hazards Identified Per Requirement §201.4(c)(2)(i)	1. Vulnerability by Jurisdiction		2. Vulnerability to State Facilities		3. Loss Estimate by Jurisdiction		4. Loss Estimate of State Facilities	
	Yes	N	S	N	S	N	S	N	S
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avalanche	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dam Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Earthquake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Expansive Soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extreme Heat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hailstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hurricane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land Subsidence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Levee Failure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe Winter Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tornado	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tsunami	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Volcano	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Windstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Legend**

- §201.4(c)(2)(ii) Assessing Vulnerability by Jurisdiction (see element B)
  1. Does the **new or updated** plan describe the State’s vulnerability in terms of the jurisdictions most threatened and most vulnerable to damage and loss associated with hazard event(s)?
- §201.4(c)(2)(ii) Assessing Vulnerability to State Facilities (see element A)
  2. Does the **new or updated** plan describe the types of State owned or operated critical facilities located in the identified hazard areas?

- §201.4(c)(2)(iii) Estimating Potential Losses by Jurisdiction (see element A)
  3. Does the **new or updated** plan present an overview and analysis of the potential losses to the identified vulnerable structures?
- §201.4(c)(2)(iii) Estimating Potential Losses of State Facilities (see element A)
  4. Does the **new or updated** plan present an estimate of the potential dollar losses to State owned or operated buildings, infrastructure, and critical facilities in the identified hazard areas?





## APPENDIX L: WV 404 ADMINISTRATIVE PLAN

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STATE OF WEST VIRGINIA  
ADMINISTRATIVE PLAN  
FOR THE  
HAZARD MITIGATION GRANT PROGRAM  
FEMA-DR-4093-WV

Revised 12/10/2012

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## **I. INTRODUCTION**

Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 100-707) was enacted on November 23, 1988, thereby establishing the Hazard Mitigation Grant Program (HMGP). The HMGP program is used to fund State and local post-disaster mitigation measures, pre- and post-disaster planning, and initiative projects.

## **II. PURPOSE**

On February 20, 2002, Section 404 of the Hazard Mitigation and Relocation Act was revised and amended by the President. Revisions included a decrease in the amount of HMGP funds available resulting from a Presidentially Declared Disaster to 7.5% of the eligible costs of the disaster. In September 2006, the available funding from a Presidentially Declared Disaster was returned to the previous 15%. HMGP project awards may be funded after removing any programmatic and administrative costs. This Administrative Plan has been revised to reflect, and expand upon these, and other, recent changes.

The plan sets forth the organization, staffing and administrative procedures for implementing the Hazard Mitigation Grant Program to be followed by the State of West Virginia.

## **III. AUTHORITIES AND REFERENCES**

### **A. Federal**

1. Public Law 93-288, the Robert T. Stafford Disaster Relief and Emergency Assistance Act.
2. 44 CFR 206, Federal Disaster Assistance Act for Disasters Declared on or After November 23, 1988.





3. 44 CFR 201, Mitigation Planning
4. 44 CFR, Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments, Sub-part C – Post-Award Requirements, Section 13.23 and 13.33.
5. 44 CFR, Part 9, Executive Order 11988, Floodplain Management and Executive Order 11990, Protection of Wetlands.
6. 44 CFR Part 10, Environmental Considerations. 44 CFR, Part 9, Executive Order 11988, Floodplain Management and Executive Order 11990, Protection of Wetland.
7. 44 CFR, Part 13, Uniform Administrative Requires for Grants and Cooperative Agreements to States and Local Governments.
8. 44 CFR Part 14, Administration of Grants: Audits of State and Local Governments
9. Executive Order 12612, Federalism

#### B. State

1. West Virginia Code, Chapter 15, Article 5
2. West Virginia Hazard Mitigation Grant Program and Flood Mitigation Assistance Program Handbook for Local Communities.
3. West Virginia Statewide All Hazards Mitigation Plan (also known as the Section 322 Plan).

### IV. DEFINITIONS

1. Applicant: A State agency, local government, or eligible private nonprofit organization, as defined in 44 CFR 206, Subpart H, submitting an application to the Mitigation and Recovery Division, West Virginia Division of Homeland Security and Emergency Management for assistance under the Hazard Mitigation Grant Program.
2. Intent to Apply: The initial request for Section 404 funding, to be submitted to FEMA by the State, within 15 days of the declaration. Standard Form 424 and accompanying assurance documents are used for this purpose.
3. Application: Defined as sub-grantee's formal application.
4. Grantee: The unit of government to which the grant is awarded and which is accountable for the use of funds provided. For the purposes of this program, the State is the grantee.
5. Subgrantee: The government or other legal entity to which a sub-grant is awarded and which is accountable to the



- grantee for the use of funds provided. Subgrantees can be a State agency, local government, private non-profit organization, or other entity as outlined in 44 CFR 206.434.
6. Notice of Intent (NOI): Pre-application form, sent to the State Hazard Mitigation Office declaring the community's intention to submit an HMGP application. The NOI describes the type of project; its location, total number of families/individuals affected by the proposed project, and gives an estimate of the total project costs.
  7. Hazard Mitigation Data Collection Team: Utilizing an enhanced data collection effort, structures affected during a Presidentially Declared disaster with mitigation potential will be catalogued by FEMA. This data collection will be accomplished through a review of the preliminary damage assessment (PDA), coordination and survey of state and local officials, and site visits by FEMA staff. The resulting product will be compiled in a report including photographs, maps, and available details organized by county and sub-organized by community. The report will also address repetitive loss and destroyed structures within the declared counties.
  8. Measures: Any mitigation measure, project, or action proposed to reduce, or, where possible, eliminate, risk of future damage, hardship, loss or suffering from disasters.
  9. Project: Any proposal approved for funding and given a unique accounting number (i.e. FEMA-9999-DR-WV-0000).
  10. Flood Insurance Rate Map (FIRM): An official map of a community on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.
  11. Post-FIRM: Construction or substantial improvement that started on or after the effective date of the initial Flood Insurance Rate Map of the community or after December 23, 1974, whichever is later.
  12. Secondary Residence: A property that is not the primary residence of a participant (i.e. summer cabin or a residence where the property owner does not live more than 6 months of the year).
  13. Project Officer: An individual highly trained in mitigation that is the primary contact between the community's Project Manager and the State Hazard Mitigation Officer.
  14. Program Specialist: An individual familiar with the aspects of hazard mitigation and floodplain management, but does not serve in a coordination/collaboration role. May include support, technology and administrative staff.



15. Lock-In: The amount of management funds available to a grantee for a particular major disaster declaration, as FEMA determines at 6 months and 12 months.
16. Pass-Through Funds: The percentage or amount of management costs that the grantee determines it will make available to sub-grantees.
  
17. State Organization:
  1. Governor
  2. Governor's Authorized Representative (GAR)
  3. WVDHSEM Administrative and Technical Staff:
    - Director, WVDHSEM;
    - Division Director;
    - State Hazard Mitigation Officer;
    - State Hazard Mitigation Planner;
    - Project Officer(s);
    - Program Specialist(s);

## V. DECLARATION PROCESS

1. Following a major disaster event, the Governor of the State may seek Federal Assistance by requesting a Presidential Declaration when the recovery process is beyond the capacity of the State and local capabilities and resources.
2. The Presidential Declaration applies to specific counties and communities in the State; however, the opportunity to participate in an HMGP application is open statewide.
3. The State must provide a Letter of Intent within 15 days after the disaster declaration that tells FEMA whether or not the State will participate in HMGP. If the Governor asks for HMGP in the declaration request, this requirement is satisfied. The 15-day Letter of Intent deadline may be extended should the Regional Administrator determine the extension, submitted in writing, is justified. (Sample Letter of Intent may be found in Appendix)



## F.1.1 VI. RESPONSIBILITIES

### A. FEMA Responsibilities

1. The FEMA Regional Administrator is responsible for:
  - Overseeing all pre- and post-disaster hazard mitigation programs and activities.
  - Assisting the State in setting priorities for the use of HMGP funds in the aftermath of a disaster.
  - Approving or denying applications for funding submitted by the State.
  
2. The FEMA Regional Mitigation staff serves as the point of contact for the State Hazard Mitigation Officer. FEMA Regional Mitigation staff members are responsible for:
  - ❖ Keeping the State apprised of the anticipated amount of available funding.
  - ❖ Assist the State Hazard Mitigation Planning Staff to ensure plans are current and assistance with plans that are expired.
  - ❖ Reviewing and evaluating submitted applications or project summaries and the State's determination of eligibility.
  - ❖ Coordinating with the Regional Environmental Officers to prepare environmental decision documents based on information submitted by the applicant and State.
  - ❖ Obtaining clearances from the State Historic Preservation Office.
  - ❖ Notifying the State in writing of application decisions.
  - ❖ Assisting the State with the identification of appropriate projects.
  - ❖ Assisting with project applications, specifically environmental, planning and floodplain management considerations and project cost-effectiveness.
  - ❖ Providing technical information from appropriate experts, as necessary.
  - ❖ Appoints a Federal Hazard Mitigation Officer for each Presidentially Declared disaster to manage



- and monitor hazard mitigation programs and activities.
- ❖ Provides technical assistance to the State government in fulfilling mitigation responsibilities.
  - ❖ Conduct's periodic review of the State Hazard Mitigation activities and programs to ensure that the State is adequately prepared to meet their responsibilities.
  - ❖ Assist the State in the identification of appropriate mitigation actions.
  - ❖ After a Presidential Declaration, follow up with the State government to ensure that mitigation commitments are fulfilled, and take action when necessary, including recovery of funds or denial of future funds, if mitigation commitments are not fulfilled.
  - ❖ After a Presidential Declaration, FEMA will provide the State with a Hazard Mitigation Data Collection Team. This data collection team shall prepare and distribute to the State a report on opportunities related to the disaster in accordance with FEMA policies and procedures.
  - ❖ Assist the State hazard mitigation planning staff to ensure plans are current, or provide assistance with updates.
  - ❖ The opportunities report is due to be delivered to the State Hazard Mitigation Officer 180 days after the date of the disaster. The Regional Administrator has the authority to extend this due date when appropriate.
  - ❖ Depending on availability, FEMA may provide technical assistance by assigning personnel to the State for a period to be determined by FEMA and the State. The Director, West Virginia Division of Homeland Security and Emergency Management, will make requests for supplemental FEMA mitigation personnel.



## B. State Responsibilities

- The West Virginia Division of Homeland Security and Emergency Management shall be the Grantee to which funds are awarded and will be accountable for those funds. The State has primary responsibility for project management, accountability of funds, and program administration.
- The State is responsible for ensuring that applicants and sub-grantees adhere to all program and administrative requirements including 44 CFR §13, 206, and 201.6.
- The State will have an Administrative Plan (404 Plan), and a State Standard All-Hazard Mitigation Plan (322 Plan) approved by the Regional Administrator.
- The State will determine priorities for funding in compliance with CFR 206.435.
- The State Hazard Mitigation Officer, Tim Keaton serves as the responsible individual for all matters related to the Hazard Mitigation Grant Program.
- The State will deliver to FEMA the State's 404 Administrative Plan within 180 days of the date of the disaster declaration.
- The State will have the 404 plan included as an annex and referenced in the State Emergency Operations Plan (EOP) within one year from the date of this revision.
- The State will make every effort to have sufficient staff to:
  - ❖ Provide a post-disaster mitigation strategy.
  - ❖ Provide applicants with technical assistance on mitigation techniques and HMGP policies and procedures.
  - ❖ Provide applicants with assistance in completing their HMGP Applications.
  - ❖ Understand the National Environmental Policy Act and related Federal environmental requirements.
  - ❖ Complete other required major tasks and activities required under the Hazard Mitigation Grant Program.



### C. Local Responsibilities

- A local unit of government is generally the subgrantee to which Hazard Mitigation Grant Program funds are awarded and shall be accountable for the use of these funds.
- The subgrantee shall have primary responsibility for managing the implementation and administration of the Hazard Mitigation Grant Program project.
- Complies with HMGP requirements, grants management procedures in 44 CFR Part 13 and 206, the grant agreement, and applicable Federal, State and local laws and standards.
- Accounts for the appropriate use of grant funds awarded to the grantee. Prepares and distributes financial reports to all appropriate parties as required by the Single Audit Act.
- Should the subgrantee lack the capacity to manage the day-to-day operation of the HMGP project, a qualified entity may be retained to manage the project. Applying for project management funds to compensate project management assistance outside the local government or agency must be approved by the State Hazard Mitigation Officer (SHMO).
- Maintains records on the program and projects as required by 44 CFR 13.42.

## F.2 VII. FUNDING

1. The amount of money available for HMGP projects following a Presidentially declared disaster is 15% of the total cost of the disaster. A standard Section 322 plan is required as of November 01, 2004.
2. An enhanced Section 322 State plan provides an opportunity to increase the HMGP to 20%.
3. Up to 7% may be set aside for mitigation planning purposes. Up to 5% of the total HMGP funds may be set aside by the State to fund mitigation measures that are difficult to evaluate against traditional program cost-effectiveness criteria.
4. Costs for HMGP Projects will be shared 75% FEMA and 25% State.
5. Management Costs shall be kept at the State level with no pass-through unless legitimate funding requests are received from local units of government, and will be allocated up to three percent (3%) of



the total project budget, as can be justified and documented by the local units of government.

6. Other funding sources include: Housing and Urban Development, United States Army Corps of Engineers, Natural Resources Conservation Service, Small Business Administration, Increased Cost of Compliance, Pre-Disaster Mitigation, Disaster Housing Program, Other Needs Assistance Grant Program, Infrastructure Grant Program.

### F.3

### F.4 VIII. STAFFING

#### A. State

1. Governor's Authorized Representative (GAR): Generally, the GAR is the Director, West Virginia Division of Homeland Security and Emergency Management.
2. The position of GAR is not static and, at the will and pleasure of the Governor, may alternate from disaster to disaster.

#### B. West Virginia Division of Homeland Security and Emergency Management (WVDHSEM):

3. Director, Mitigation and Recovery Division
4. State Hazard Mitigation Officer (SHMO)
5. State Hazard Mitigation Planner
6. State National Flood Insurance Program Coordinator
7. National Flood Insurance Program Assistant
8. State Hazard Mitigation Grant Program Project Officers: The State may also employ contractors who are, or may be, trained as HMGP Project Officers. Additionally, personnel may be assigned by FEMA.

#### B. Local

1. Project Development Team: Individuals qualified to assess and select the most appropriate properties to include in the HMGP Application, using the areas of interest, requirements and priorities outlined in the Notice of Intent letter, distributed to local units of government, following a Presidentially Declared Disaster. The team should include an individual, or individuals, qualified to complete the Hazard Mitigation Grant Program Application.
2. Authorized Agent: the individual authorized to act on behalf of the community receiving an HMGP project. The Authorized





Agent has the responsibility to ensure the successful completion of the project.

3. Project Manager: a qualified individual who will oversee the HMGP project, maintain necessary records and files, act as liaison with the local unit of government, the State Hazard Mitigation Office, project participants, contractors and professionals; i.e. attorneys
4. Such clerical staff as is available to the project.

## IX. IDENTIFICATION AND NOTIFICATION OF POTENTIAL HMGP APPLICANTS

### A. Identification

1. Potential projects may be identified utilizing:
  - a. Areas identified in local all-hazard mitigation plans.
  - b. Items identified in the State of West Virginia's All-Hazards Mitigation Plan that supports the State's identified goals and/or are determined to provide the most benefit to an area.
  - c. The preliminary damage assessment.
  - d. The HMGP Data Collection team report.
  - e. Previously submitted, unfunded HMGP applications.
  - f. State agency personnel and local governments involved in the development of the Section 322 Plan may provide further mitigation possibilities and applicants.
2. The State Hazard Mitigation Officer will prepare strategy paper to summarize and prioritize data collection /public information efforts.

### B. Notification

1. Public Notices such as newspaper ads, fliers, radio/TV announcements.
2. Community briefings that will be attended by State Hazard Mitigation Staff to provide information on the Section 404 program.
3. Following a Presidentially Declared Disaster, the State will notify all local units of government, including municipalities and counties, in all fifty-five counties of the State, within 60 days, of the availability of funds for



HMGP projects. Note: The Regional Administrator may grant an extension, submitted in writing, should an extension be justified.

4. Such notification shall be by Letter of Intent with a *Notice of Intent* (Pre- Application for Hazard Mitigation Grant Program form) enclosed. Included in the Notice of Intent letter to communities are listed the State and FEMA areas of interest, the requirements for meeting these goals and the State's priorities for the selection of applications.
5. The deadline for submitting a community's Notice of Intent (NOI) is clearly stated in the letter. NOI's received after this deadline will not be considered.
6. After all the NOI's are received, the State will compile a list of communities submitting NOI's, along with the number of properties and the approximate amount of funding requested. This information will be forwarded to FEMA, Region III.
7. The State Hazard Mitigation Officer, during development of the application, will offer technical assistance, when available, to each community.
8. An HMGP Workshop may be offered to communities to enhance attendee's knowledge for completion of the HMGP Application. An interest form is included with the NOI letter to determine if there is sufficient interest.
9. If there be sufficient interest in the HMGP Application workshop, the one day workshop should be held in a location most central to the disaster area. Traditionally, with the approval of the WVDHSEM Director, motel, meal and transportation costs have been paid by WVDHSEM to one community representative, preferably the individual who will be most involved in completing the application.

## X. APPLICANTS' ELIGIBILITY REQUIREMENTS

### F.5

#### A. Minimum Requirements

1. Have an approved all-hazards mitigation plan (322 plan).
2. Be a State or local unit of government, or
3. Native American Tribe, or
4. Certain non-profit organizations or institutions that own or operate a private non-profit facility as defined in 44 CFR 206.221 (e), and



5. Be in a community participating in, and in good standing with, the National Flood Insurance Program.
6. Possess the ability to develop the HMGP Application and, if funded, the ability to administer the project, possibly with assistance.

#### B. Additional Applicant Requirements

1. Have the support of the local unit of government and of the community.
2. Meet applicable State and local permit requirements.
3. Have, and enforce, an approved Floodplain Ordinance.
4. Discourage inappropriate development in the floodplain or other identified hazardous areas.

### XI. CRITERIA FOR PROJECT ELIGIBILITY

1. Conforms to State and Local Hazard Mitigation Plan. (Section 322)
2. Provides beneficial impact upon the at risk area.
3. Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.
4. Conforms with environmental laws and regulations. Be in conformance with 44 CFR Part 9, Floodplain Management and Protection of Wetlands, and 44 CFR Part 10, Environmental.
5. Solves a problem independently or constitutes a functionally independent portion of a solution.
6. Is cost-effective. Will not cost more than the anticipated value of the reduction in damages to the area if future disasters were to occur. (Meets benefits vs. costs).
7. Meets all applicable State and local permit requirements.
8. Constitutes a practical, effective and environmentally sound proposal.
9. Contributes, to the extent practicable, to a permanent or long-term solution to the problem it is intended to address, rather than temporary or short-term.
10. Addresses the problems of floodway, repetitively and substantially damaged structures. Specifically, the State's areas of interest are:
  - Reduction in damage to structures located in the floodway.
  - Reduction in damage to repetitive loss structures.



- Reduction in damage to structures considered substantially damaged.
  - Reduction of properties considered severe repetitive loss.
  - Other eligible projects as described in CFR Title 44 Section 206.434 (d)(2)
    - Stream Capacity Restoration Activities
    - Eligible Pilot Projects
11. Adheres to the State's priorities for selection of applications which are:
- Occupied substantially and/or repetitively damaged structures in the floodway.
  - Stream Restoration
  - Occupied substantially and/or repetitively flooded structures in the 100 year floodplain.
  - Occupied substantially damaged and/or repetitively damaged structures in the 500 year floodplain
12. Projects addressing FEMA identified Repetitive Loss structures, Pre-FIRM, or Severe Repetitive Loss construction will be given higher priority.
13. Post-FIRM structures will only be considered if evidence of proper permitting is presented, or, an error on the FIRM is presented and can be proven.

## XII. APPLICATION PROCEDURES

1. Each community submitting a Notice of Intent by the established and published deadline will either be mailed, or provided at the HMGP Workshop, a West Virginia Hazard Mitigation Grant Program and Flood Mitigation Assistant Program Handbook for Local Communities. If available, each community will be offered technical assistance in completing their application by the State Hazard Mitigation Office. Every effort will be made to ensure that such technical assistance is given in a fair and equitable manner to each community requesting assistance.
2. Applications for a Hazard Mitigation Grant Program project must be submitted by the Chief Executive Officer of the responsible governmental entity or private non-profit organization, in person



or be postmarked, to the State Hazard Mitigation Office, on, or before, the designated deadline. No applications will be accepted after the stated deadline...NO EXCEPTIONS. A copy of the HMGP Application is included in the Local Communities Handbook.

3. The Application must be fully completed. Exception: Page 24, *Agency Contracts* will be completed by the State Hazard Mitigation Office and FEMA. In addition to the completed application, the following items must be included for each participant.

- Property Inventory Form
- Statement of Voluntary Participation
- West Virginia Hazardous Material Property Survey
- Tax ticket: S.F.1 PF 12
- Substantial Damage Calculation Form (if appropriate)
- Tax map with property location marked
- FIRM with property location marked
- Photographs

4. Attachments and Enclosures to be included are:

- Local unit of government letter supporting HMGP Application.
- Community letter re: Impact on Low income/Minority Individuals.
- Community letter re: Contamination by Hazardous Materials.
- Community letter re: Compliance with Federal Fair Housing Regulations.
- Topographical Maps.
- Street maps.
- Sign-in sheet(s) from public meeting(s).
- Newspaper public meeting notices and/or other material(s) advertising HMGP meeting(s).
- Newspaper articles related to disaster.
- Photos of damaged areas in the community (as available).
- FIRM(S).
- Letters from environmental agencies. (FEMA/STATE will provide).
- List of potential property substitutions.



5. When submitting an application to FEMA, the State Hazard Mitigation Officer (SHMO) will prepare a project merit package containing:
  - A narrative recommendation, and rationale for project selection.
  - A certification that the project meets all eligibility requirements as listed in Section XI.
  - Any pertinent project management information not contained In the State Administrative Plan.
  - GAR letter submitting recommended project(s) to FEMA.
  
6. Environmental review data shall be included for each project enabling FEMA to conduct an environmental review in accordance with HMA Guidance 2010 Part V A.4.  
The State will ensure the following:
  - a. Each property has a fully completed West Virginia Hazardous Materials Survey
  - b. Photographic imagery necessary to determine historic preservation recordation eligibility.
  - c. Provide FEMA all documentation necessary to comply with the National Environmental Policy Act (NEPA)
  
7. Benefit-cost analyses shall be performed in accordance with FEMA guidelines as outlined in HMA Guidance 2010 Part III D.3 using FEMA's BCA toolkit 4.5.5 and best available data.
  
8. Obtaining clearances from the State Historic Preservation Office shall be the responsibility of FEMA.
  
9. A project should be of the nature that work can begin within ninety days of receipt of notice of approval and be completed within one to three years, depending on the complexity of the project.

### XIII. REVIEW, RANKING, SELECTION AND SUBMISSION OF PROJECTS

1. After receipt of the applications, HMGP staff will review each application for completeness. Should an application need additional information, HMGP staff will inform the applicant. Assistance in obtaining necessary information, forms, etc. will again be offered to the applicant. A deadline for submitting the updated application will be set by the State Hazard Mitigation Officer (SHMO).
2. All applications shall be reviewed by a committee consisting of the State Hazard Mitigation Officer (SHMO) and staff from the Mitigation section of



- the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM) for ranking and selection.
3. Ranking shall be accomplished based on the following criteria:
    - Benefit Cost
    - Technical feasibility
    - Local planning criteria
    - Compliance with priorities identified in the State Hazard Mitigation Plan and local mitigation plans
    - Compliance with National Flood Insurance Program regulations
  4. The committee will rank the projects and submit projects, up to the limit of available funding, to the Governor for final selection. An oversubscription list may be provided for substitution at the time of application submittal. Such oversubscription must contain all data required for eligibility at the time of submission.
  5. The State Hazard Mitigation Officer (SHMO) will determine if the selected projects are eligible for the standard or 5% Initiative funding, and if so designate the application accordingly.
  6. Following the Governor's approval, the application(s) will be submitted to FEMA, Region III, utilizing National Emergency Management Information System (NEMIS). Paper copies of the application(s) will also be submitted to FEMA.
  7. Applications must be submitted to FEMA within 12 months following date of declaration.
  8. Projects not submitted to FEMA will be retained by the State Hazard Mitigation Officer (SHMO) in the event additional funding becomes available. Applicants will be notified, in writing, if their project is not selected for funding.
  9. Final approval of the selected project(s) is the responsibility of FEMA.

#### XIV. NOTIFICATION OF PROJECT APPROVAL

1. Upon notification from FEMA of their decision on selected projects, the State Hazard Mitigation Officer will notify applicant that their project has been:

- A. Approved:

- Upon approval of application by FEMA, the sub-grantee will be provided with a copy of FEMA's Record of Environmental Consideration, a copy of FEMA's Financial Obligation Report and a letter from FEMA informing the applicant of the approval.



- The sub-grantee is provided a prepared West Virginia Division of Homeland Security and Emergency Management Assurances and Certification Agreement. This document details the duties and responsibilities of the sub-grantee. Article 14 informs the subgrantee of the Single Audit Act of 1984 requirements.
- No funds may be released to the subgrantee until the document referred to above has been signed and received by the WVDHSEM.
- There will be a face-to-face meeting between the HMGP Project Officer assigned to the project and the subgrantee project manager to inform the project manager of duties and responsibilities associated with the implementation and administration of the project.
- Provide the project manager with a diskette containing all necessary forms.
- Offer continued technical assistance from the State Hazard Mitigation Office.

B. Not approved: The State Hazard Mitigation Officer (SHMO) will inform applicants, in writing, those whose applications have not been approved and the reasons for not being approved. Applicant will be advised of the appeal process.

## XV. APPEALS

1. Applicants with projects not approved by FEMA will be notified by the State Hazard Mitigation Officer and advised of the following appeal process:
  - a. An eligible applicant, or the State, may appeal, in writing, any FEMA decision regarding an unapproved application.
  - b. The appeal should contain documentation that justifies the request for reconsideration.
  - c. The appeal will be submitted to the State Hazard Mitigation Officer (SHMO), in writing within 60 days of the applicant's receipt of FEMA's denial decision.
  
2. Two levels of appeal:
  - First appeal - Regional Administrator





Second appeal – Associate Director for Mitigation, FEMA  
Headquarters

3. The State's Hazard Mitigation Officer will forward any applicant's appeal, with the State's written recommendation, to the Regional Administrator within 60 days of receipt from the applicant.
4. The Regional Administrator will notify the State, in writing, within 90 days following FEMA's receipt of an appeal, of their appeal decision.
5. If additional information, or technical evaluation, is needed in order to make a decision, the Regional Administrator, or Associate Director, will request the information through the State Hazard Mitigation Officer (SHMO).
6. FEMA will provide its decision on the appeal to the State in writing. If the decision is to grant the appeal, the Regional Administrator will advise the State Hazard Mitigation Officer (SHMO) and take any appropriate action at the Regional level.
7. The State will notify the entity making the appeal of the decision within 10 days of notification by FEMA.

## XVI. PROJECT IMPLEMENTATION

- The State Hazard Mitigation Officer will verify the status of local plans and oversee the implementation of HMGP projects. Projects will be monitored by site visits, updates via telephone, meetings and progress reports.
- The HMGP will be administered in an equitable and impartial manner in compliance with section 308 of the Stafford Act and Title VI of the 1964 Civil Rights Act.
- The State and subgrantee(s) will avoid conflict of interest and will comply with procurement guidelines of 44 CFR 13.36.
- The subgrantee is responsible for maintaining the project after the initial implementation.
- The subgrantee will implement any environmental or historical preservation mitigation actions required in relation to the project's approval.



- HMGP funds may not be used to purchase contaminated property. The owner, prior to purchase, must remove all hazardous materials and containers.
- When the project is implemented, Flood Insurance must cover any structures not being demolished or relocated outside of the Special Flood Hazard Area throughout the life of the property, regardless of ownership. The amount of insurance is to be equal to the cost of implementing the property mitigation measure, adjusted annually for inflation.
- Alterations to existing structures will:
  - ❖ Comply with all applicable State and local codes and ordinances.
  - ❖ Comply with floodplain management standards outlined in 44 CFR Part 9 and 60.0.
- The State of West Virginia requires that any work performed that is funded with public monies (federal, state, or local) must comply with the Davis-Bacon Act of 1931. This applies to all project related work. Therefore mitigation projects approved by FEMA are **not** exempt from prevailing wage requirements.
- FEMA, the grantee and subgrantee will avoid Duplication of Benefits (DOB's) between the HMGP and any other form of assistance. DOB's are deducted from the Fair Market Value purchase price on structures where the pre-event FMV purchase value is used. If, however, the owner has receipts proving that the grants were used for structural repairs, or cleanup, no deductions are required. For post event-FMV, DOB's are not calculated.

DOB's that may be deducted from the Fair Market Value include:

- U.S. Small Business Administration loans: such loans must be either repaid or rolled over at closing.
- Flood Insurance payments, minimal repair grants, other needs assistance Grants that were awarded for the purpose of making repairs to a structure after the Fair Market date when the pre-FMV is used.
- If the owner used any grant for purposes other than stipulated, i.e. made a mortgage payment, this is a potential DOB and the



amount is deducted from the purchase offer.

- An insurance payment that reimbursed the owner for their own labor to clean up after the event will not be deducted if such cleanup occurred: no receipt is required.
- Purchased property, acquisitions and relocations, will be used for open-space. Requirements for open-space acquisition and relocation projects Include:
  - ❖ Informing participants, in writing, that the project will not use its eminent domain authority to acquire their property.
  - ❖ With stated exceptions, the property will be used in perpetuity for open space.
  - ❖ Existing buildings will be removed within 90 days of settlement.
  - ❖ FEMA Model Deed Restriction (Exhibit A) will be attached to each property deed as a condition of receiving the grant. The State and subgrantee agree to ensure that all items and conditions outlined in Exhibit A are met.
- Fair Market Value (FMV) will be established for each property to be acquired. The methodology will be used consistently throughout the project. Methods used are:
  - ❖ Certified independent appraisals (preferred method)
  - ❖ A formula based on tax assessments.
- The State will coordinate with the subgrantee on whether the FMV will be based on pre- or post-event certified appraisals or on the tax assessment formula. All appraisals will be based on the same criteria based on bullet 4 below.
- All property owners will be treated fairly and offered an equitable package of benefits.



- The subgrantee will inform each property owner, in writing, the amount it considers to be the FMV of the property.
- Pre-event value is only available to owners who owned the property during the event. Owners who purchased the property after the event cannot be offered more than the post-event market value.
- If there is a shortfall between the amount the community pays an owner for her or his property and the cost of replacement housing, the State may allow the community to provide additional funds. The following conditions must exist:
  - ❖ Decent, safe and sanitary housing of comparable size and capacity is not available in a near-by community.
  - ❖ The shortfall would have a disproportionately high adverse effect on low-income or minority populations.
  - ❖ Funds cannot be secured from other, more appropriate sources.
- A title search will be conducted on each property to ensure that the owner possesses a marketable title. It is the responsibility of the owner to furnish a clear title, free of defects.
- Subgrantee takes possession and acquires full title at settlement. Title will be recorded within 14 days after settlement and will run with the land in perpetuity.
- The owner vacates the property immediately unless there can be demonstrated a need by the owner to remain on the property for a short period of time, (i.e. owner is having difficulty finding replacement housing). The subgrantee may charge the former owner rent. Such rent is to be credited to the account of the project. The renter is responsible for maintaining liability insurance, and contents



insurance if they so desire. The renter is responsible for all utility fees incurred.

- In certain instances, the State may seek reimbursement for demolition and debris removal under FEMA's Public Assistance Program.
- The subgrantee will provide for the continued maintenance of the property. Regardless of the type of new land use, no future Federal Assistance will be provided.
- Before transferring ownership of the property, the subgrantee will seek approval of the State and FEMA. No further National Environmental Policy Act evaluation is required, however, activities on the land must be consistent with authorized open space land use.
- The State will monitor and inspect the purchased properties every three years and certify that the inspected parcel(s) continues to be used for open space or agricultural purposes and will take necessary measures to bring a non-compliant project back into compliance within 60 days notice to the community.
- Allowable and unallowable open space uses are outlined in 44 CFR Part 80.19.
- As the State does not generally consider the purchase of large tracts of land, requirements for crop storage facilities on open space, future disaster assistance, and uninsured and insured crop requirements, and, therefore, are not included in this plan. Should these requirements become an issue, the requirements outlined 44 CFR Part 80.19 will apply.
- Due to the voluntary nature of the HMGP property owners are not eligible for Uniform Relocation Assistance (URA). Property owners and the subgrantees will sign a Voluntary Participation Agreement, informing the property owner of the voluntary nature of the project.
- An exception to the voluntary rule are tenants and mobile home owners who rent mobile home pads and are being involuntarily



displaced due to the owner selling the property and are eligible for URA Assistance. The amount of assistance the community may pay to the tenant is derived from 49 CFR, Part 24, and Subpart E. Conditions governing the amount of URA to which the tenant is entitled are outlined in the 2010 HMA Unified Guidance Part IX A.15. Except under certain conditions, the maximum allowable URA allowance is \$5,250.00.

- Owners of mobile homes who rent home pads being acquired by the project are being involuntarily displaced and are eligible for the following types of URA assistance:
  - ❖ Home Pad Rental Assistance: Eligible for rental and utility increases to a maximum of \$5,250.00
  - ❖ Replacement Housing Assistance: If the mobile home is purchased, the displaced mobile home owner is entitled to replacement housing assistance. For further clarification on replacement housing assistance, refer to 49 CFR, Part 24 and the 2010 HMA Unified Guidance Part IX A.15.
  - ❖ Costs To Move a Manufactured Home: Reasonable relocation/moving costs are eligible. Eligible costs include disassembling, moving, and reassembling and attached appurtenances, such as porches, decks, skirting and awnings, anchoring the unit. Utility hookup charges are included.
  - ❖ Purchasing a New Home or Home pad: It is allowable should a tenant choose to use the rental assistance to purchase a new home or home pad.



## XVII. ALLOWABLE PROJECT COSTS

- A. General policies for determining allowable costs as established in 44 CFR 13.22, will be followed:
- Grant funds may be used only for:
    - ❖ Allowable costs of grantees, subgrantees and contractors; and
    - ❖ Reasonable fees or profit for cost-plus contractors, but not to the grantee or subgrantee.
- B. The State or local units of government will use the governing principles as stated in 2 CFR Part 225, Cost Principles for State, Local and Indian Tribal Governments.
- C. General criteria the State will use for allowable costs:
- Necessary and reasonable for proper and efficient performance and administration of Federal awards.
  - Conforms to conditions set forth in 2 CFR Part 225, Federal laws, terms and conditions of the Federal award.
  - Allocable to Federal awards under 2 CFR Part 225.
  - Be authorized or not prohibited under State or local laws or regulations.
  - Will not be included as a cost or used to meet cost sharing or matching requirements.
  - Be consistent with policies, regulations, and procedures that apply uniformly to both Federal awards and other activities of the governmental unit.
  - Except as otherwise provided in 2 CFR Part 225, to be determined in accordance with generally accepted accounting principles.
  - Be adequately documented.



- D. In reviewing budgets, the State should consider whether the application, budget and change of scope requests are costs that are reasonable. Elements to consider when determining reasonableness of a given cost include:
- Federal, State and other laws and regulations.
  - Terms and conditions of the grant.
  - Market prices for comparable goods or services.
- E. Unallowable costs include:
- Costs incurred prior to date of disaster declaration.
  - Loss of tax revenue due to acquisitions/relocations.
  - Maintenance of project after initial implementation.
- F. Project specific allowable costs include: (See the 2010 HMA Unified Guidance for a more complete explanation of the following).
- Costs for post-disaster code enforcement: Only extraordinary enforcement costs will be allowed.
  - Environmental mitigation costs: The costs to implement any environmental or historic-preservation mitigation actions required in relation to project approval are allowable costs.
  - Acquisition/relocation costs: Fair Market Value of acquired property, real estate legal fees, appraisal costs, moving structure to new location, necessary site preparations.
  - Additional award to relocate: When there is a significant shortfall between the amount the community pays an owner for her/his property and the cost of comparable replacement housing, the State may, in exceptional circumstances, allow the community to provide additional funding.
- G. Examples of allowable costs under 2 CFR Part 225 are:
- Advertising on radio, television and newspapers for recruitment of personnel, goods and services, public notices for bids on project work.
  - Audit services for case or project reviews and project inspections.
  - Bonding costs when attaining surety bonds for employees and officials.
  - Budget development, preparation, presentation and execution.
  - Telephones, mail and messenger services.





- Wages, salaries, fringe benefits to compensate personnel.
- Costs associated with the accounts payable function.
- Equipment and other capital expenditures.
- Maintenance, operation, and repairs are allowable if they keep property in efficient operating condition, do not add to the permanent value of the property and are not included in rental charges for space.
- Expendable supplies and minor equipment with an individual cost/value of \$250 or less. Expendable equipment with an individual cost/value exceeding \$250.00 must be pre- approved by the State Hazard Mitigation Officer (SHMO).
- Motor pools to include vehicle maintenance, inspection and repair services if charged to the program at a mileage or fixed rate. State travel is only allowed under Management costs.
- Public relations if used to maintain the image of the governmental unit and promote understanding and favorable relations with the public.
- Employee training is allowable to the extent that the training is required for program operation.
- Travel to include transportation, lodging, subsistence provided that such travel is on official business, the costs do not exceed the amount normally allowed by the agency and the travel is reimbursed under Management Costs.

## XVIII. ADMINISTRATION OF APPROVED PROJECTS

### 1. Roles and Responsibilities

#### A. State Hazard Mitigation Officer

- Monitors and evaluates project accomplishments and adherence to work schedule.
- Submits requests for extensions and cost overruns to FEMA 60 days prior to project expiration or need.
- Reviews quarterly progress reports from subgrantee(s).
- Submits Quarterly Reports to FEMA as required.
- Reviews requests for funds and approves or denies the request. Prepares Letter of Credit



Payment Requests and records requests in Fund Track.

- Has Letter of Credit Payment Request (LOCPR) signed by the State Hazard Mitigation Officer (SHMO), State project Officer, project's Authorized Agent, and the GAR.
- Will deliver (LOCPR), with appropriate signatures, to WVDHSEM Administration for processing and payment.
- Will record information from the LOCPR in the fund track record.
- Maintain necessary financial documentation and progress reports to support funds distributed to subgrantee(s).
- Review claims, certifications of costs, cost overruns, cost under runs, audits and appeals, and forward to GAR.
- Coordinate HMGP project actions with the GAR and FEMA, as necessary, and provide assistance required in administering the program.
- Supervises HMGP Project Officers to ensure maintenance of a relationship with their assigned sub-grantee(s).
- Directs Project Officers in the maintenance of project files which shall contain:
  - ❖ Verification of local plan status.
  - ❖ Copy of application
  - ❖ Correspondence
  - ❖ Individual Property Inventories and all necessary forms
  - ❖ Copies of Letter of Credit Payment Requests (LOCPR), signed LOCPR receipts
  - ❖ Invoices
  - ❖ Quarterly Reports
  - ❖ Financial Records
  - ❖ Closeout documents

#### B. Roles and Responsibilities of HMGP Project Officers

- Be available by phone, and/or in person, to assist applicants who request help in developing the HMGP application(s).



- Reviews assigned application(s) and assists applicant(s) in making sure that the application(s) is complete and accurate.
- Offers technical assistance and advice for the implementation and administration of newly approved projects.
- Has regular telephone and/or in-person contacts with project managers of approved projects to ensure that the project is on schedule and being administered according to the policies and procedures of the State and FEMA.
- Receives and reviews Letter of Credit Payment Requests from project(s): delivers to the State Hazard Mitigation Officer (SHMO) for further action.
- Reviews invoices to ensure accuracy and appropriateness for LOCPR payment and provides the State Hazard Mitigation Officer (SHMO) with copy(s) of invoice(s) justifying payment.
- Prepares Letter of Credit Payment Requests and forwards to the Authorized Agent. Makes sure that the LOCPR is signed and returned in a timely manner and gives the State Hazard Mitigation Officer (SHMO) a copy of all documentation, and signed LOCPR.
- Maintains the project file as outlined in the above section.
- Obtains Quarterly Reports from assigned project(s), reviews report(s), and delivers report(s) to the State Hazard Mitigation Officer (SHMO).
- Informs the State Hazard Mitigation Officer (SHMO), in a timely manner (60 days prior to need), of any Change of Scope requests, cost overruns cost under runs or other pertinent information.
- Upon completion of the project, meets with the sub-grantee's Authorized Agent and/or project manager to review the project start to finish.
- Prepares a Property Survey Inventory spreadsheet to be submitted with closeout documentation.

## C. Subgrantee

### 1. Duties of the Chief Executive Officer and Project



## Manager.

- Immediately following notification of project approval, the Chief Executive Officer should announce to the community and all participants of the project's approval.
- The project manager will be responsible for, and oversee, the day-to-day operation of the project.
- The project manager will maintain close contact with participants and keep them informed of the progress of the project.
- The project manager will submit Quarterly Reports, beginning the first full quarter after receipt of funding. These reports are due no later than the 15<sup>th</sup> of the month following the quarter. The Federal fiscal year begins October 1st of the calendar year. (See appendix for sample Quarterly Report).
- Final reports will be a complete assessment of the project.
- Insure repairs or construction is in accordance with applicable standards of safety, decency, and sanitation, and in conformity with applicable codes, specifications, and laws and regulation.
- Ensure that the project is proceeding on schedule. If there are delays, the project manager should inform the Project Officer and the State Hazard Mitigation Officer (SHMO) of the reasons for the delay and work with the State Hazard Mitigation Officer (SHMO) to develop a new timetable for completion. If the project is experiencing significant delays, FEMA should be informed and a request for additional time be made in writing.

## 2. The community, in administering the HMGP project, is required to fulfill the following:

- Verify local plan is in an approved state.
- Update list of interested property owners to determine if all participants in the application are still interested in selling their property.



- The Authorized Agent and/or project manager, in consultation with the State Hazard Mitigation Officer (SHMO), determines the method to be used to determine Fair Market Value.
- Advertises for Licensed Certified Appraiser/Reviewer bids.
- Selects appraisers.
- Appraise properties; have review appraisals performed.
- Prepare and mail offer letters, Voluntary Transaction Agreements and Determination of Value documents to property owners.
- Accept any owner obtained appraisals and open negotiations.
- Advertise for Real Estate Attorney bids, obtain bids, and select an attorney.
- Determine if there are any Duplication of Benefits.
- Attorney begins closing procedures.
- Close on properties.
- Advertise for asbestos testing, asbestos abatement and demolition contractors. (Note: Asbestos inspector may not perform asbestos abatement).
- Test for asbestos – receive report(s).
- Hold pre-bid conference: set date for bids to be received and opened.
- Open bids and select contractor(s).
- Abate asbestos, demolish properties and restore land.
- Close out project.
- Implement and maintain open space plan.

3. A project file will be maintained which shall include:

- ❖ The application with Property Inventories and appropriate forms for all participants
- ❖ Verification of local plan compliance
- ❖ Copies of all correspondence
- ❖ Vouchers
- ❖ Reports
- ❖ Receipts/Invoices to verify expenditures for HMGP funds
- ❖ Financial records
- ❖ Deposit project funds in a non-interest bearing bank account



- ❖ Bids for attorneys, appraisals, asbestos testing, asbestos abatement and demolition/land clearance/stabilization
- ❖ Contracts
- ❖ Copies of Letter of Payment Request forms
- ❖ Copies of all checks
- ❖ Copies of receipt letter and receipt for funds received from FEMA/State
- ❖ Copies of appraisals
- ❖ Copies of asbestos testing reports
- ❖ Copy of deeds with Exhibit A attached
- ❖ Photos proving sites were demolished, cleared and restored to open space

#### 4. Cost overruns and under runs

- Should there be a cost over run in a project, the applicant may request approval of additional funds by providing justification such as invoices, activity reports, progress reports, and the like, for evaluation by the State Hazard Mitigation Officer (SHMO).
- The State Hazard Mitigation Officer (SHMO) will make all decisions regarding overruns.
- The State Hazard Mitigation Officer (SHMO) will evaluate each cost over run and, if justified, and additional funds are available, approve an amount not to exceed 10% of the project cost. The State will notify FEMA Region III of all overruns and/or project re-scopes prior to approving any additional Federal funds to cover any cost overruns. The State may approve cost overruns that can be met by offsetting cost under runs on other projects within the same disaster after FEMA Region III has been properly notified and has given approval concurrence.
- Anticipated, or known over runs, will be reported to FEMA on the Quarterly Report(s).
- Cost overruns exceeding 10% of project cost may be approved providing they can be met without additional Federal Funds or by off- setting cost under runs, so long as the full scope of work on all affected projects can still be met.
- Anticipated cost under runs will be reported to the State Hazard Mitigation Officer (SHMO) by the



project manager and included in the Quarterly Report(s). The under run funds may be used to fund overruns in other projects or, should the under run be of sufficient size to warrant it, fund the purchase of additional properties in the project area after FEMA Region III has been properly notified and has given approval concurrence.

- Decisions regarding the use of under run funds will be made by the State Hazard Mitigation Officer (SHMO).

#### 5. Change of Scope

- A community Project Manager will present requests for Change of Scope to the State Hazard Mitigation Officer (SHMO) in writing, with all necessary documentation.
- If the State Hazard Mitigation Officer (SHMO) believes the request for Change of Scope to be justified, and funds are available, the request for Change of Scope will be submitted to FEMA for approval 60 days in advance of any action being taken on the change.

## XIX. CLOSEOUT PROCEDURES

### A. Project Closeout

- The subgrantee will notify the State Hazard Mitigation Officer (SHMO) when a project is ready to be closed. It is recognized that, based upon performance period deadlines, the State Hazard Mitigation Officer (SHMO) may suggest project closure to FEMA.
- The seven steps to closure of a project are:



1. Agreement between the subgrantee and the State that the project is ready to be closed. Should either not agree, the project manager or the State Hazard Mitigation Officer (SHMO) would request an extension, in writing, outlining the request's justification.
2. The sub-grantee, the State, and FEMA will coordinate to make sure that funds advanced through the program balance with funds expended by the State and sub-grantee. If there is disagreement between the expended funds and the grant amount, FEMA and the State take steps to reconcile and adjust final project expenditures and Grantee Management Costs..
3. The State will submit a final project report that includes:
  - ❖ Final Financial and Progress Report to FEMA (if applicable)
  - ❖ Final Letter of Credit Payment Request.
  - ❖ FEMA Form 20-18, Report of Government Property
  - ❖ Photos, Property Survey Inventory spreadsheet, etc. to validate expenditures.
4. The State will conduct site visits for all projects to ensure the approved scope of work was completed. Will provide FEMA with a letter confirming final inspection and that all final payments have been made to project.
5. FEMA and the State will coordinate their financial systems to record the amount and date of the final payment(s). Financial files will be closed and excess funds will be de-obligated.
6. The State will provide FEMA with a letter requesting closure of the project. The information and enclosures:
  - Project name, Federal Project number, State identification number.
  - Financial summary of the project.
  - Certifications:





- ❖ All eligible funds paid to subgrantee.
- ❖ All work completed according to FEMA and State requirements.
- ❖ All costs incurred as the result of eligible work.
- ❖ All work completed in accordance with provisions of the FEMA/State and State/Local agreements.
- ❖ All payments made according to Federal and State legal and regulatory requirements.
- ❖ No bills are outstanding.
- ❖ No further requests for funding will be made for the project.

## B. Program Closeout

1. When all projects under a single disaster are closed, the entire program is ready for closure. The steps that comprise program closeout are as follows:
  - Any mission assignments and technical assistance contracts will be closed out.
  - There will be agreement between FEMA and the State on the Final Claim Amount and concurrence date. The State will submit a concurrence letter and sign FEMA Form 425.
  - The HMGP will be closed in program and financial systems. FEMA and the State Hazard Mitigation Officer (SHMO) are responsible for ensuring that Federal and State records are available in the event of an audit.
  
2. State specific responsibilities for the HMGP closeout process may be found in the 2010 HMA Unified Guidance Part VI, D.1, D.2 and D.2.1
3. All records will be maintained for a minimum three years.



## XX. AUDITS

### A. Federal Audits

1. The State will comply with the audit requirements under the Single Audit Act of 1984, P.L. 98-502, implemented by OMB Circular A-133 "Audit of State and Local Governments".
2. The sub-grantee will maintain complete records of all work, including receipts, checks, job orders, contracts, equipment usage, payroll information, and any other documentation that will be required by an audit. This information will be stored and made available for State or FEMA auditors to review.
3. The State will retain all backup documentation including:
  - Invoices.
  - Letter of Credit Payment Requests
  - Acquisition/real property project records (deeds, titles, easements, etc. will be maintained in sub-grantee files and will be made available to the auditor upon request. However, a verification spreadsheet will be maintained in the HMGP Office project file).
  - Engineering certificates.

### B. State Audits

1. The State and each sub-grantee that receives \$300,000.00 or more in federal financial assistance shall have audits in accordance with 44 CFR, Part 14.
2. The State assures that these audits are performed on a timely basis. If, after a review of the audit(s), adverse findings exist, the State will take appropriate corrective action and report that action to FEMA.
3. The State will provide a copy of the audit performed on Section 404 projects to the FEMA Inspector General.
4. The State may request that a specific disaster audit be performed on projects of any size.
5. Should there appear to be improprieties in the management of accounting for Federal or State funds, a request for review may be requested.



## XXI. REVIEW AND UPDATE

This 404 Administrative Plan will be reviewed and updated annually, or immediately following a Presidentially Declared Disaster, to ensure that it is current with 404 policies and procedures. Following the review and/or update, FEMA will be informed that either:

- No changes are necessary, or;
- Presented, in writing, any revisions.





## APPENDIX M: GOVERNOR'S RESOLUTION OF ADOPTION & ASSURANCES

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## APPENDIX N: STATEWIDE BUILDING CODE REGULATIONS

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## West Virginia Code 29-3-5b - Promulgation of rules and statewide building code

### WEST VIRGINIA CODE > CHAPTER 29 > ARTICLE 3 > § 29-3-5B - PROMULGATION OF RULES AND STATEWIDE BUILDING CODE

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CURRENT AS OF: 2010

- (a) The State Fire Commission shall propose rules for legislative approval in accordance with the provisions of article three, chapter twenty-nine-a of this code to safeguard life and property and to ensure the quality of construction of all structures erected or renovated throughout this state through the adoption of a state building code. The rules shall be in accordance with standard safe practices so embodied in widely recognized standards of good practice for building construction and all aspects related thereto and have force and effect in those counties and municipalities adopting the state building code: **PROVIDED**, That each county or municipality may adopt the code to the extent that it is only prospective and not retroactive in its application.
- (b) The State Fire Commission has authority to propose rules for legislative approval in accordance with the provisions of article three, chapter twenty-nine-a of this code, regarding building construction, renovation and all other aspects as related to the construction and mechanical operations of a structure. The rules shall be known as the "State Building Code."
- (c) The State Fire Commission shall propose a rule for legislative approval in accordance with the provisions of article three, chapter twenty-nine-a of this code to include the following building energy codes in the State Building Code:
- (1) The 2009 edition of the International Energy Conservation Code for residential buildings or other building energy code or codes for residential buildings that meets or exceeds equivalent energy savings; and
  - (2) The ANSI/ASHRAE/IESNA Standard 90.1-2007 building energy code for commercial buildings or other building energy code or codes for commercial buildings that meets or exceeds equivalent energy savings.
- (d) The State Fire Commission has authority to propose rules for legislative approval, in accordance



with the provisions of article three, chapter twenty-nine-a, establishing state standards and fee schedules for the licensing, registration, certification, regulation and continuing education of persons which will conduct inspections relating to the State Building Code, which include, but are not limited to, building code officials, inspectors, plans examiners and home inspectors.

(e) The State Fire Commission has authority to establish advisory boards as it deems appropriate to encourage representative participation in subsequent rule-making from groups or individuals with an interest in any aspect of the State Building Code or related construction or renovation practices.

(f) For the purpose of this section, the term "building code" is intended to include all aspects of safe building construction and mechanical operations and all safety aspects related thereto. Whenever any other state law, county or municipal ordinance or regulation of any agency thereof is more stringent or imposes a higher standard than is required by the State Building Code, the provisions of the state law, county or municipal ordinance or regulation of any agency thereof governs if they are not inconsistent with the laws of West Virginia and are not contrary to recognized standards and good engineering practices. In any question, the decision of the State Fire Commission determines the relative priority of any such state law, county or municipal ordinance or regulation of any agency thereof and determines compliance with State Building Code by officials of the state, counties, municipalities and political subdivisions of the state.

(g) Enforcement of the provisions of the State Building Code is the responsibility of the respective local jurisdiction. Also, any county or municipality may enter into an agreement with any other county or municipality to provide inspection and enforcement services: **PROVIDED**, That any county or municipality may adopt the State Building Code with or without adopting the BOCA National Property Maintenance Code.

(h) After the State Fire Commission has promulgated rules as provided in this section, each county or municipality intending to adopt the State Building Code shall notify the State Fire Commission of its intent.

(i) The State Fire Commission may conduct public meetings in each county or municipality adopting the State Building Code to explain the provisions of the rules.

(j) The provisions of the State Building Code relating to the construction, repair, alteration, restoration and movement of structures are not mandatory for existing buildings and structures identified and classified by the State Register of Historic Places under the provisions of section eight,

article one of this chapter or the National Register of Historic Places, pursuant to 16 U.S.C. §470a. Prior to renovations regarding the application of the State Building Code, in relation to historical preservation of structures identified as such, the authority having jurisdiction shall consult with the Division of Culture and History, State Historic Preservation Office. The final decision is vested in the State Fire Commission. Additions constructed on a historic building are not excluded from complying with the State Building Code.



## APPENDIX O: HIRA DATA FILES

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This appendix is redacted. Please contact State Hazard Mitigation Officer for Review of Contents.





## APPENDIX P: HMA PROGRAM DATASETS

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This appendix is redacted. Please contact State Hazard Mitigation Officer for Review of Contents.





## APPENDIX Q: PUBLIC OUTREACH

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### Q.1 INTRODUCTION

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As part of the mitigation planning process, WV engaged in an ambitious public outreach strategy. This effort was led by DHSEM's State Hazard Mitigation Officer, Mitigation Branch Director, Mitigation Planners, and the Contractor. The strategy encompassed numerous media outlets including electronic publications, physical publications, surveys, and workshops. This appendix documents those efforts and provides the feedback that was received.

The outreach efforts described in this appendix are summarized into following two broad categories:

- Disaster Times: A monthly newsletter documenting progress made in the development of the Hazard Mitigation Plan.
- Public Outreach Workshops

#### Q.1.1 DISASTER TIMES

Beginning in October 2012, a monthly e-newsletter was distributed to all plan update Stakeholders. These newsletters included updates on the planning progress, development of the Hazard Identification and Risk Assessment (HIRA) and the Threat and Hazard Identification and Risk Assessment (THIRA), follow-up on the 2010 mitigation actions, capabilities assessment development process, the project schedule, upcoming meetings, recent disaster declarations, other outreach components, contact information for project managers and personnel, information on the FTP and SharePoint sites, and any other information pertaining to the West Virginia Hazard Mitigation Plan 2013 Update process. These newsletters are archived here directly following the narrative description of the Outreach efforts.

### Q.1.2 PUBLIC OUTREACH WORKSHOPS

During the week of April 8, 2013, the DHSEM, accompanied by the Consultant, orchestrated a series of five outreach workshops throughout the state. These meetings provided participants with an opportunity to learn about the planning progress to date, draft HIRA and mitigation strategies, and to discuss state policies related to implementation of mitigation strategies in local communities. This outreach provided jurisdictions a forum to respond and provide input regarding the draft. Table Q.1 summarizes meeting dates, locations, and number of attendees.

**TABLE Q.1. PUBLIC OUTREACH WORKSHOPS DATES AND LOCATIONS**

LOCATION	DATE	TIME	ATTENDEES
Cacapon Resort State Park	4/8/2013	1:30-3:00PM	13
Tygart State Park	4/9/2013	9:30-11:00PM	7
Pipestem State Park	4/10/2013	9:30-11:00PM	12
Parkersburg City Council Chamber	4/11/2013	9:30-11:00PM	5
WV State Police Academy (Charleston)	4/12/2013	9:30-11:00PM	6

These workshops were advertised through numerous emails sent to local officials and emergency management personnel, as well as through social Media. Figure Q.1 and Figure Q.2 are from the DHSEM Twitter and Facebook pages, documenting solicitation efforts to engage members of the public.



**FIGURE Q.1. FACEBOOK POST ADVERTISING THE PUBLIC OUTREACH WORKSHOPS**





FIGURE Q.2. TWITTER POST ADVERTISING THE PUBLIC OUTREACH WORKSHOPS

## WORKSHOP RESULTS

The meeting discussion was hosted by Brian Penix, the acting State Hazard Mitigation Officer (SHMO), from DHSEM, and Jake Jarosz, a member of the Consultant team. The workshop included a presentation that outlined the development process of the Mitigation Plan, results of the HIRA, hazard ranking maps, and the draft mitigation strategies. Participants were encouraged to ask questions and provide input where appropriate. The presentation is included in this appendix following the narrative write-up of outreach efforts.

Following the presentation, participants completed a questionnaire describing their primary concerns regarding hazard occurrence, mitigation project implementation, and state assistance. These questionnaires provided a formal mechanism for communicating priorities and objectives to the State. Summarized results can be found in this appendix.

At the start of the meeting, participants were provided with a number of handouts. These included:

- agenda,
- questionnaire, and



- draft mitigation goals and strategies

Following the presentation and the questionnaire, an open discussion forum was provided to participants to discuss comments on the drafts, potential mitigation strategies, and to provide State funding policies on mitigation strategies. Due to recent changes in Federal policies, including the passing of the Biggert-Waters Act, the 2013 Disaster Relief and Appropriations Act, and the Sandy Recovery Improvement Act of 2013. This Congressional legislation has drastically changed many aspects related to mitigation and emergency management, so the State, local, officials and members of the public discussed how this would impact funding of mitigation strategies and State priorities.

Throughout these forums, numerous topics were discussed. These included:

- How local hazard rankings are included in statewide mitigation funding priorities
- Local susceptibility to dam failure
- Exercises related to preparedness for dam failure events
- Use of Hazus in risk assessments and calculation of agricultural damages
- Assessment of critical infrastructure in hazard analysis
- Calculating cost-effectiveness in applications for federal mitigation grants funding
- Inclusion of environmental damages in the benefit-cost analysis
- Eligibility of generators under federal mitigation grant programs

The following is a summary of the feedback received from workshop participants. Complete results from the questionnaires can be found later in this appendix.

- Concerns regarding flooding, landslides, and winter storms were frequently expressed at each workshop. Dams were also a major concern.
- Generator procurement for critical facilities to mitigate their loss of function during a hazard event was regularly discussed. Because of recent policy changes following Hurricane Sandy, availability of funding through FEMA's Hazard Mitigation Grant Program (HMGP) for generator purchases and installation has been expanded. The Acting SHMO spoke to this topic, as well as policies developed by the State regarding eligible applicants and State priorities.
- Demolition and acquisition of properties located in floodplains has been a very successful strategy in West Virginia; however, the State is attempting to look at alternative projects as recourse to flooding events. Although this process has proven effective in West Virginia, some communities have become resistant to this process because of fears of reduced tax base and perception that acquisition projects are anti-development.



# Disaster Times

VOLUME II, ISSUE IV

JANUARY 14, 2013

A MONTHLY UPDATE ON THE 2013 WEST VIRGINIA HAZARD MITIGATION PLAN UPDATE PROCESS.

## Progress Update

The project team has continued to make diligent progress on the 2013 Update to the West Virginia Hazard Mitigation Plan. This month's progress update will be organized by planning area:

### **THIRA**

- The WV THIRA has been completed and the State Preparedness Report was submitted to FEMA on time, before January 1, 2013.

### **Hazard Identification and Risk Assessment**

- **NCDC Data and Hazard Rankings:** The project team continues to sort through the data available from the National Climactic Data Center to develop comprehensive hazard rankings.
- **Hazard Ranking Parameters:** The HIRA team has identified the need to include two new parameters in the hazard rankings: 1) Geographic Extent and 2) Local Plan Rankings. These parameters are not only required under the Disaster Mitigation Act of 2000 (DMA 2000), but will help ensure accurate and meaningful hazard rankings.

### **Mitigation Planning**

- **Capabilities Assessment:** A draft update has been completed but will require additional details on specific programs as well as further refinement by the WV Hazard Mitigation Council for completion.
- **Local Capabilities:** The eleven local mitigation plans have been evaluated for their mitigation capabilities. This will feed the update to Chapter 5, Local Mitigation Capabilities.
- **Agency Profiles:** This appendix has been updated to reflect all state agencies and provides a quick description of the agency mission and responsibilities.
- **2010 Mitigation Strategies Update:** DMA 2000 requires an update on what has been accomplished regarding the implementation of the mitigation strategies set forth in the previous version of the plan. The project team has developed a tracking tool and will be working to identify progress made on these projects.

## HIRA / Mitigation Strategy Meeting

The Hazard Identification and Risk Assessment / Mitigation Strategies Development Meeting will be held in early March, tentatively on Tuesday, March 5. Once details have been finalized a separate notice will be sent via email. This meeting is especially important because it involves the identification of specific projects that will be implemented over the next planning period. The meeting will consist of:

- A review of the results of the Hazard Identification and Risk Assessment results and the associated Hazard Rankings;
- Identification of Mitigation Goals for the upcoming planning period;
- Development of a preliminary Mitigation Action Plan; and
- Identification of responsible agencies for specific mitigation strategies/projects to be implemented.

## HIRA / Mitigation Strategies Meeting (Continued)

In the weeks that follow this meeting, conference calls will be held to finalize the mitigation strategies and the Mitigation Action Plan. This plan will identify the specific project to be implemented, agencies responsible for implementation, project deadlines, interim measures of success, potential funding sources, and hazards to be addressed. If you are unable to attend the meeting on March 5th, we would still appreciate your contribution to the development of this plan through participation in one of these conference calls.

<u>The Dewberry Team</u>			
<b>Project Manager</b>	Carrie Speranza	703.849.0367	csperanza@dewberry.com
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<b><u>Project SharePoint Site</u></b> For access please follow this link: <a href="https://projects2.dewberry.com/sites/2013WVHMP">https://projects2.dewberry.com/sites/2013WVHMP</a>  This site requires a user name and password. Please email <a href="mailto:jjarosz@dewberry.com">jjarosz@dewberry.com</a> to receive your login credentials.  If you misplace your SharePoint username/password, please email <a href="mailto:helpdesk@dewberry.com">helpdesk@dewberry.com</a> for a password reset.	<b><u>Project FTP Site</u></b> For access please follow this link: <a href="ftp.dewberry.com">ftp.dewberry.com</a>  Username: 2013WVHMP Password: IGHJCB (Case Sensitive)  To add a document to this site, click “Page” on the right hand side of the top toolbar. Then scroll down to the bottom of the dropdown menu and click “Open FTP Site in Windows Explorer”. Then just drag and drop files as you normally would in Windows Explorer.  **Note: Files that are not accessed within 5 days will be automatically removed. Once you’ve posted something to the FTP site, please notify a member of the Dewberry Team so that it can be retrieved.



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# Disaster Times

VOLUME II, ISSUE I

OCTOBER 1, 2012

A MONTHLY UPDATE ON THE 2013 WEST VIRGINIA HAZARD MITIGATION PLAN UPDATE PROCESS.

## INSIDE THIS ISSUE:

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## Why Mitigate?

In the United States between 1996 and 2011, there were 84 disasters causing at least \$1 billion in damages, generating a cumulative \$541 billion in damages. That is 41 more disasters and \$202 billion more than the previous 15 year period. As America's infrastructure continues to age, as people continue to live on higher-value properties in more vulnerable places, and as the atmosphere continues to warm, disasters will continue to occur. Mitigation is the tool that helps to protect our investments by strategically planning to keep ourselves out of harms way.

Examples of potential mitigation strategies include:

- Elevating or acquiring properties built in a flood-zone or

those that have been prone to repeated flooding events

- Conducting regular prescribed burns near wildland-urban interfaces
- Implementing zoning recommendations from local Land Use Plans



By developing a Hazard Mitigation Plan, West Virginia tangibly displays its commitment towards investing in the sustainability, resilience, and longevity of West Virginia communities. This

plan will put on paper the State's long-term designed course of action for mitigating the effects of disasters and increasing communities' resilience in order to help the State grow and thrive. Additionally, it will meet the requirements prescribed under the Disaster Mitigation Act of 2000 (DMA2K), thereby qualifying West Virginia communities for Hazard Mitigation Assistance from the Federal government.



## The Dewberry Team

The Dewberry team is excited to be a part of the West Virginia Hazard Mitigation Plan Update. We are planners, engineers, first responders, and emergency managers who specialize in mitigation planning and mitigation strategy implementation. We were lucky enough to

participate in the 2010 update, and it is an honor to be a part of it again in 2013.

Detailed contact information for members of the planning team can be found on the last page of this newsletter. Please feel free to contact any one of us

if you have any questions, concerns, suggestions, or recommendations. It would be a pleasure to hear from you.

Best Regards,  
The Dewberry Team

# Project Kickoff



The Hazard Mitigation Council meeting at the Project Kickoff Meeting

On August 22, 2012, The Hazard Mitigation Council met to kick off the development of the 2012 West Virginia Hazard Mitigation Plan Update. There were 34 people in attendance - excluding Dewberry staff. The meeting was opened and introduced by the West Virginia State Hazard Mitigation Officer (SHMO), Mr. Tim Keaton.

At the meeting, plan developers, contributors and stakeholders discussed a variety of issues relating to the plan's development. Some of these topics included: communication between Council members and stakeholders, a review of mitigation planning requirements, an overview of the previous plan, goals for the plan

update, hazards that face the State, what was previously profiled, what new hazards should be considered for this Plan Update, data needs in order to conduct a risk analysis, potential mitigation actions, goals for updating and improving the State's approach to mitigation, the additional requirement of a Threat and Hazard Identification and Risk Assessment (THIRA), next steps and the project's timeline for development. The article that follows, "Work Plan & Timeline", provides details regarding when each of these steps are anticipated.

## Work Plan & Timeline

The development of the State Hazard Mitigation Plan involves numerous steps and procedures that occur over the course of a lengthy plan development period. Below are a summary of some of the benchmarks that have been set and the associated date:

- 10/01/2012: Data Collection
- 10/01/2012: 2010 Plan Evaluation
- 10/10/2012: THIRA Workshop\*
- 11/30/2012: Draft Threat and Hazard Identification and Risk Assessment (THIRA)
- 12/03/2012: Draft Capability Assessment
- 03/05/2013: Mitigation Goals, Strategies and Projects
- 05/31/2013: Hazard Identification and Risk Assessment Update
- 04/01/2013: Public Outreach
- 07/31/2013: Project Scoping
- 08/05/2013: Draft Plan Submittal and Review

*"It wasn't raining when Noah built the ark."*

- Howard Ruff

## Data Call



Send us your Data!!

It's your Plan! In order to generate accurate risk assessments to both Human Caused as well as Natural Hazards, **we need your data!!** At the Project Kickoff, we provided a description of what data we need in order to update the Risk Assess-

ment portion of the plan, and we still need it. Please send this to Rachael Herman, whose contact information can be found on the last page of this newsletter, at your earliest convenience.

## Final THIRA Workshop

The final THIRA Workshop will be held on October 10, 2012. We will be reviewing the potential scenarios for the identified natural, technological, and human caused hazards to assess the State's capabilities across prevention, preparedness, mitigation, response, and recovery. The Hazard Mitigation Council will collectively develop Capability Targets setting the priorities for improvement actions throughout the State. This workshop will not discuss the state hazard mitigation plan and will focus completely on the Threat & Hazard Identification and Risk Assessment (THIRA) Report due to FEMA December 31, 2012. We look forward to seeing you on October 10<sup>th</sup>!

Contact Corinne Bartshire (916.380.3776; [cbartshire@dewberry.com](mailto:cbartshire@dewberry.com)) for more information.

### The Dewberry Team

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#### **References:**

1. *What's Up With The Weather?*. National Geographic Magazine. National Geographic Society. September 2012. Pg 32.
2. *America's Crumbling Infrastructure Will Challenge Emergency Managers for Decades*. Emergency Management Magazine: Strategy & Leadership in Critical Times. E.Republic, Inc. Retrieved from (September 21, 2012): <http://www.emergencymgmt.com/safety/Crumbling-Infrastructure-Challenge-Emergency-Managers.html>



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# Disaster Times

VOLUME II, ISSUE II

NOVEMBER 5, 2012

A MONTHLY UPDATE ON THE 2013 WEST VIRGINIA HAZARD MITIGATION PLAN UPDATE PROCESS.

## INSIDE THIS ISSUE:

Hurricane Sandy 1

THIRA Workshop 1

Accomplishments & Next Steps 2

## Hurricane Sandy

On Monday, October 29, 2012 President Obama issued a Presidential Disaster Declaration (EM-3358) in West Virginia as a result of Hurricane Sandy.<sup>1</sup> All 58 counties within the State are eligible for direct federal assistance under this declaration.

Hurricane Sandy was the tenth hurricane of the 2012 Atlantic Hurricane Season, and, according to initial estimates, the second most costly Atlantic hurricane in history, only following Hurricane Katrina. With winds spanning 1,100 miles from the eye, the storm affected nearly every northeast and mid-Atlantic state on the east coast. Sandy caused an estimated \$20 billion in damages.

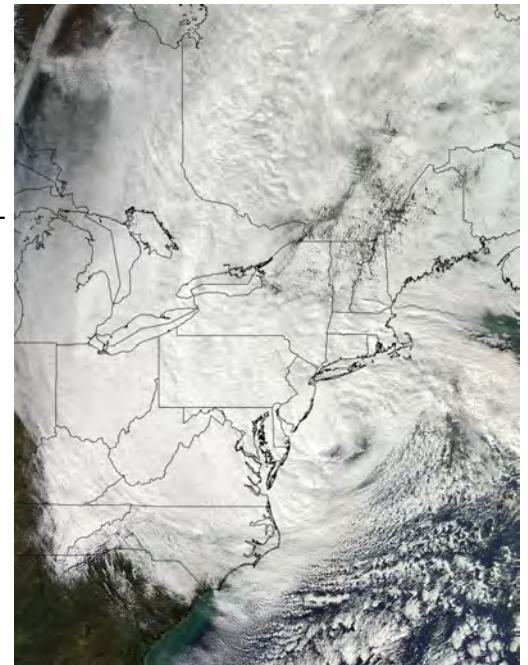
West Virginia felt the effects in the form of wind, rain and snow. Some counties received nearly three feet of snow, experienced wind speeds of up to

65 mph, and rainfall totals of up to nearly five inches.<sup>2</sup> At least six deaths have been related to the extreme weather from Hurricane Sandy, one of which was a candidate for the West Virginia Legislature. Additionally, there have been at least 36 road closures and there numerous reports of roof collapses. High water, downed trees, and snow continue to hamper recovery efforts throughout the State.<sup>3/4</sup>

### Pictures & Descriptions of Hurricane Sandy

Send us your photos or any narrative descriptions you may have of response efforts and impacts from this natural Dis-

aster. We will use these to help illustrate the storm's impact on West Virginia Communities. Send these to Jake Jarosz at [jjarosz@dewberry.com](mailto:jjarosz@dewberry.com)



Credit: NASA Goddard MODIS Rapid Response Team

## THIRA Workshop

Thank you to those who participated in the final Threat & Hazard Identification and Risk Assessment (THIRA) Workshop on October 10th, 2012. We presented the State's desired outcomes (goals) and the developed scenarios for each of the identified natural, technological, and human caused hazards. Based on those scenarios we collectively assessed the State's capabilities across prevention, prepar-

edness, mitigation, response, and recovery to address those scenarios. This resulted in an identification of the estimated worst case impact to each of the 31 core capabilities. The worst case impacts were used to identify Capability Targets setting the priorities for improvement actions throughout the State. These will be available for your review and comment soon. We look forward to your continued partici-

pation and cooperation in reviewing the DRAFT final materials. The THIRA Report is due to FEMA December 31, 2012.

Some Capability Targets set by the Mitigation Council are:

**Planning** - Engage all stakeholders in systematic processes for the development of executable strategic, operational, and tactical procedures (i.e. SOPs) including community-based approaches to



## THIRA Workshop (Continued)

meet defined objectives.

*Operational Coordination* - Establish and maintain a unified and coordinated operational structure and process encompassing the entire State, within 8 hours of a potential or actual incident, that appropriately integrates all critical stakeholders and supports the execution of core capabilities.

*Physical Protective Measures* - Implement physical protective measures as appropriate for prioritized CI/KR facilities.

*Cybersecurity* - Detect 100% of malicious activity directed against all critical infrastructure, key resources, and networks to protect against failure of critical systems.

*Long-term Vulnerability Reduction* - Achieve a measurable decrease in the long-term vulnerability of critical infrastructure systems and other community systems and features that contribute to an increased risk of identified hazards and threats.

*Fatality Management Services* - During the first 72 hours of an incident, conduct operations to recover 125 fatalities within a single incident area and share information with mass care services for the purpose of reuniting family members and caregivers with missing persons/remains, and providing counseling to the bereaved.

*Operational Communications* - Within the first 72 hours of an incident, ensure a redundant capacity to communicate with both the emergency response community and the affected populations is sufficient; and establish interoperable voice and data communications among responders.

*Economic Recovery* - Engage with the whole community to develop an Economic Recovery Plan.

## Accomplishments & Next Steps

“It wasn’t raining when  
Noah built the ark.”

- Howard Ruff

With the final THIRA Workshop complete, next steps include:

- 11/30/2012: Draft Threat and Hazard Identification and Risk Assessment (THIRA)
- 12/03/2012: Draft Capability Assessment
- 03/05/2013: Mitigation Goals, Strategies and Projects
- 05/31/2013: Hazard Identification and Risk Assessment Update
- 04/01/2013: Public Outreach
- 07/31/2013: Project Scoping
- 08/05/2013: Draft Plan Submittal and Review

The Dewberry Team will continue to work on the DRAFT Final THIRA documents and has recently begun work on the Draft Capabilities Assessment Section. Once those materials are in their final draft form, we will solicit a review from the Mitigation Advisory Council. You can expect those materials at the end of the month. We look forward to continuing to work with you on this exciting project!

## The Dewberry Team

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1. Disaster Declarations. *West Virginia Hurricane Sandy (EM-3358)*. <http://www.fema.gov/disaster/3358>
2. National Hurricane Center. *Remnants of Hurricane Sandy Public Advisory*. <http://www.nhc.noaa.gov/text/refresh/MLAHPCAT3+shtml/310323.shtml>
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4. Huffington Post. *W.VA’s superstorm death toll still at 6*. [http://www.washingtonpost.com/national/wvas-superstorm-death-toll-still-at-6-but-concerns-grow-about-people-trapped-since-monday/2012/11/02/b816f980-2503-11e2-92f8-7f9c4daf276a\\_story.html](http://www.washingtonpost.com/national/wvas-superstorm-death-toll-still-at-6-but-concerns-grow-about-people-trapped-since-monday/2012/11/02/b816f980-2503-11e2-92f8-7f9c4daf276a_story.html)



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# Disaster Times

VOLUME II, ISSUE III

DECEMBER 5, 2012

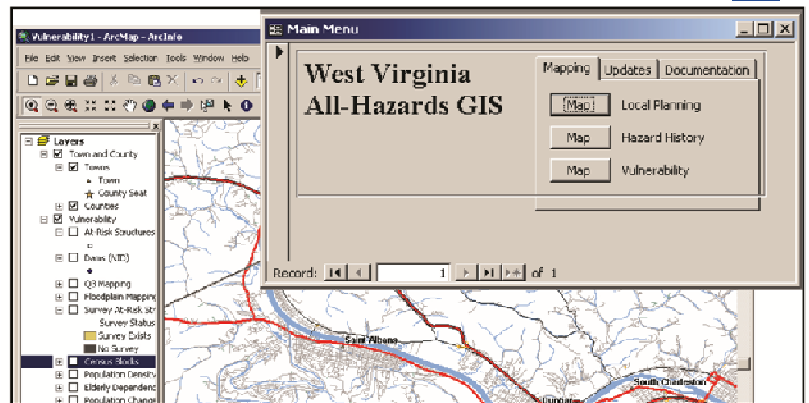
A MONTHLY UPDATE ON THE 2013 WEST VIRGINIA HAZARD MITIGATION PLAN UPDATE PROCESS.

## Progress Update

This past month included several substantive efforts in the beginning stages of the planning process for the Update to the WV Hazard Mitigation Plan. This included updating the Agency Profiles and beginning work on the Capability Assessment. The majority of the efforts, however, have centered around the Hazard Identification and Risk Assessment portion of the plan. Specific achievements include:

- Coordinating with State and Federal agencies, including USACE, NOAA, WVDOT, WVDEP to get updated data regarding dams, levees, specific facilities, and hazard related losses.
- Updating hazard profiles to detail several significant events having impacted the State since the previous plan update (winter storm, flooding, tornado outbreak, derecho wind event, Hurricane Sandy, etc.).
- Working to incorporate HAZUS riverine flooding analysis for the entire State into the HIRA to provide a better idea of potential flood losses.

Next month will bring a detailed analysis of the local plan hazard rankings, as well as local capabilities. This analysis will be used to inform the HIRA and to build a foundation for a uniform ranking methodology across the state.



## Hurricane Sandy Disaster Declaration Update

On Monday, October 29, 2012 an Emergency Declaration was made (EM-3358) for West Virginia as a result of Hurricane Sandy. Under this declaration, all 58 counties within the State are eligible for Public Assistance, Category B (Emergency Protective Measures).

On Tuesday, November 27, 2012 a full Presidential Disaster Declaration (DR-4093) was issued for the following counties: Barbour, Boone, Braxton, Clay, Fayette, Kanawha, Lewis, Nicholas, Pendleton, Pocahontas, Preston, Raleigh, Randolph, Taylor, Tucker, Upshur, Webster, and Wyoming. This declaration makes federal funding available to state and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by Hurricane Sandy.

Federal funding is also available for hazard mitigation activities Statewide through the Hazard Mitigation Grant Program (HMGP).

## The Dewberry Team

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# Disaster Times

VOLUME II, ISSUE V

FEBRUARY II, 2013

A MONTHLY UPDATE ON THE 2013 WEST VIRGINIA HAZARD MITIGATION PLAN UPDATE PROCESS.

## HIRA / Mitigation Strategy Meeting

**March 22, 2013 @ 0900**  
**WV State Police Training Center**  
135 Academy Dr  
Dunbar, WV 25064



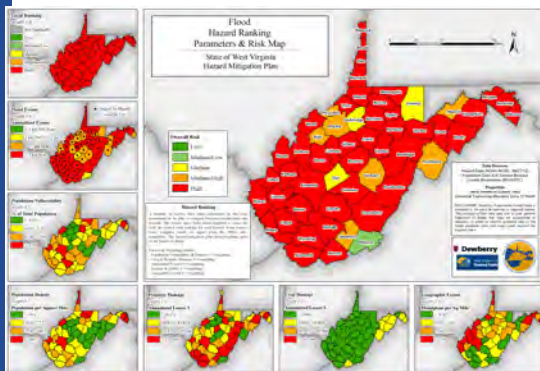
The date for the Hazard Identification and Risk Assessment / Mitigation Strategies Development Meeting has been scheduled. It will now be held on **March 22, 2013 at the WV State Police Training Center**. A separate meeting invitation will be sent out once complete details have been

finalized. This meeting is especially important because it involves validation and confirmation of the data included in the HIRA, updated hazard rankings, and the identification of specific projects that will be implemented over the next planning period. The meeting will consist of:

- A review of the results of the Hazard Identification and Risk Assessment and the associated Hazard Rankings;
- Identification of Mitigation Goals for the upcoming planning period;
- Development of a preliminary Mitigation Action Plan; and
- Identification of responsible agencies for specific mitigation strategies/projects to be implemented.

In the weeks that follow this meeting, conference calls will be held to finalize the mitigation strategies and the Mitigation Action Plan. This plan will identify the specific project to be implemented, agencies responsible for implementation, project deadlines, interim measures of success, potential funding sources, and hazards to be addressed. If you are unable to attend the meeting on March 22nd, we would still appreciate your contribution through participation in one of these conference calls.

## Progress Update and Hazard Ranking Map Teaser



The project team has continued to make diligent progress on the 2013 Update to the West Virginia Hazard Mitigation Plan.

### Hazard Identification and Risk Assessment

- **Hazard Ranking Maps:** These maps provide a visual depiction of the risk posed to each county throughout the State by Hazard Category. The teaser included above displays overall risk due to flooding.

# Progress Update and Hazard Ranking Map Teaser

- Hazard Ranking Maps: These maps provide a visual depiction of the risk posed to each county throughout the State by Hazard Category. The teaser included above displays overall risk due to flooding. Completed maps for all hazard categories, and a comprehensive description of how these rankings are determined will be discussed at the HIRA/Mitigation Strategies Development Meeting on March 22.
- State Facilities: Building replacement and contents values for all State facilities have been updated and incorporated into the HIRA.

## Mitigation Planning

- 2010 Mitigation Strategies Update: DMA 2000 requires an update on what has been accomplished regarding the implementation of the mitigation strategies set forth in the previous version of the plan. In the coming months, the Project Team will be working with Members of the Hazard Mitigation Council (HMC) to determine the status of each action.

### The Dewberry Team

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## Hazard Mitigation

Hazard mitigation involves taking proactive action in order to reduce or eliminate long-term risk to people and their property from known hazards. Mitigation planning is the process of assessing hazards and developing mitigation strategies. It involves assessment of existing capabilities, prioritization of resources, and the development of detailed action plans. Development of a meaningful mitigation plan requires statewide partnerships with people, organizations, businesses, and entire communities.

In developing a hazard mitigation plan, West Virginia demonstrates its commitment to the protection of life and property within its jurisdiction. It also then becomes eligible for certain types of federal non-emergency mitigation assistance through FEMA's Hazard Mitigation Assistance (HMA) program.



Please help West Virginia make meaningful decisions on where to invest its mitigation related resources by participating in a workshop.

## Why Plan?

The Disaster Mitigation Act of 2000 (DMA2000) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act in order to improve the hazard mitigation planning process. It emphasizes planning for disasters before they occur and lays out specific requirements for what the plan should contain. In order to encourage and incentivize mitigation planning, DMA2000 makes adoption of a federally approved mitigation plan a requirement for receiving certain types of non-emergency federal mitigation assistance.

Section 322 of DMA 2000 addresses mitigation planning at the state and local levels. Under this requirement, in order to receive federal approval, West Virginia must meet certain responsibilities. Some of these are:

- Preparing and submitting a state mitigation plan;
- Reviewing and updating the plan every three years;
- Providing technical assistance and training to local governments;
- Reviewing local hazard mitigation plan;
- Developing a statewide comprehensive mitigation strategy.



8401 Arlington Blvd,  
Fairfax, VA 22031

## West Virginia Hazard Mitigation Plan 2013 Update

### Stakeholder Workshops

April 8-12



# WV 2013 Hazard Mitigation Plan Update

## Purpose of the Workshops

As part of the process to update the West Virginia Hazard Mitigation Plan, persons and organizations throughout the State with an interest in hazard mitigation are invited to participate in the planning process. In order to accomplish this, a series of Stakeholder Workshops are being held April 8-12 throughout the State.

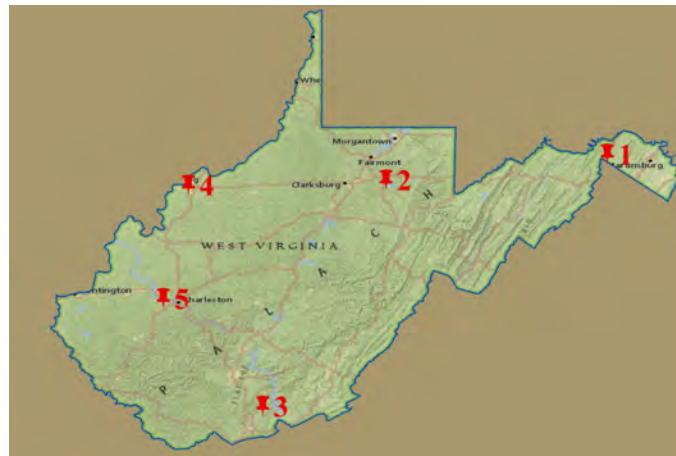
## Who Should Attend?

Participants should include a representative cross-section of organizations and community members with an interest in reducing the risk within their community. Some of these may include:

- Public Officials
- Local Emergency Managers
- Fire & Rescue
- Law Enforcement
- Local Planners
- Local Transportation
- Local Public Works
- Local Schools
- Local Utilities
- Architects and Engineers
- American Red Cross
- Hazard Experts from State and Federal Agencies
- WV Planning District Committee Members
- Colleges and Universities
- Non-profit Organizations
- Businesses

## Meeting Dates & Locations

- 1: April 8, 2013** **1:30-3:00 PM**  
Cacapon Resort State Park  
Cacapon Lodge, Washington Fairfax Room  
818 Cacapon Lodge Drive  
Berkeley Springs, WV 25411
- 2: April 9, 2013** **9:30-11:00 AM**  
Tygart State Park  
Tygart Lodge, Conference Room #1  
Rt 1 Box 260  
Grafton, WV 26354
- 3: April 10, 2013** **9:30-11:00 AM**  
Pipestem State Park  
McKeever Lodge, Faulconer Room  
3405 Pipestem Drive  
Pipestem, WV 25979
- 4: April 11, 2013** **9:30-11:00 AM**  
Parkersburg City Council Chambers  
Conference Room (2nd Floor)  
#1 Government Square  
Parkersburg, WV 26101
- 5: April 12, 2013** **9:30-11:00 AM**  
WV State Police Academy  
Room #4  
135 Academy Drive  
Dunbar, WV 25064



## Agenda

*Introductions*

*What is Hazard Mitigation?*

*Why Plan?*

*Questionnaire*

*Hazards of Concern (HIRA)*

*Mitigation Strategies*

*Local Mitigation Successes*

*Next Steps*



**For questions or directions,  
please contact:**

Lirerose Beach (WVDHSEM)  
(Office) 304-957-2572  
Lirerose.M.Beach@wv.gov

Jake Jarosz, CFM (Dewberry)  
(Office) 703.849.0535 / (Cell) 703.675.9982  
JJarosz@dewberry.com





# West Virginia 2013 Hazard Mitigation Plan Update

## Public Outreach Initiative

### Agenda

- |  |               |  |               |
|--|---------------|--|---------------|
| <b>April 8, 2013</b>                   | 1:30-3:00 PM  | <b>April 11, 2013</b>                    | 9:30-11:00 AM |
| <i>Cacapon Resort State Park</i>       |               | <i>Parkersburg City Council Chambers</i> |               |
| Cacapon Lodge, Washington Fairfax Room |               | Conference Room (2nd Floor)              |               |
| 818 Cacapon Lodge Drive                |               | #1 Government Square                     |               |
| Berkeley Springs, WV 25411             |               | Parkersburg, WV 26101                    |               |
| <b>April 9, 2013</b>                   | 9:30-11:00 AM | <b>April 12, 2013</b>                    | 9:30-11:00 AM |
| <i>Tygart State Park</i>               |               | <i>WV State Police Academy</i>           |               |
| Tygart Lodge, Conference Room #1       |               | Room #4                                  |               |
| Rt 1 Box 260                           |               | 135 Academy Drive                        |               |
| Grafton, WV 26354                      |               | Dunbar, WV 25064                         |               |
| <b>April 10, 2013</b>                  | 9:30-11:00 AM |  |               |
| <i>Pipestem State Park</i>             |               |  |               |
| McKeever Lodge, Faulconer Room         |               |  |               |
| 3405 Pipestem Drive                    |               |  |               |
| Pipestem, WV 25979                     |               |  |               |

Description	Lead	Time
<b>Welcome, Introductions and Today's Agenda</b>		
<ul style="list-style-type: none"> <li>• What is Hazard Mitigation?</li> <li>• Why Plan?</li> </ul>	Jake Jarosz, Dewberry	10 Minutes
<b>Questionnaire</b>	Ali Velasco, Dewberry	5 Minutes
<b>Hazards of Concern (HIRA)</b>	Ali Velasco, Dewberry	20 Minutes
<b>Mitigation Strategies</b>	Jake Jarosz, Dewberry	25 Minutes
<b>Local Mitigation Success Stories</b>	Ali Velasco, Dewberry	20 Minutes
<b>Next Steps</b>	Jake Jarosz, Dewberry	10 Minutes

**Attendees:** Public officials, emergency managers, fire & rescue, law enforcement, planners, transportation, public works, schools, utilities, architects and engineers, American Red Cross, non-profit organizations, WV Planning District Committee members, colleges & universities, businesses, general citizenry, hazard experts from State and Federal Agencies, WV Hazard Mitigation Council; WV Division of Homeland Security and Emergency Management; FEMA Region III; Dewberry



## West Virginia 2013 Hazard Mitigation Plan Update Public Outreach Workshops

Cacapon State Park, WV  
Monday, April 8, 2013  
Sign-in Sheet

LAST NAME	FIRST NAME	ORGANIZATION	E-MAIL	INITIALS
Beach	Lirrose	WV DHEM	Lirrose.M.Beach@wv.gov	LB
MYERS	MIKE	Pendleton County O&M	mikemyers@pendletoncountywv.com	MM
Minor	Bruce	Pendleton O&M	tast12000@yahoo.com	BM
Penix	Brian	WV DHEM	Brian.M.Penix@wv.gov	BP
MICHAEL	DAVID	MORGAN CO O&M	EMERGENCYMANAGEMENT@MORGANCOUNTY.WV.GOV	DM
Crause	Michael	Amphershed Co O&M	mikec@hampshoresps.com	MC
GREEN	SANDOR	WV DHEM	SANDOR.H.GREEN@WV.GOV	SG
Miller	Barbara	Jefferson Co. O&M	bmiller@jeffersoncountywv.org	BM
Aberegg	Andrea	EastRidge Health Systems	adbergg@eastridgesps.org	AA
Piepenburg	Matthew	JCP&D	engineering@jcp&d.com	MP
Pennington	Matthew	Region 9 PDC	MPennington@Region9WV.Cares	MBP
Allen	STEPHEN	Berkeley Co. O&M	SALLEN@BERKELEYWV.org	SA



WEST VIRGINIA STATEWIDE HAZARD MITIGATION PLAN  
2013 UPDATE

LAST NAME	FIRST NAME	ORGANIZATION	E-MAIL	INITIALS
Hammond	Jeff	SHEMANDOAH VALLEY MEDICAL SYSTEMS, INC.	jhammond@svms.net	JH
RYMAN	JEFF	SHEMANDOAH VALLEY MEDICAL SYSTEMS, INC.	jryman@svms.net	JR
Talley	Hosely	Shenandoah Valley Medical Systems Inc.	ktalley@svms.net	TH
HAZEL	DREW	DEWBERRY		DH
J	JAKE	DEWBERRY		JJ





## West Virginia 2013 Hazard Mitigation Plan Update

### Public Outreach Workshops

Tygart State Park, WV  
Tuesday, April 9, 2013  
Sign-in Sheet

LAST NAME	FIRST NAME	ORGANIZATION	E-MAIL	INITIALS
Beach	Linerose	WV DHEM	Linerose.M.Beach@wv.gov	lmb
Jakobz	Jake	Dewberry	JJakobz@dewberry.com	JEB
Hazel	Dana	Dewberry	W.Hazel@dewberry.com	DH
Penix	Brian	WV DHEM	Brian.M.Penix@wv.gov	BP
Hart	Tom	MARSHALL CO DEM	thartem@marshallcountywv.org	TH
Prati-Miller	Carmen	AEP	capratimiller@aep.com	cp
FARLEY	JIM	UPSHUR DEM	UPSHURCOE@mcfortmnc.com	JF
Bump	PAUL	HARRISON	Bump@HARRISON.ORG	JB
Rowan	William	Lewis OSHA	Lcoen@lewisosa.com	WR
Wolfe	Justin	Preston Co DEM	jwolfe@preston911.com	JW
Core	ANYSSA	WV DHEM	anyssa.m.Core@wv.gov	AM



## West Virginia 2013 Hazard Mitigation Plan Update Public Outreach Workshops

Pipestem State Park, WV  
Wednesday, April 10, 2013  
Sign-in Sheet

LAST NAME	FIRST NAME	ORGANIZATION	E-MAIL	INITIALS
Beach	Linerose	WV DHEM	Linerose.M.Beach@wv.gov	LB
Meadows	Dean	Wyoming Co. OES	mdmeadows@wyomingcounty.com	DM
Penix	Brian	WV DHEM	Brian.M.Penix@WV.Gov	BP
Brown	Paula	Greenbrier Co OES	Paula.brown@greenbriercounty.wv.net	PWB
Payton	Kevin	City of Beckley	kp@beckley.org	KP
Pickett	Mark	PCHA / MSCC Region I	mpickett@scholarline.org	MP
Roberts	Susan	Region I PRC	jason@roberts@regiononeprc.org	SR
Wilson	Tim	Monroe Co. OES	twilson@monroe-county.wv.net	TW
Booth	Yvonne	Monroe Co 911	ybooth@monroecounty.wv.net	YB
Jarosz	Jackie	Dewberry	T.Jarosz@dewberry.com	TEJ
HAZEL	DREW	DEWBERRY	WHAZEL@DEWBERRY.COM	DH
White	Theresa	Fayette County Emergency Management	twhite@fayettecounty.wv.org	THW







## West Virginia 2013 Hazard Mitigation Plan Update Public Outreach Workshops

Parkersburg, WV  
Thursday, April 11, 2013  
Sign-in Sheet

LAST NAME	FIRST NAME	ORGANIZATION	E-MAIL	INITIALS
Lirrose	Jake	Dewberry	lirrose@dewberry.com	JLF
Penix	Brian	WVHSEM	Brian.M.Penix@wv.gov	BP
Beach	Lirrose	WVHSEM	Lirrose.M.Beach@wv.gov	LB
Hazel	Drew	Dewberry	WHzee@dewberry.com	HT
Hess	Doug	The Arc of the MOB	doug.hess@arcwv.org	DH
Hupp	Ed	Wood Co OEN	ehupp@woodcountygov.com	EH
Rader	Fred	MOVRC	fred.rader@movrc.org	FR
Zinnok	Barb	Region XI	bzinnok@bhjmc.org	BZ
Knights	Steve	Pleas. Co. OES	knights14@fronternet.net	SK





**West Virginia 2013 Hazard Mitigation Plan Update**  
**Public Outreach Workshops**

Dunbar, WV  
Friday, April 12, 2013  
Sign-in Sheet

LAST NAME	FIRST NAME	ORGANIZATION	E-MAIL	INITIALS
Beach	Liriose	WV DITSEM	Liriose.M.beach@wv.gov	LB
Thompson	Eric	Acia	Eric.acia@spoo.com	EA
Smittle	WALTER	A.C. COMMISSION	DES@NICHOLSON.COM	WJ
Penix	Brian	WV DITSEM	Brian.M.Penix@WVU.GOV	BP
Greathouse	Kara	WV POC Reg.3	Kgreathouse@wvregion3.org	KLG
Hennessey	Carla	Nicholas Co DITSEM	Carla.hennessey@nicholasoes.com	CDH
Taylor	Annette	"	annette.taylor@nicholasoes.com	DMAT
McClung	Sheena	"	Sheena.mcclung@nicholasoes.com	SM
Jaross	Jake	Dewberry	JJaross@dewberry.com	
Hazel	Drew	Dewberry	WHazel@dewberry.com	







## West Virginia Hazard Mitigation Plan 2013 Update


### Public Outreach Workshops

4-12-2013


## What is Mitigation?


Description	Time
<b>Welcome, Introductions and Today's Agenda</b> <ul style="list-style-type: none"> <li>• What is Hazard Mitigation?</li> <li>• Why Plan?</li> </ul>	10 Minutes
Questionnaire	5 Minutes
Hazards of Concern (HIRA)	20 Minutes
Mitigation Strategies	25 Minutes
Local Mitigation Successes	20 Minutes
Next Steps	10 Minutes



## What is Mitigation?


"Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking action *now*—before the next disaster—to reduce human and financial consequences later."

-FEMA Website




## Federal Authorities

- Robert T. Stafford Disaster Relief and Emergency Assistance Act (PL 93-288)
- Disaster Mitigation Act of 2000 (PL 106-390)
- Final Rule & Interim Final Rule
- FY2011 Hazard Mitigation Assistance Unified Guidance
- National Flood Insurance Act of 1968
- Biggert-Waters Flood Insurance Reform and Modernization Act of 2012



## Why Plan?

- Assess Risk
- Inventory Resources
- Prioritize Investments
- Eligibility for Federal Mitigation Grants



## Why Plan?

### Update Every 3 Years

- Reassess Hazards
- Incorporate Changes
- Address Weaknesses
- Report Progress



## HMA Programs



## The Planning Process



## Hazard Identification and Risk Assessment (HIRA)

### Purpose:

- Provides a factual basis for prioritizing hazard mitigation activities

### Major components:

- Identify and profile hazards
- Describe vulnerability and estimate losses
- Incorporate findings of local and regional plans

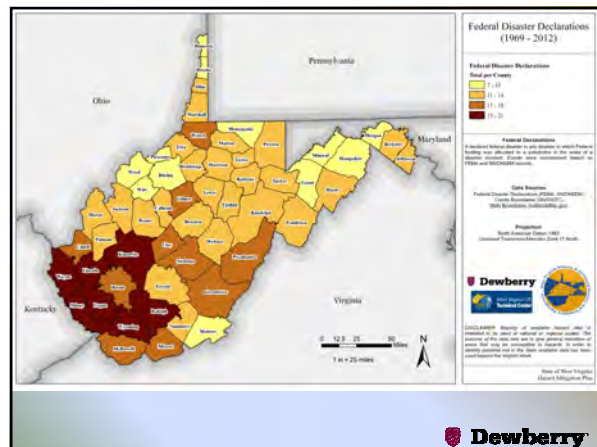


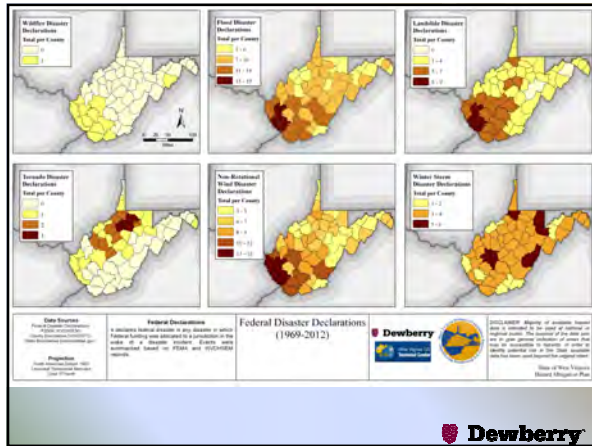
## Federally Declared Disasters

### 57 Declarations Since 1954

- 50 major disaster declarations
- 5 emergency declarations
- 2 fire management assistance declarations

Disaster Number	Year	Incident Period	Declaration Date	Disaster Types	Counties Declared
1881	2010	18-Dec to 20-Dec	2-Mar	Severe Winter Storm and Snowstorm	15
1883	2010	12-Mar to 9-Apr	29-Mar	Severe Storms, Flooding, Mudslides, and Landslides	6
1903	2010	5-Feb to 11-Feb	23-Apr	Severe Winter Storms and Snowstorms	17
1918	2010	12-Jun to 29-Jun	24-Jun	Severe Storms, Flooding, Mudslides, and Landslides	4
4059	2012	2-Feb to 5-Mar	16-Mar	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	11
4061	2012	15-Mar to 31-Mar	22-Mar	Severe Storms, Flooding, Mudslides, and Landslides	3
4071	2012	29-Jun to 8-Jul	23-Jul	Severe Storms and Straight-Line Winds	47
4093	2012	29-Oct to 8-Nov	27-Nov	Hurricane Sandy (Winter Impacts)	18





### Statewide Rankings

High	Medium- High	Medium	Medium- Low	Low
Flood Winter Weather	Wind	Wildfire Tornado	Drought Extreme Heat Hail Landslide Lightning	Natural Resource Extraction Land Subsidence (Karst) Earthquake

Other hazards considered:

- Dam & Levee Failure
- Hazardous Materials
- Nuclear Accidents

### Ranking Parameters

- “Semi-Quantitative” Scoring System**
  - Actual Data Values grouped in categories 1-4 based on statistics
- Data with normalization (inflation ...)**
  - Limitations with probability & impact data
- Parameters Used:**
  - Population Vulnerability (weight 0.5)
  - Population Density (weight 0.5)
  - Annualized Events (weight 1)
  - Deaths & Injuries (weight 1)
  - Annualized Property Damage (weight 1)
  - Annualized Crop Damage (weight 1)
  - Regional Plan Hazard Rankings (weight 1)
  - Geographic Extent of Hazard (weight 1.5)

### What's New in 2013?

- Hazard Ranking: Supplemented Data**
  - New Parameter: Geographic Extent
  - New Parameter: Local Plan Ranking
- New Analysis**
  - Winter Weather
  - Wind/Tornado
- New Ranking**
  - Karst
  - Mining
  - Earthquake
  - Hail
  - Lightning
  - Extreme Heat

### Regional HMP Integration

**Vulnerability and risk assessment results**

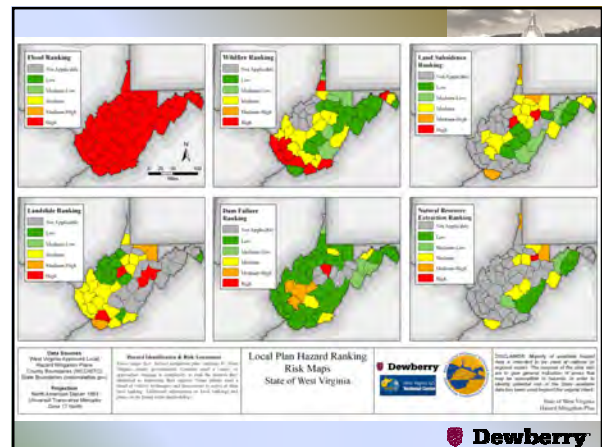
**Hazard rankings incorporated into State plan hazard rankings**

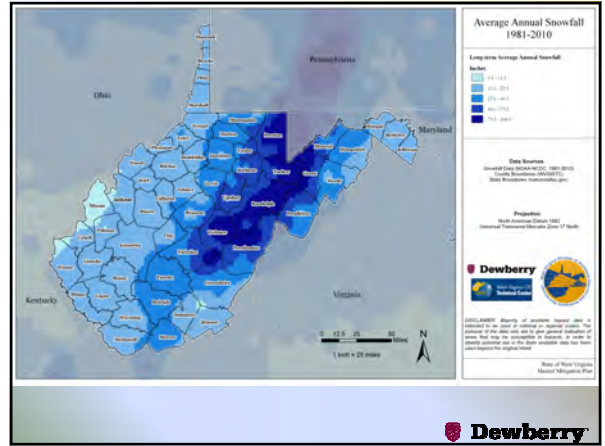
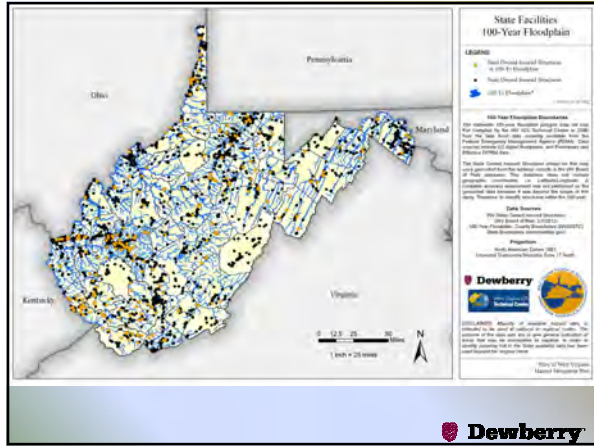
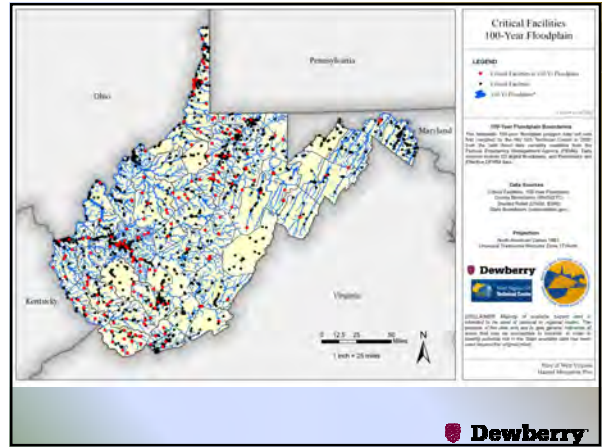
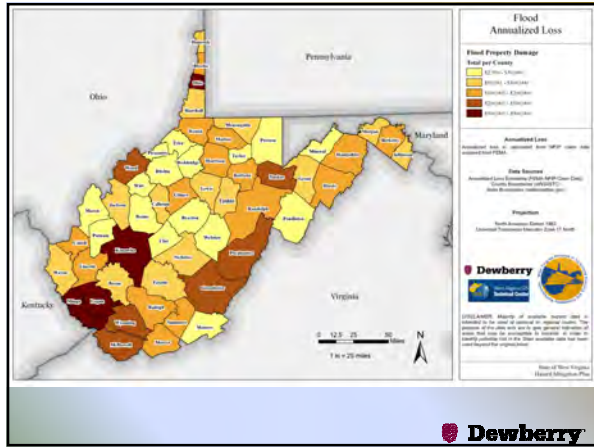
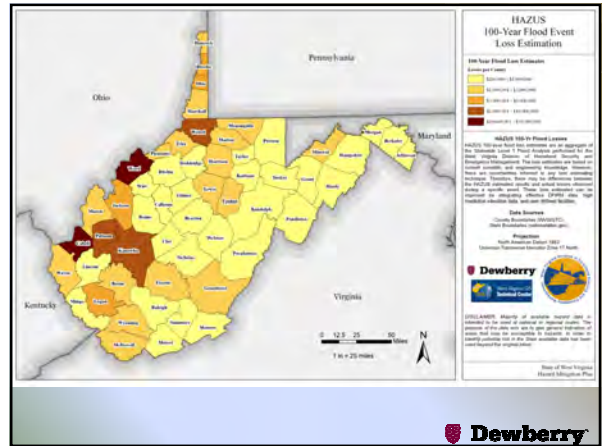
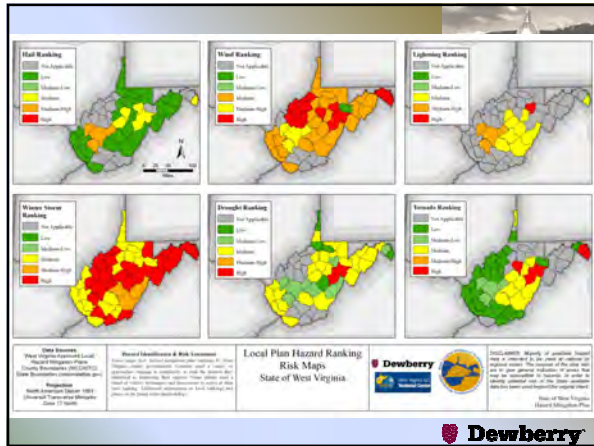
**Mitigation Strategies & Actions**

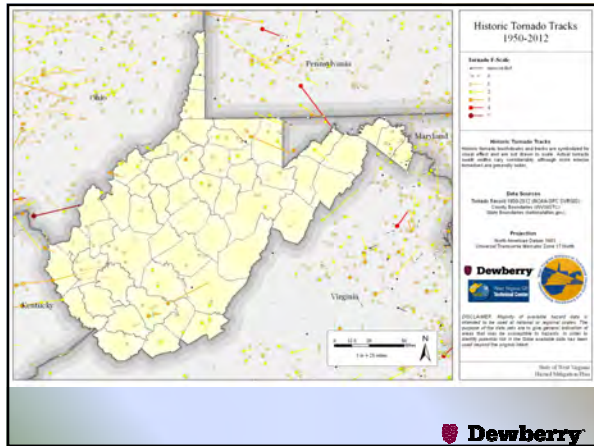
**FEMA Guidance:**  
Assessing Vulnerability by Jurisdiction

A. Does the new or updated plan describe the State's vulnerability based on estimates provided in local risk assessments as well as the State risk assessment?

C. Does the updated plan explain the process used to analyze the information from the local risk assessments, as necessary?





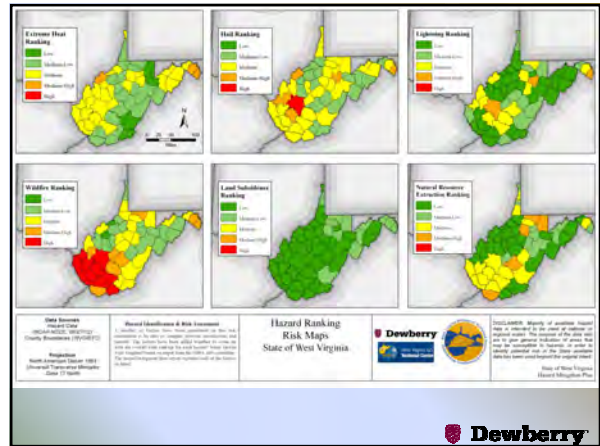
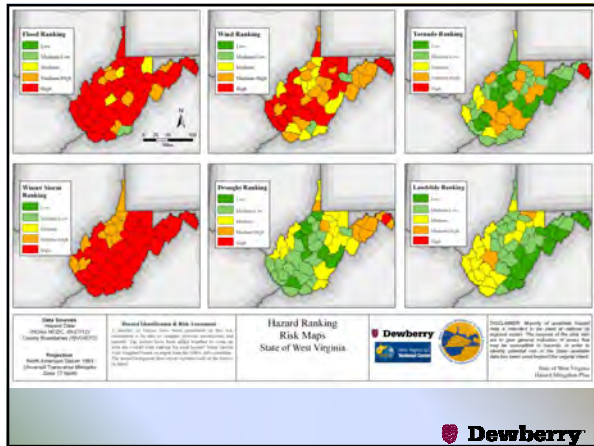
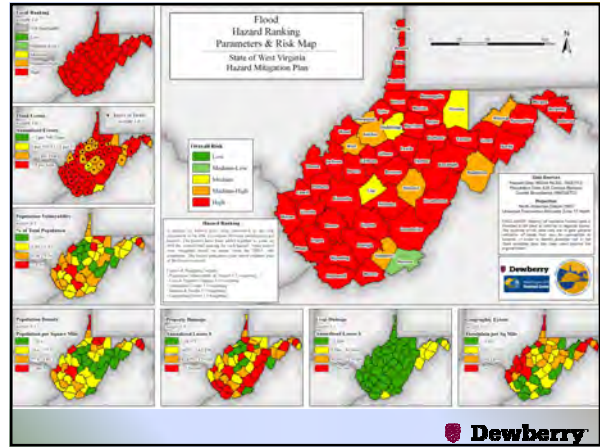


### Annualized Losses

Hazard Type	NCDC Annualized Events	NCDC Annualized Property Damage	NCDC Annualized Crop Damage	NCDC Total Annualized Damages	Supplemental Total Annualized Damages	Source
Drought	2.5	\$0	\$1,990,868	\$1,990,868		
Extreme Cold	2.0	\$415,796	\$1,540	\$417,337		
Extreme Heat	2.7	\$0	\$0	\$0		
Flooding	87.9	\$51,680,684	\$176,127	\$51,836,811	\$8,522,491	NFP Claims
Hail	38.1	\$589,121	\$3,112	\$592,233		
High Wind	71.3	\$1,819,475	\$20,331	\$1,839,806	\$1,468,890	Hazus
Landslide	0.6	\$23,759	\$0	\$23,759	>\$10 million	WVGES (1976 dollars)
Lightning	4.1	\$240,778	\$0	\$240,778		
Tornado	2.3	\$2,042,192	\$51,475	\$2,093,667		
Wildfire	1.6	\$3,835	\$0	\$3,835	\$14,583,188	WVDOF \$300/acre of timber damage
Winter Weather	43.8	\$6,885,218	\$704	\$6,885,922		
Earthquake				Not Available	\$7,159,176	Hazus
Land Subsidence				Not Available		
Natural Resource Extract.				Not Available		
<b>Total</b>		<b>\$63,680,858</b>	<b>\$2,244,157</b>	<b>\$65,925,016</b>		<b>\$41,733,745</b>

## Ranking Maps

### 2013 Update



# Mitigation Strategies

## 2013 Update



## Definitions

**Goals**


- General guideline that describes what West Virginia would like to achieve

**Objectives**

- Specific and measurable strategies that must be implemented to achieve the identified goals

**Actions**

- More specific than an objective with identified responsible parties, timeframes, and potential funding sources



## Mitigation Goals

**2010 Goals**

- **Goal 1**
  - Protect life and property
- **Goal 2**
  - Improve understanding of risk and vulnerability
- **Goal 3**
  - Bolster public understanding and preparedness

**2013 Goals**

- **Goal 1**
  - Improve statewide resilience
- **Goal 2**
  - Protect life and property
- **Goal 3**
  - Improve understanding of risk and vulnerability for planning purposes
- **Goal 4**
  - Bolster public understanding and preparedness



## Mitigation Strategy

**2010 Goals**

- **Goal 4**
  - Maximize state mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts on Severe Repetitive and Repetitive Loss properties

**2013 Goals**

- **Goal 5**
  - Maximize state mitigation program resources to prioritize and implement mitigation projects to reduce flooding impacts while considering local priorities




## Break-Out Groups

- Risk Assessment
- Education & Outreach
- Planning, Policy, Funding & Legislation
- Structures




## 2013 Mitigation Strategies

- What works?
- What doesn't ?
- Suggested Changes?




### Eligible Project Types

- Acquisition and Relocation/Demolition
- Elevation
- Dry Floodproofing
  - Historic & Non-Residential Structures only
- Minor Localized Flood Reduction Projects




### Eligible Project Types

- Structural & Non-structural Retrofit
- Safe-room Construction
- Infrastructure Retrofit
  - Utility Systems, Roads & Bridges
- Soil Stabilization




### Eligible Project Types

- Wildfire Mitigation
- Post-Disaster Code Enforcement
- Generators
- 5% Initiative Projects



### Next Steps

- Finalize updated plan draft
- Submit to WVDHSEM for review
- Submit to FEMA





**Stakeholder Workshop Questionnaire**

**Date:** Monday, April 8, 2013

**Time:** 1:30 – 3:00 PM

**Location:** Cacapon State Park

**Section 1: Hazard Identification & Risk Assessment**

**1. How concerned are you about the following hazards in your community?**

Place an X in the appropriate column for each hazard. If a particular hazard is not listed, please write it in under "Other".

Hazard Type	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Flooding	X (6)	X (3)	X		
High-Wind/ Severe Storm	X (4)	X (5)	X		
Winter Weather	X (3)	X (4)	X (3)		
Drought/ Extreme Heat		X (3)	X (5)	X (2)	
Wildfire		X (3)	X (4)	X (2)	
Landslide		X	X (2)	X (6)	X
Earthquake			X	X (6)	X (3)
Natural Resource Extraction				X (6)	X (3)
Dam/Levee Failure	X		X (4)	X (4)	X
HazMat	X	X (3)	X (5)	X	
Nuclear		X (3)	X (2)	X	X (4)
Other: <u>Karst-Sinkhole</u>			X		
Other: <u>Flash Flooding</u>	X				
Other: <u>Power Outage</u>	X				
Other: <u>Communication Outages</u>	X				
Other: <u>Food / Water/ Ice Distribution</u>	X				
Other: <u>Information Technology</u>		X			
Other: <u>Remnants of Hurricanes</u>		X			
Other: <u>Snowstorm</u>			X		





Other: <u>Terrorism</u>				X	
Other: <u>CBRNE</u>		X			

**2. Why are you concerned or not concerned about particular hazards?**

*If you wrote in a hazard, please describe why you are concerned about that hazard.*

- Based upon experience with events in the county on the basis of personal experience and data.
- Not enough room here – please see Jefferson County’s latest mitigation plan for further info.
- Flooding, Wind, winter weather most affect our county. Wildfires are a concern due to vast amount of timberland.
- Likelihood or intensity of hazard not as great or doesn’t have as large of an impact as others do on county population/ costs
- History of events that have occurred
- Level of concern is based on past knowledge of events. HazMat or nuclear is a gnawing threat that needs a greater plan. It is a rapidly growing and changing. We are becoming more dependent. Need to plan.
- 1) Excessive chance of high wind/storm. 2) Flooding: Damage to property. Past several years. 3) Winter Weather: High snow fall.
- Power and Communication outages. Generators only 1 potential shelter has generator. None of schools (community focal points) have emergency power. 911 Center has no alternative phone line routes.
- A large geographical area of karst geology within eastern panhandle. Many U.S. Routes and Interstate traverse across these areas and could be at risk.

**Section II: Mitigation Strategies**

**3. Which mitigation strategies have worked well in your community or for your organization?**

- Flood hazard mitigation buyouts
- Floodplain management
- 1) Enforcement of planning ordinances! Enforcement of floodplain regulations and electrical codes. 2)3ft freeboard for building in a floodplain. 3) Buyouts for flooding. 4) Wind mitigation reports. 5) Whole community involvement. 6) Generators on Critical infrastructure/prime power surveys. 7) Public Education of Risks.
- Educate the public. Learning from past experiences/failures.
- High Wind/Storm: Communication/notification to public to prepare.
- Enforcement of floodplain building ordinances.
- Flood HMGP/Repetitive Loss Buy out.



- 4. Which groups should the State work with to reduce hazard losses (please identify)?**
- County council; emergency management; LEPC;
  - Farm Land Protection Group; County planning office.
  - 1) Local Governments. 2) WVDHSEM 3) WVDEP 4) Firefighters 6) Emergency Managers 7) Local planning and zoning officials.
  - Wind, flood, winter weather.
  - Not aware of laws/regulations
  - Local codes and ordinance enforcement agencies such as county and city government planning and development offices.
- 5. What is the State of West Virginia doing to effectively reduce your organization's risk from hazards? Please list any state laws, programs, policies, projects or regulations which help reduce your organization's vulnerability to hazards.**
- Hazard Mitigation planning and funding of flood prone buyouts
  - Providing resources, both monetary & equipment for us to enact safety measures.
  - I am not familiar of the laws, policies and particular regulations.
  - Flood plain ordinances. Community Rating System. Stormwater Management Ordinances.
- 6. What should the State's mitigation priorities be for the State as a whole and for the local jurisdictions?**
- 1) Flooding; 2) winterstorms; 3) HazMat
  - Flooding and severe weather
  - Please see Jefferson County Mitigation Plan
  - More training; PUBLIC AWARENESS/TRAINING. Without it goals are useless.
  - Training & Preparedness
  - Flooding has proven to be of great threat. Although must give careful thought to unexperienced events.
  - Food/water/Meds – Need regional warehouses. i.e. 50-100 mile radiuses from each county seat.
  - Retrofitting existin stormwater facilities. Help developing and enforcing floodplain and stormwater ordinances. Reconnection to floodplains and education. Apply for CRS. Reducing impervious services.
- 7. What can the State do to better improve its mitigation programs? What kinds of mitigation related activities would you like to see?**
- Continue planning and buyout programs and education of the public.
  - Generators on all Critical Infrastructure. Prime Power Surveys on al Critical Infrastructure.
  - More training exercises (region based)



- Reconnection to floodplains. Help establishing vegetative buffers along sensitive corridors. Help assist communities apply for CRS. Retrofitting existing stormwater facilities.



**Stakeholder Workshop Questionnaire**

**Date:** Tuesday, April 9, 2013

**Time:** 9:30 – 11:00 AM

**Location:** Tygart State Park

**Section 1: Hazard Identification & Risk Assessment**

**1. How concerned are you about the following hazards in your community?**

*Place an X in the appropriate column for each hazard. If a particular hazard is not listed, please write it in under "Other".*

Hazard Type	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Flooding	X (3)	X (3)			
High-Wind/ Severe Storm	X	X (5)			
Winter Weather	X	X (2)	X (3)		
Drought/ Extreme Heat			X (4)	X (2)	
Wildfire			X (3)	X (3)	
Landslide			X	X (5)	
Earthquake			X	X (3)	X (2)
Natural Resource Extraction		X (4)	X (2)		
Dam/Levee Failure			X (2)	X (4)	
HazMat		X (2)	X (4)		
Nuclear			X (3)	X	X (2)
Other: <u>Transportation</u>		X			

**2. Why are you concerned or not concerned about particular hazards?**

*If you wrote in a hazard, please describe why you are concerned about that hazard.*

- 25 years of historic experiences and knowing the impacts of each.
- Historical data shows areas of concern and problems most often dealt with the known causes more area for concern.
- All potential hazards in our community; Some "low" graded hazards becoming more frequent.
- Resource extraction – concerned about adverse environmental impacts and HazMat issues.



## Section II: Mitigation Strategies

### 3. Which mitigation strategies have worked well in your community or for your organization?

- Dunno
- Increased floodplain control measures. Working closely with other agencies – keeping good contacts with utility companies and other stakeholders.
- Many counties in Region 4 have used HMGP funding for demolition and elevation projects in the floodplain.
- N/A
- Advanced planning, developing working relationships.

### 4. Which groups should the State work with to reduce hazard losses (please identify)?

- Planning/Zoning Groups; municipal bodies; utility companies – principally electric.
- Municipalities / PSDs / Electric Companies.
- Emergency Management, critical facilities (PSDs, VFDs, schools, etc.)
- O.E.M. Local community partners

### 5. What is the State of West Virginia doing to effectively reduce your organization's risk from hazards? Please list any state laws, programs, policies, projects or regulations which help reduce your organization's vulnerability to hazards.

- Floodplain management; utility regulation.
- Mitigation workshops are a great start to give everyone an opportunity to provide input.

### 6. What should the State's mitigation priorities be for the State as a whole and for the local jurisdictions?

- Health and well being of population; economic concerns.
- Power outages effecting PSDs and municipal water sources. This has happened in the last two declarations. We had to help find generators to maintain water supply to large areas of the county. We have also had issues with a nursing care facility with inadequate back up generator support.
- Generators for critical facilities.
- Expand mitigation programs beyond flooding.

### 7. What can the State do to better improve its mitigation programs? What kinds of mitigation related activities would you like to see?

- 2: Power Company – Resilience/Protection; 1: Force feed the information to constituents.
- Education on different programs available to help local agencies.
- Expand the projects to include mitigation of hazards other than just flooding.
- Possibly expand the mitigation office & staff; offer local training on the process on the state level.



**Stakeholder Workshop Questionnaire**

**Date:** Wednesday, April 10, 2013

**Time:** 9:30 – 11:00 AM

**Location:** Pipestem State Park

**Section 1: Hazard Identification & Risk Assessment**

**1. How concerned are you about the following hazards in your community?**

*Place an X in the appropriate column for each hazard. If a particular hazard is not listed, please write it in under "Other".*

Hazard Type	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Flooding	X (5)	X (2)	X (2)		
High-Wind/ Severe Storm	X (2)	X (5)	X (2)		
Winter Weather	X (3)	X (6)			
Drought/ Extreme Heat			X (2)	X (6)	X
Wildfire		X (2)	X (3)	X (4)	
Landslide	X	X	X	X (3)	X (3)
Earthquake			X	X (5)	X (3)
Natural Resource Extraction			X (2)	X (5)	X (2)
Dam/Levee Failure			X (2)	X (6)	X
HazMat	X (2)		X (3)	X (4)	
Nuclear			X	X (4)	X (4)
Other: _____					

**2. Why are you concerned or not concerned about particular hazards?**

*If you wrote in a hazard, please describe why you are concerned about that hazard.*

- Flood – economic impact / damage extent / frequency; Winterstorm – economic impact / damage extent / frequency; Others – less economic/demographic impact
- Flooding has historically impacted my Region of the state and WV as a whole more than other hazards.
- Based on existing locality and Reynolds Hospital HIRAs
- Based upon prior events and location to major roadways, natural disaster and transportation HazMat related incidents produce highest areas of concern.



- Some are not applicable (i.e. nuclear). The region experiences frequent flooding, hence the most concern for this hazard.
- Major impact to community & citizens. Infrastructure needs resource strains and loss of revenue.

## **Section II: Mitigation Strategies**

### **3. Which mitigation strategies have worked well in your community or for your organization?**

- HMGP – Acquisition – No elevation/relocation
- Property buy outs; educations.
- Created Regional HIRA; Drill/exercise high rated hazards
- Code enforcement programs, robust training and education program, public-private partnership
- HMGP, ICC, Improved floodplain management
- HMGP buyouts, flood walls, etc.
- Buyouts, drainage programs, raising homes (elevation).

### **4. Which groups should the State work with to reduce hazard losses (please identify)?**

- USACE, other state agencies with similar concerns/impacts & funding.
- Homeowners in floodplains.
- EM; WVHA – Medical Surge Capacity Task Force; BPH – Center Threat Preparedness; Southern WV Preparedness partnership.
- Critical infrastructure owners/operators, utilities, faith-based organizations
- County officials
- County Emergency Services, municipal officials.
- Soil conservation, NRCS, Local OEMS, FEMA, DEP, DNR, Dept of Forestry.

### **5. What is the State of West Virginia doing to effectively reduce your organization's risk from hazards? Please list any state laws, programs, policies, projects or regulations which help reduce your organization's vulnerability to hazards.**

- The Biggert-Waters Reform Act is of great concern – what can the State do to provide Federal input to make changes in the Act that would lessen the significant impact to flood insurance rates.
- The State has been working closely with WV VOAD and this collaborative effort is leading to better preparedness for response through Region LTRGs.
- LEPC's Hazardous Material EMP
- State efforts concerning critical infrastructure and information sharing seem to be progressive. State homeland security grant program have been somewhat beneficial in aiding mitigation efforts.



- HMGP
- Other options than acquisition.

**6. What should the State's mitigation priorities be for the State as a whole and for the local jurisdictions?**

- Complete analysis of frequency, demographics, economic impact, damage costs to local area, etc. Balanced analysis vs. just demographics.
- Coordination w/ all entities involved → communication
- Bolstering the public's understanding and responsibility should be a primary priority.
- I think they are properly identified.
- Life safety and property safety. Resiliency of State's capabilities.

**7. What can the State do to better improve its mitigation programs? What kinds of mitigation related activities would you like to see?**

- Generator support will be of interest. No elevation programs through HMGP.
- Maximize grant funding and planned use of funds based on planning.
- Fully address the goals and objectives it has already established for itself.
- Stream Restoration Program.
- Directives and Descriptions to eligible applicants.





**Stakeholder Workshop Questionnaire**

**Date:** Thursday, April 11, 2013

**Time:** 9:30 – 11:00 AM

**Location:** Parkersburg City Council Chambers

**Section 1: Hazard Identification & Risk Assessment**

**1. How concerned are you about the following hazards in your community?**

*Place an X in the appropriate column for each hazard. If a particular hazard is not listed, please write it in under "Other".*

Hazard Type	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Flooding	X				
High-Wind/ Severe Storm	X				
Winter Weather	X				
Drought/ Extreme Heat		X			
Wildfire				X	
Landslide				X	
Earthquake				X	
Natural Resource Extraction				X	
Dam/Levee Failure				X	
HazMat	x				
Nuclear					x
Other: _____					

**2. Why are you concerned or not concerned about particular hazards?**

*If you wrote in a hazard, please describe why you are concerned about that hazard.*

- The major issue of concern is people with disabilities may have more critical needs (oxygen, electric to charge power chairs or power other devices). So with any disaster – Flooding or winter storms – that may take out electric or prevent travel to get medicine either in person or USPS/Fed-ex, etc is a great concern.

**Section II: Mitigation Strategies**

**3. Which mitigation strategies have worked well in your community or for your organization?**



- 
- 4. **Which groups should the State work with to reduce hazard losses (please identify)?**
  - Emergency Managers in the counties and the underutilized LEPC's to do a better local public information campaign. While the LEPC can apply for the HMEP grants, most do not. Except for Wirt County in this region – public information before, during and after a disaster is non-existent and no interest from those people improving that either.
- 5. **What is the State of West Virginia doing to effectively reduce your organization's risk from hazards? Please list any state laws, programs, policies, projects or regulations which help reduce your organization's vulnerability to hazards.**
  - They began a program with J.H. consulting to do a state-wide plan for special populations – but almost no one – including state agencies that should – know nothing about it and it is not being implemented on a county by county basis as the plan was designed.
- 6. **What should the State's mitigation priorities be for the State as a whole and for the local jurisdictions?**
  -
- 7. **What can the State do to better improve its mitigation programs? What kinds of mitigation related activities would you like to see?**
  - Better locally coordinated public campaigns to let people know how to be prepared. Most public meetings are poorly attended because only a legal ad is placed in the paper. Better publicity of those sessions would help. Using the CERT teams would be a great help too.



**Stakeholder Workshop Questionnaire**

**Date:** Friday, April 12, 2013

**Time:** 9:30 – 11:00 AM

**Location:** State Police Academy

**Section 1: Hazard Identification & Risk Assessment**

**1. How concerned are you about the following hazards in your community?**

*Place an X in the appropriate column for each hazard. If a particular hazard is not listed, please write it in under "Other".*

Hazard Type	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Flooding	X (2)	X	X		
High-Wind/ Severe Storm	X	X	X	X	
Winter Weather	X (2)	X	X		
Drought/ Extreme Heat		X	X	X	X
Wildfire		X	X	X (2)	
Landslide			X (2)	X	X
Earthquake				X	X (3)
Natural Resource Extraction			X	X (2)	X
Dam/Levee Failure			X	X (2)	X
HazMat	X	X		X	X
Nuclear				X (2)	X (2)
Other: _____					

**2. Why are you concerned or not concerned about particular hazards?**

*If you wrote in a hazard, please describe why you are concerned about that hazard.*

- Flooding, winter weather, & Hazmat issues are daily/commonplace.
- Nicholas County has suffered through several flooding events so that is why it is my highest concern.
- Particular hazards (flooding, severe storms) are more likely to occur and cause more damage than others (earthquake, tornados).
- N/A

**Section II: Mitigation Strategies**



**3. Which mitigation strategies have worked well in your community or for your organization?**

- There are none currently in place except for the Kanawha County plan that was rewritten in 2012 without our input.
- We have only had buy-out programs and it has helped.
- “Whole Community” involvement via L.E.P.C.

**4. Which groups should the State work with to reduce hazard losses (please identify)?**

- Centers for Independent Living currently get no attention from the WVDHSEM.
- City & County Governments; County Floodplain Managers; County Emergency Services.
- Emergency Management, DOH, Floodplain managers, county commissions

**5. What is the State of West Virginia doing to effectively reduce your organization’s risk from hazards? Please list any state laws, programs, policies, projects or regulations which help reduce your organization’s vulnerability to hazards.**

- Centers for Independent Living currently get no attention from the WVDHSEM.
- The State offers different mitigation projects.
- EMPG, HMGP

**6. What should the State’s mitigation priorities be for the State as a whole and for the local jurisdictions?**

- There is no state plan for the aging and disability community.
- Flooding & storms
- Support jurisdictions with available resources

**7. What can the State do to better improve its mitigation programs? What kinds of mitigation related activities would you like to see?**

- Talking and working with the disability community; asking what is needed not telling.
- Unsure
- More trainings, NOFAs, informational workshops... maybe I’m not on the right email list.
- Emergency managers are very much involved with planning mitigation programs. Training on HAZUS, etc.



## APPENDIX R: PLAN MAPS

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This appendix provides the maps included in the main plan on full pages. These figure numbers correspond with the figures in the plan.

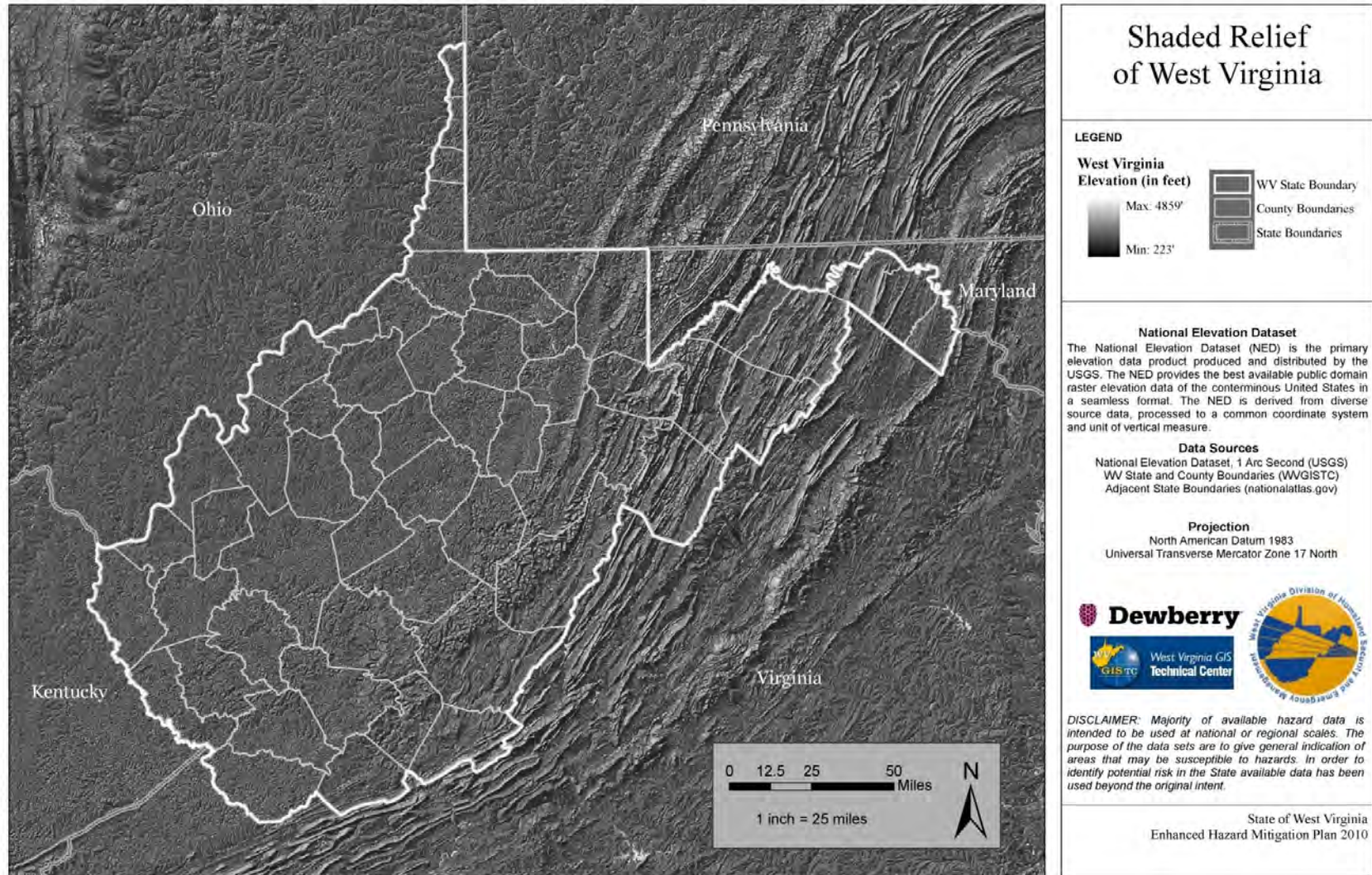


FIGURE 3 1. WEST VIRGINIA SHADED RELIEF

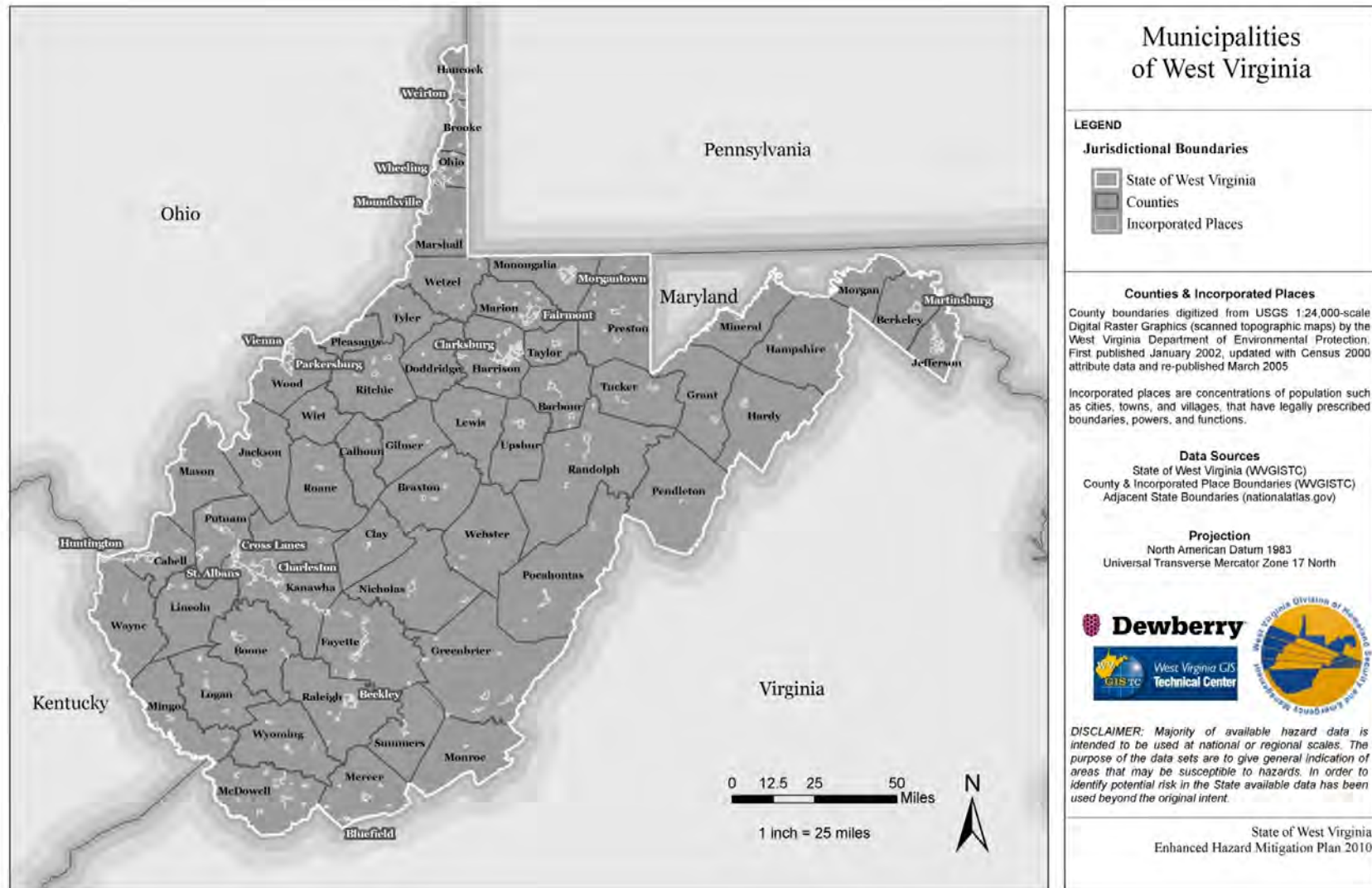


FIGURE 3 2. WEST VIRGINIA MUNICIPALITIES

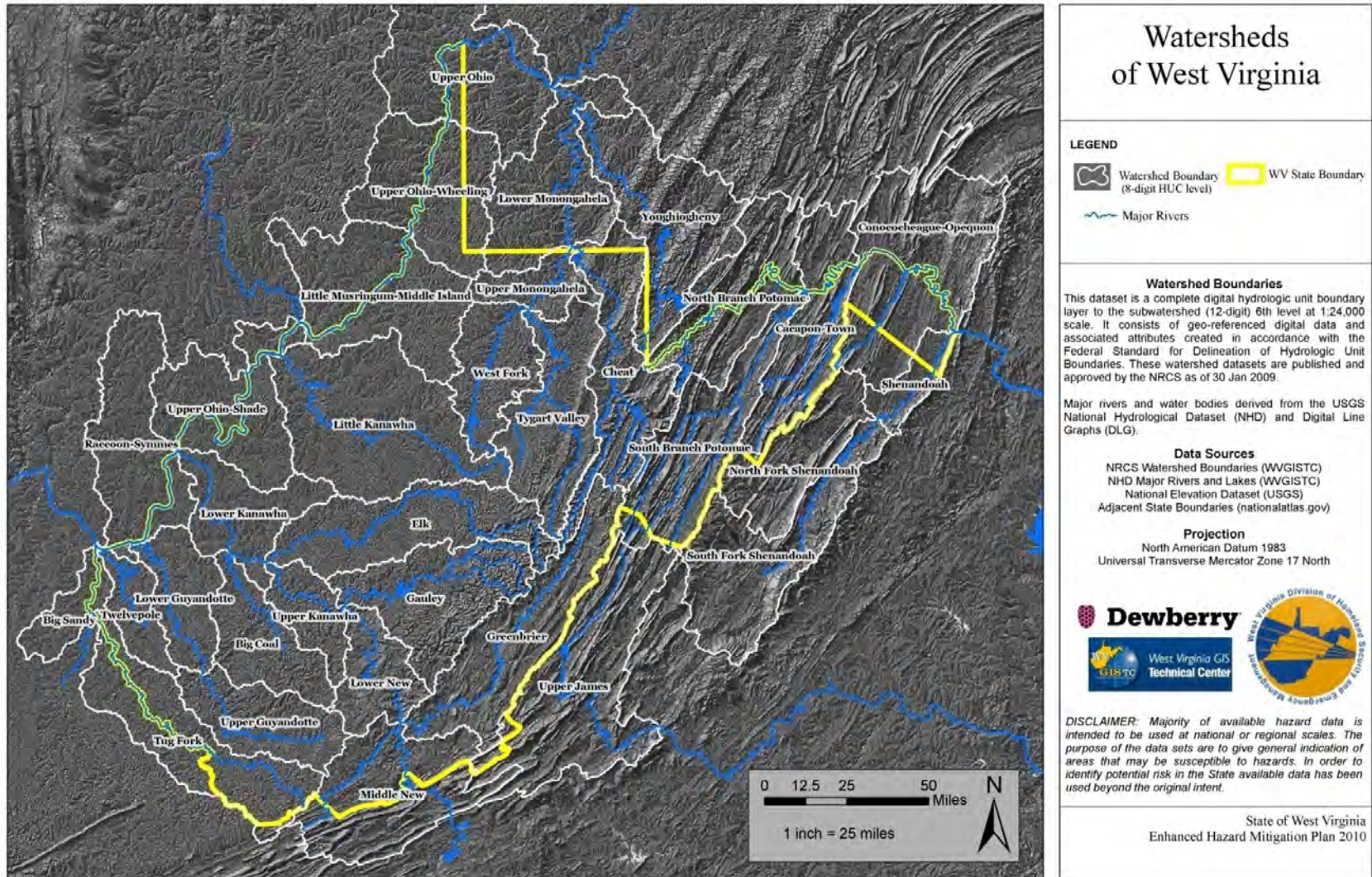


FIGURE 3-3. WEST VIRGINIA WATERSHEDS



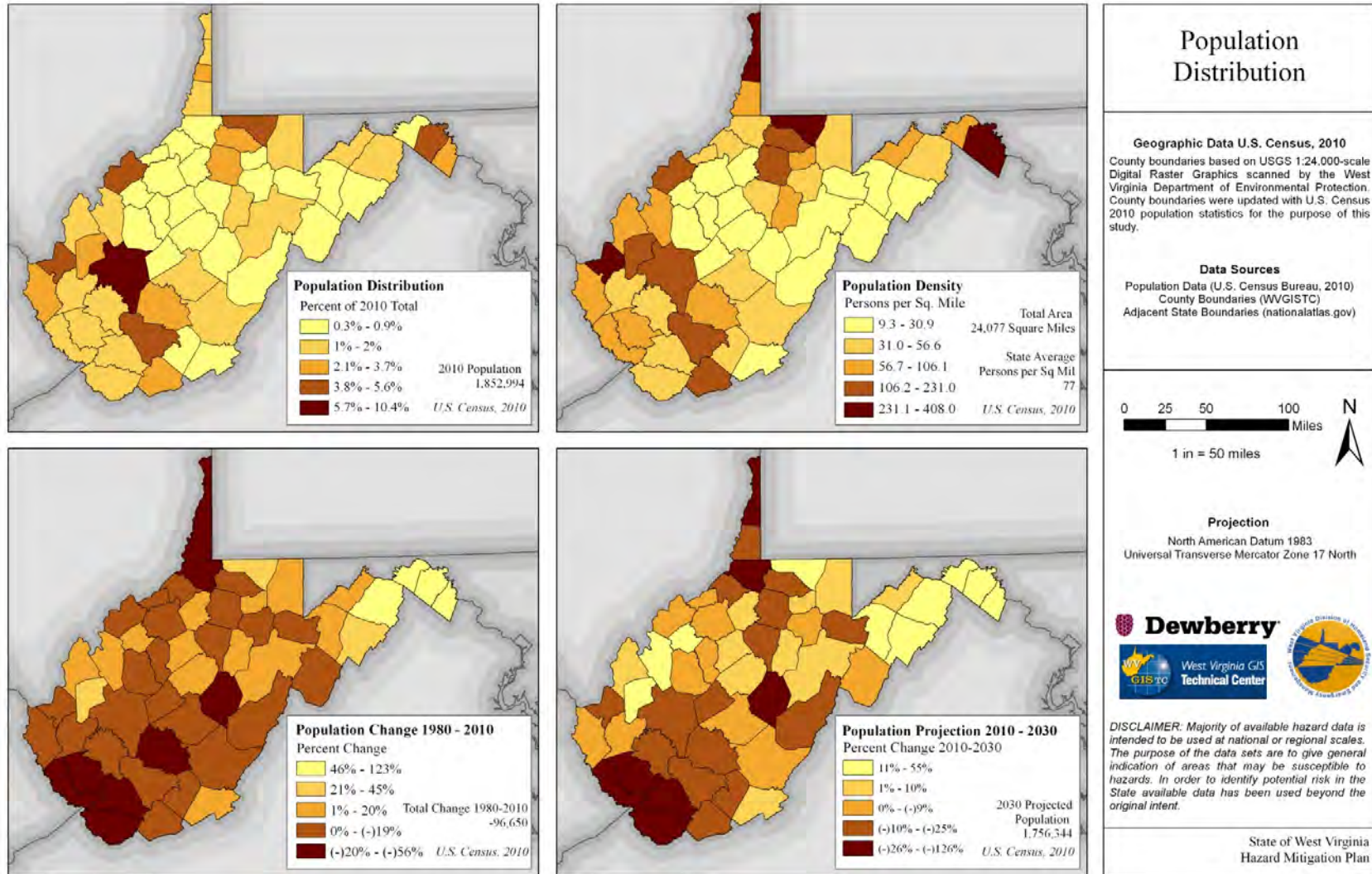


FIGURE 3-4. COMPARISON OF POPULATION DISTRIBUTION, DENSITY, 30-YEAR POPULATION CHANGE, AND 20-YEAR PROJECTIONS.

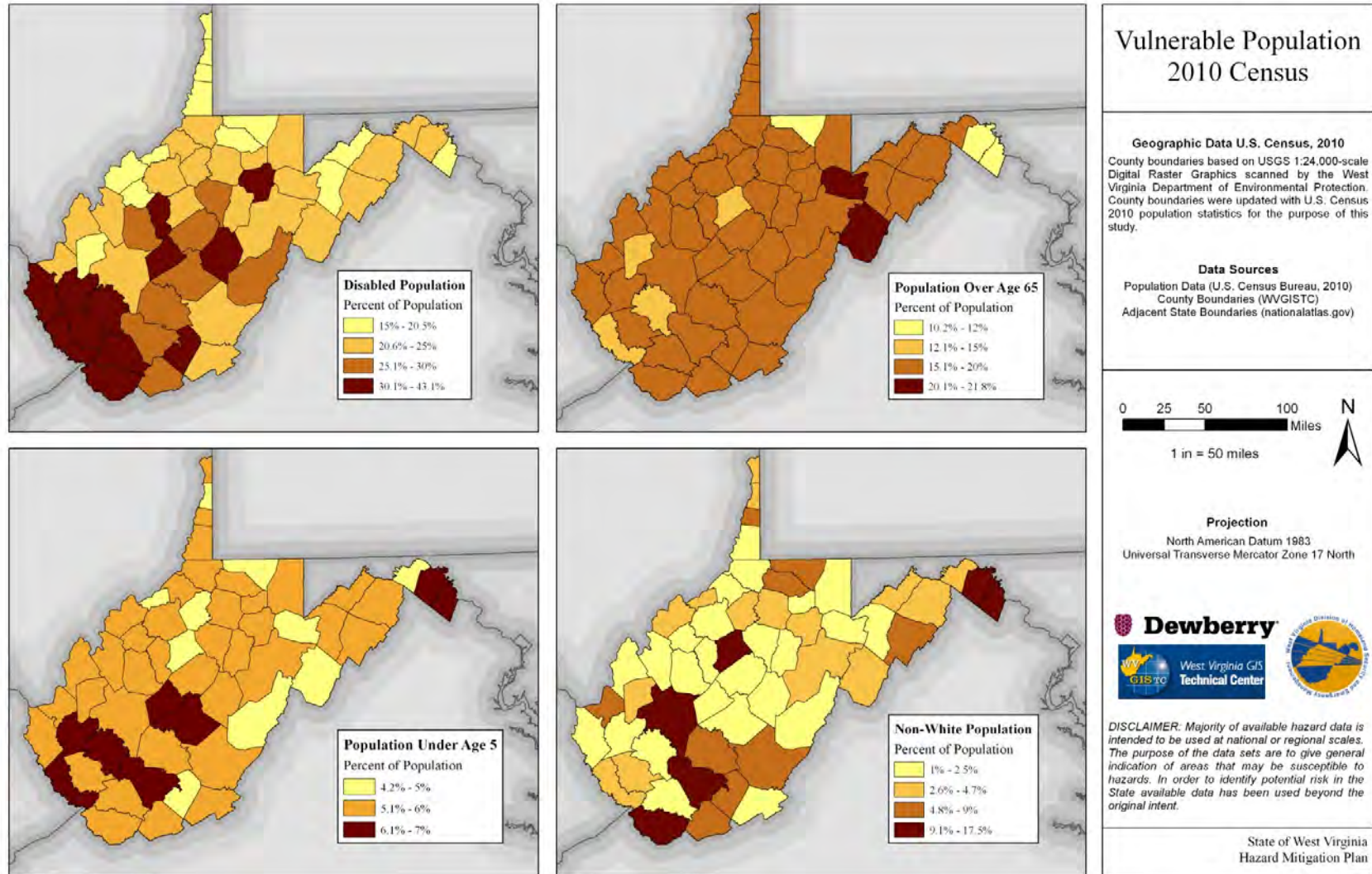


FIGURE 3-8. WEST VIRGINIA VULNERABLE POPULATIONS 1

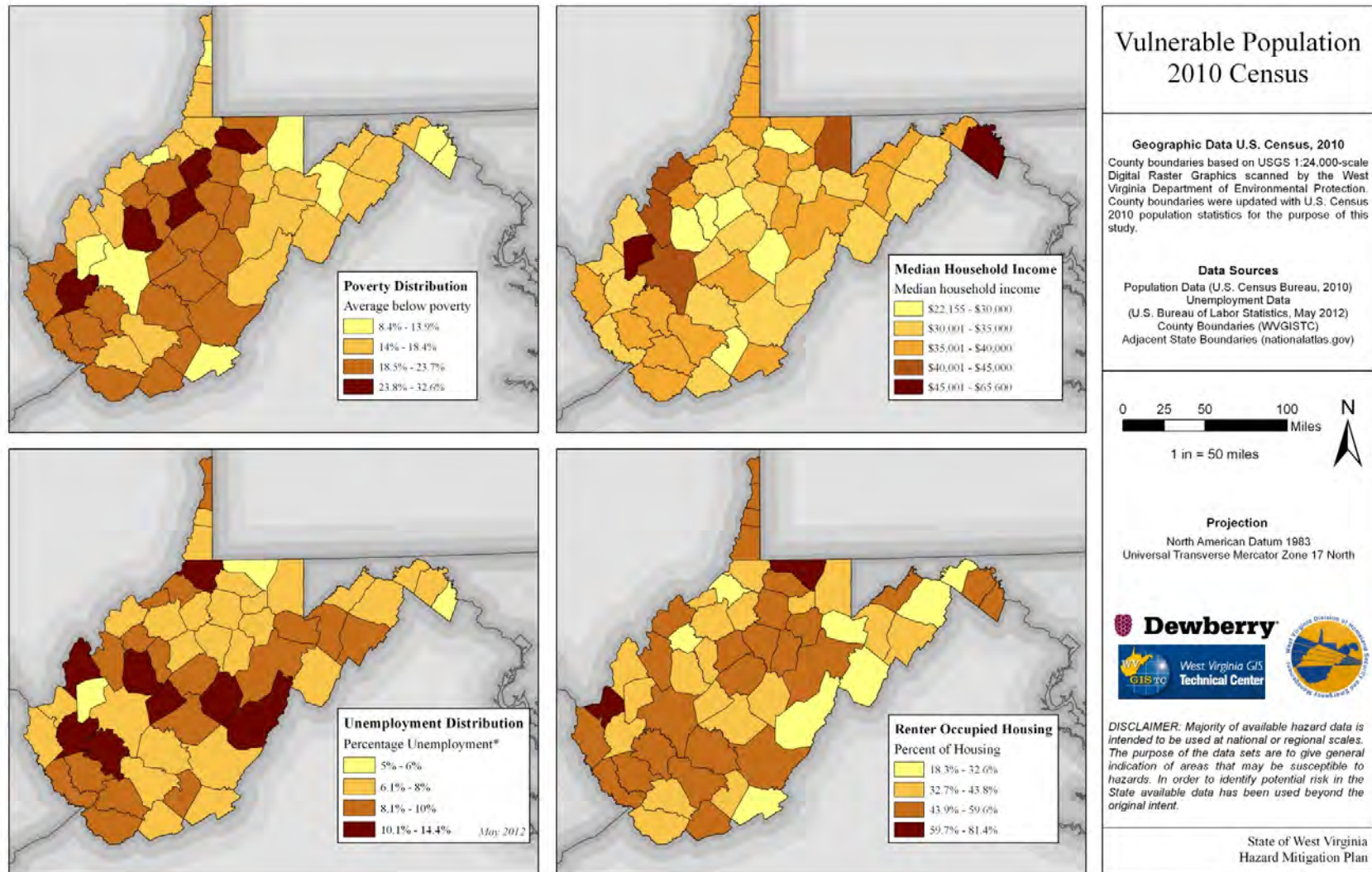


FIGURE 3-9. WEST VIRGINIA VULNERABLE POPULATIONS 2

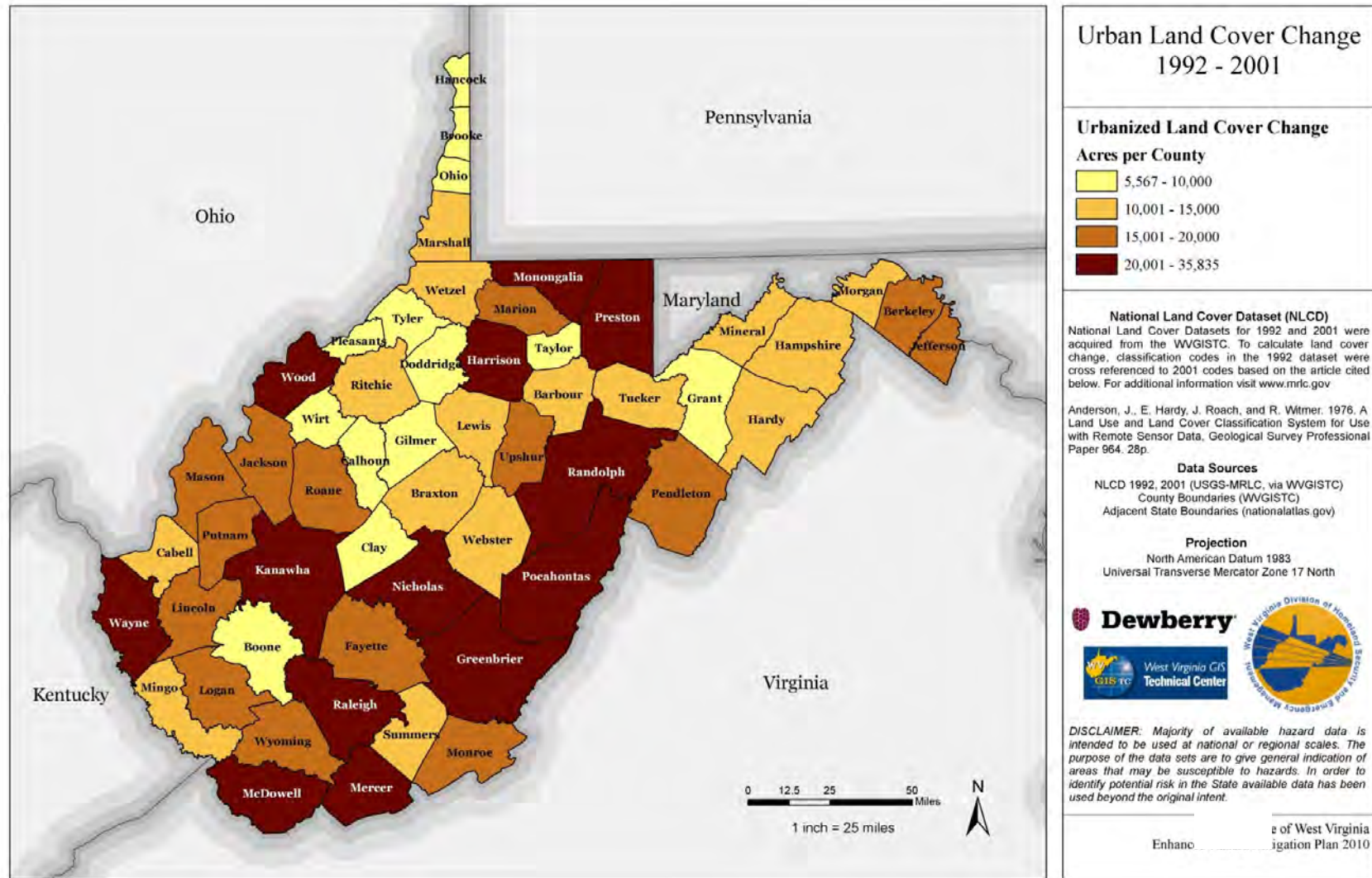


FIGURE 3-10. URBAN LAND COVER CHANGE

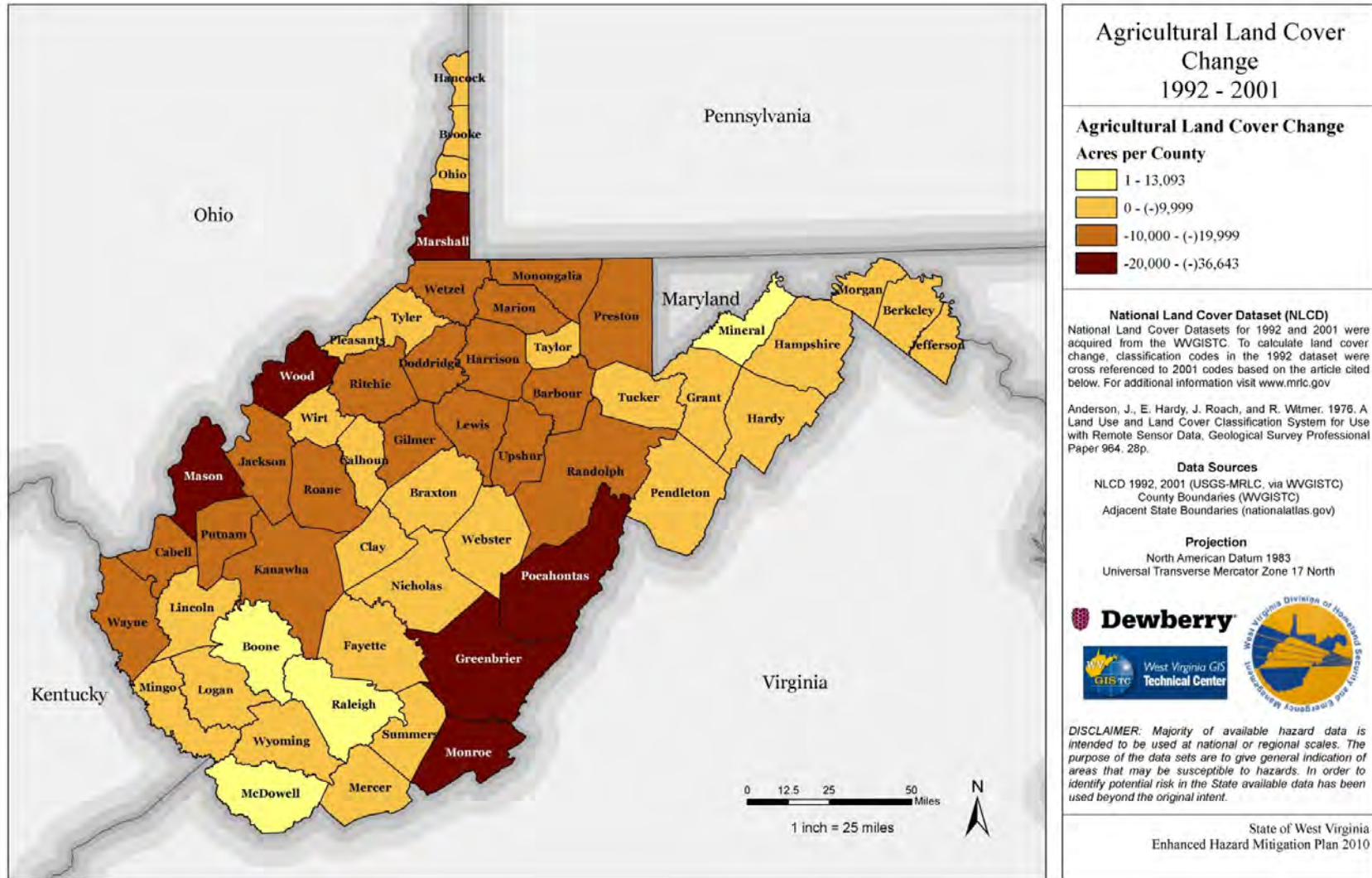


FIGURE 3-11. AGRICULTURAL LAND COVER CHANGE

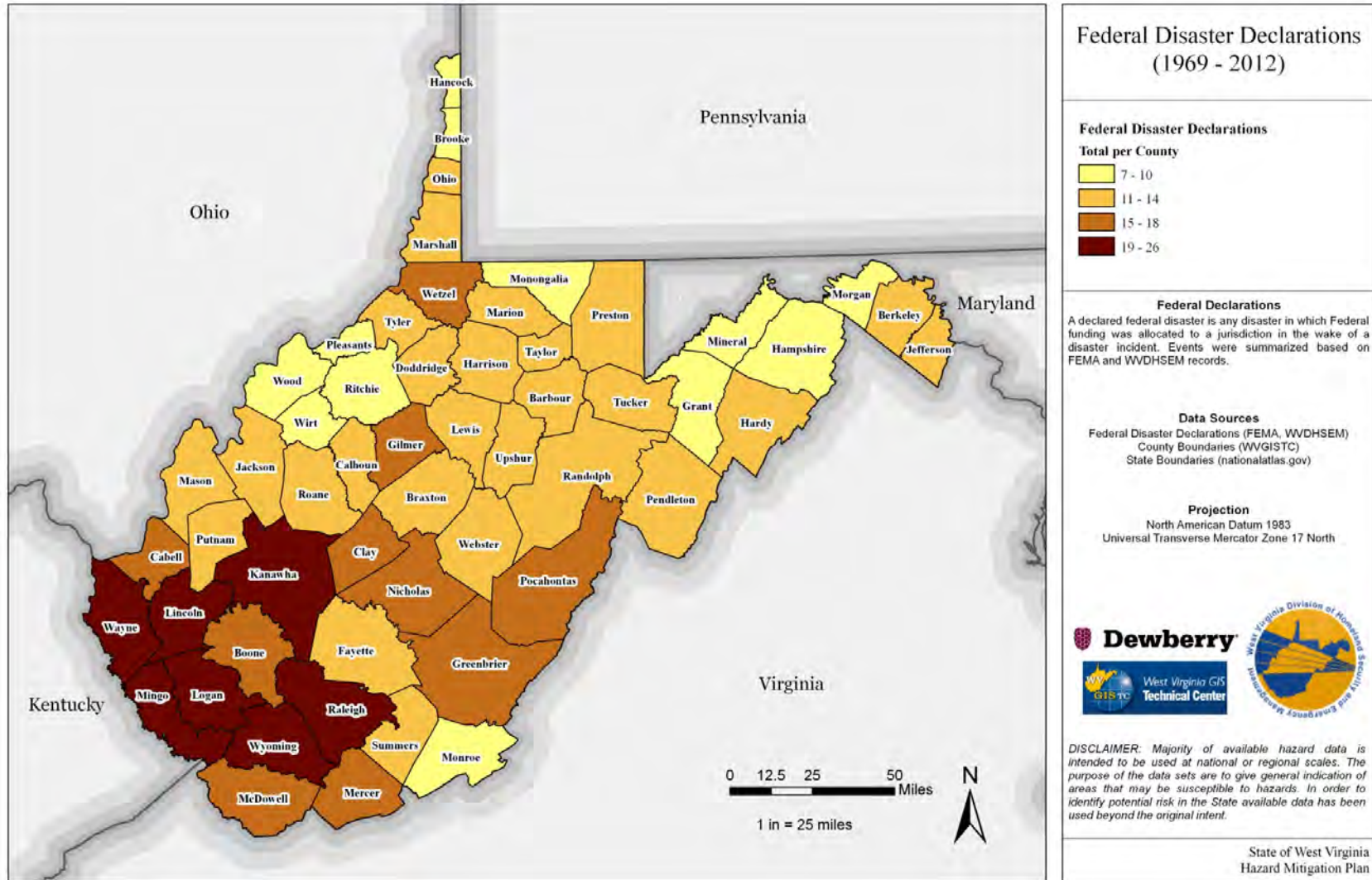


FIGURE 3-13. TOTAL FEDERAL DISASTER DECLARATIONS BY COUNTY (1969 –2012)

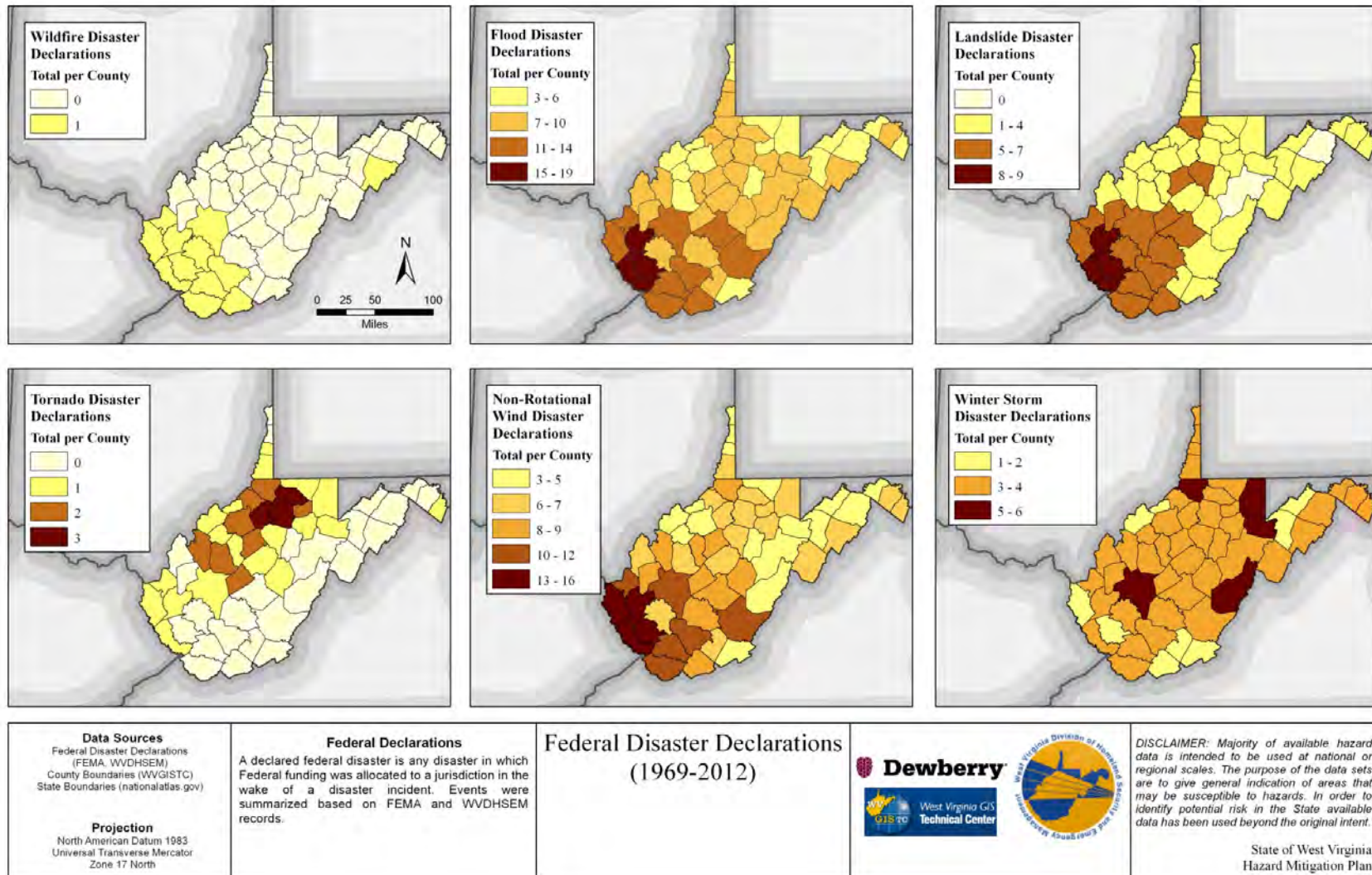


FIGURE 3-14. HAZARD SPECIFIC FEDERAL DISASTER DECLARATIONS BY COUNTY.

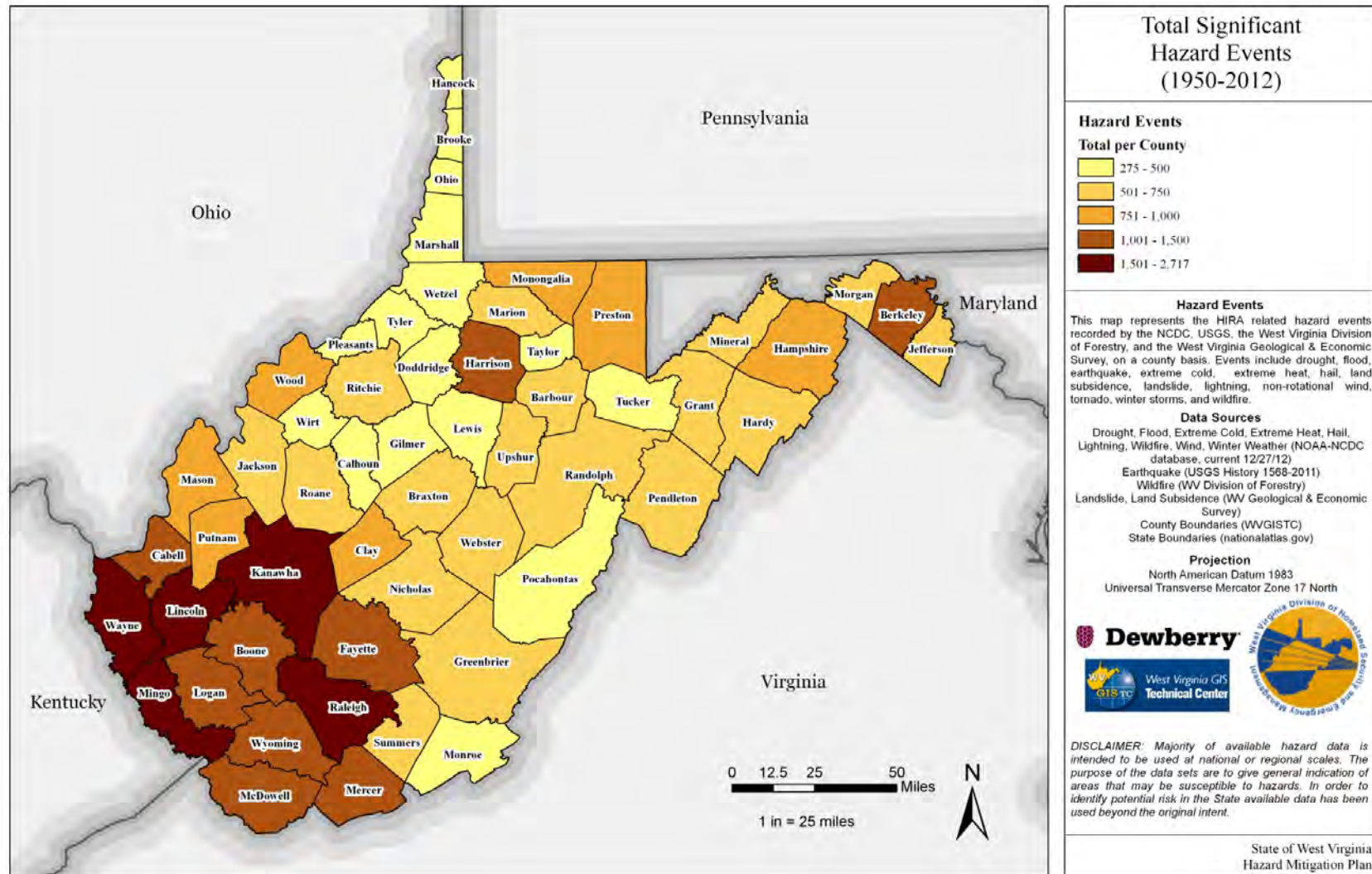


FIGURE 3-17. TOTAL NCDC STORM EVENTS PER COUNTY FOR 1950 THROUGH 2012. INCLUDES ZONAL EVENTS.



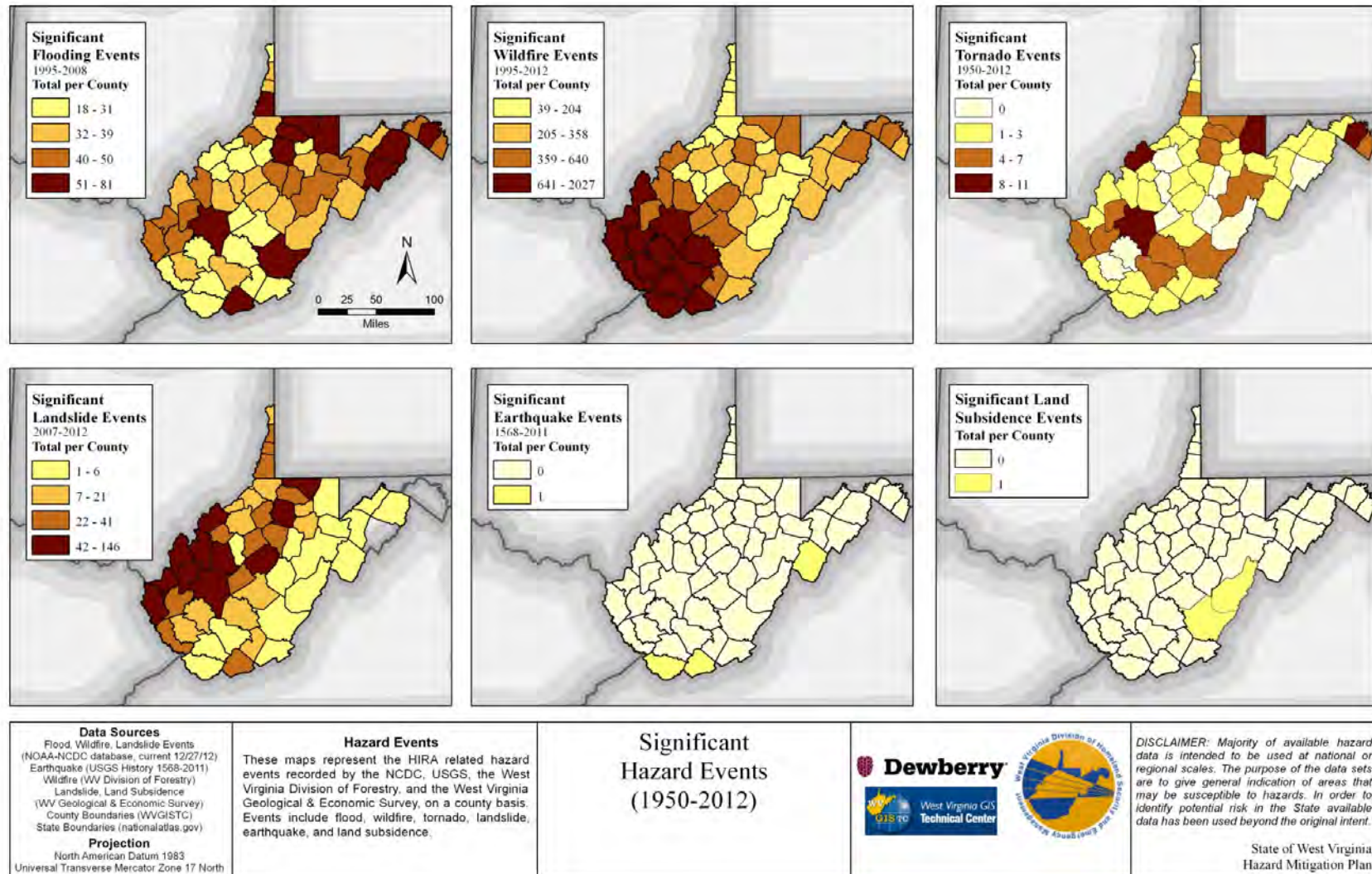


FIGURE 3-18. TOTAL NCDC STORM EVENTS BY HAZARD FOR 1950 THROUGH 2012. INCLUDES ZONAL EVENTS.

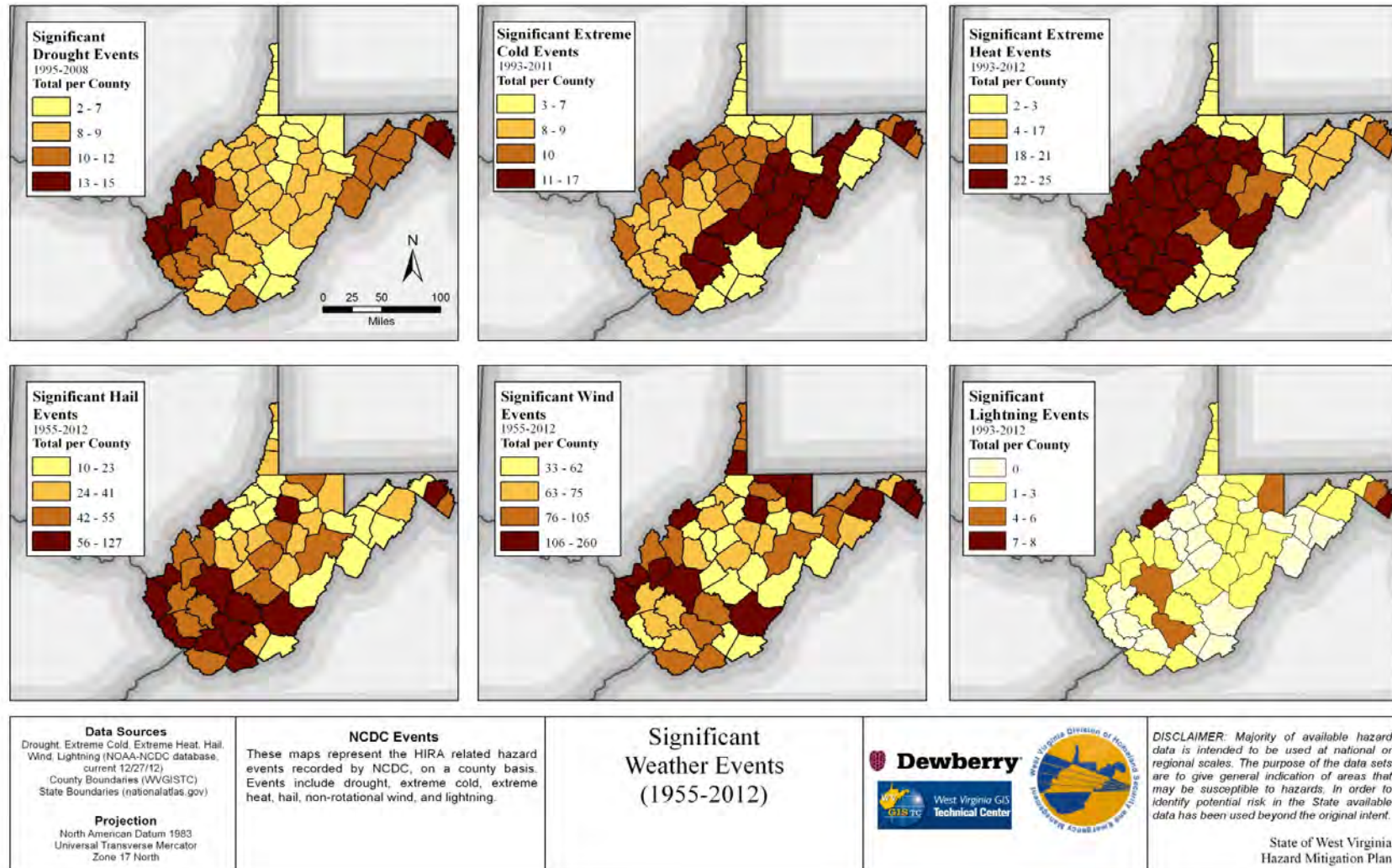


FIGURE 3-19. TOTAL NCDC STORM EVENTS BY HAZARD FOR 1950 THROUGH 2012. INCLUDES ZONAL EVENTS.

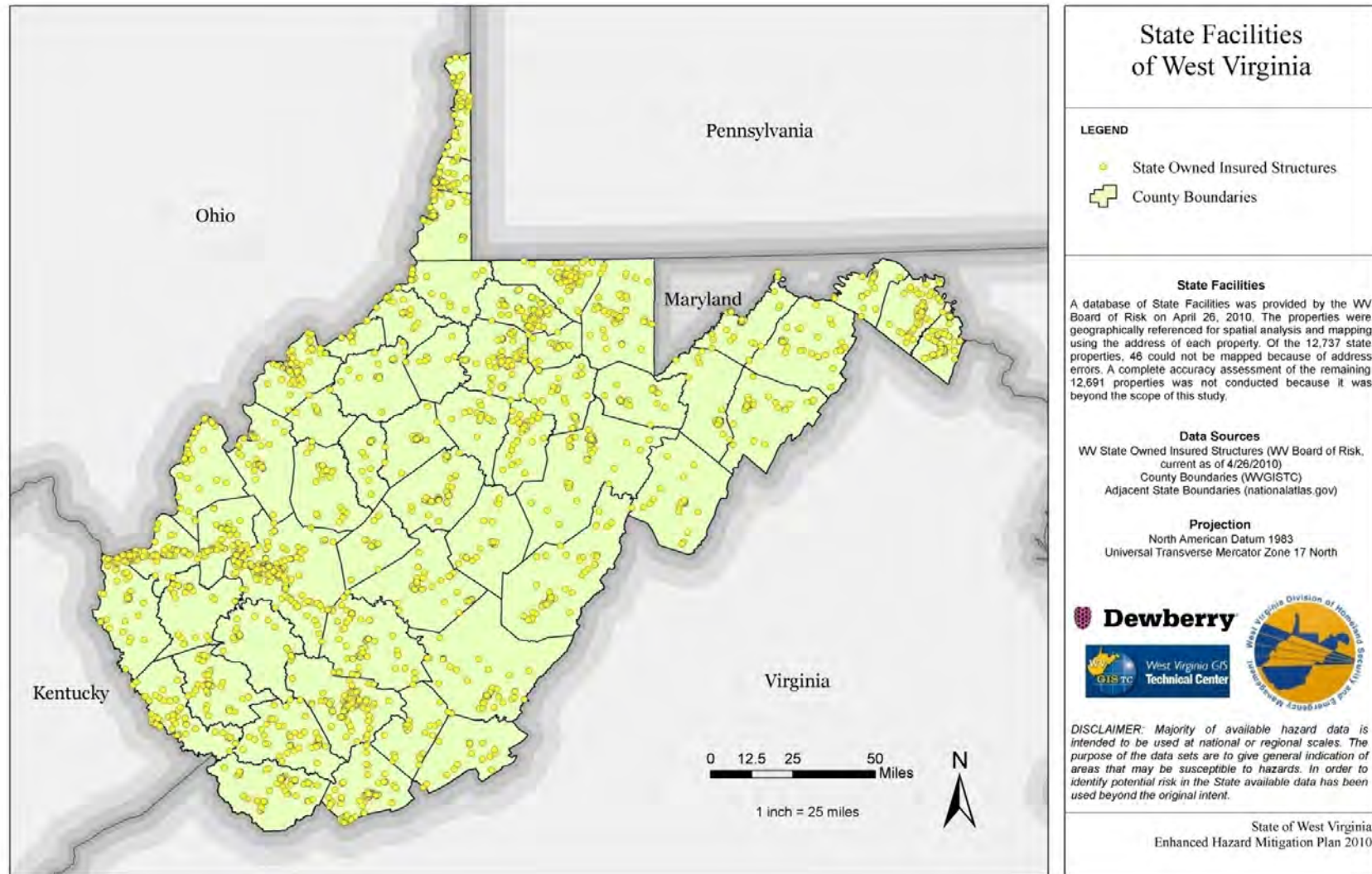


FIGURE 3-20. WEST VIRGINIA BOARD OF RISK STATE FACILITIES – NOTE CONCENTRATION NEAR MORGANTOWN (WVU) AND CHARLESTON (STATE CAPITOL)

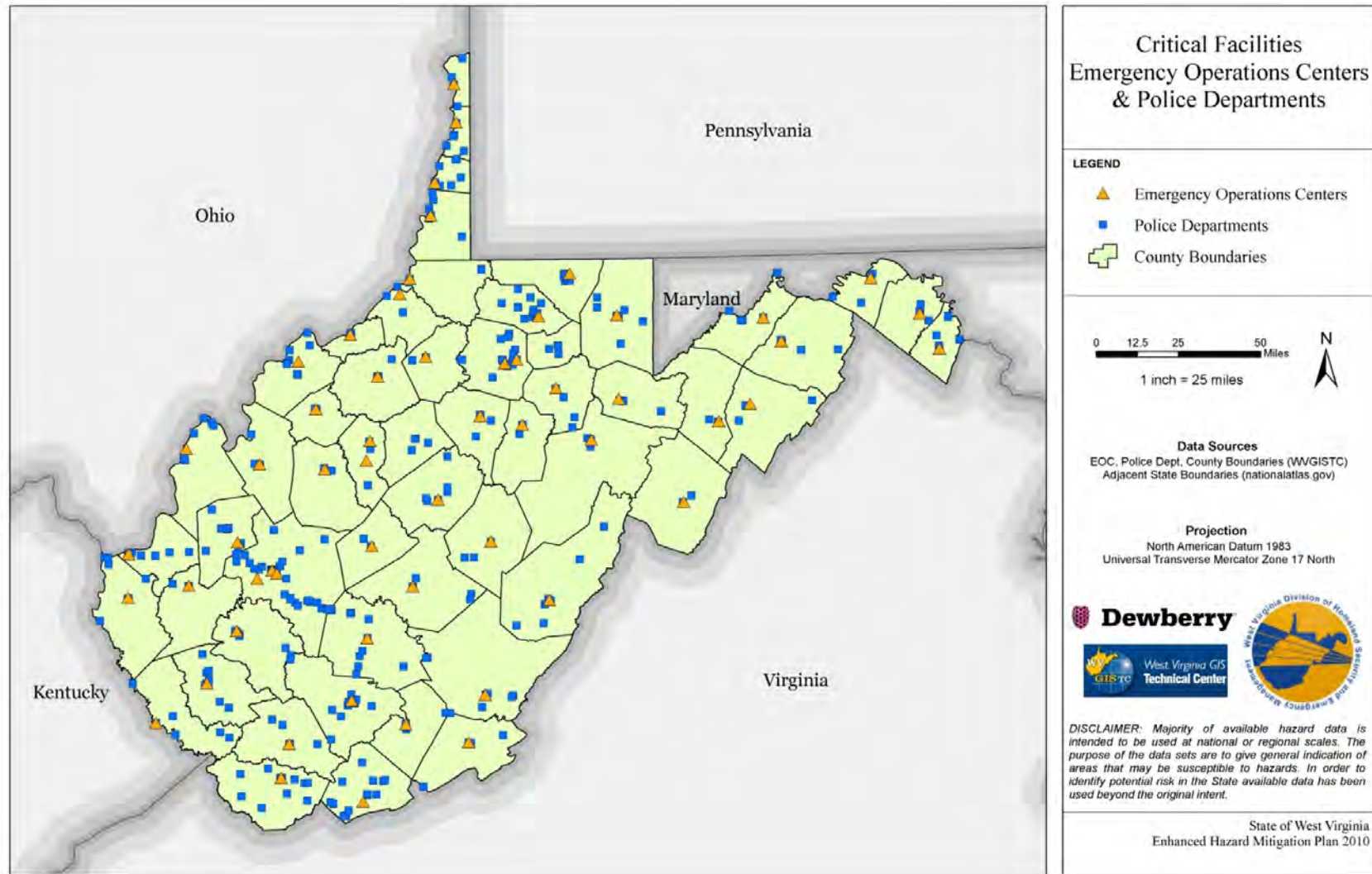


FIGURE 3-21. EMERGENCY OPERATIONS CENTERS AND POLICE DEPARTMENT

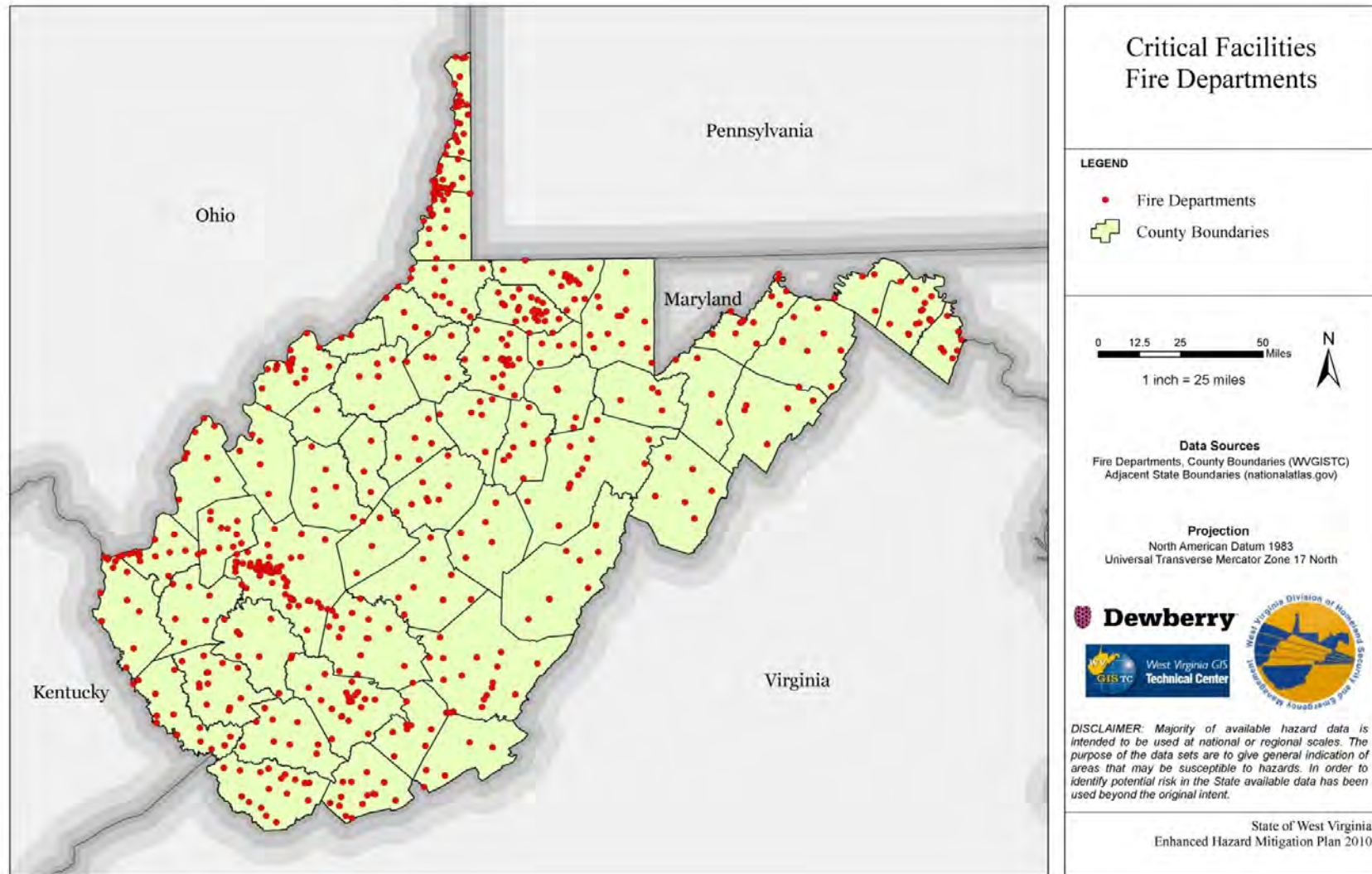


FIGURE 3-22. FIRE DEPARTMENTS

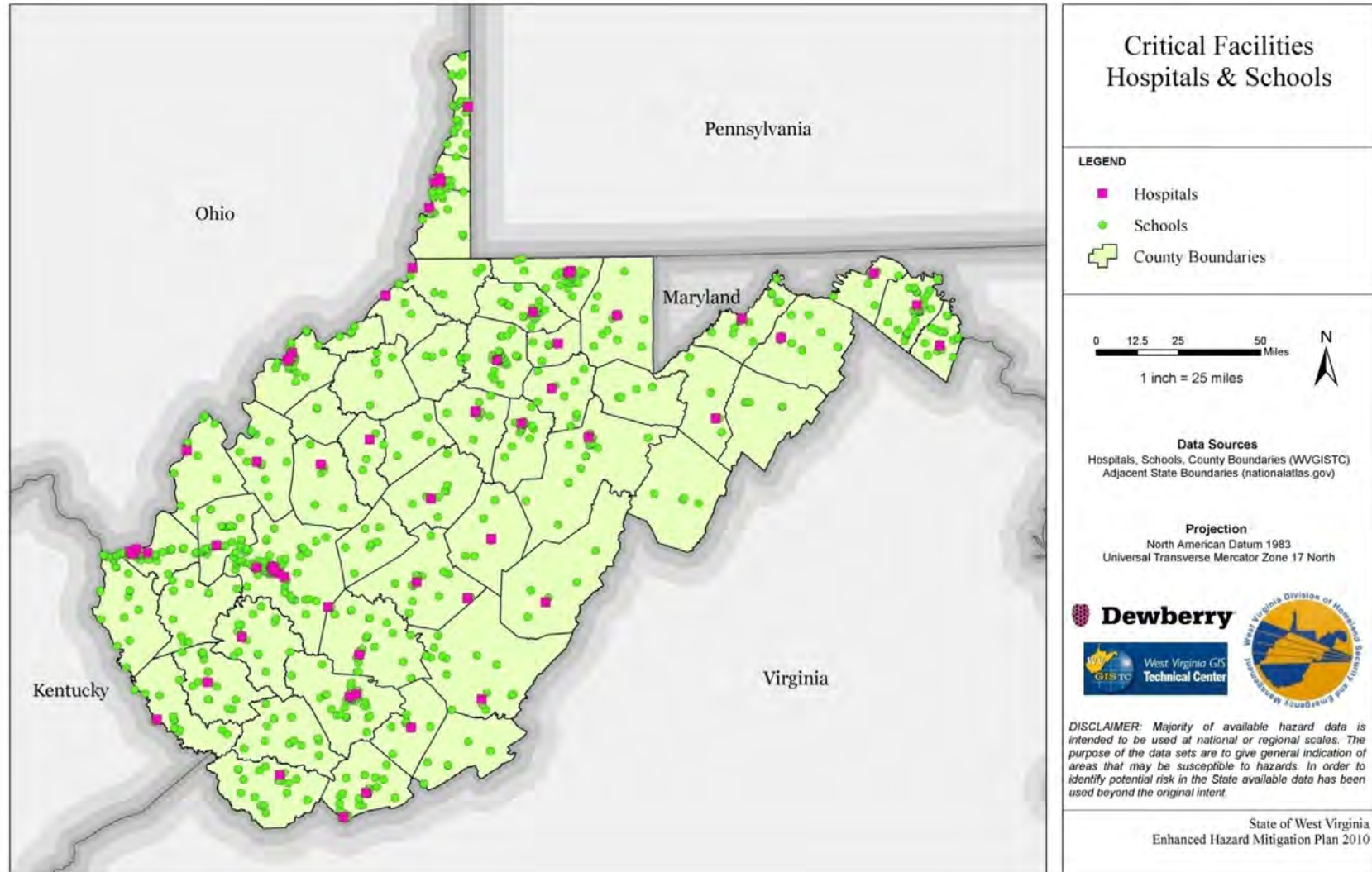


FIGURE 3-23. HOSPITALS AND SCHOOLS

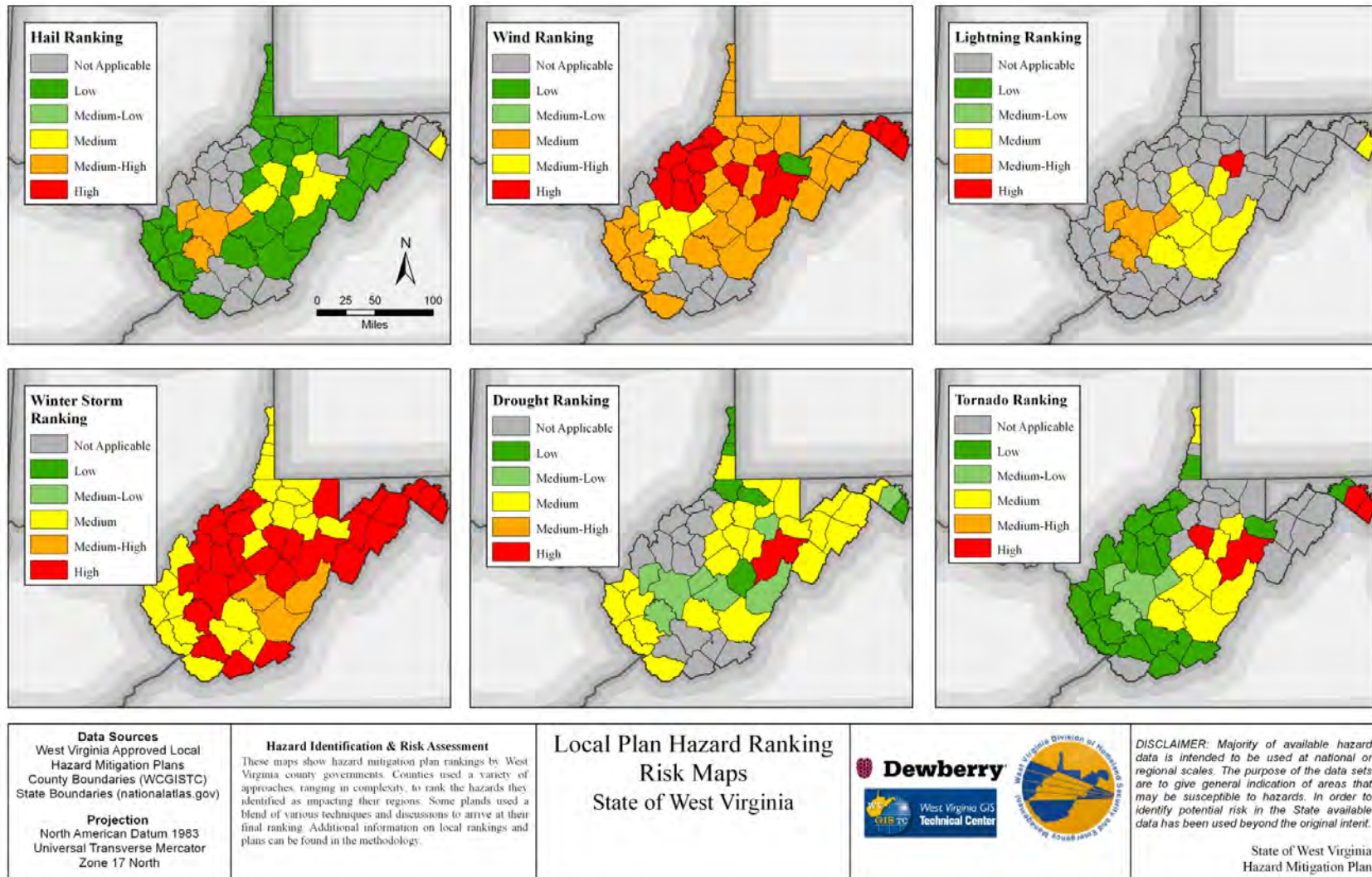


FIGURE 3-24. LOCAL PLAN HAZARD RANKING

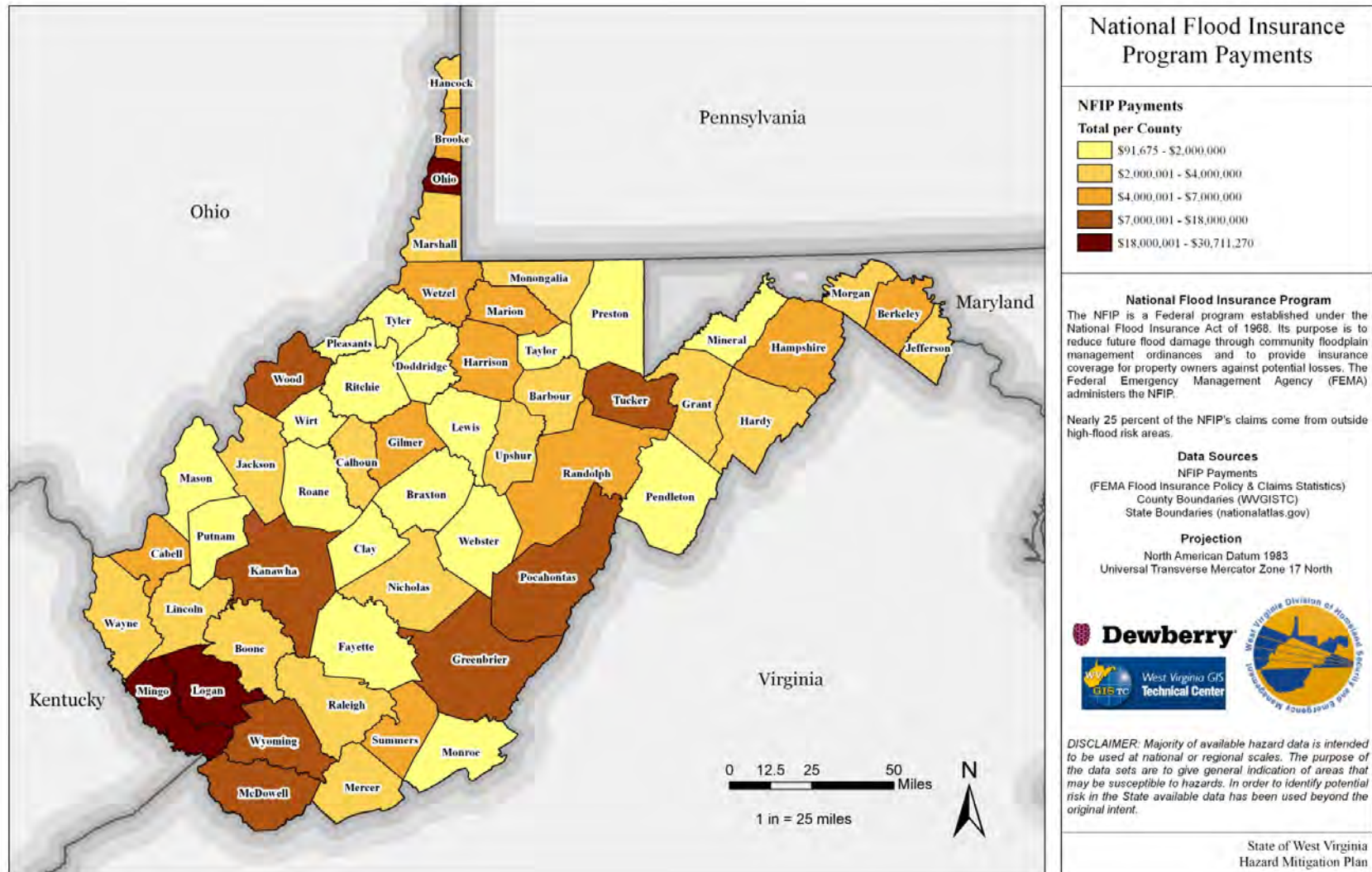


FIGURE 3-25. WEST VIRGINIA NATIONAL FLOOD INSURANCE PROGRAM (NFIP) PAYMENTS MADE PER COUNTY (AS OF FEBRUARY 2013).



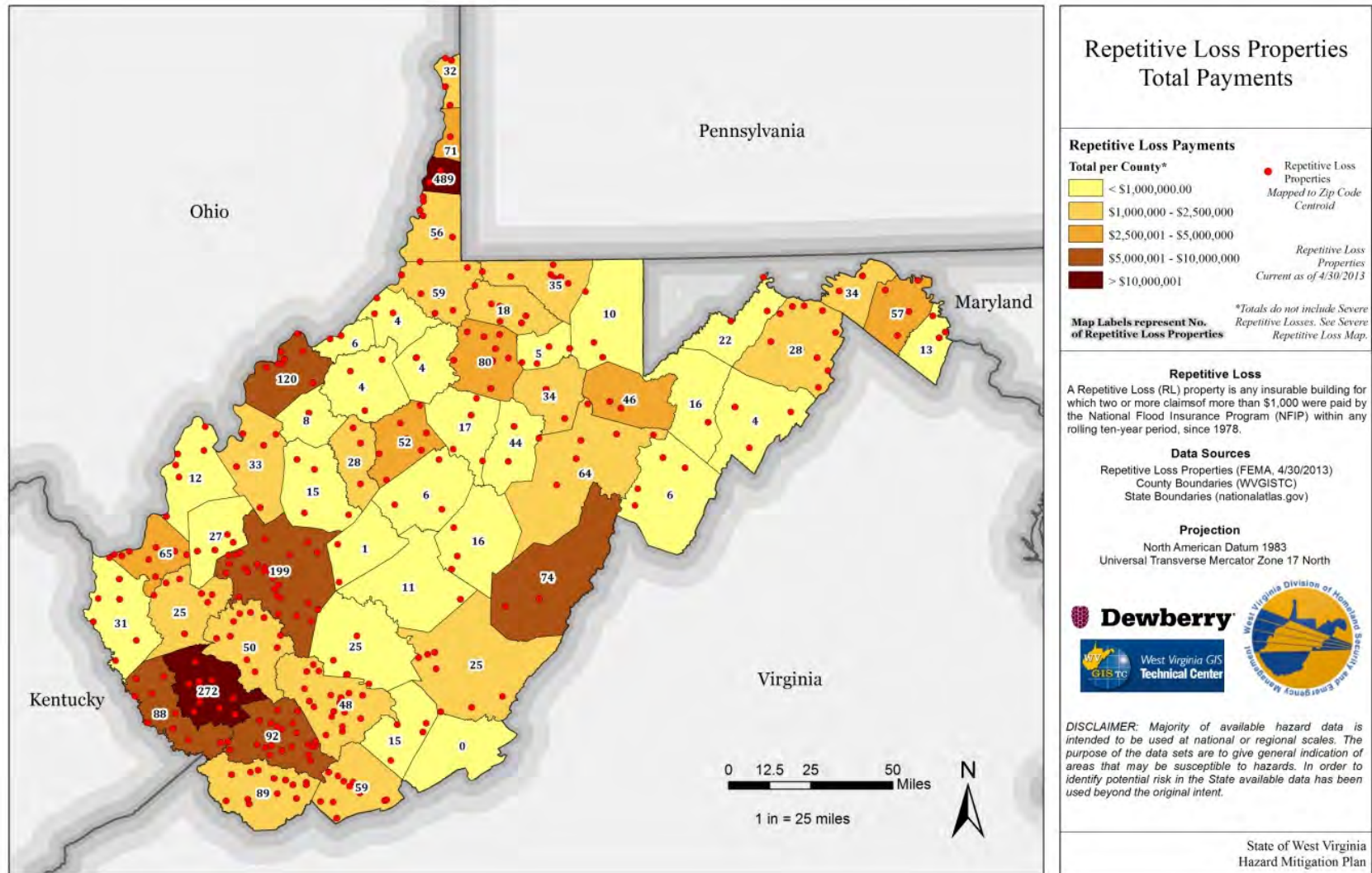


FIGURE 3-26. REPETITIVE LOSS PROPERTIES CLAIMS PAYMENTS PER COUNTY

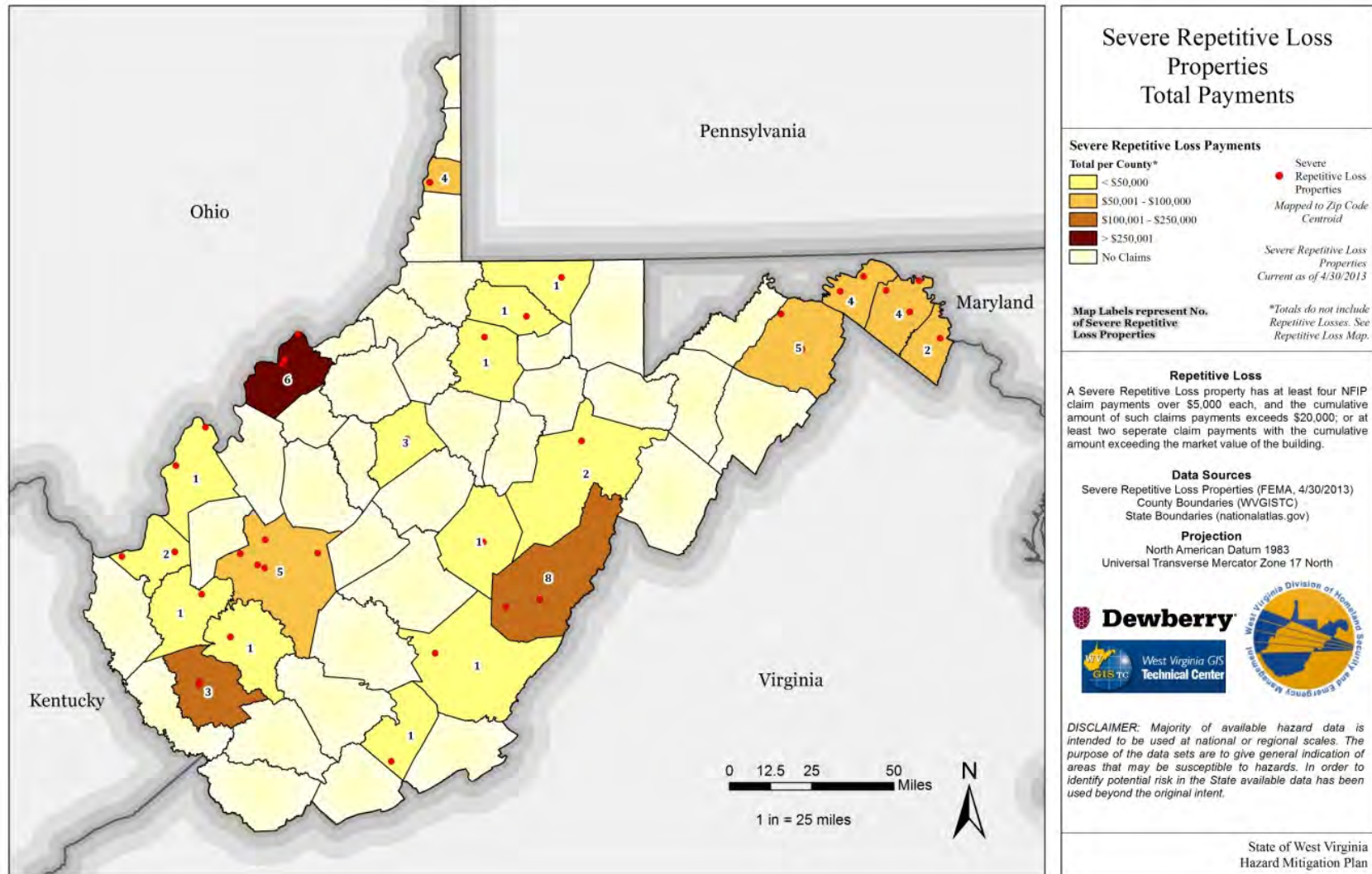


FIGURE 3-27. SEVERE REPETITIVE LOSS PROPERTIES PER COUNTY

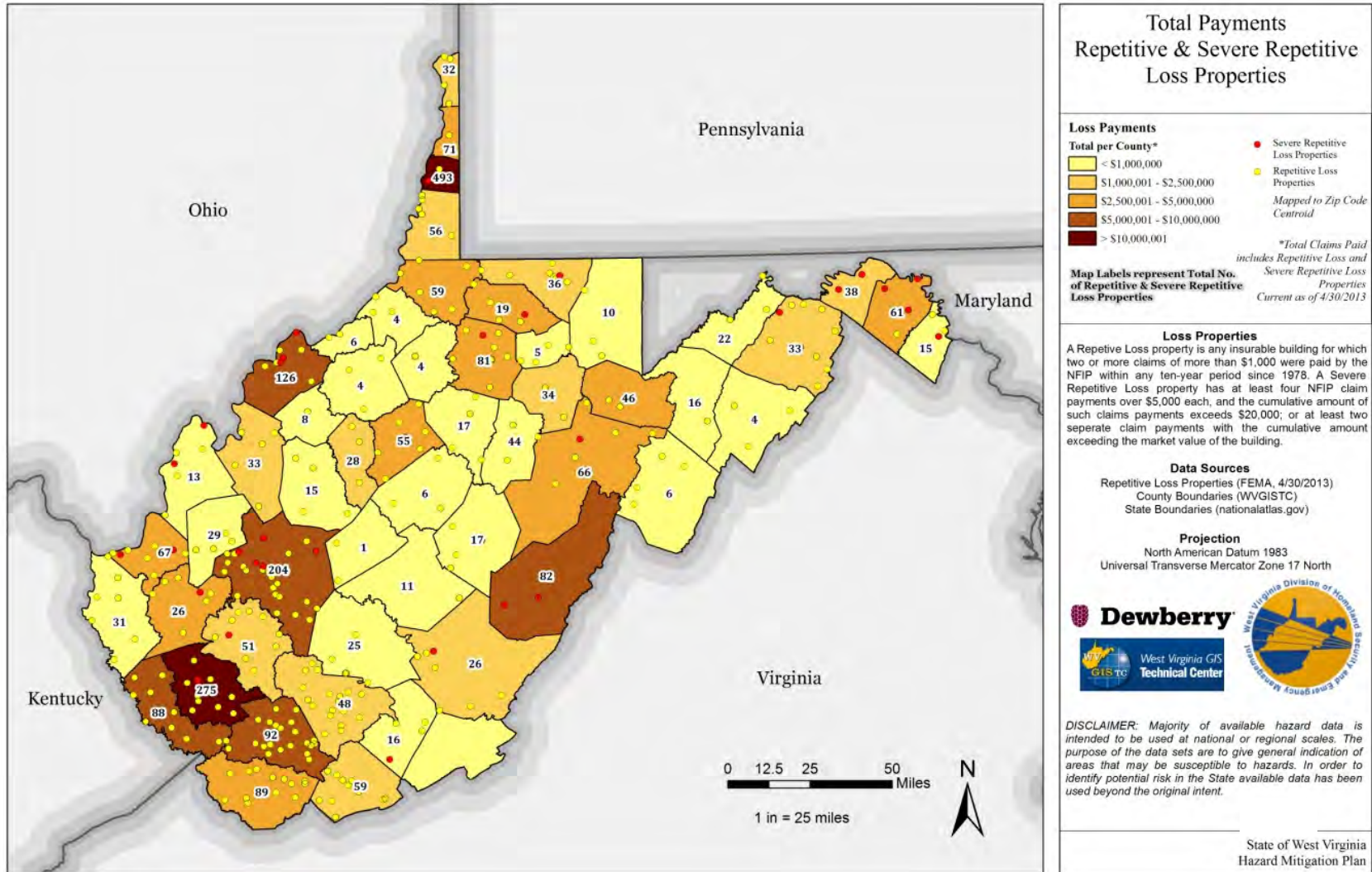


FIGURE 3-28. REPETITIVE AND SEVERE REPETITIVE LOSS PROPERTIES PAYMENTS PER COUNTY

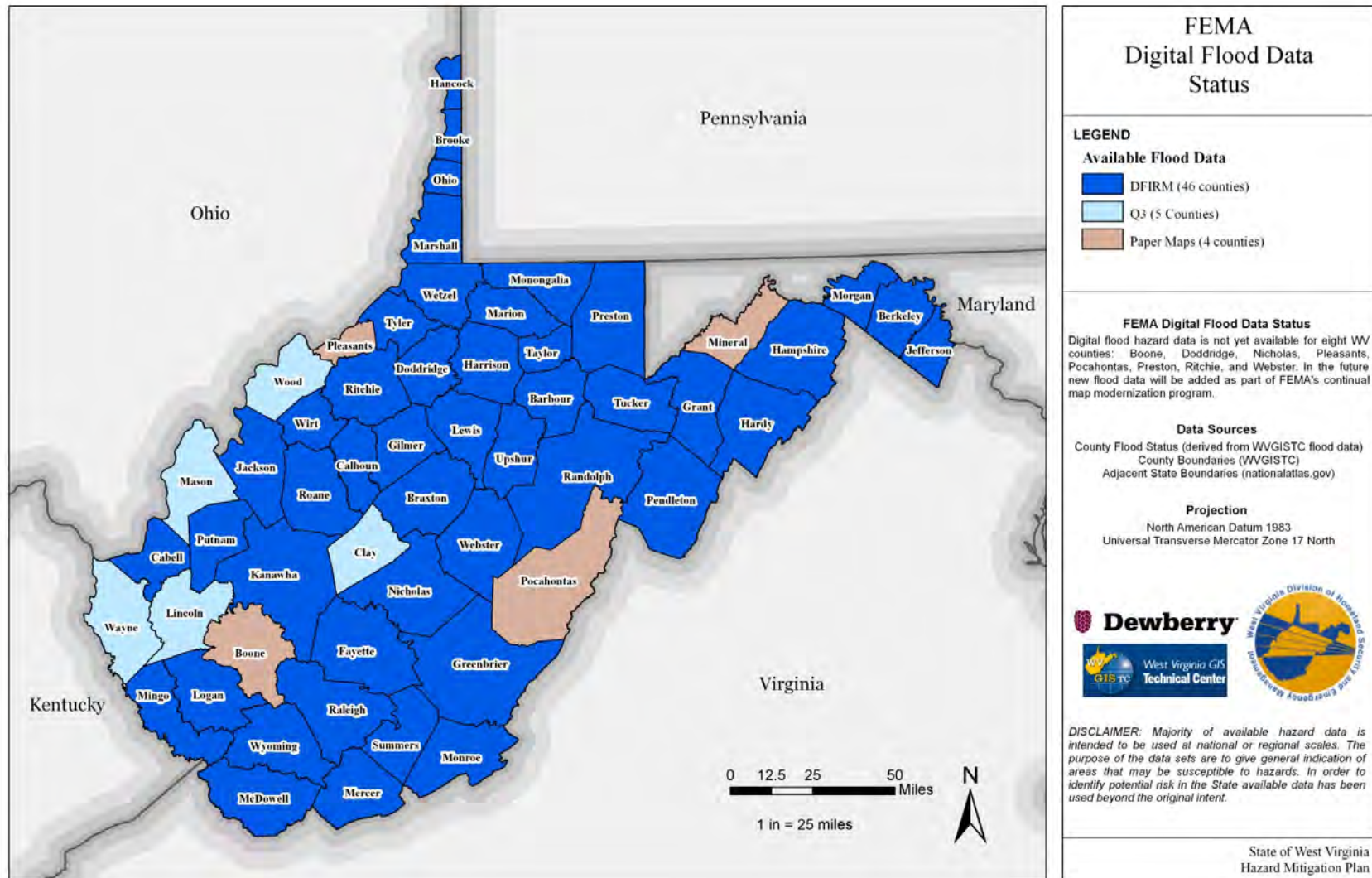


FIGURE 3-29. FEMA DIGITAL FLOOD DATA STATUS BY COUNTY

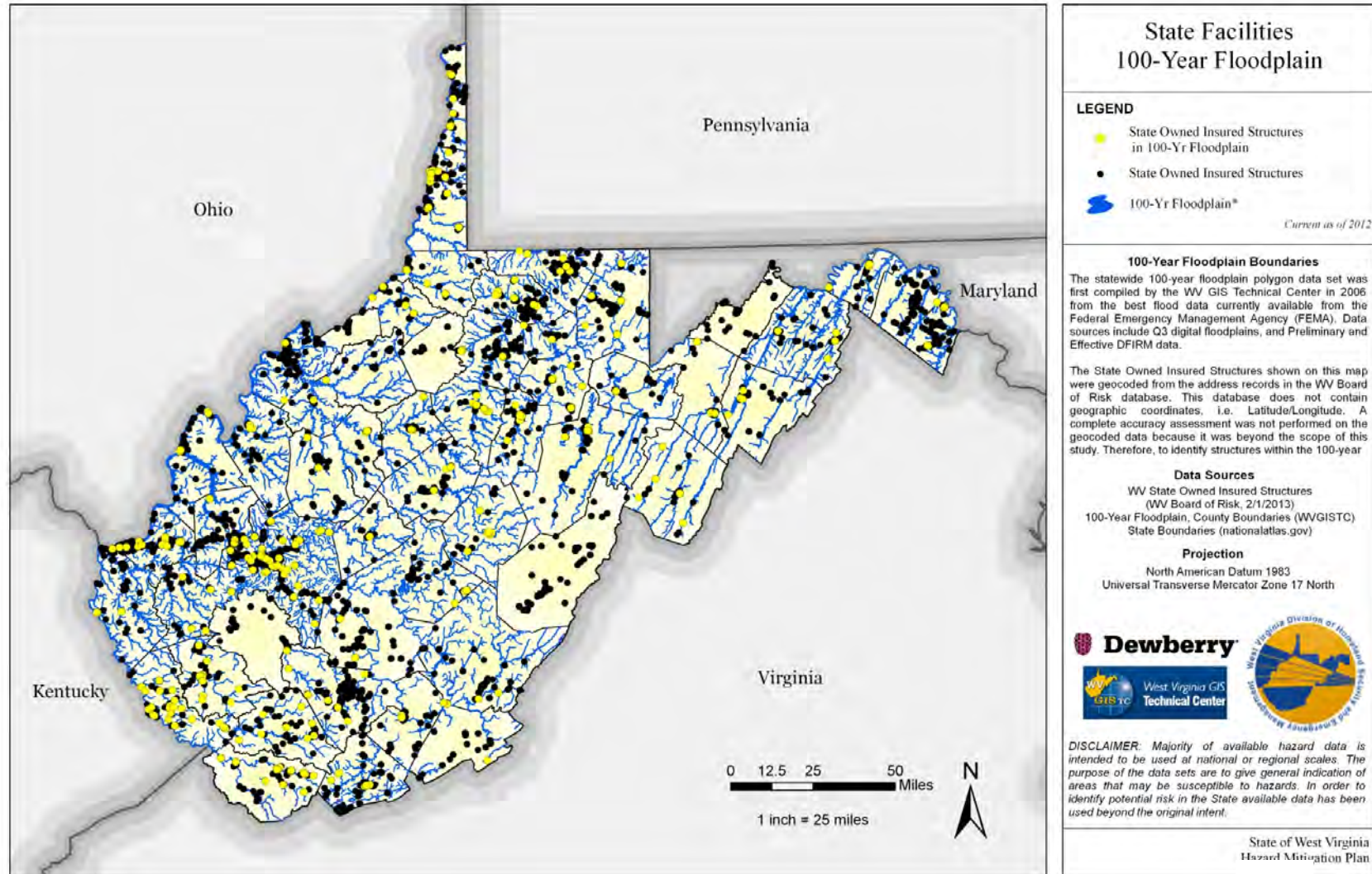


FIGURE 3-30. STATE FACILITIES WITHIN THE 100-YEAR FLOODPLAIN

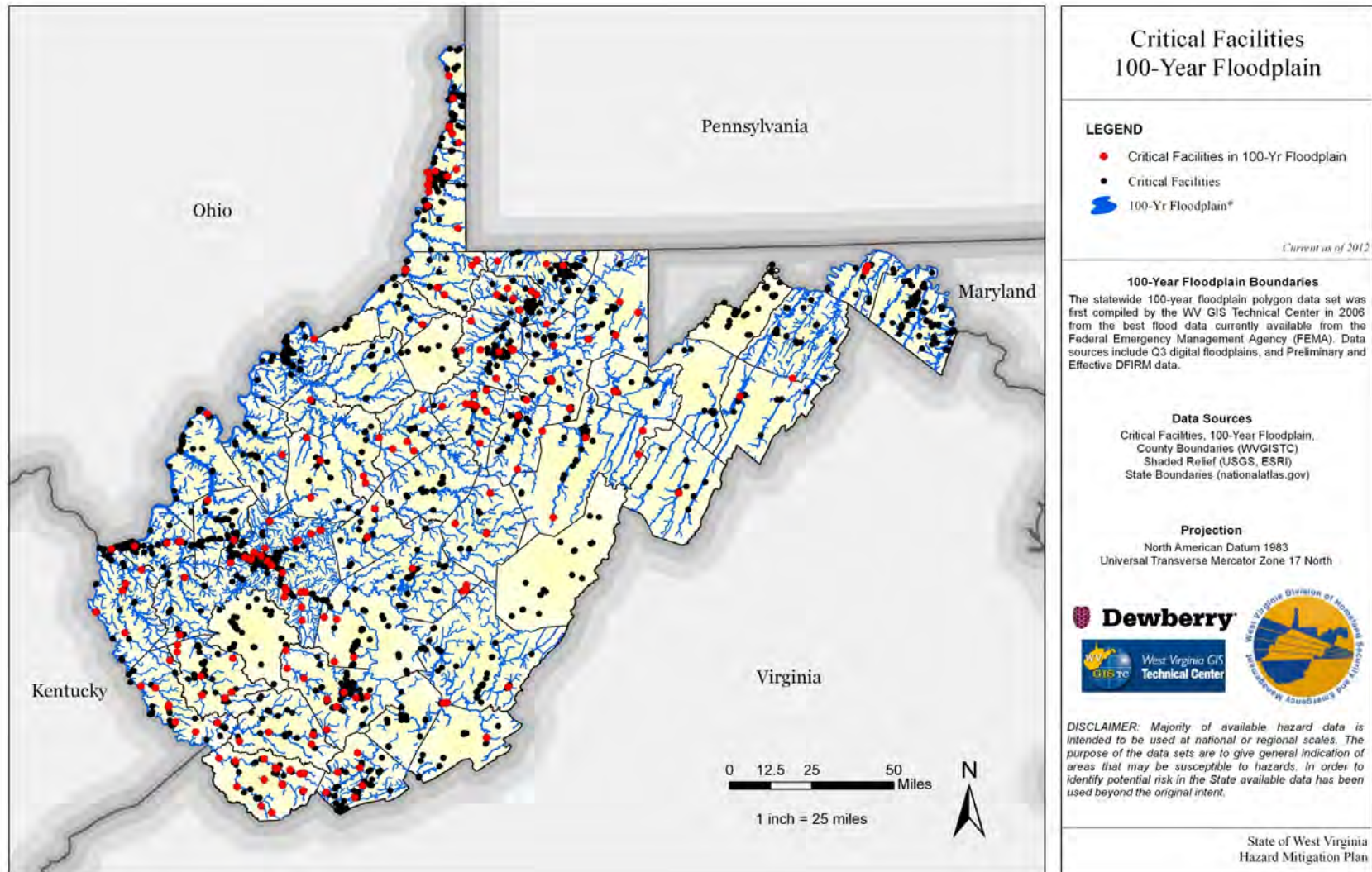


FIGURE 3-31. STATE CRITICAL FACILITIES WITHIN THE 100-YEAR FLOODPLAIN

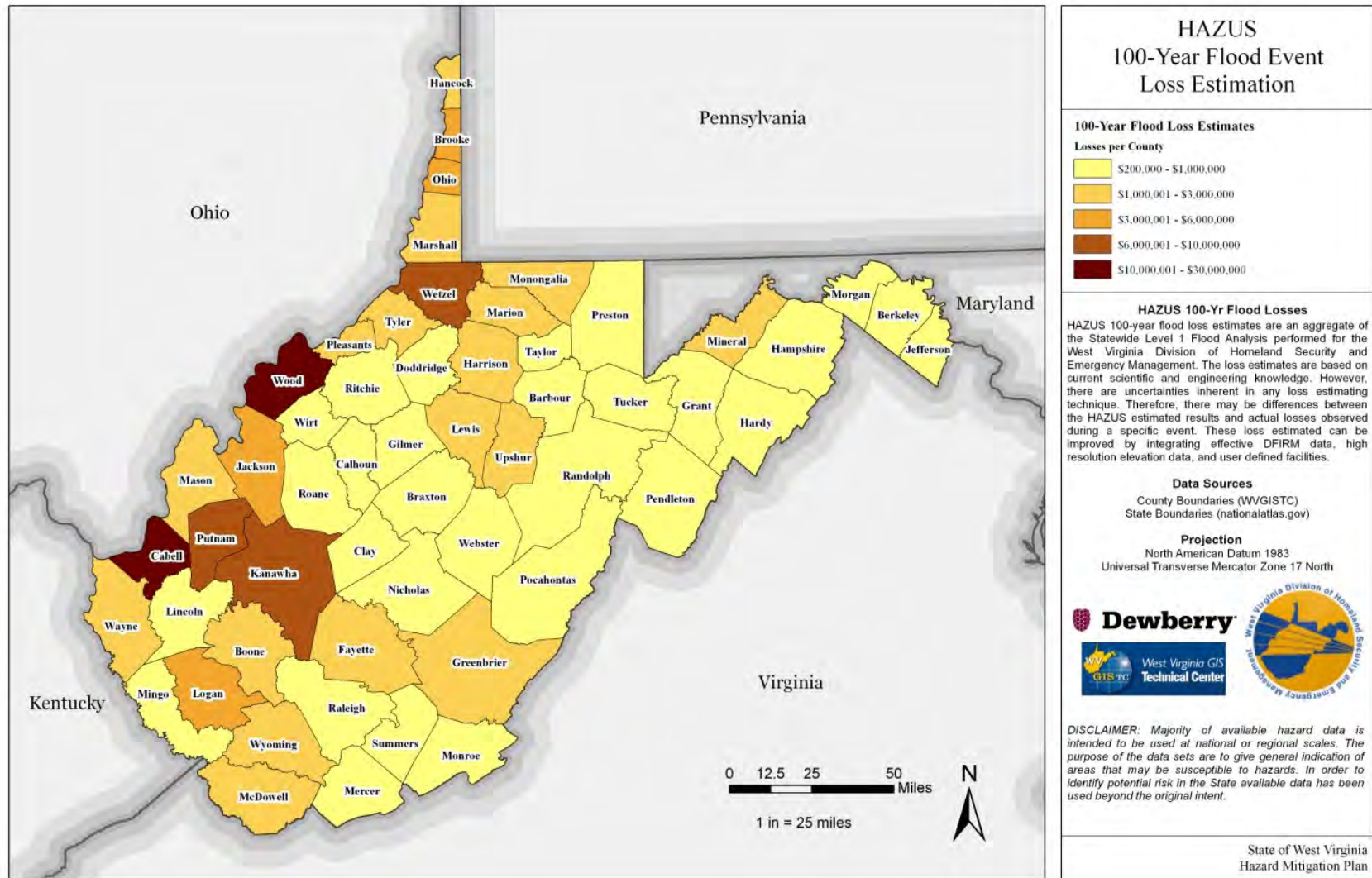


FIGURE 3-32. HAZUS ESTIMATED ECONOMIC LOSSES FOR THE 100-YEAR RETURN PERIOD.

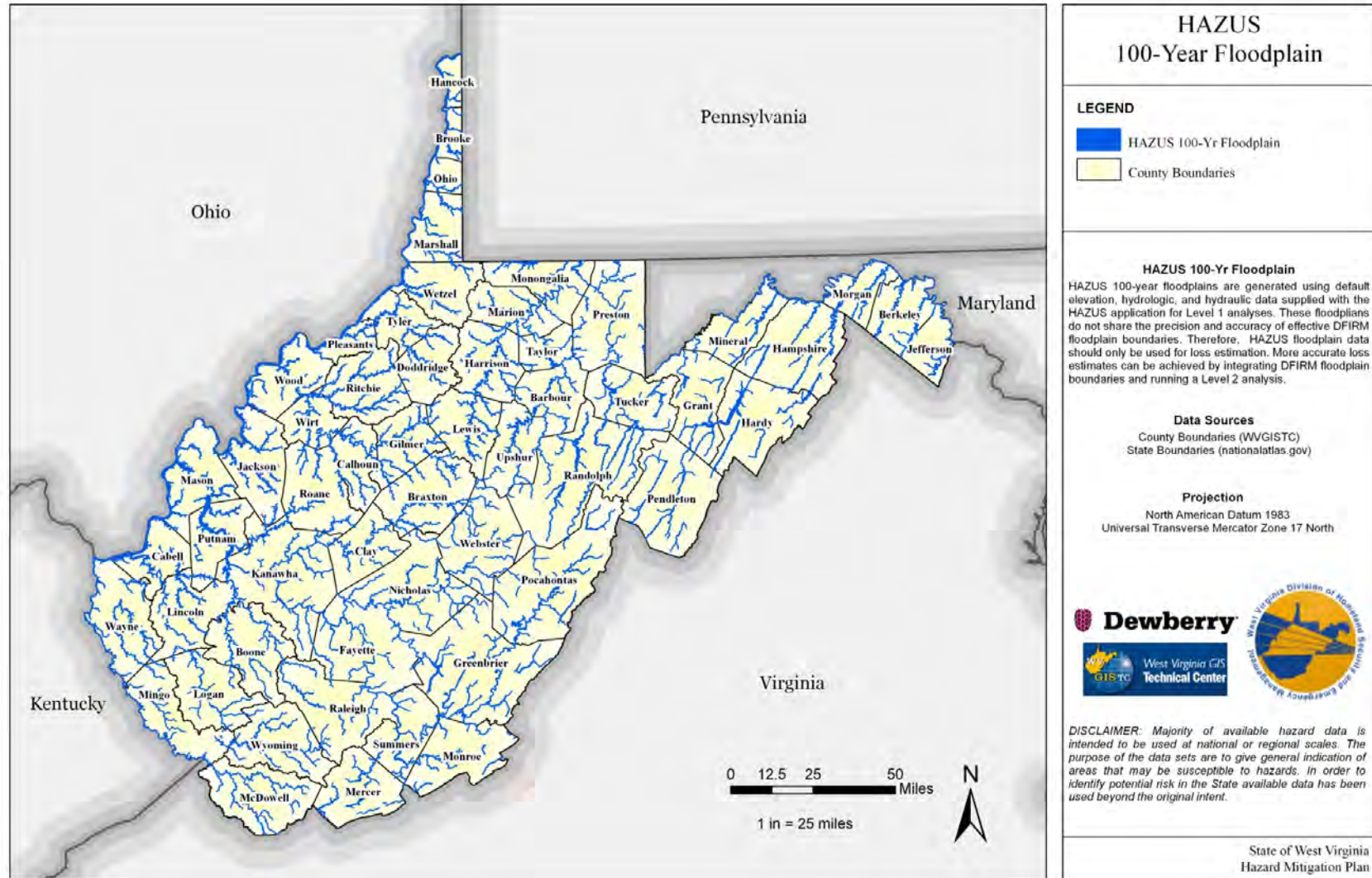


FIGURE 3-33. FLOODPLAINS DELINEATED BY HAZUS USING 10-SQUARE MILE DRAINAGE AREA.



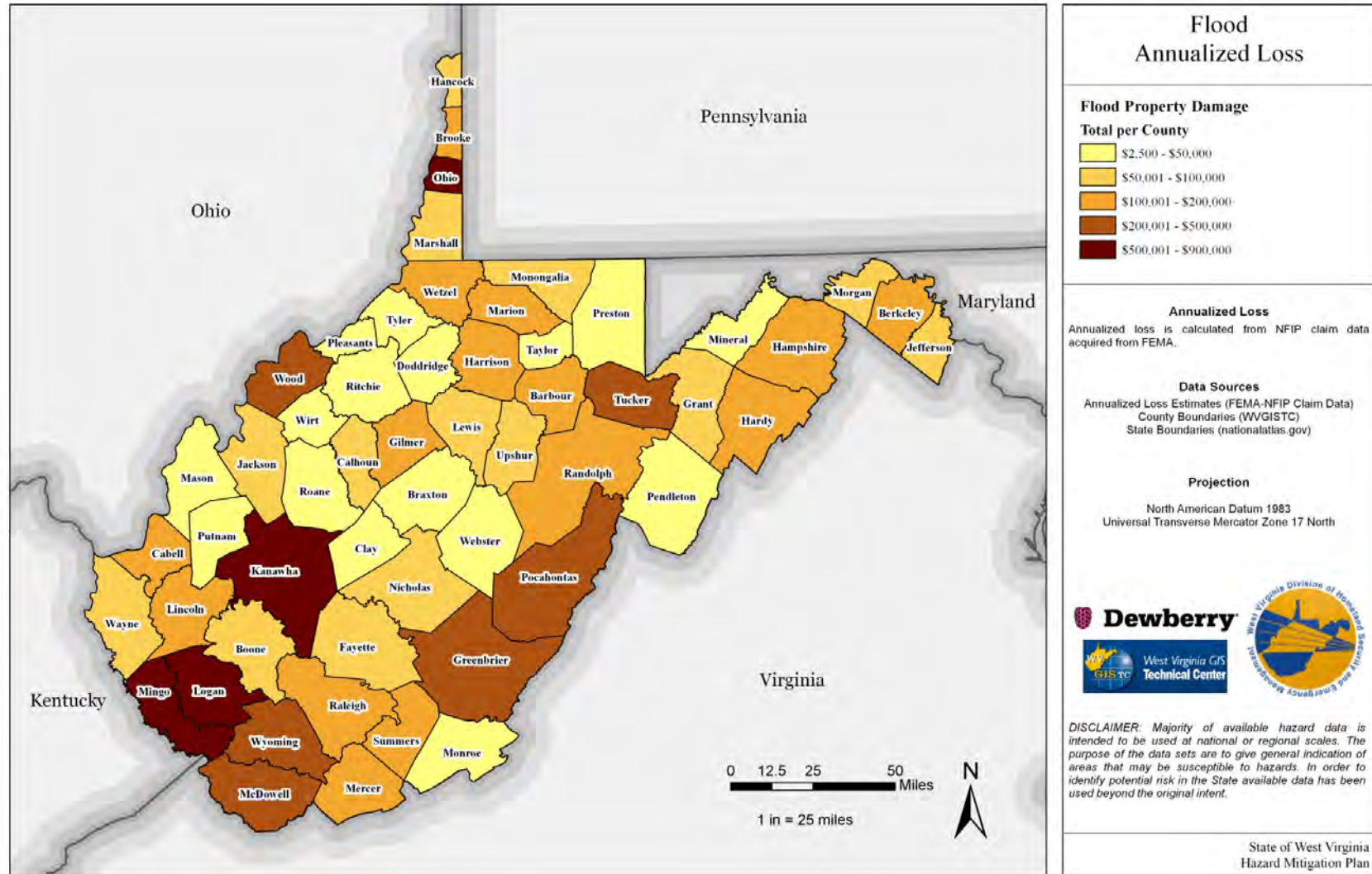


FIGURE 3-34. FLOOD ANNUALIZED LOSS (BASED ON NFIP CLAIM DATA)

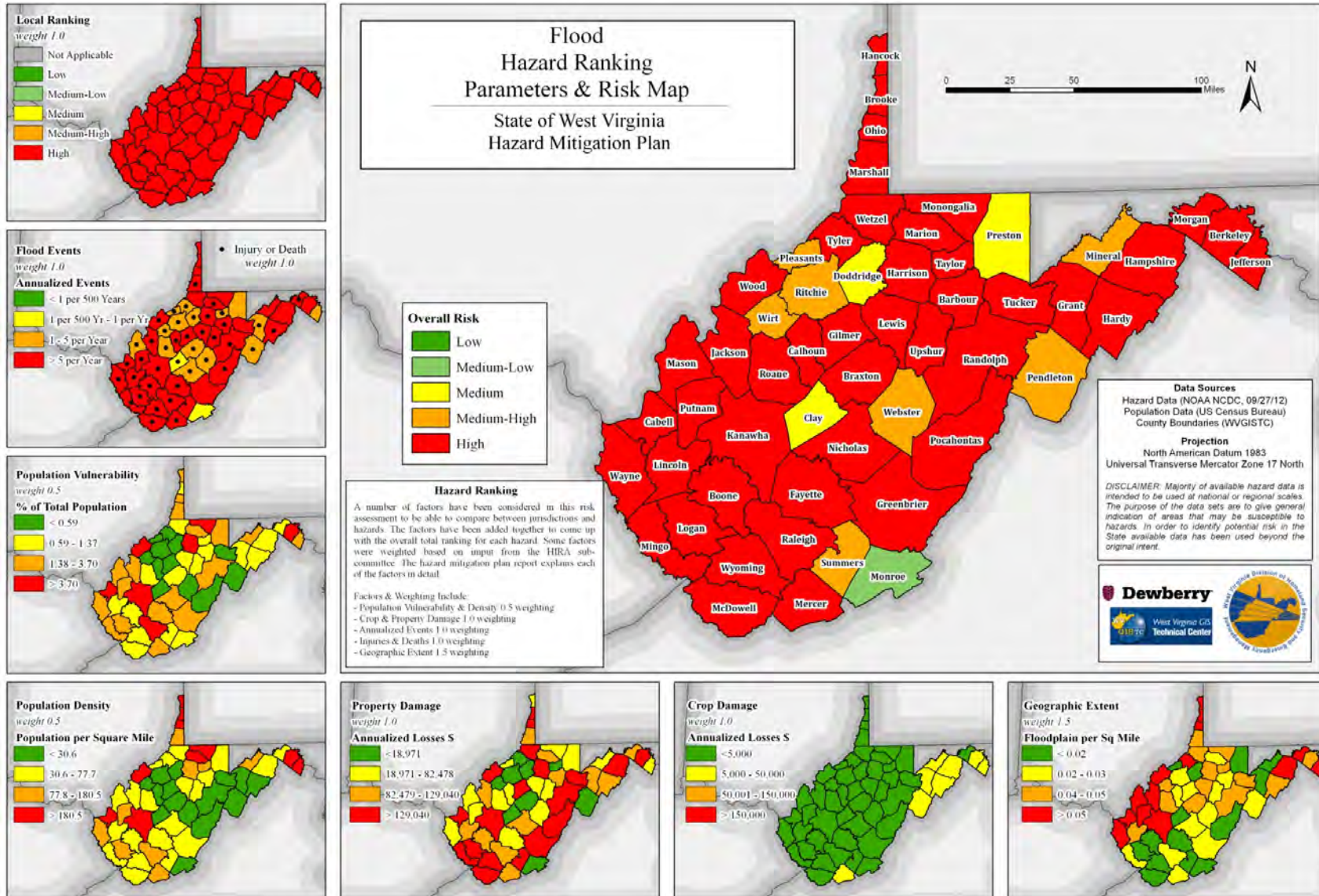


FIGURE 3-35. FLOOD HAZARD RANKING PARAMETERS AND RISK MAP

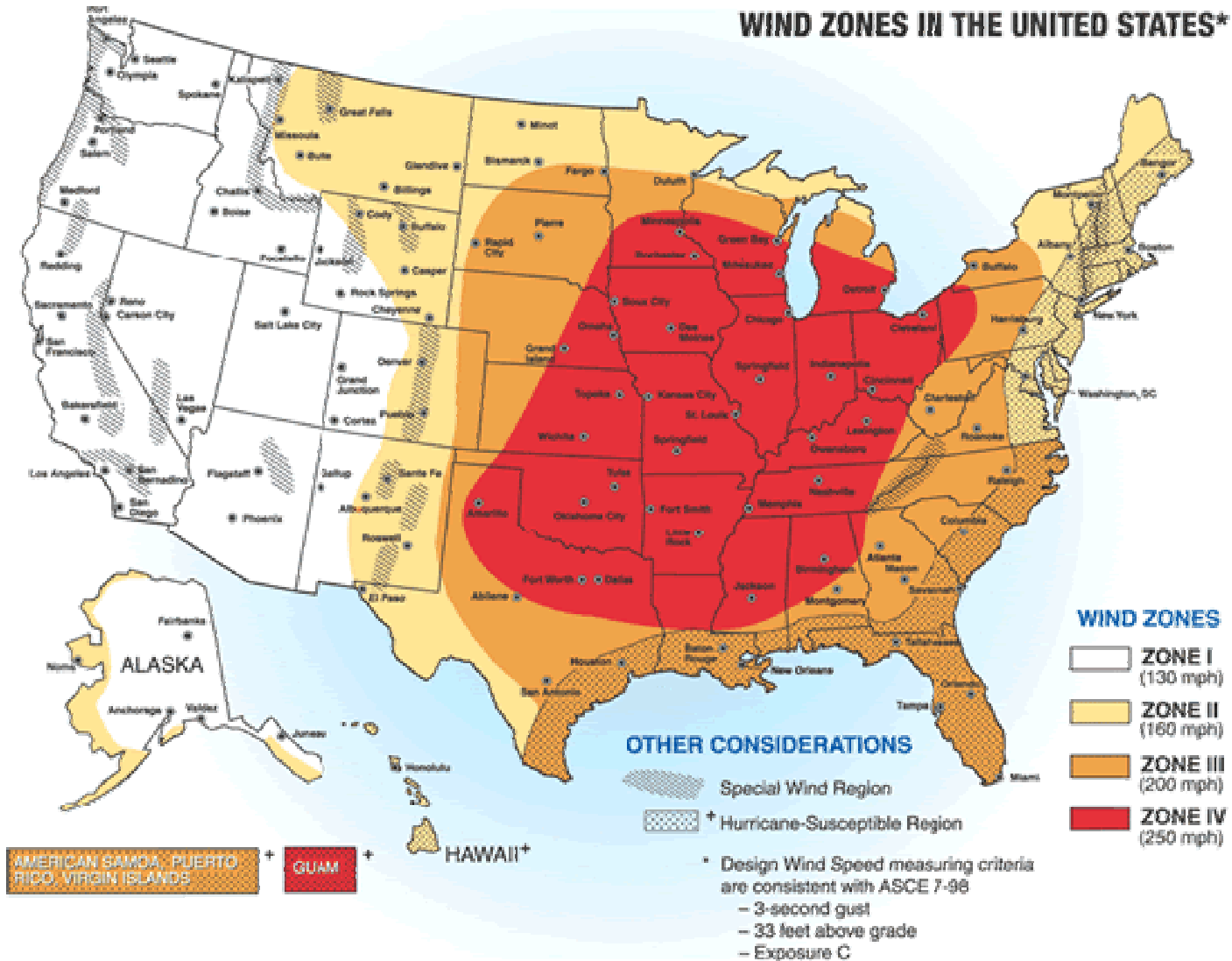


FIGURE 3-36. FEMA SAFE ROOM DESIGN WIND SPEED ZONES FOR UNITED STATES

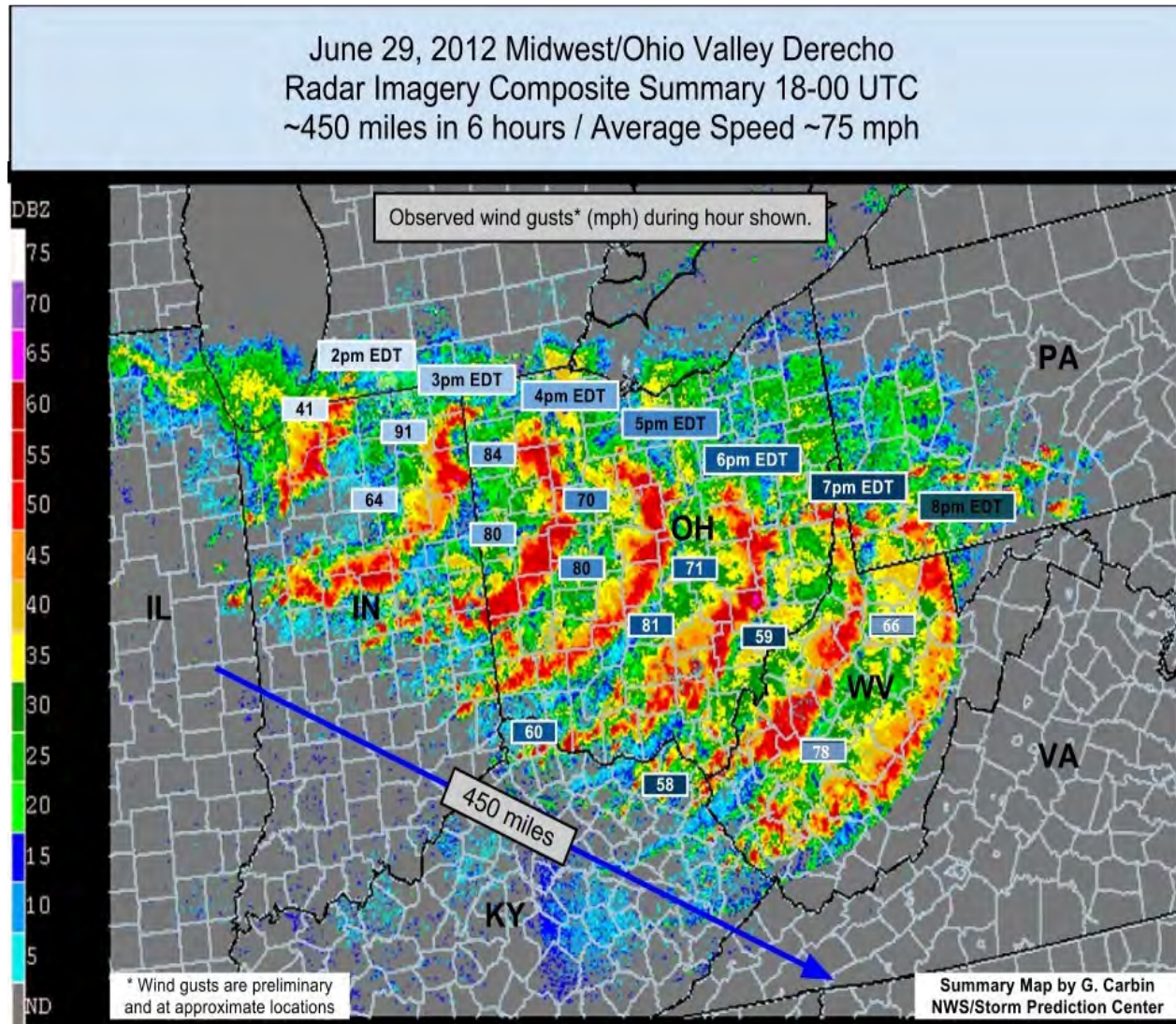


FIGURE 3-37: TIME-SEQUENCED DOPPLER RADAR IMAGERY SHOWS THE PROGRESSION OF A DERECHO EVENT THAT DEVELOPED IN THE MIDWEST AND PROPAGATED RAPIDLY SOUTHEAST ON JUNE 29, 2012 (SOURCE: NWS STORM PREDICTION CENTER).

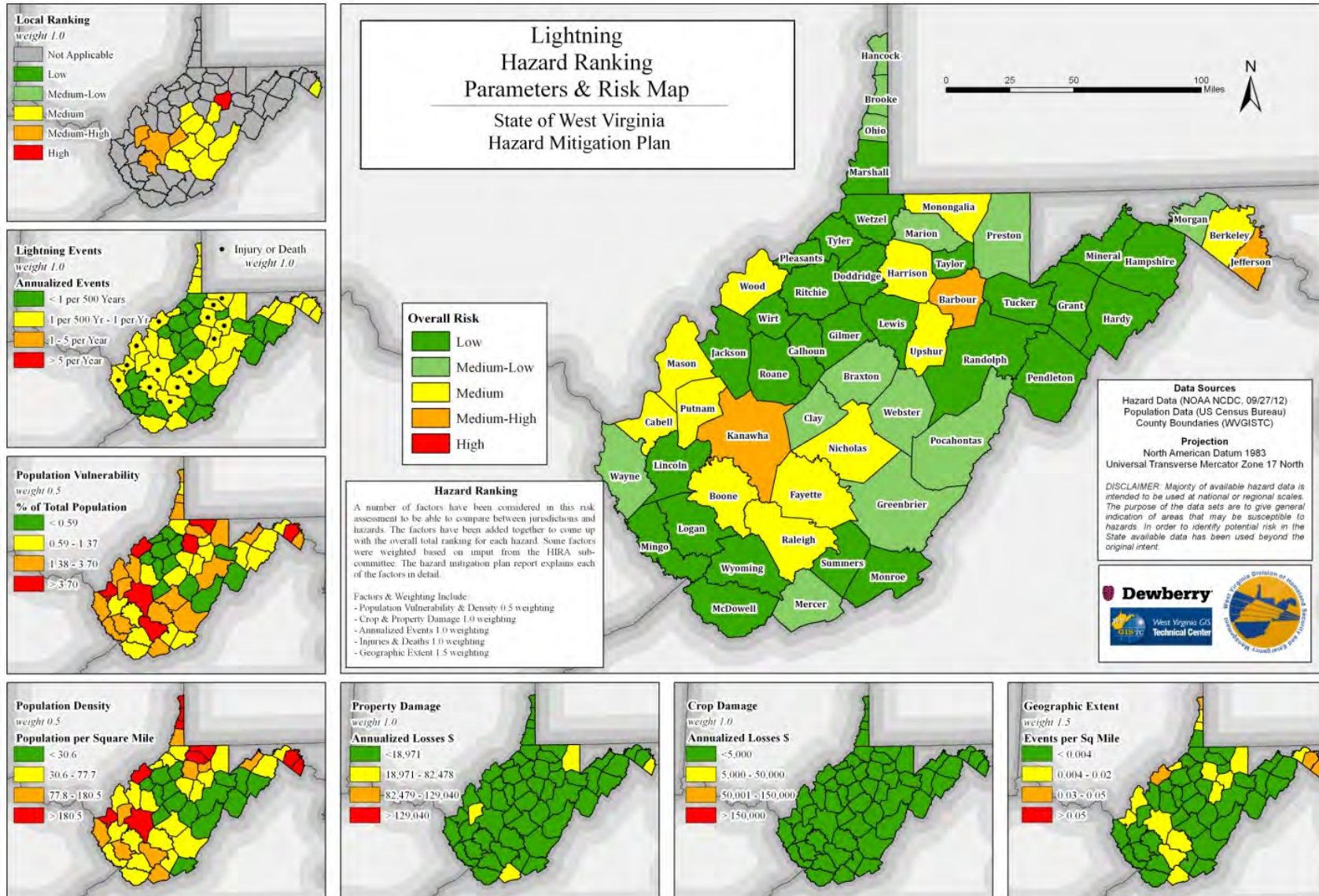


FIGURE 3-38. LIGHTNING HAZARD RANKING PARAMETERS AND RISK MAP

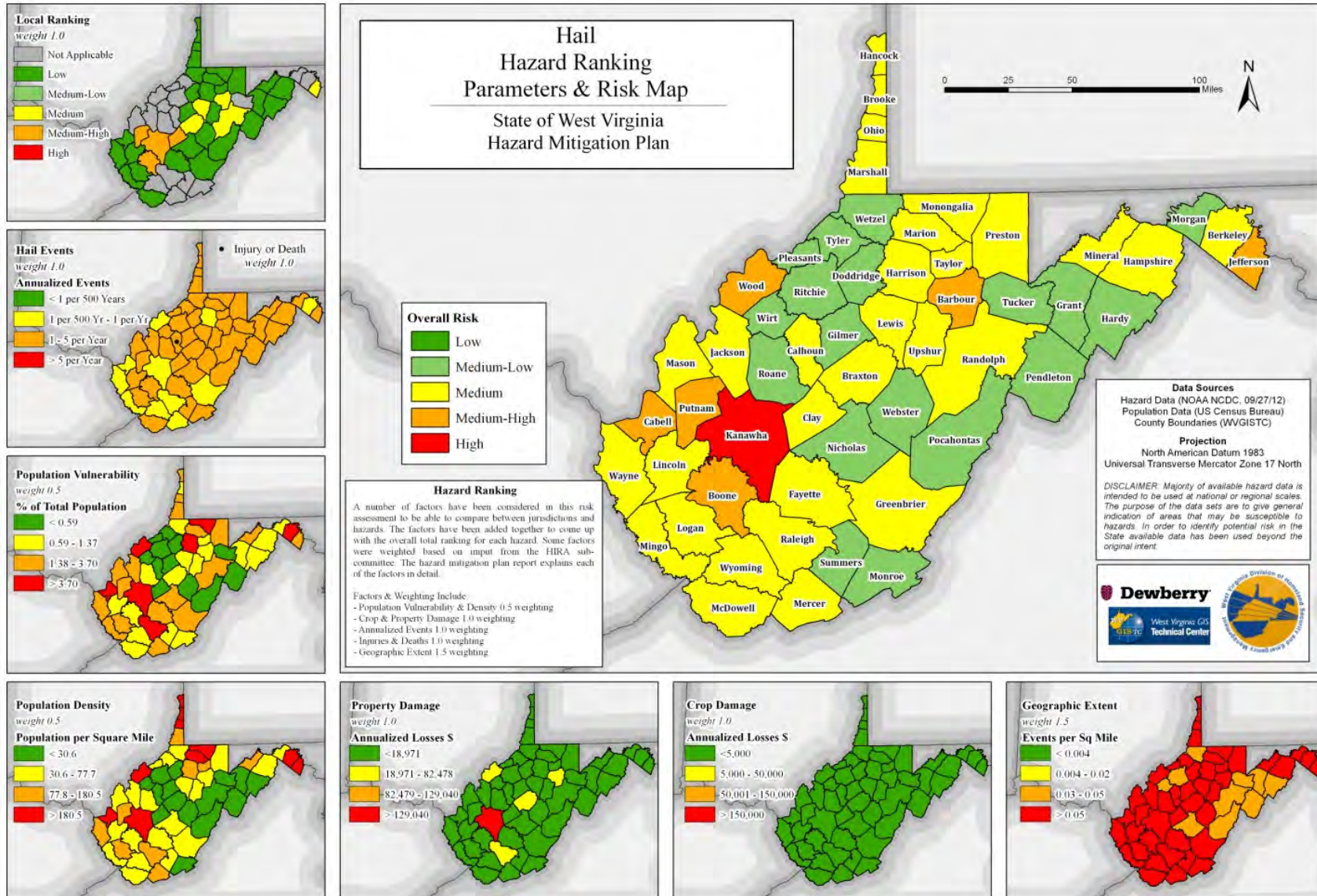


FIGURE 3-39. HAIL HAZARD RANKING PARAMETERS AND RISK MAP

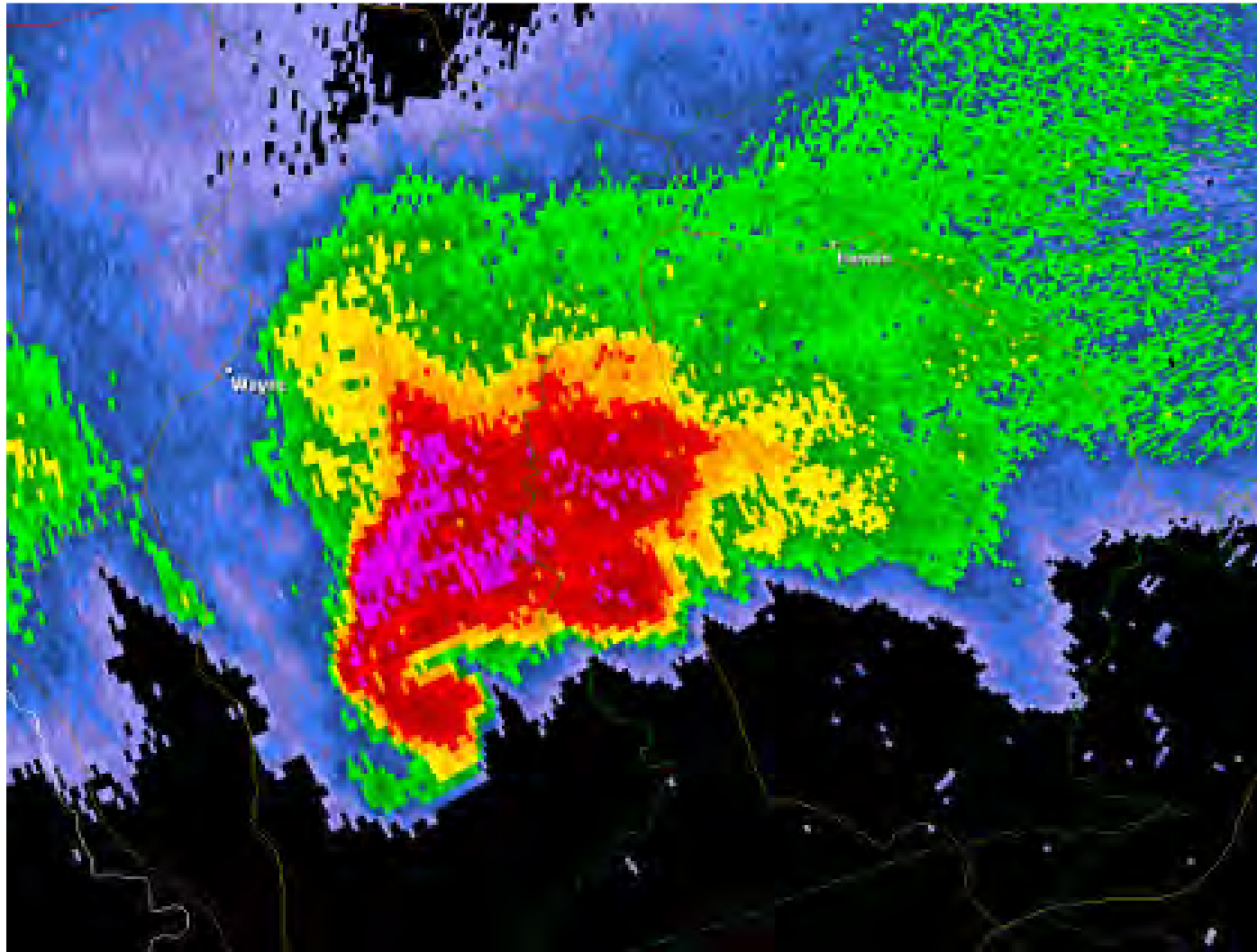


FIGURE 3-40: MARCH 2, 2012 TORNADO OUTBREAK: EF-3 TORNADO TRACKS THROUGH WAYNE & LINCOLN COUNTIES.

\*THIS DOPPLER RADAR IMAGE OF THE PARENT THUNDERSTORM SHOWS A DISTINCT “HOOK” ECHO, WHICH IS AN INDICATION OF STRONG ROTATION WITHIN THE STORM. THE LOCATION OF THE TORNADO IS NEAR THE “BALL” OF RED REFLECTIVITY THAT MAKES UP THE END OR TAIL OF THE HOOK NEAR THE BOTTOM OF THE IMAGE.

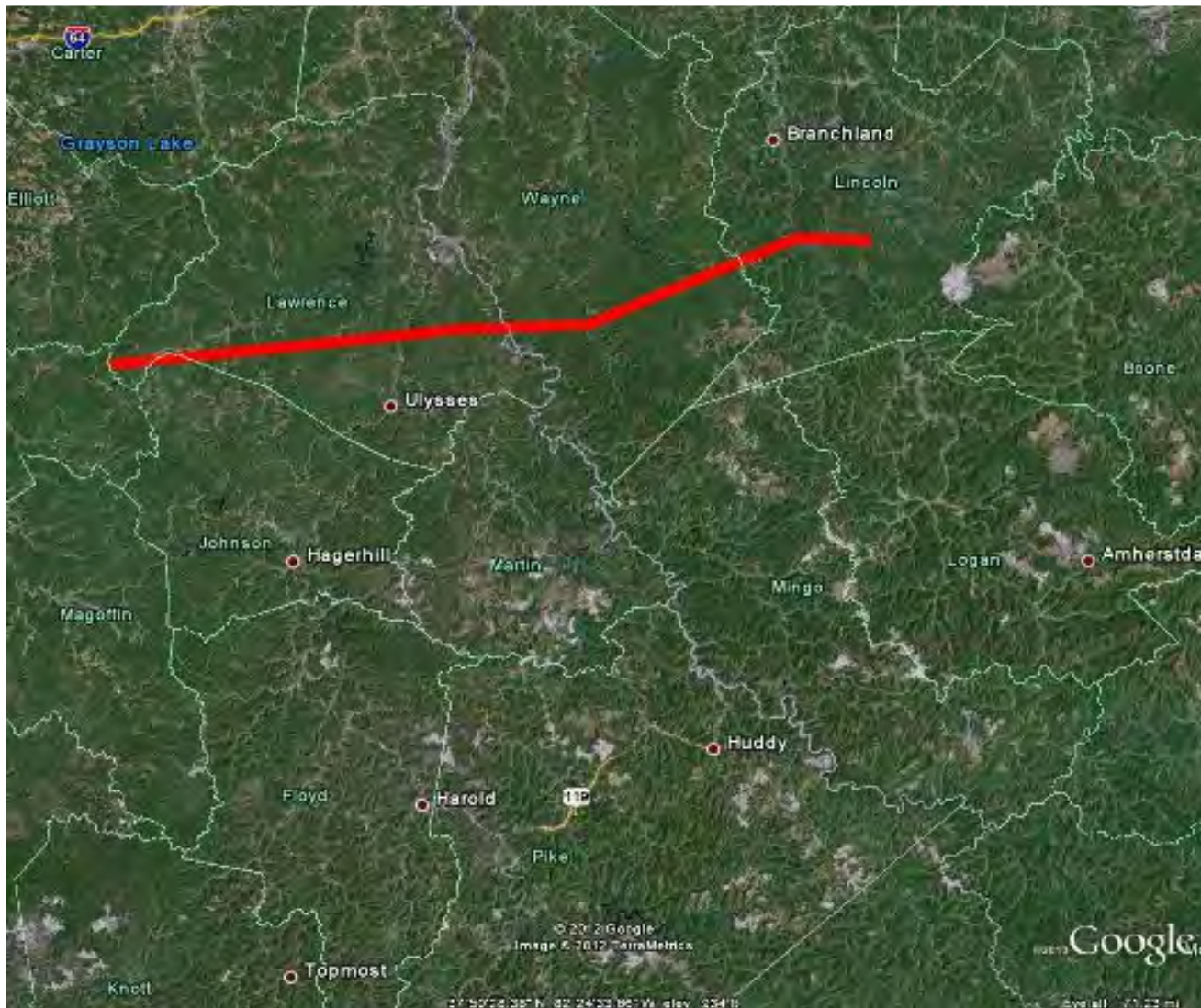
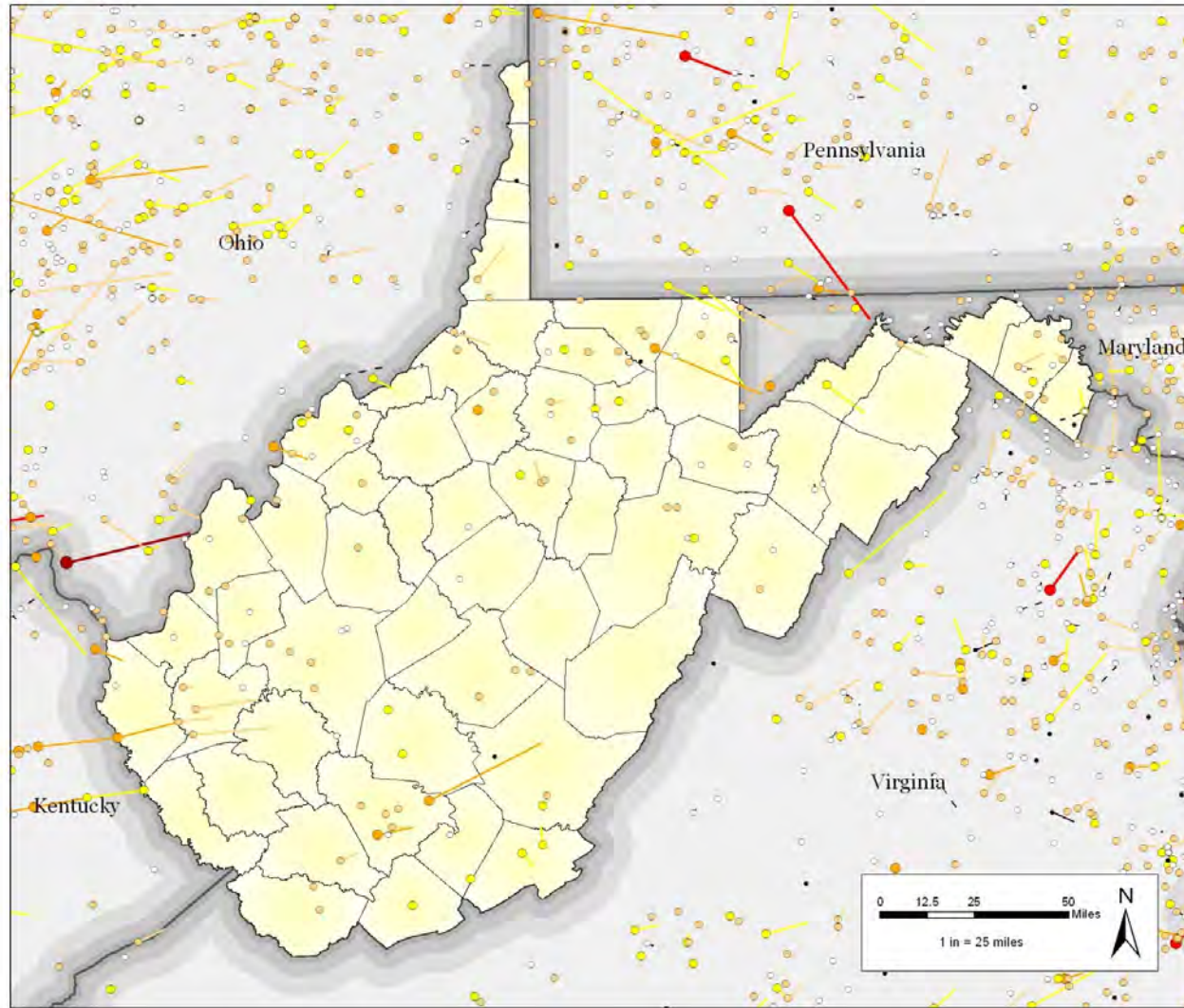


Figure 3-41. March 2, 2012 Tornado Outbreak: EF-3 tornado tracks through Wayne & Lincoln Counties





### Historic Tornado Tracks 1950-2012

**Tornado F-Scale**

- unrecorded
- 0
- 1
- 2
- 3
- 4
- 5

**Historic Tornado Tracks**  
Historic tornado touchdowns and tracks are symbolized for visual effect and are not drawn to scale. Actual tornado swath widths vary considerably, although more intense tornadoes are generally wider.

**Data Sources**  
Tornado Record 1950-2012 (NOAA-SPC SVRGIS)  
County Boundaries (WVGISTC)  
State Boundaries (nationalatlas.gov)

**Projection**  
North American Datum 1983  
Universal Transverse Mercator Zone 17 North

**Dewberry**  
West Virginia GIS Technical Center

**West Virginia Division of Homeland Security & Emergency Management**

*DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.*

State of West Virginia  
Hazard Mitigation Plan

FIGURE 3-42. HISTORIC TORNADO TRACKS, 1950-2012

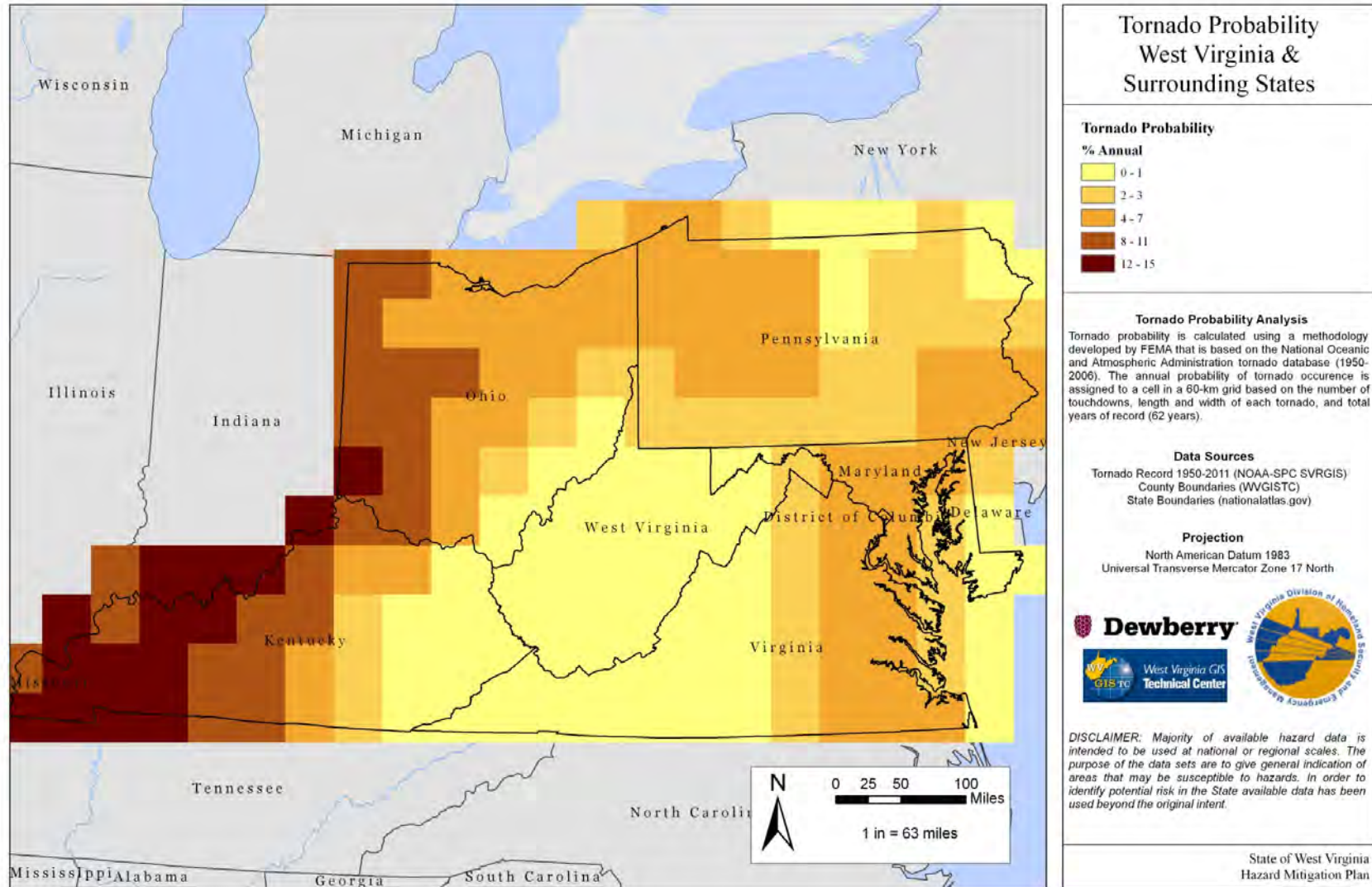


FIGURE 3-43. TORNADO PROBABILITY.

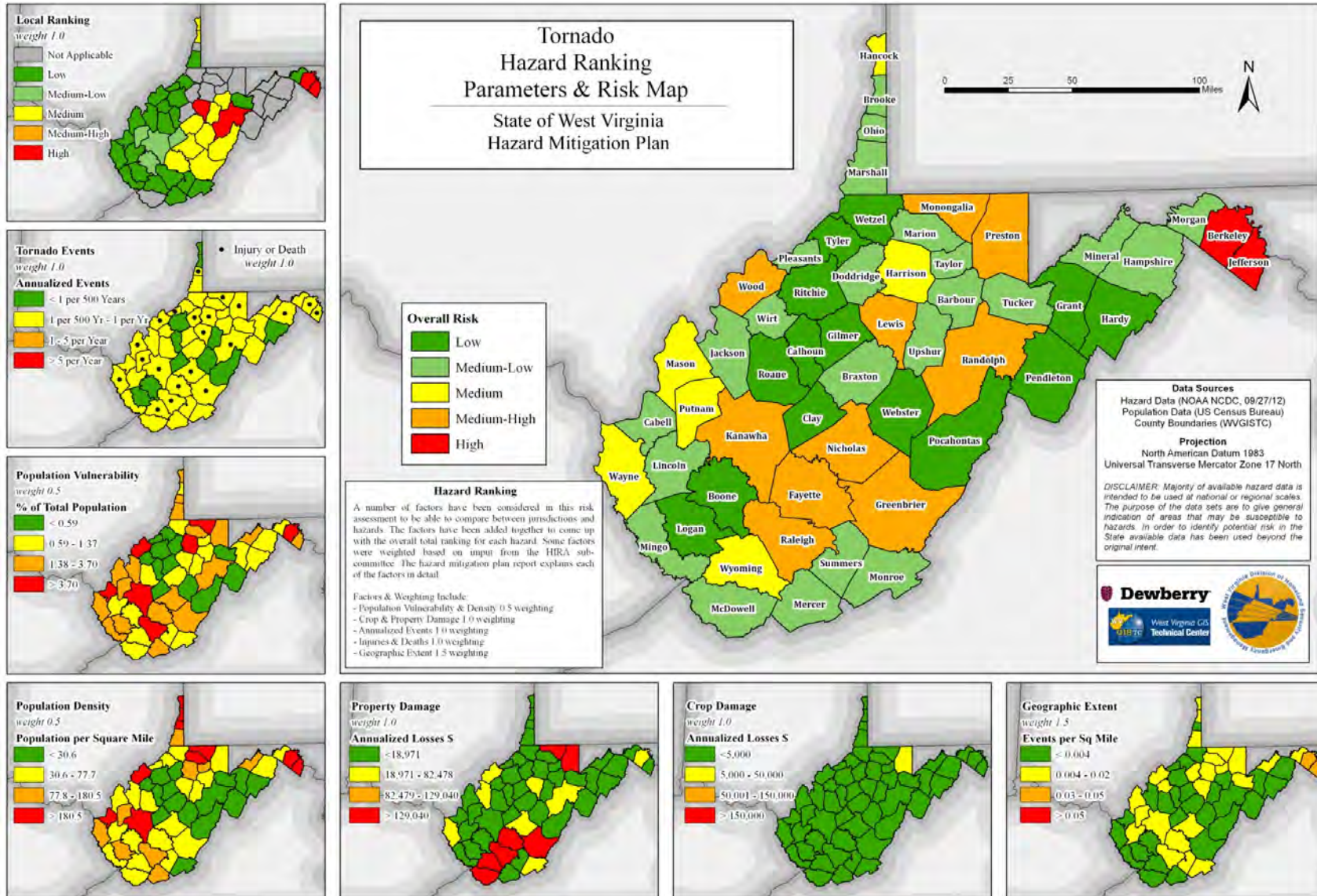


FIGURE 3-44. TORNADO HAZARD RANKING PARAMETERS AND RISK MAP

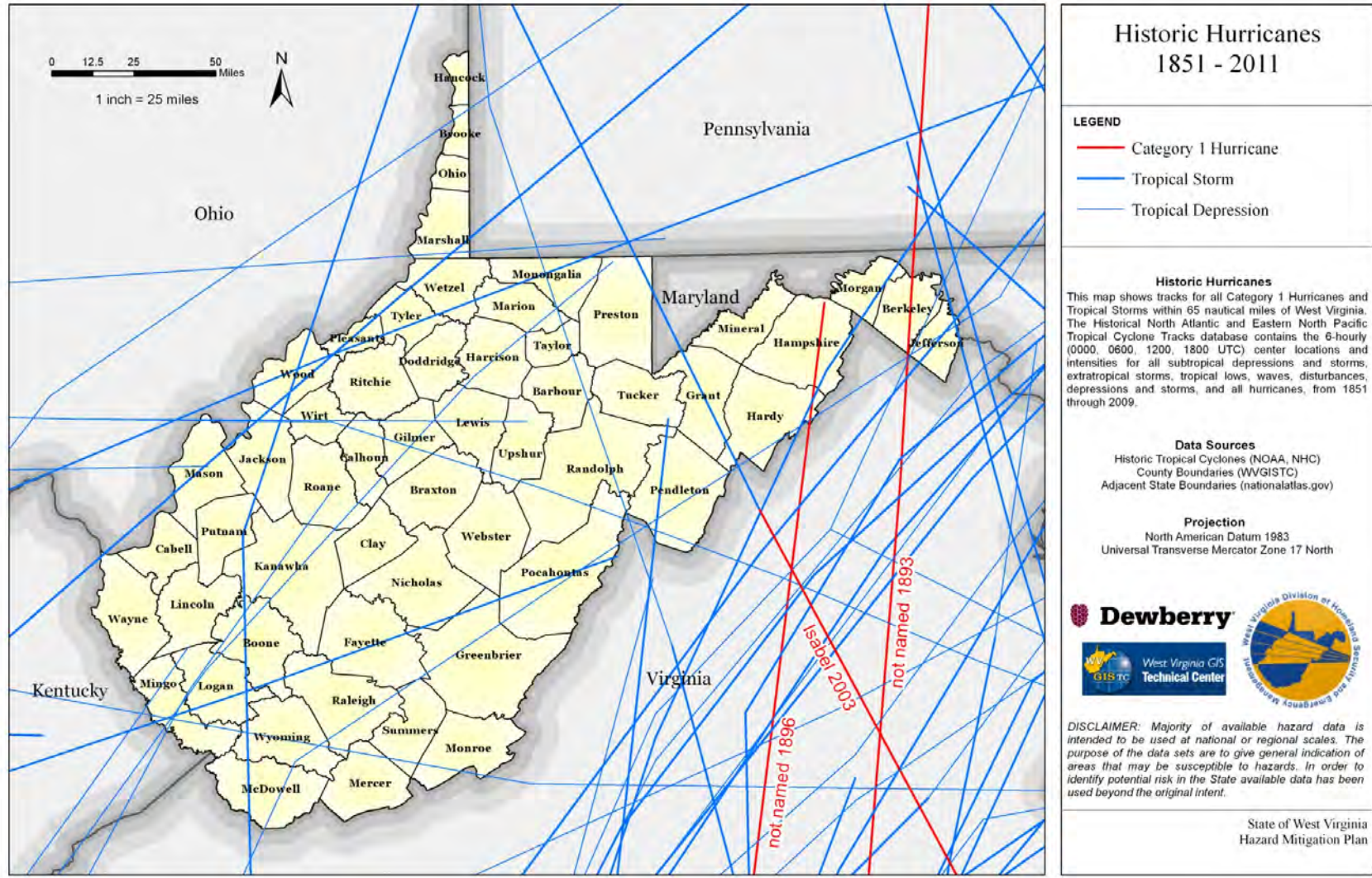


FIGURE 3-45. HISTORIC HURRICANES, 1851 – 2012

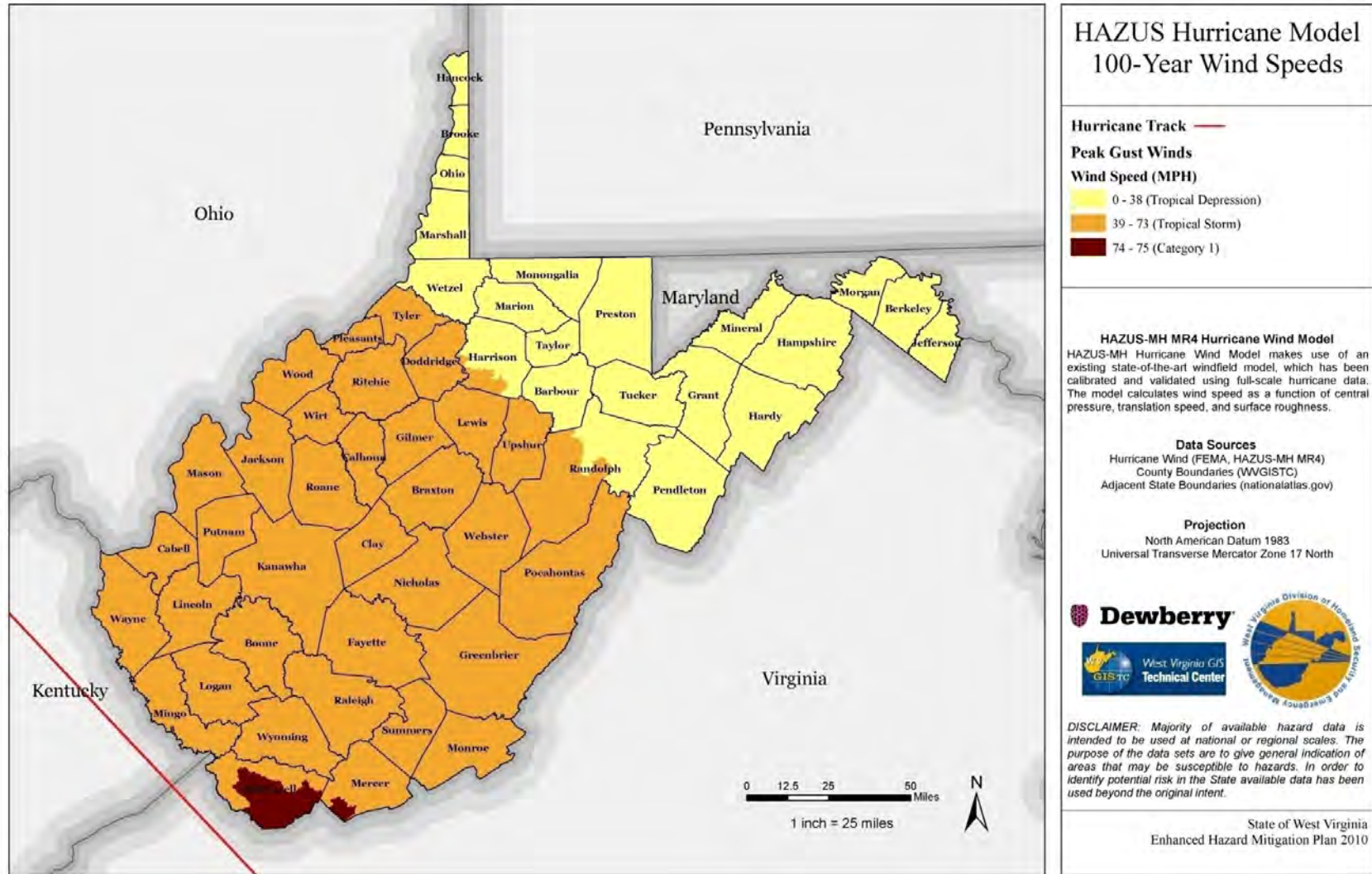


FIGURE 3-46. HAZUS HURRICANE MODEL, 100-YEAR EVENT WIND SPEEDS

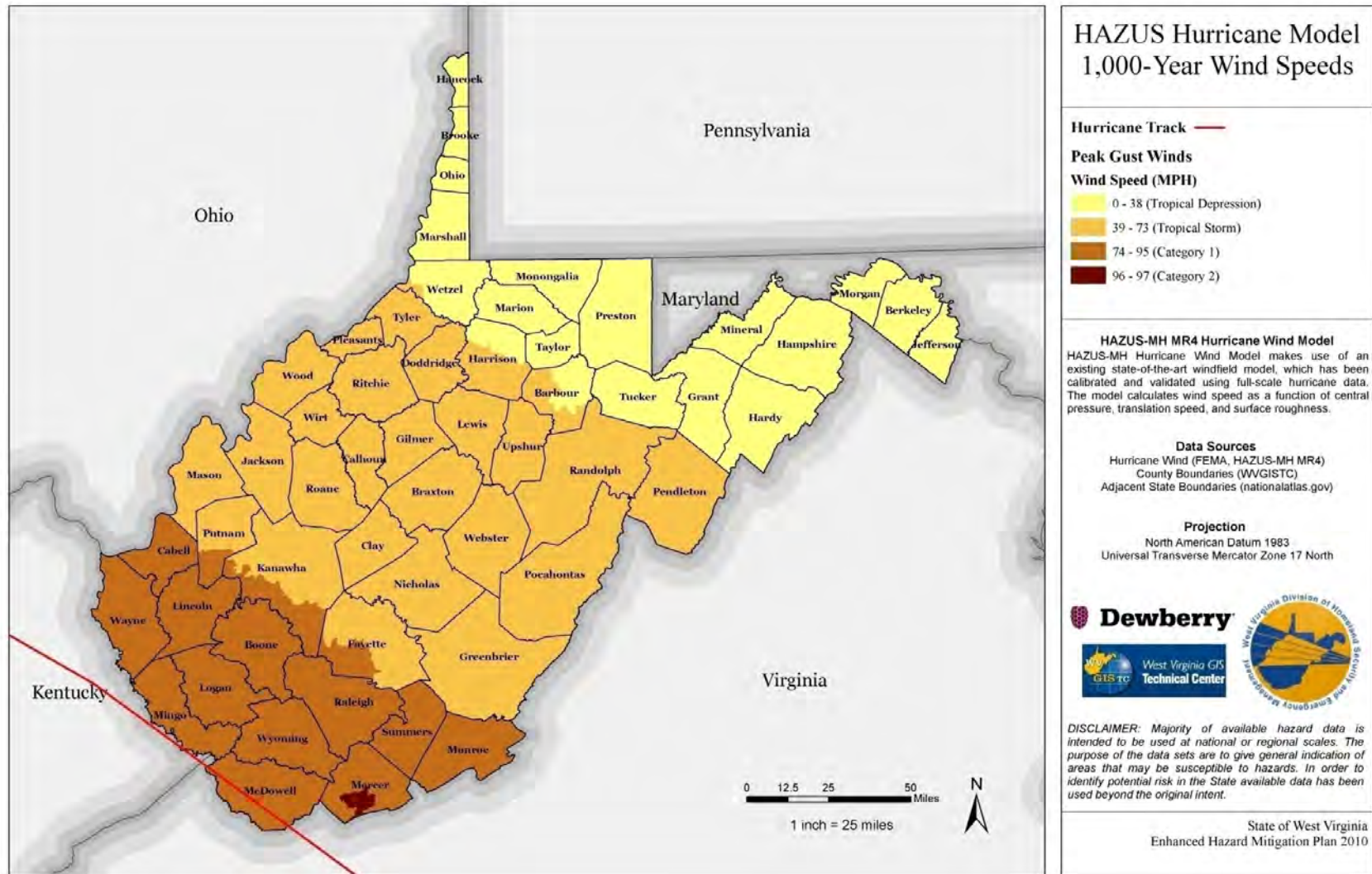


FIGURE 3-47. HAZUS HURRICANE MODEL, 1,000-YEAR EVENT WIND SPEEDS

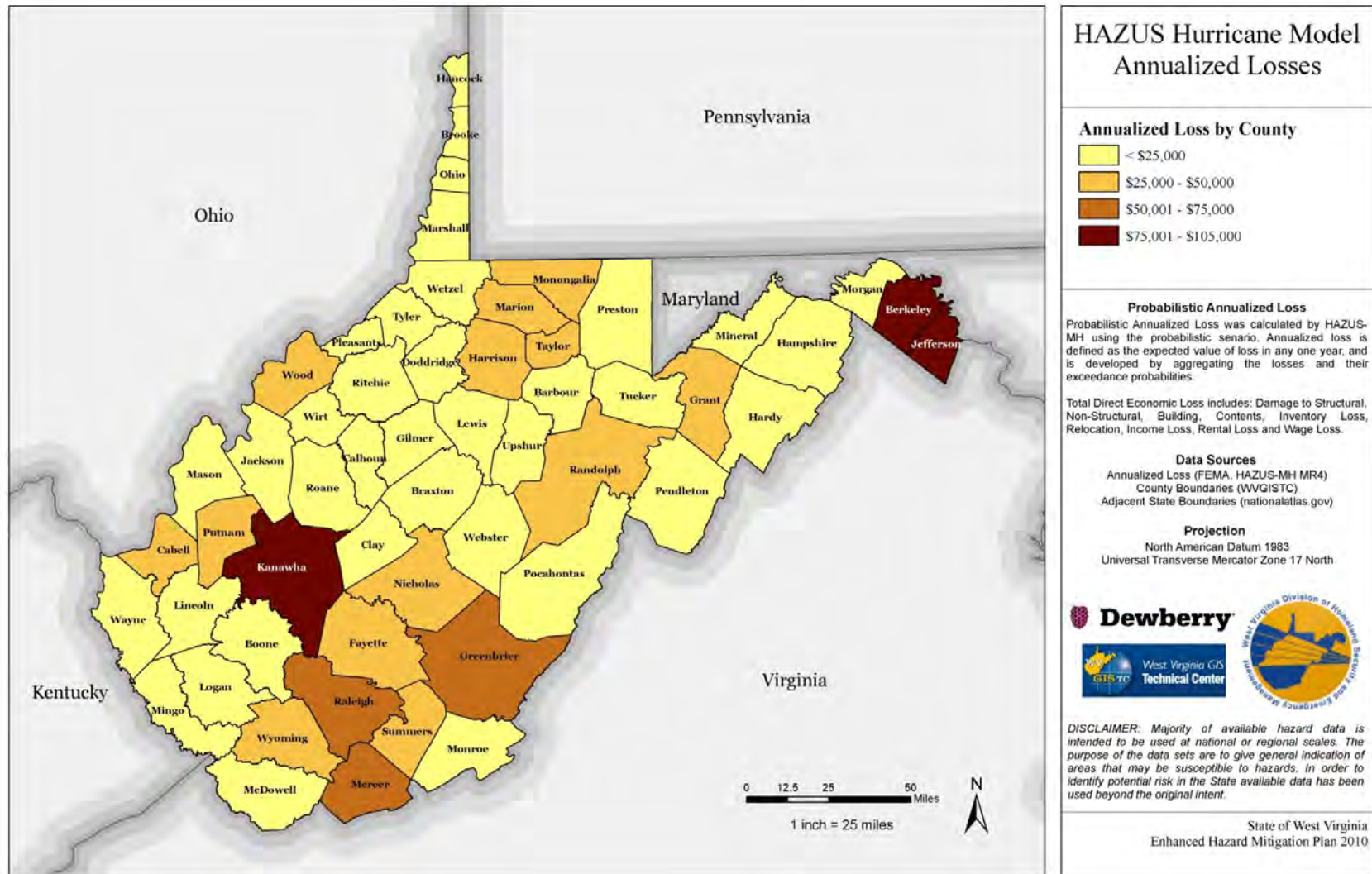


FIGURE 3-48. HURRICANE PROBABILISTIC ANNUALIZED LOSS (HAZUS)

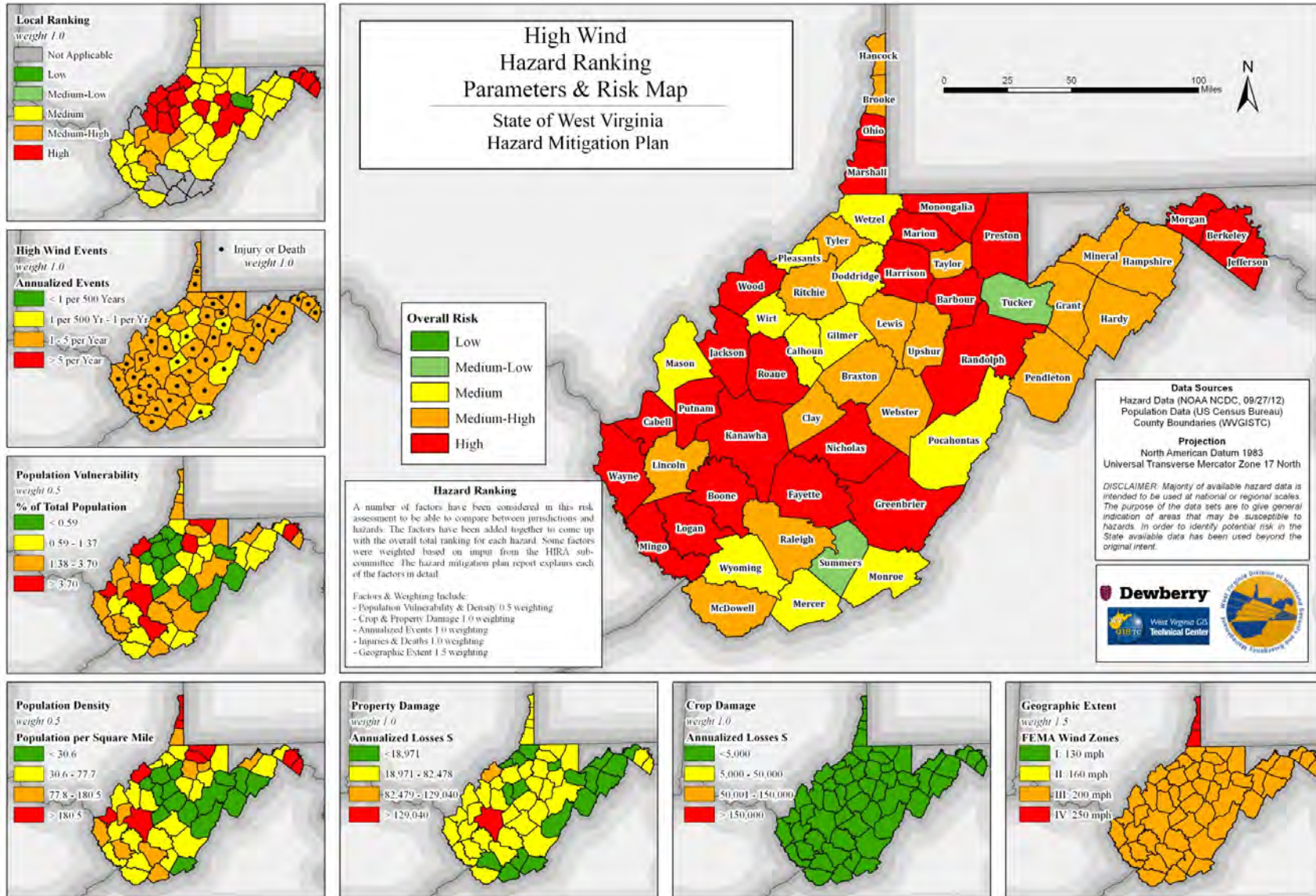


FIGURE 0-49. WIND HAZARD RANKING PARAMETERS AND RISK MAP



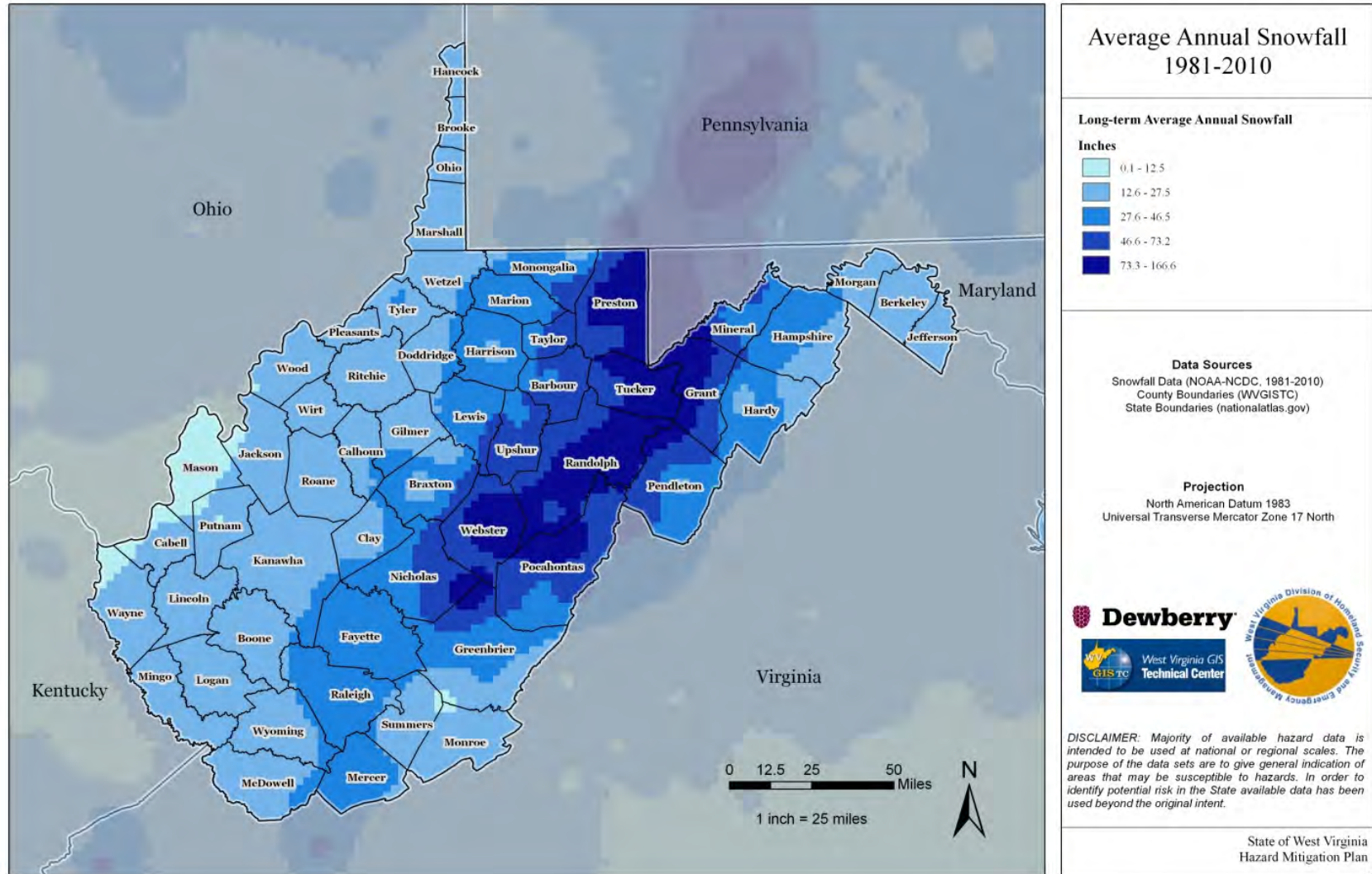


FIGURE 3-50. AVERAGE ANNUAL SNOWFALL (BASED ON PERIOD 1981-2010)

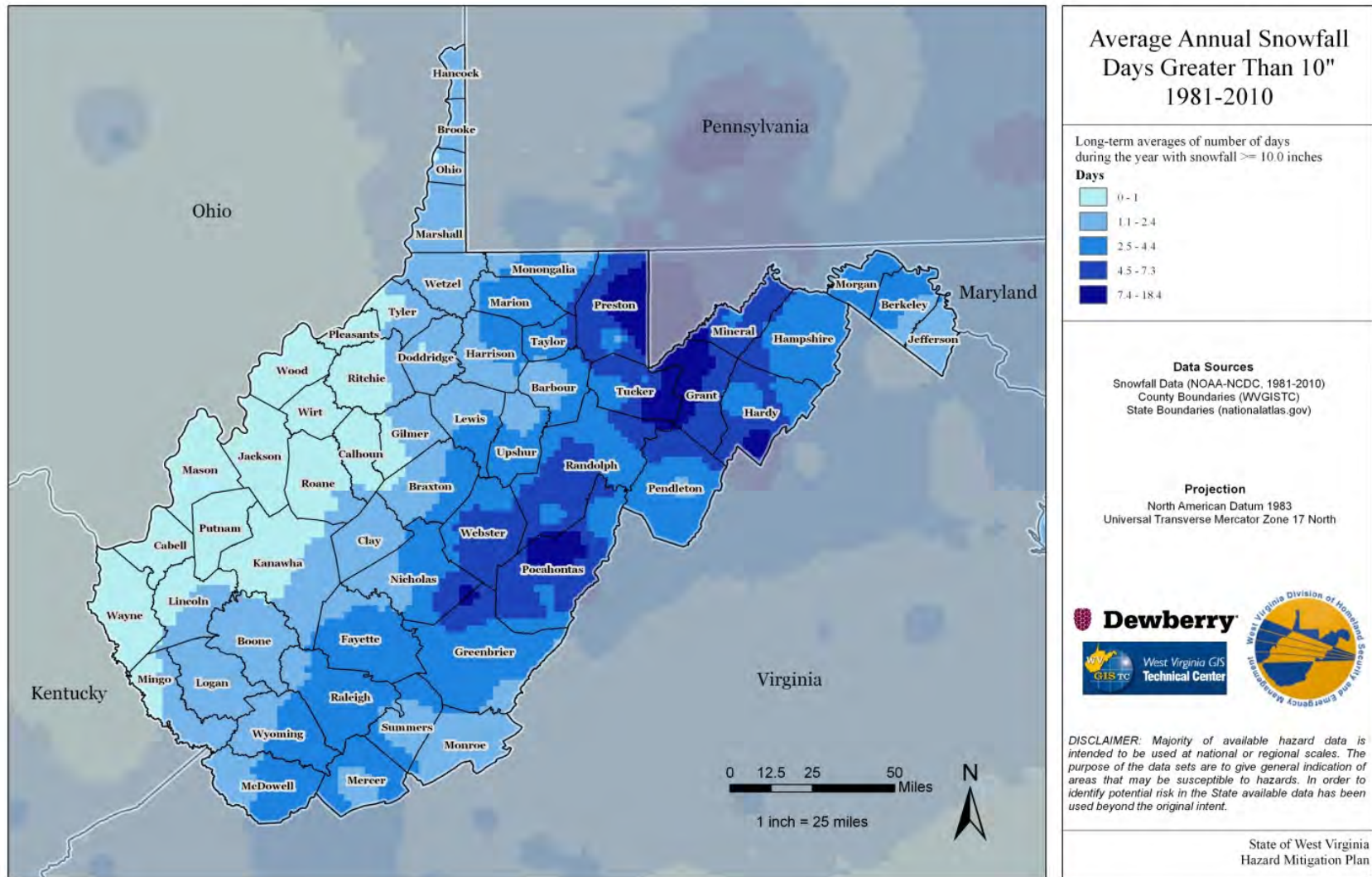


FIGURE 3-51. AVERAGE NUMBER OF DAYS ANNUALLY WITH SNOWFALL GREATER THAN 10" (1981-2010)

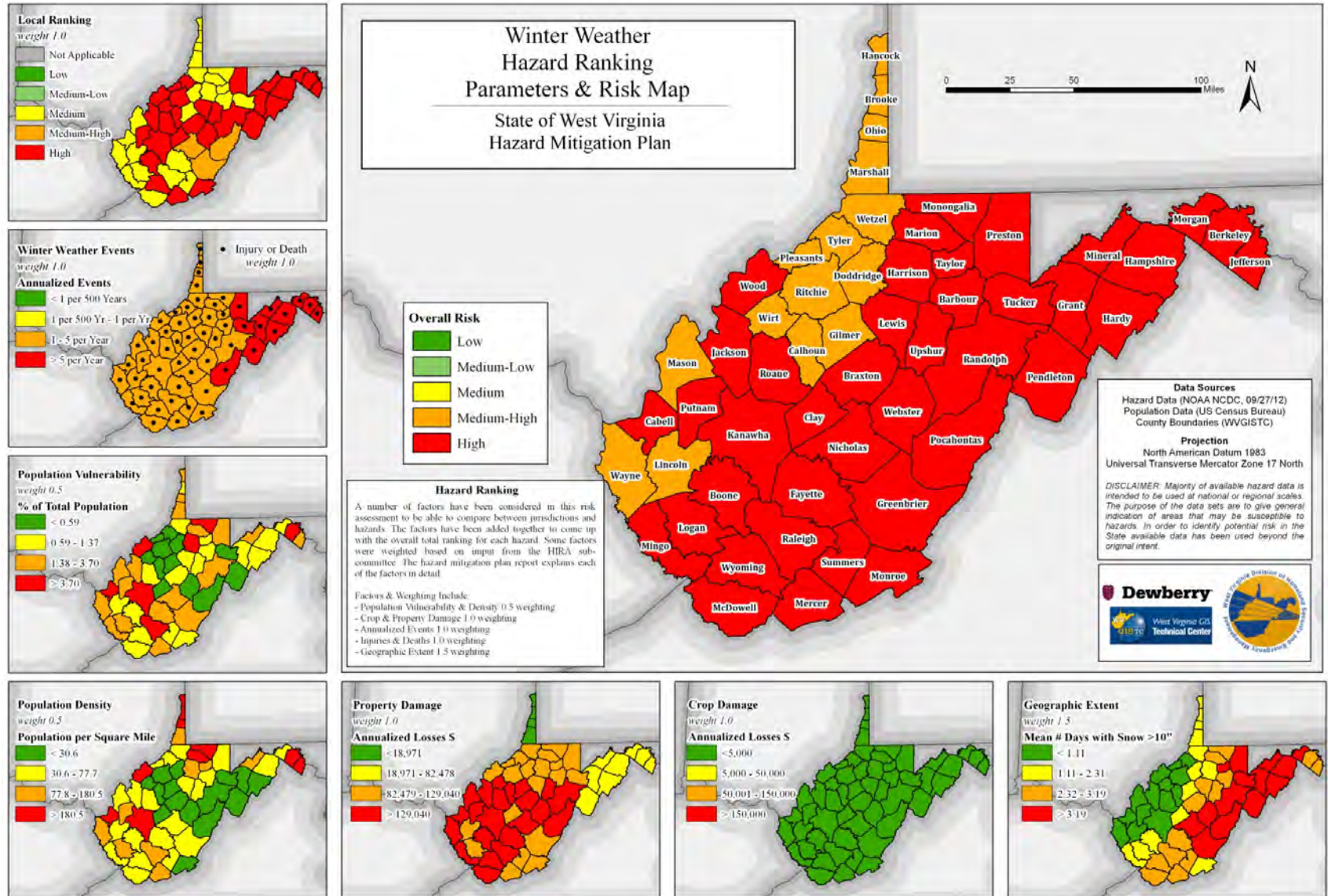


FIGURE 3-52. WINTER STORM HAZARD RANKING PARAMETERS & RISK MAP

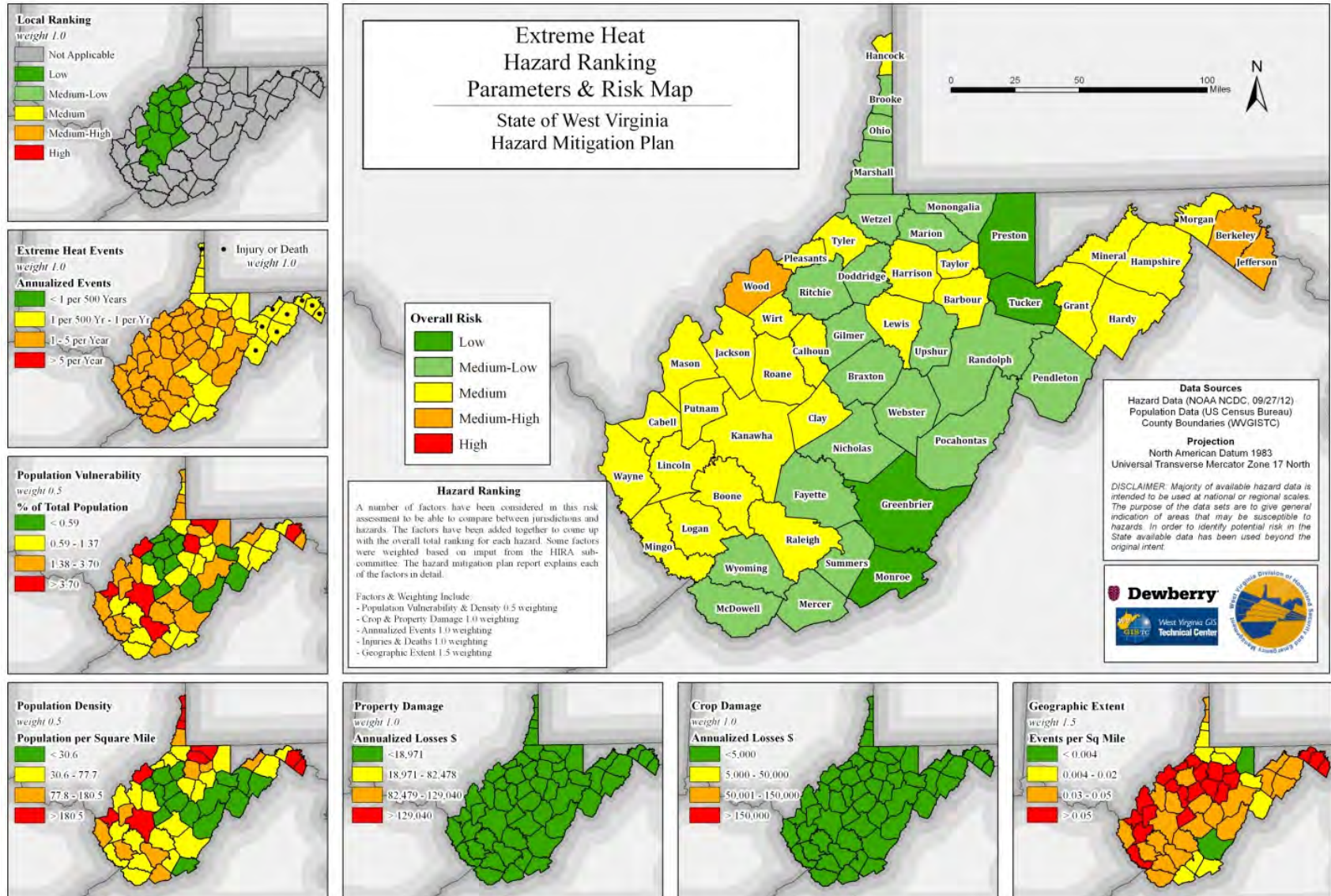


FIGURE 3-54. EXTREME HEAT HAZARD RANKING & RISK MAP

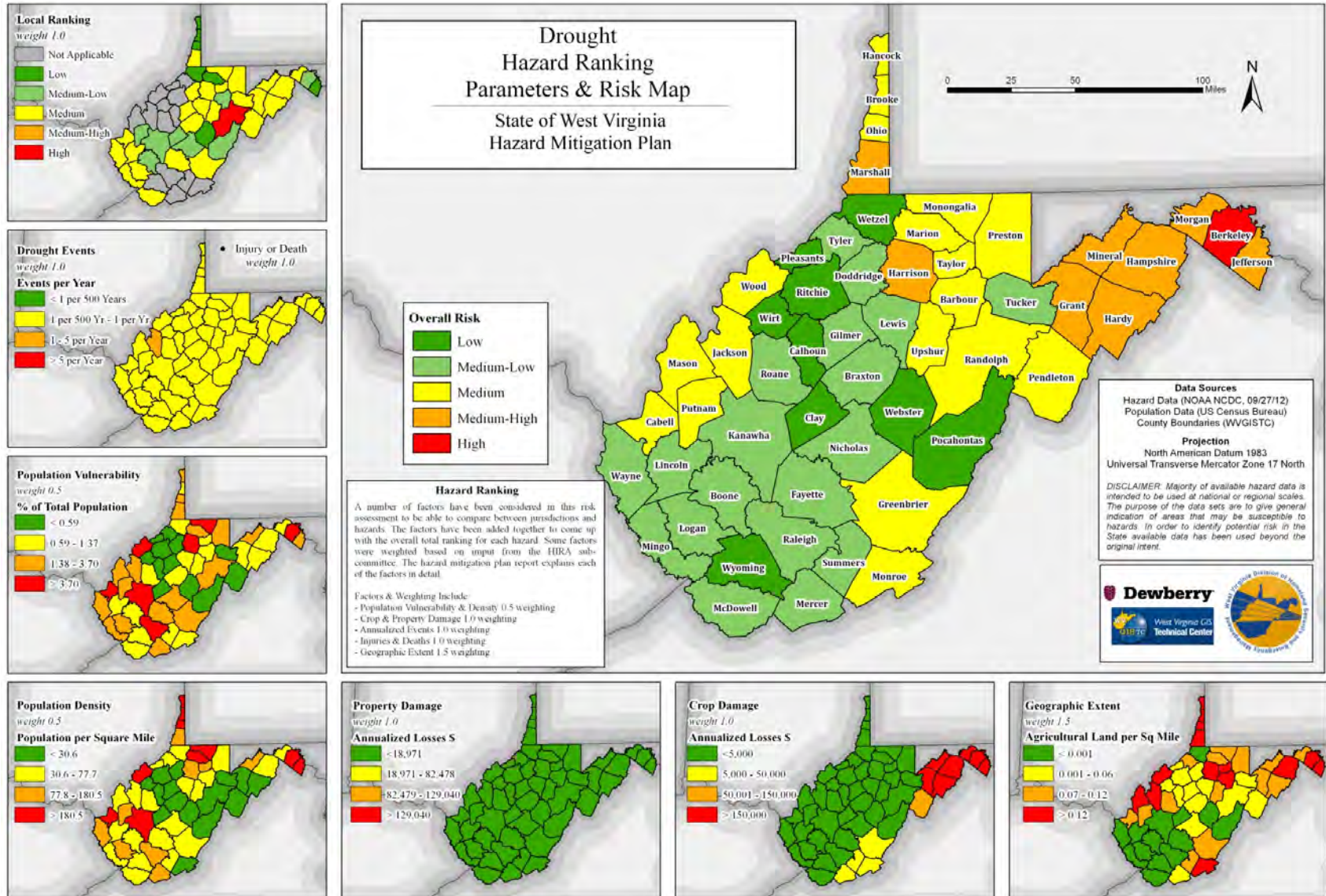


FIGURE 3-55. DROUGHT HAZARD RANKING & RISK MAP



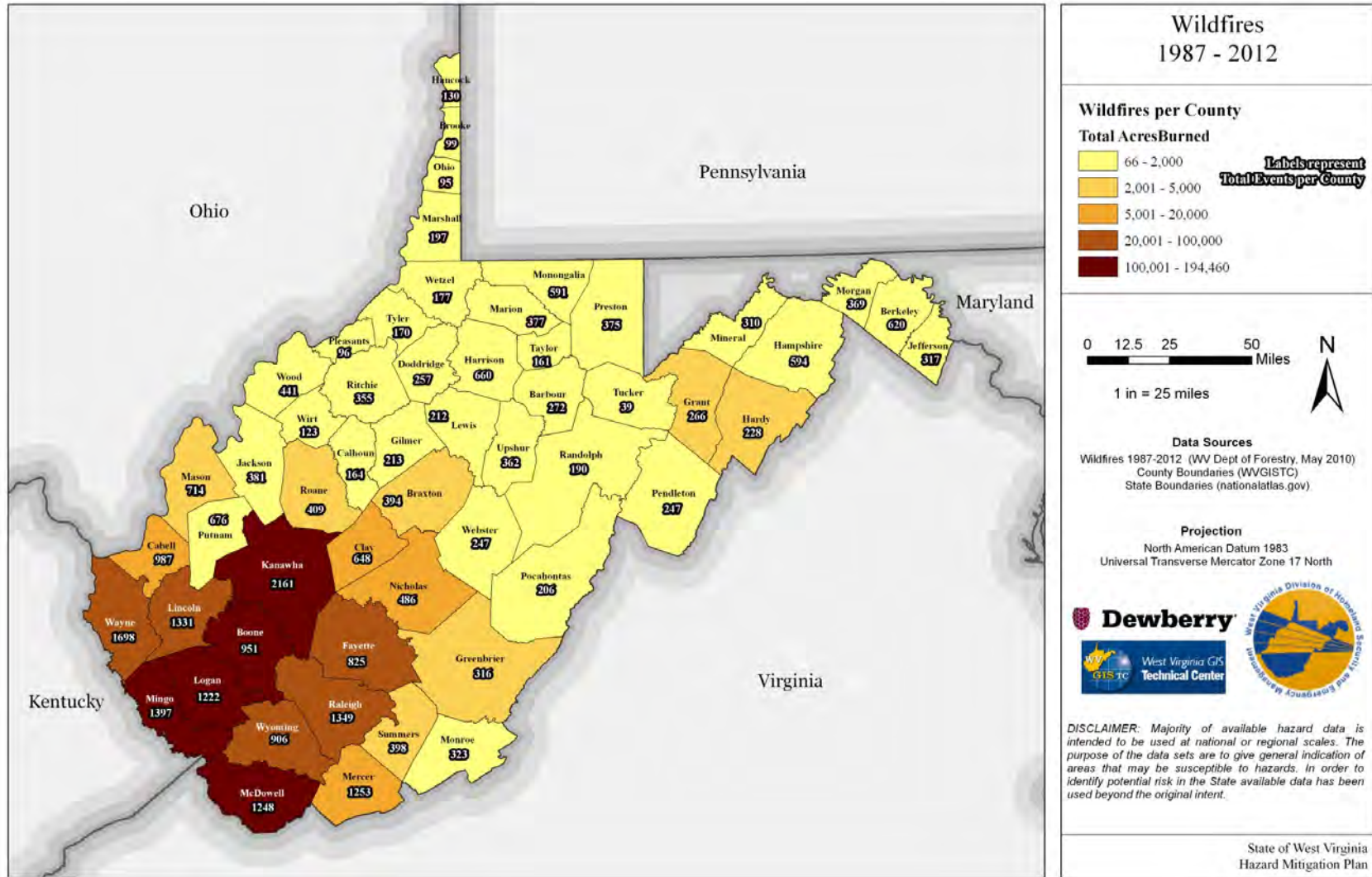


FIGURE 3-59. NUMBER OF WILDFIRES AND ACRES BURNED (1987 – 2012)

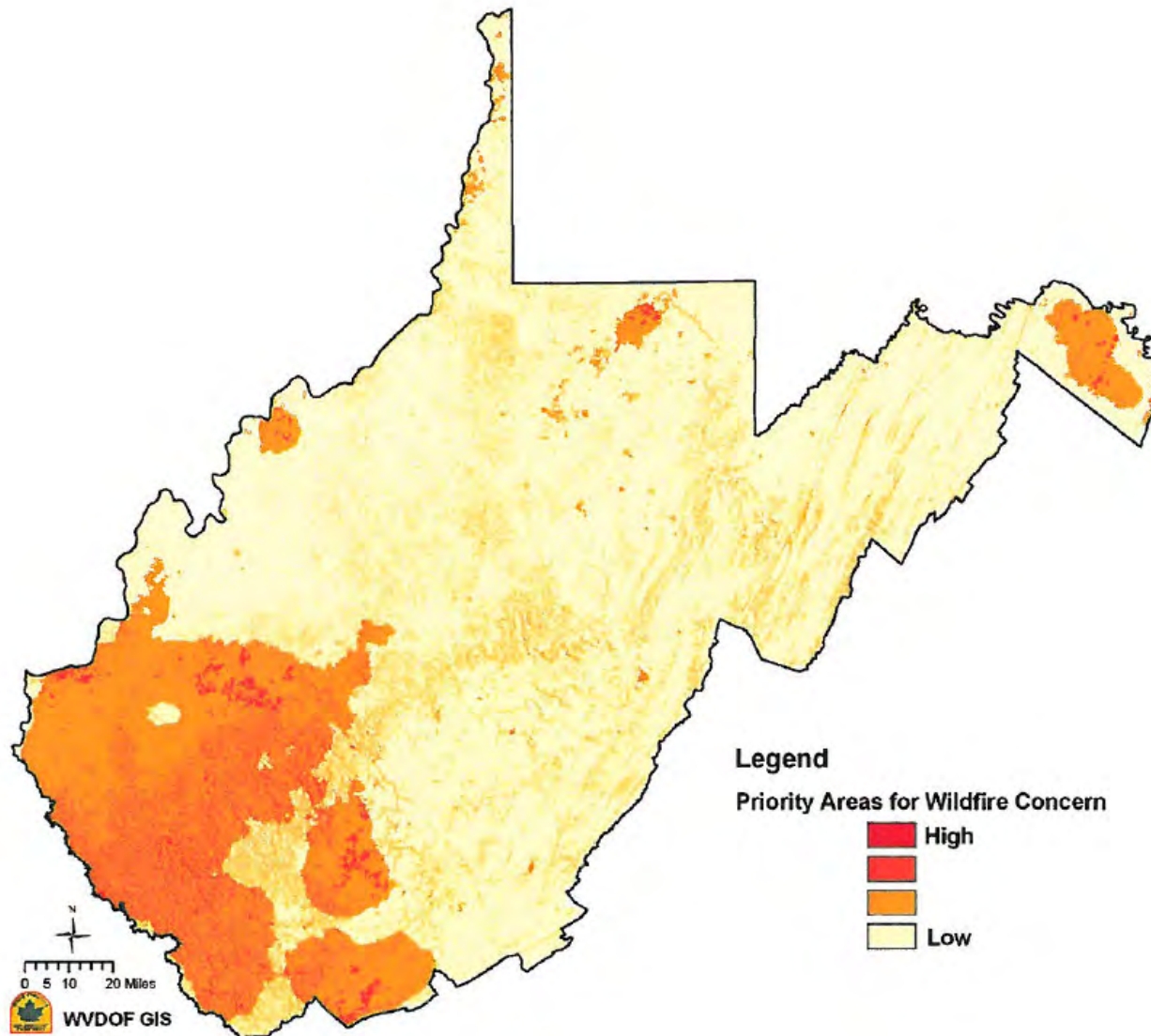


FIGURE 3-63. HIGHEST PRIORITY AREAS FOR WILDFIRE CONCERN IN WEST VIRGINIA (WVDOF GIS, 2009)



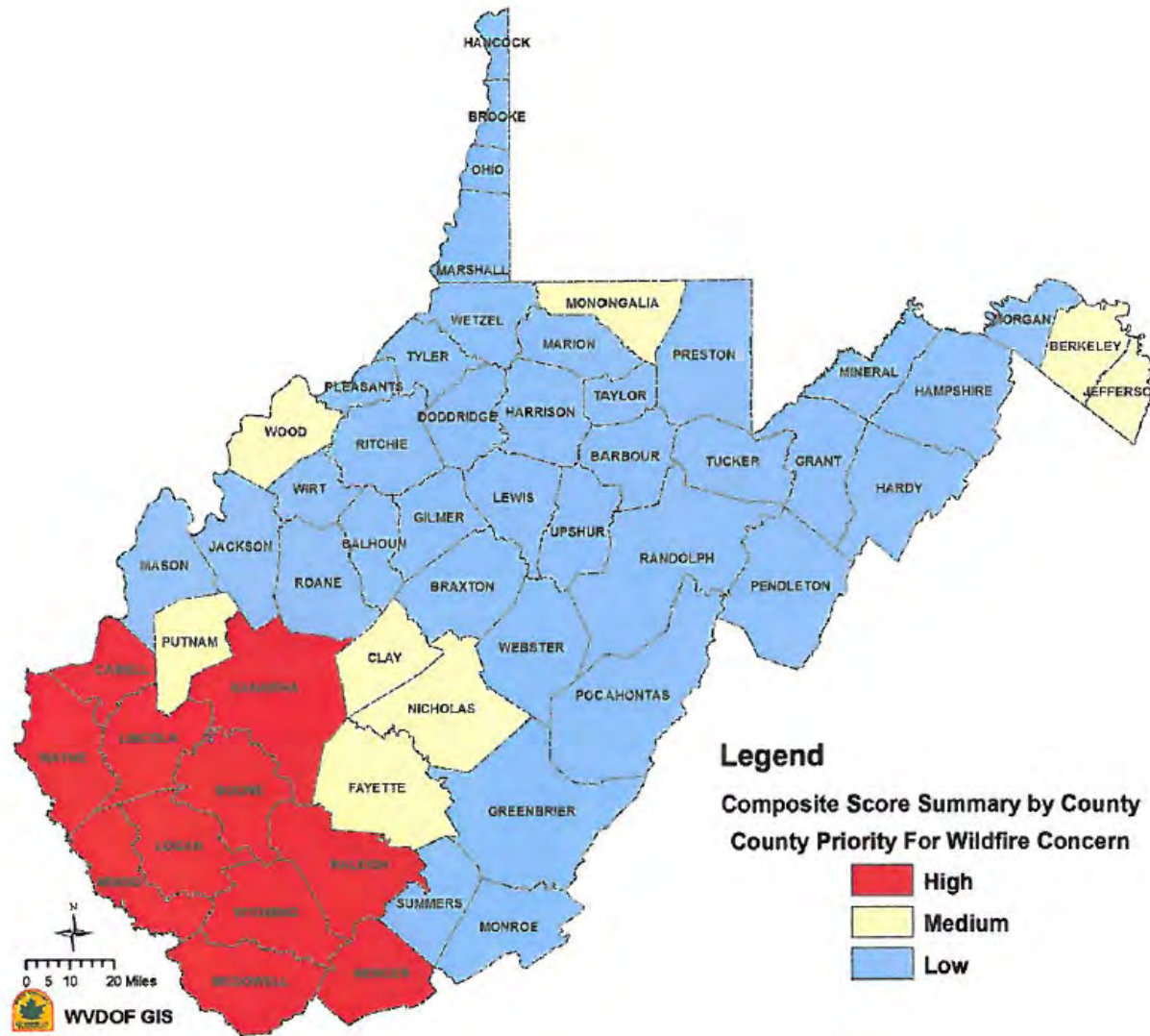


FIGURE 3-64. PRIORITY AREAS OF WILDFIRE CONCERN IN WV RISK SCORE BASED ON PAST OCCURRENCES, TOPOGRAPHY, AND WILDLAND-URBAN INTERFACE. (WVDOF GIS, 2009)

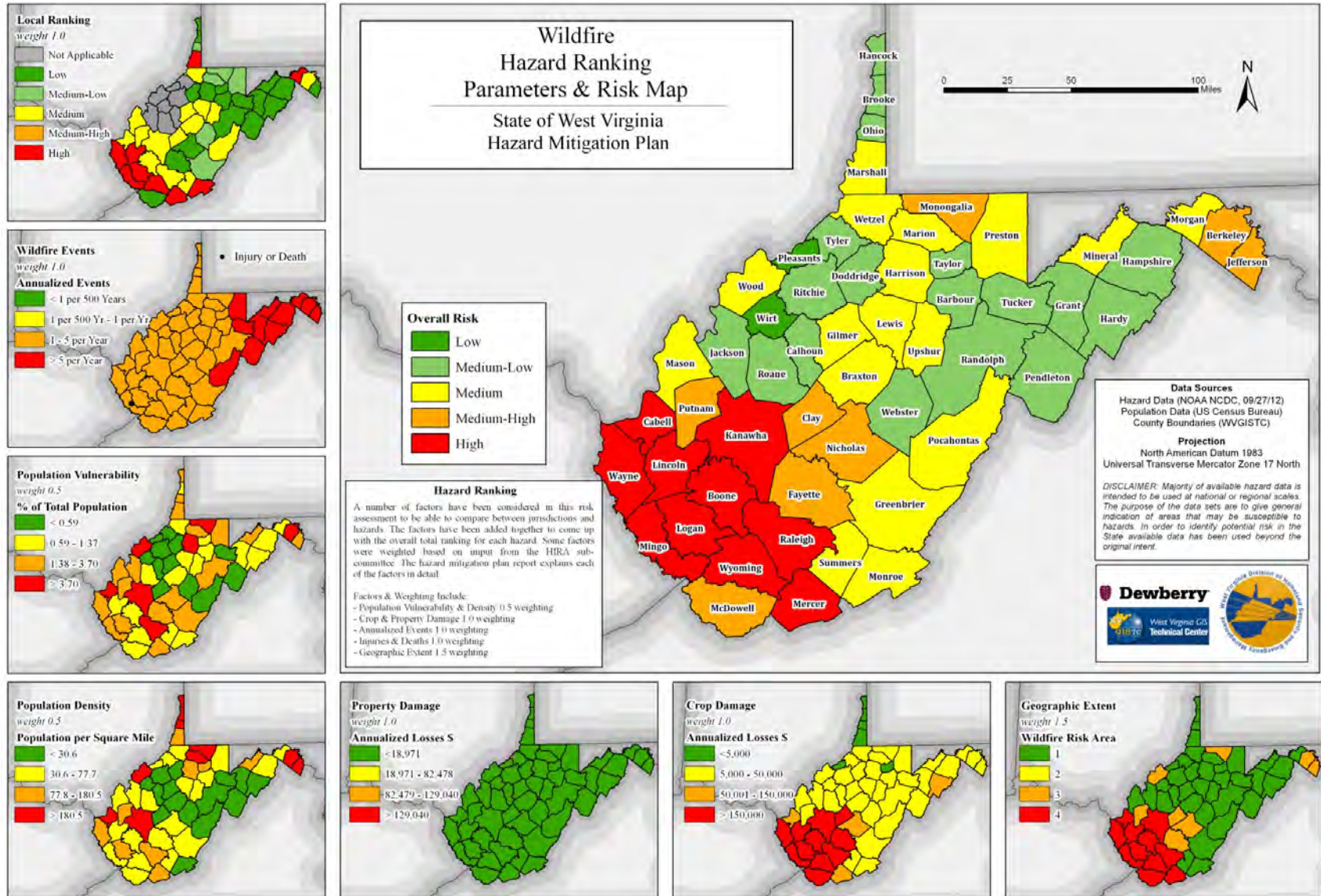


FIGURE 3-65. WILDFIRE HAZARD RANKING PARAMETERS AND RISK MAP

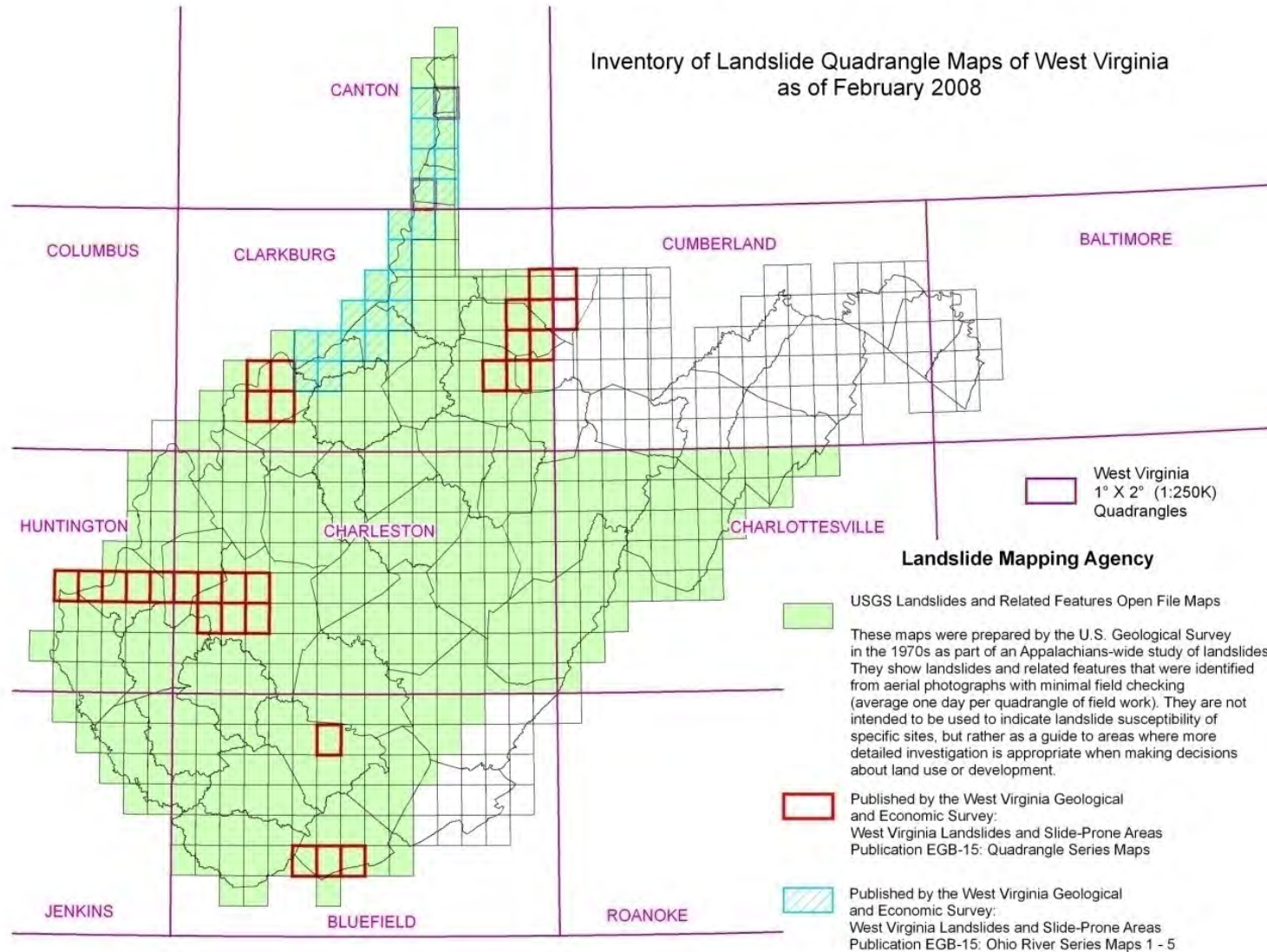


FIGURE 3-66. INVENTORY OF LANDSLIDE QUADRANGLE MAPS OF WEST VIRGINIA AS OF FEBRUARY 2008.

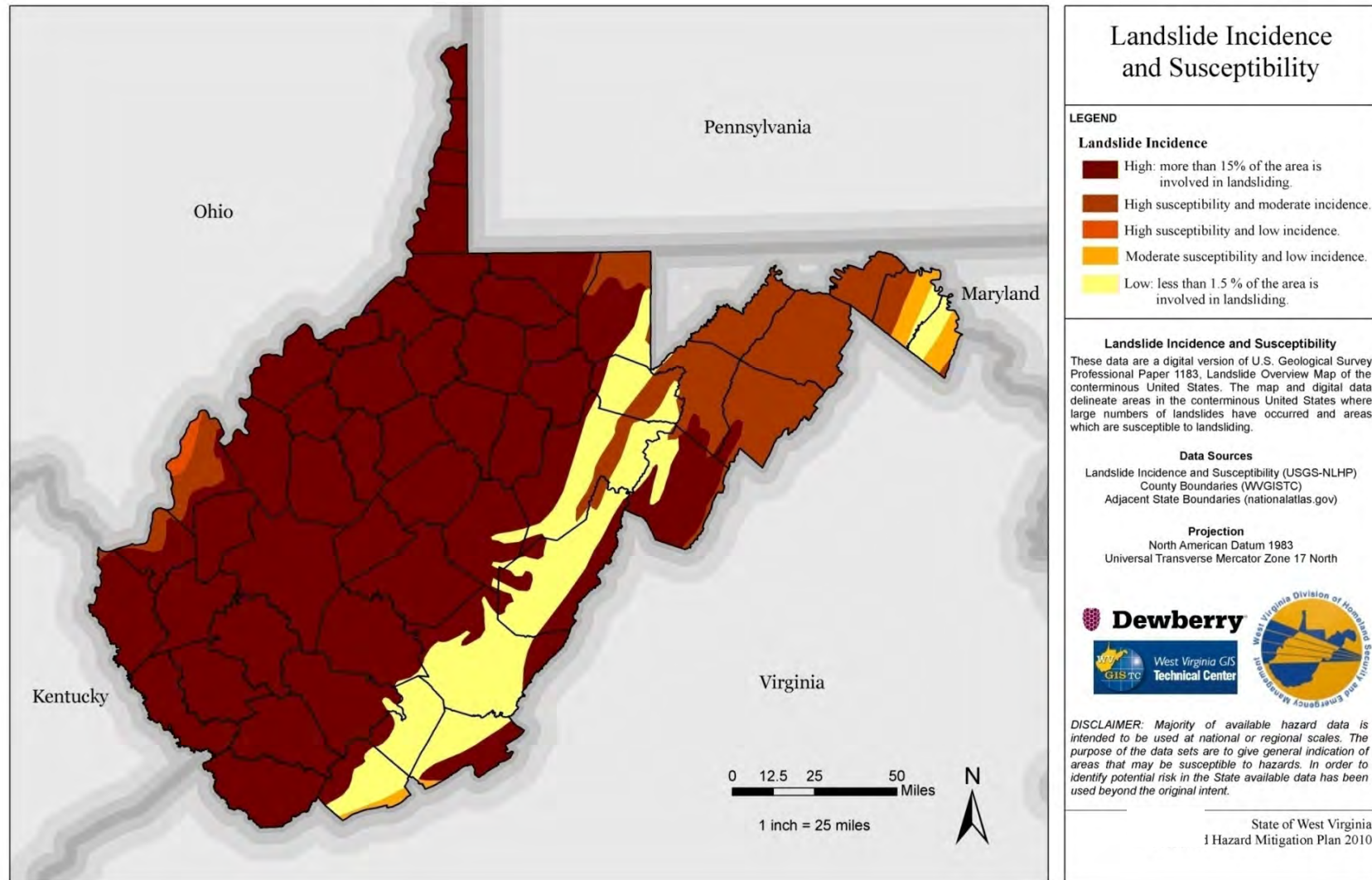


FIGURE 3-67. LANDSLIDE INCIDENCE AREAS

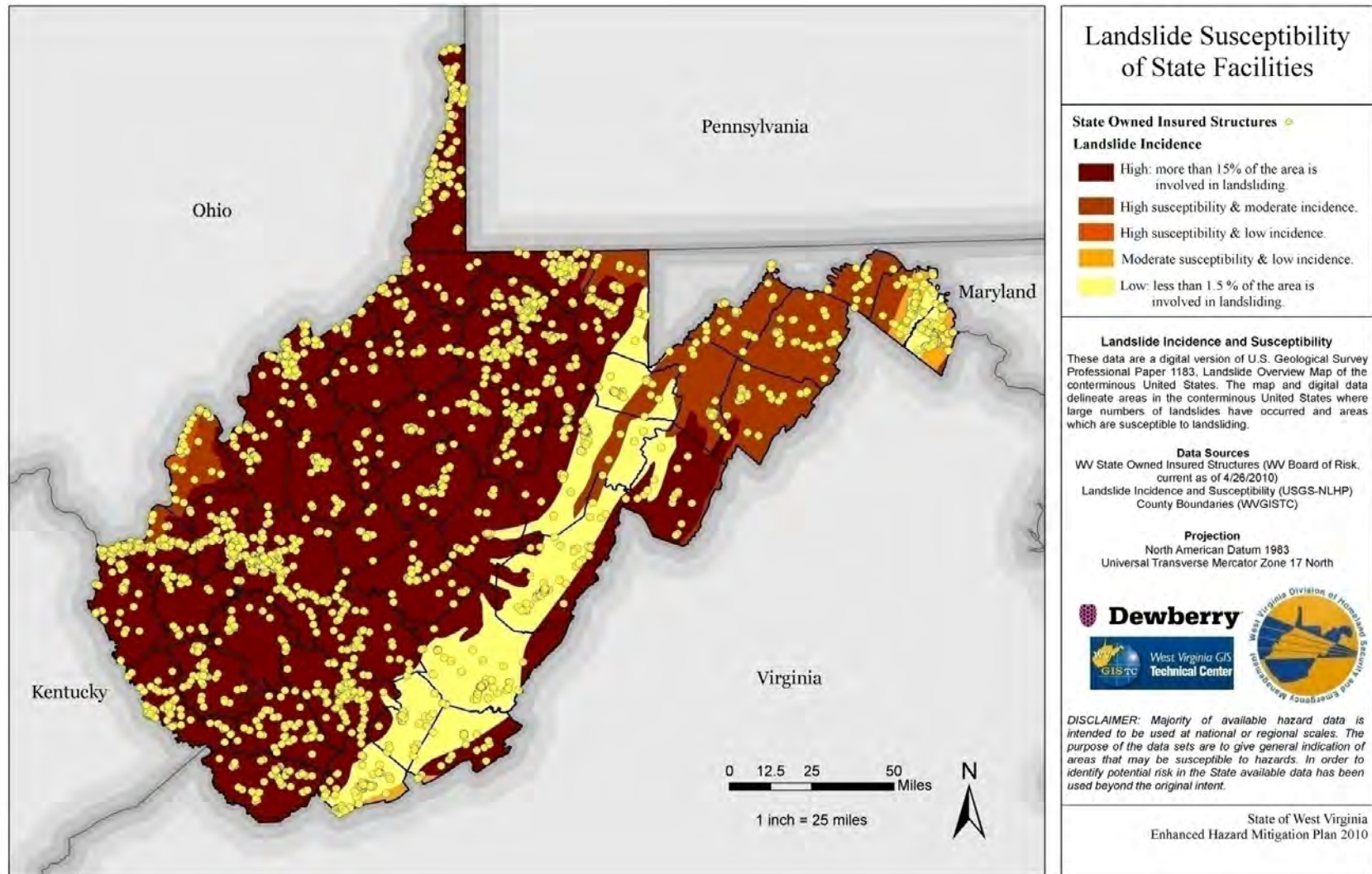


FIGURE 3-68. LANDSLIDE SUSCEPTIBILITY OF STATE FACILITIES

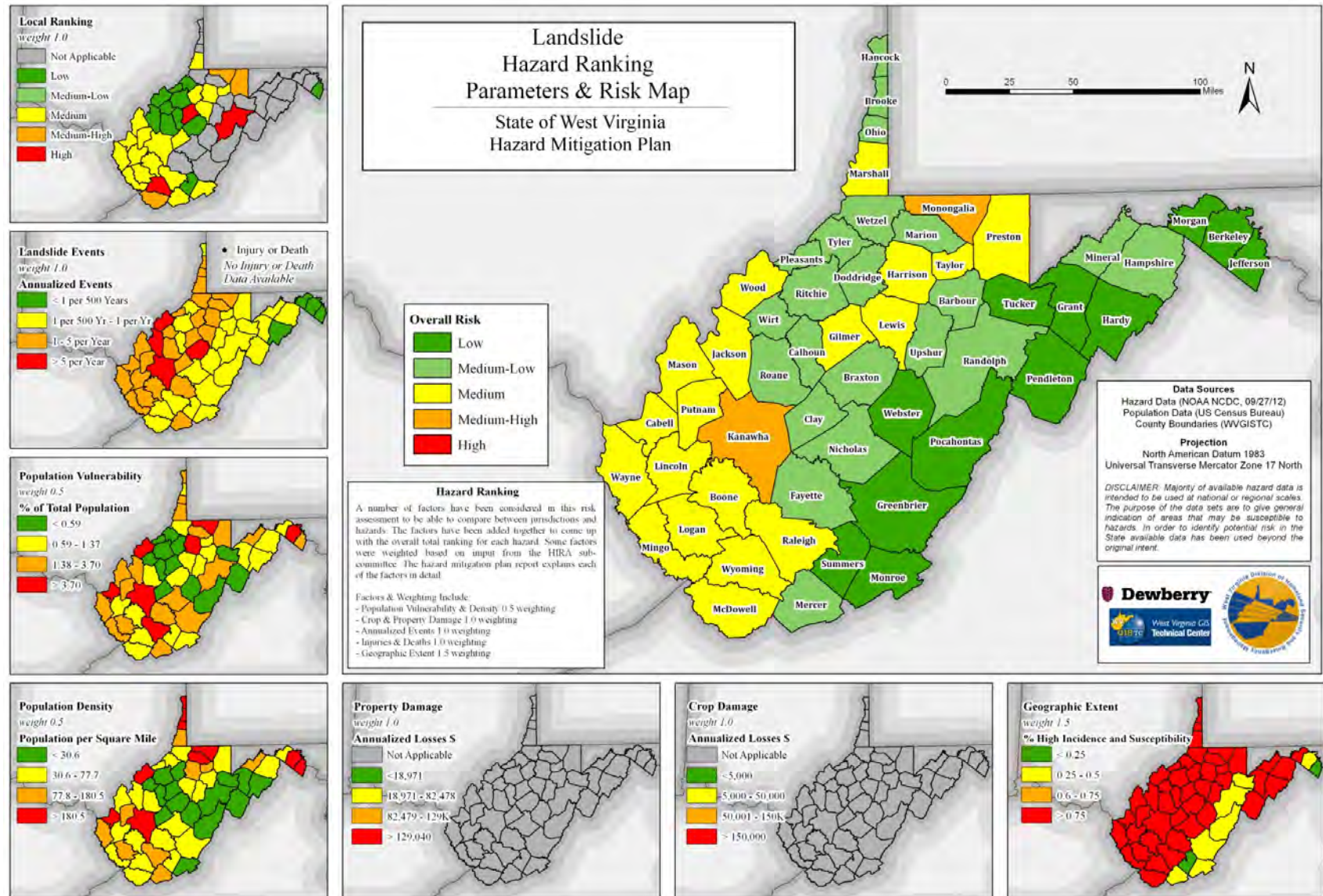


FIGURE 3-69. LANDSLIDE HAZARD RANKING PARAMETERS AND RISK MAP

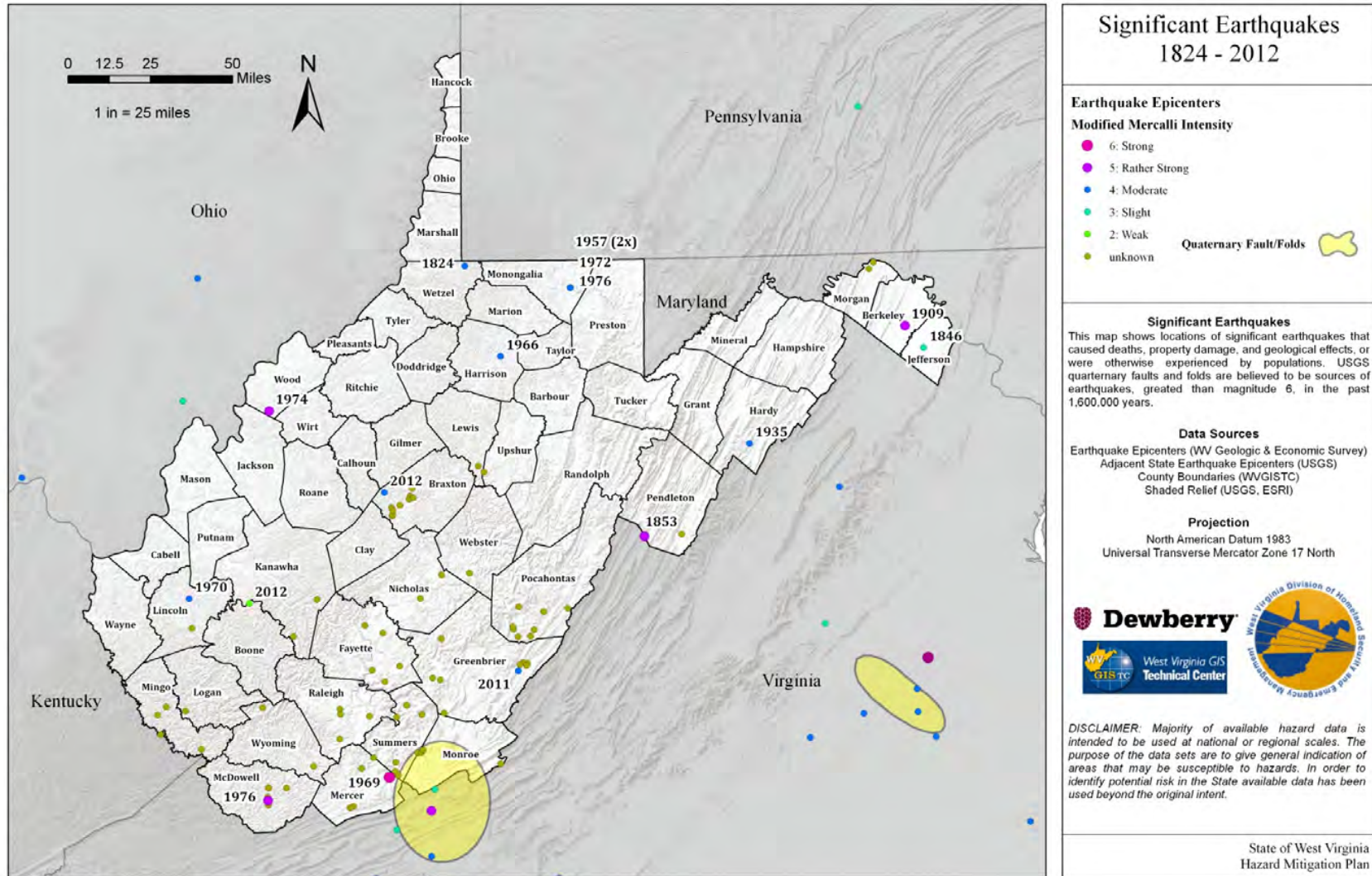


FIGURE 3-70. SIGNIFICANT EARTHQUAKES (1568 – 2012)

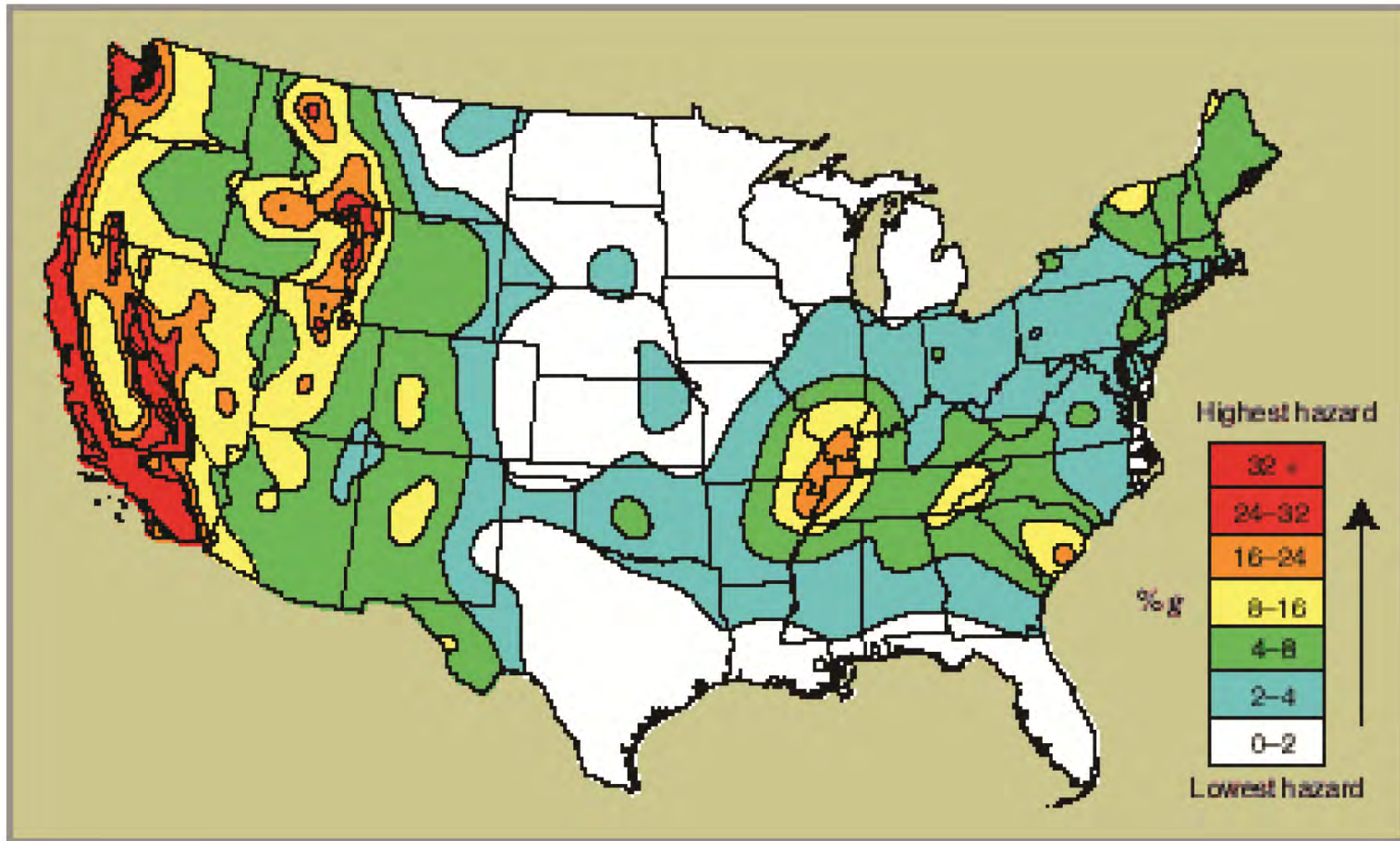


FIGURE 3-71. RELATIVE SEISMIC HAZARD MAP

SOURCE: USGS, 2002



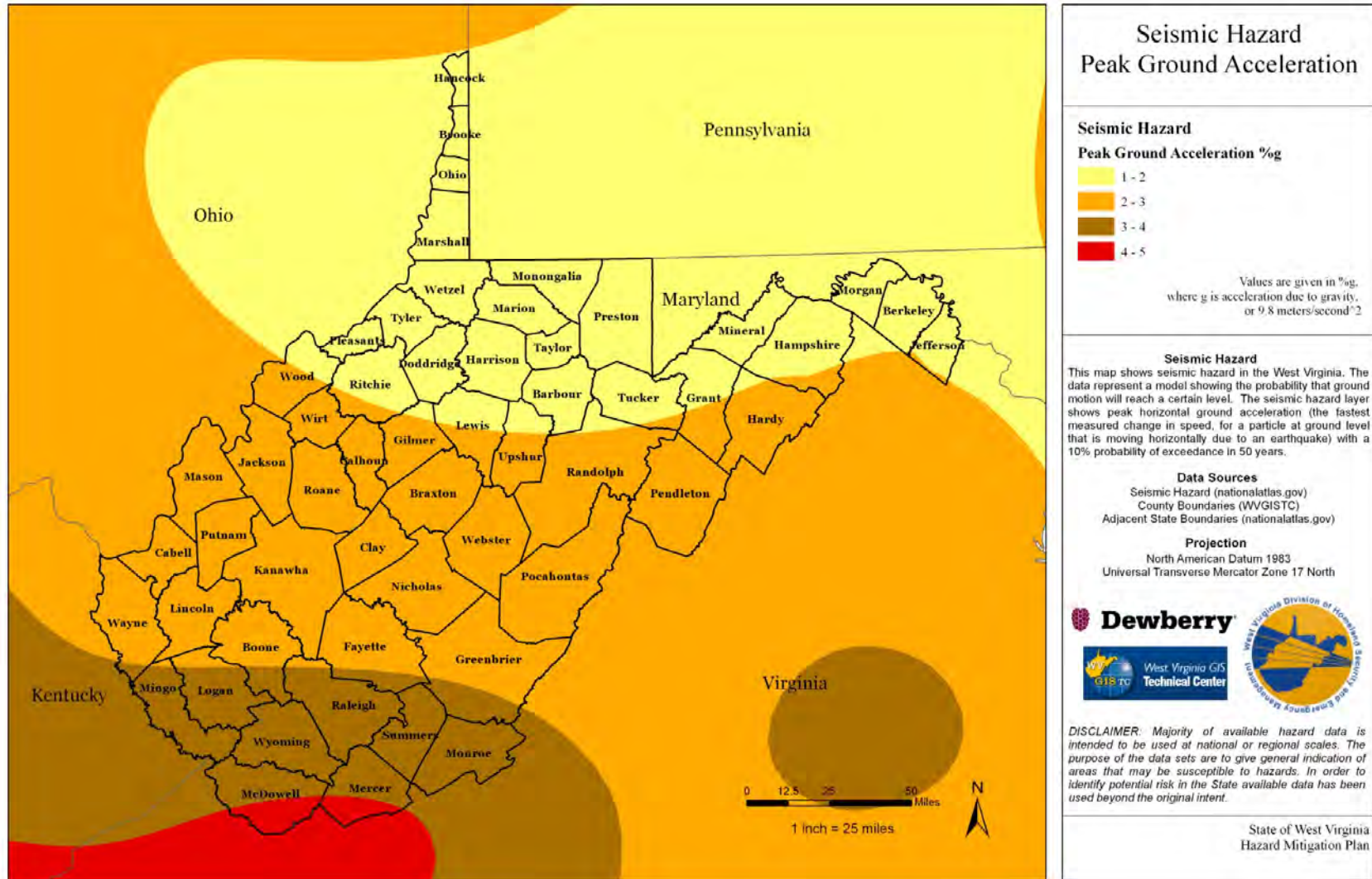


FIGURE 3-72. SEISMIC HAZARD, PEAK GROUND ACCELERATION

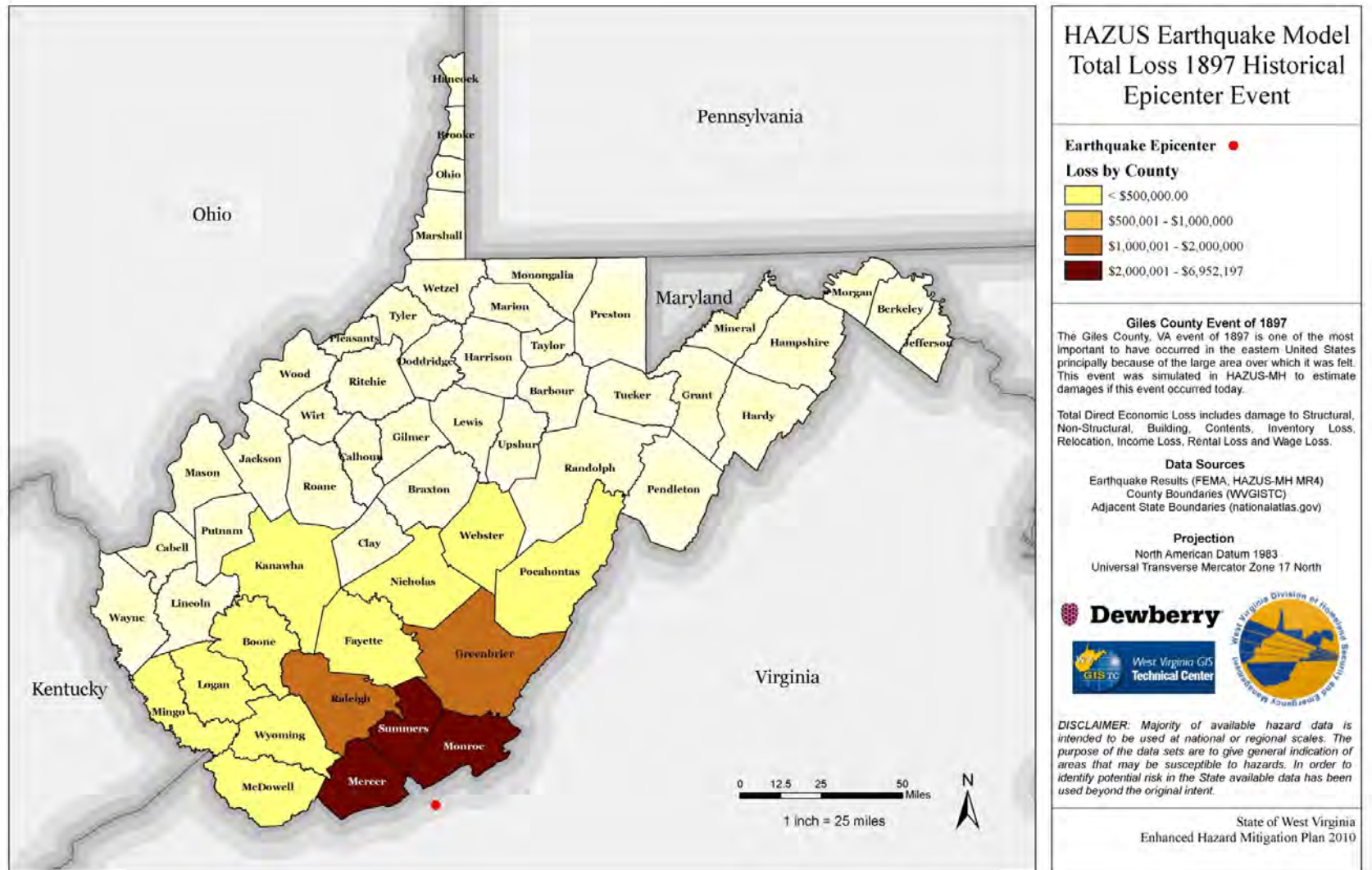


FIGURE 3-73. TOTAL LOSS FROM 1897 HISTORICAL EPICENTER EVENT (HAZUS)

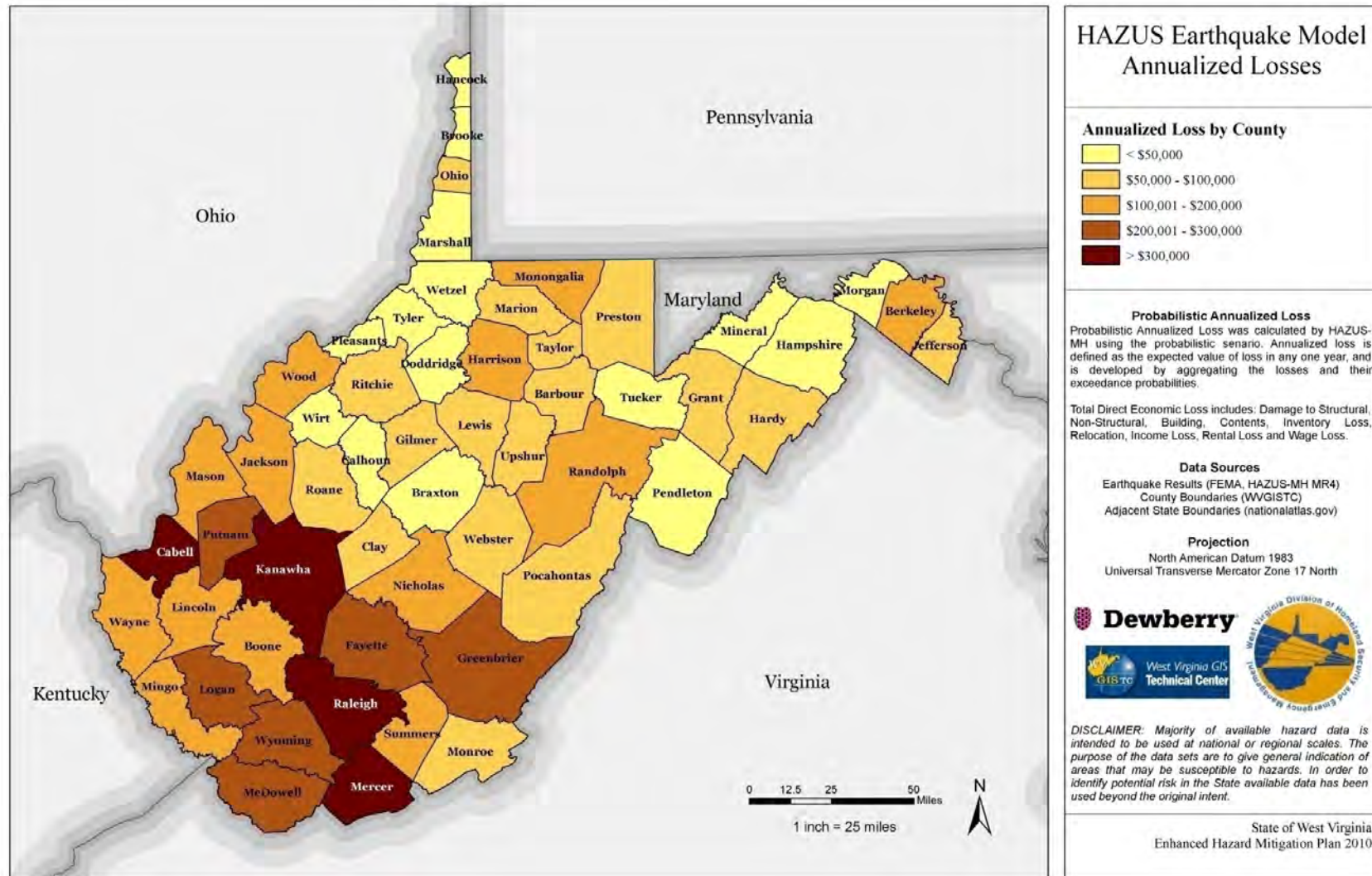


FIGURE 3-74. EARTHQUAKE PROBABILISTIC ANNUALIZED LOSS

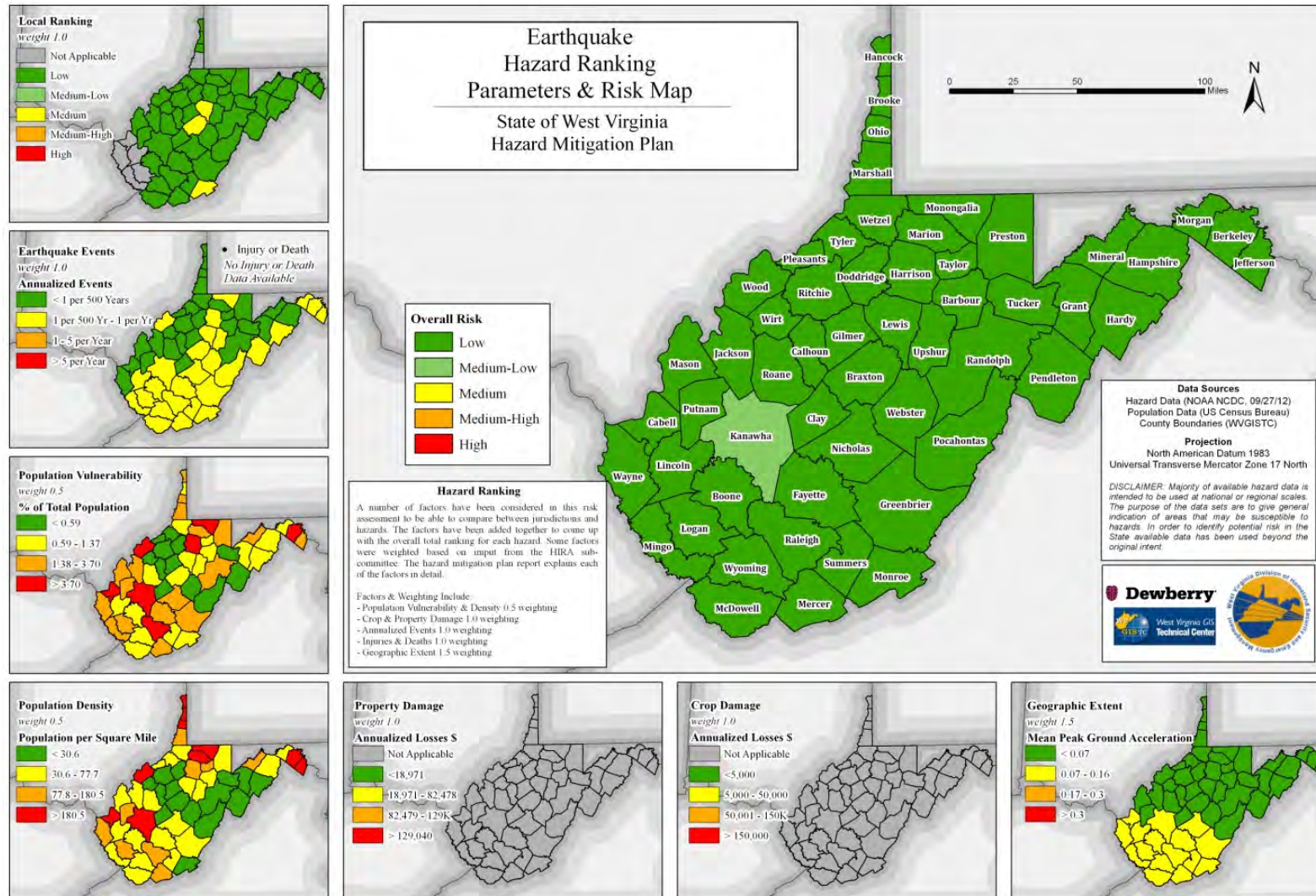


FIGURE 3-75. EARTHQUAKE HAZARD RANKING PARAMETERS AND RISK MAP

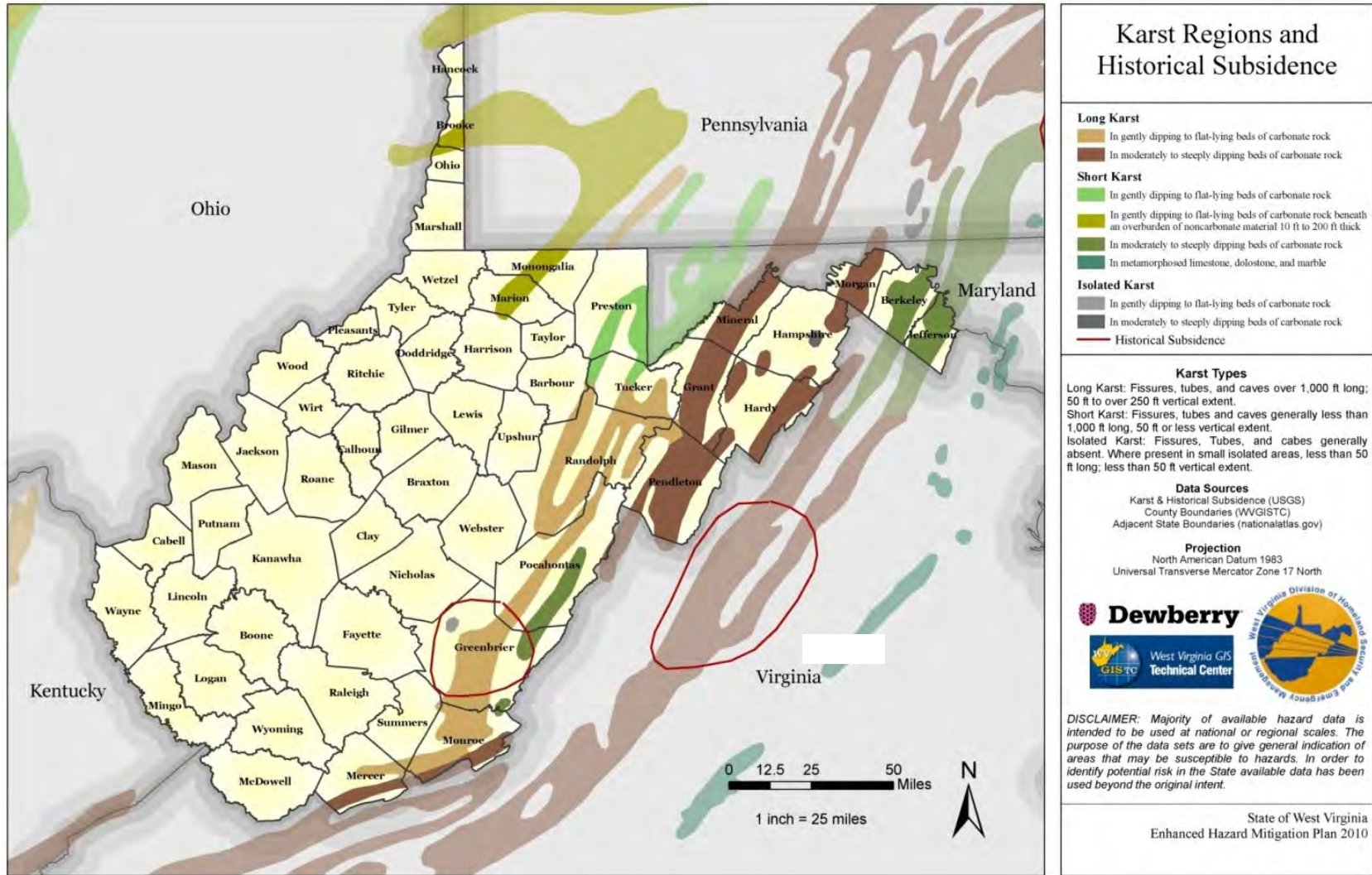


FIGURE 3-77. WEST VIRGINIA KARST REGIONS AND HISTORICAL SUBSIDENCE

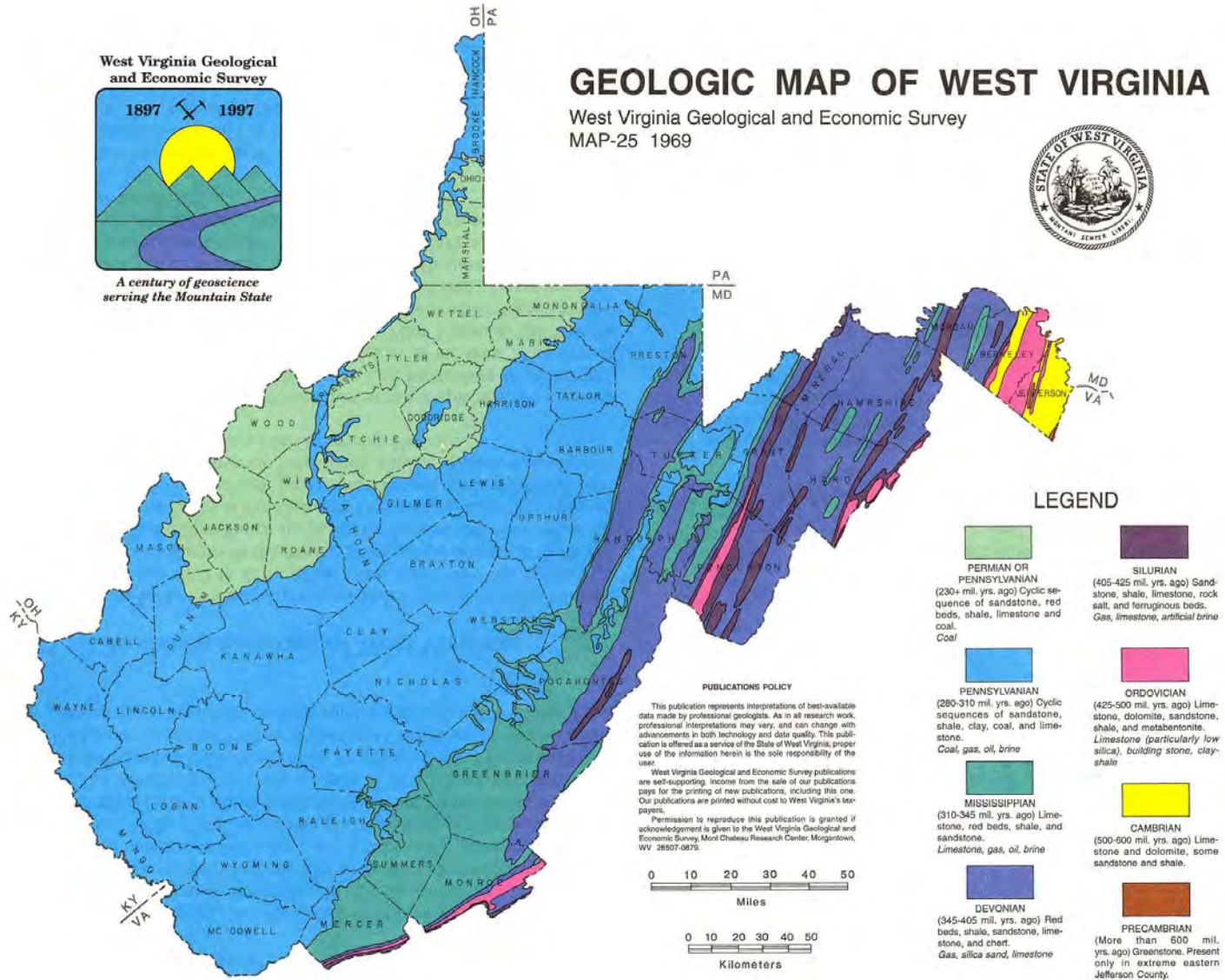


FIGURE 3-78. GEOLOGICAL MAP OF WEST VIRGINIA (WVGES, 1969)

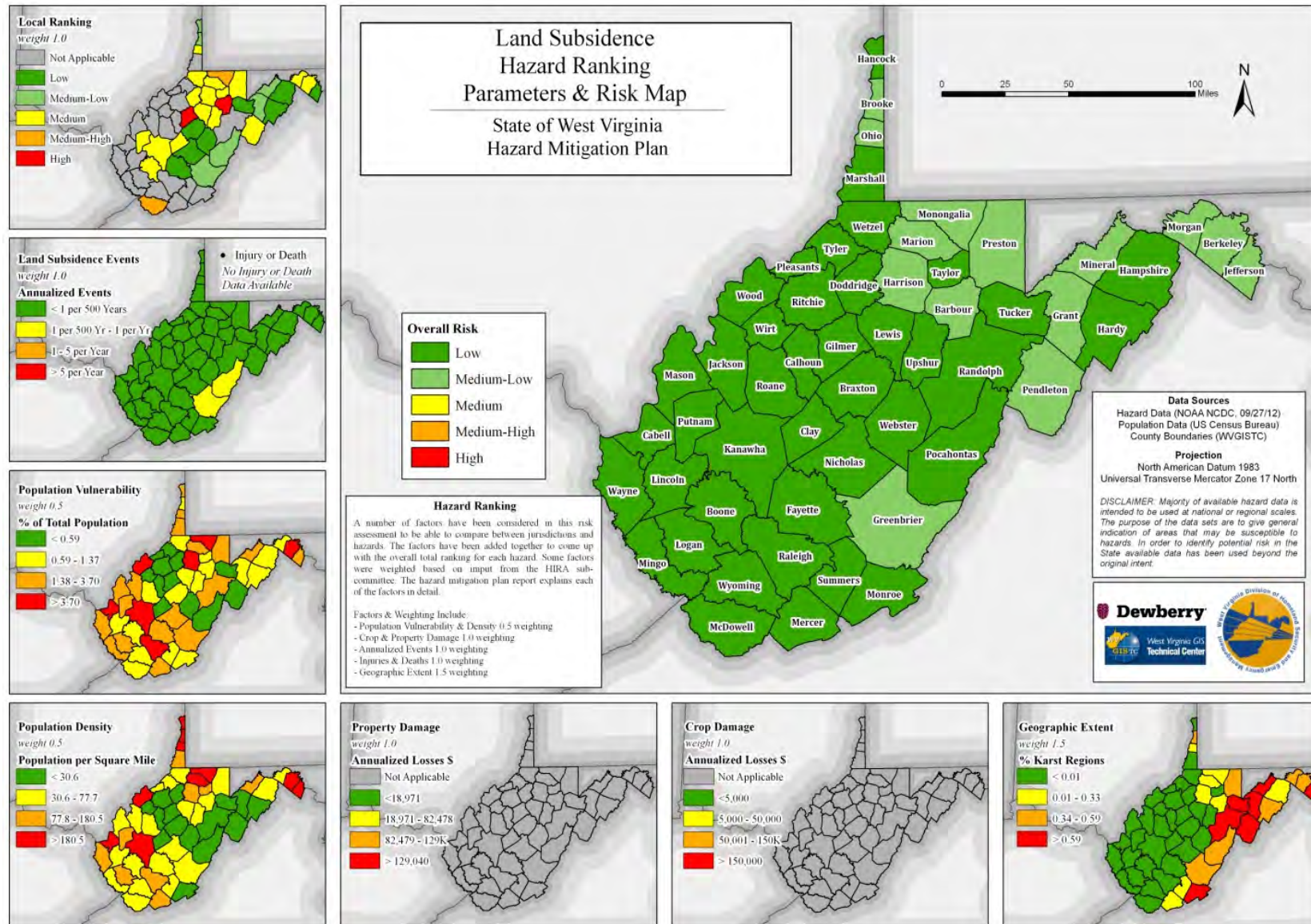


FIGURE 3-79. LAND SUBSIDENCE HAZARD RANKING PARAMETERS AND RISK MAP

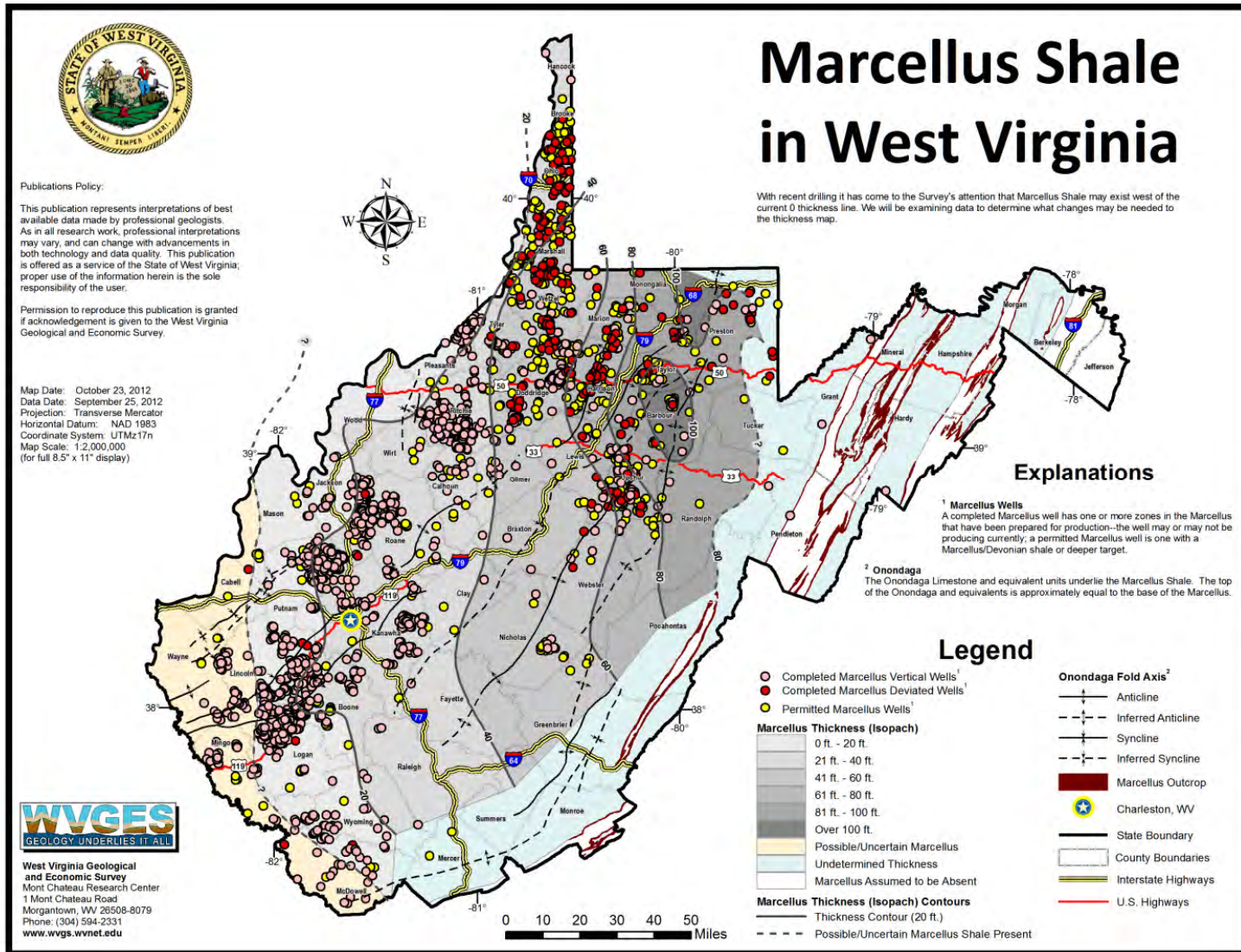


FIGURE 3-80. MARCELLUS SHALE IN WEST VIRGINIA (SOURCE: WEST VIRGINIA GEOLOGICAL AND ECONOMIC SURVEY)



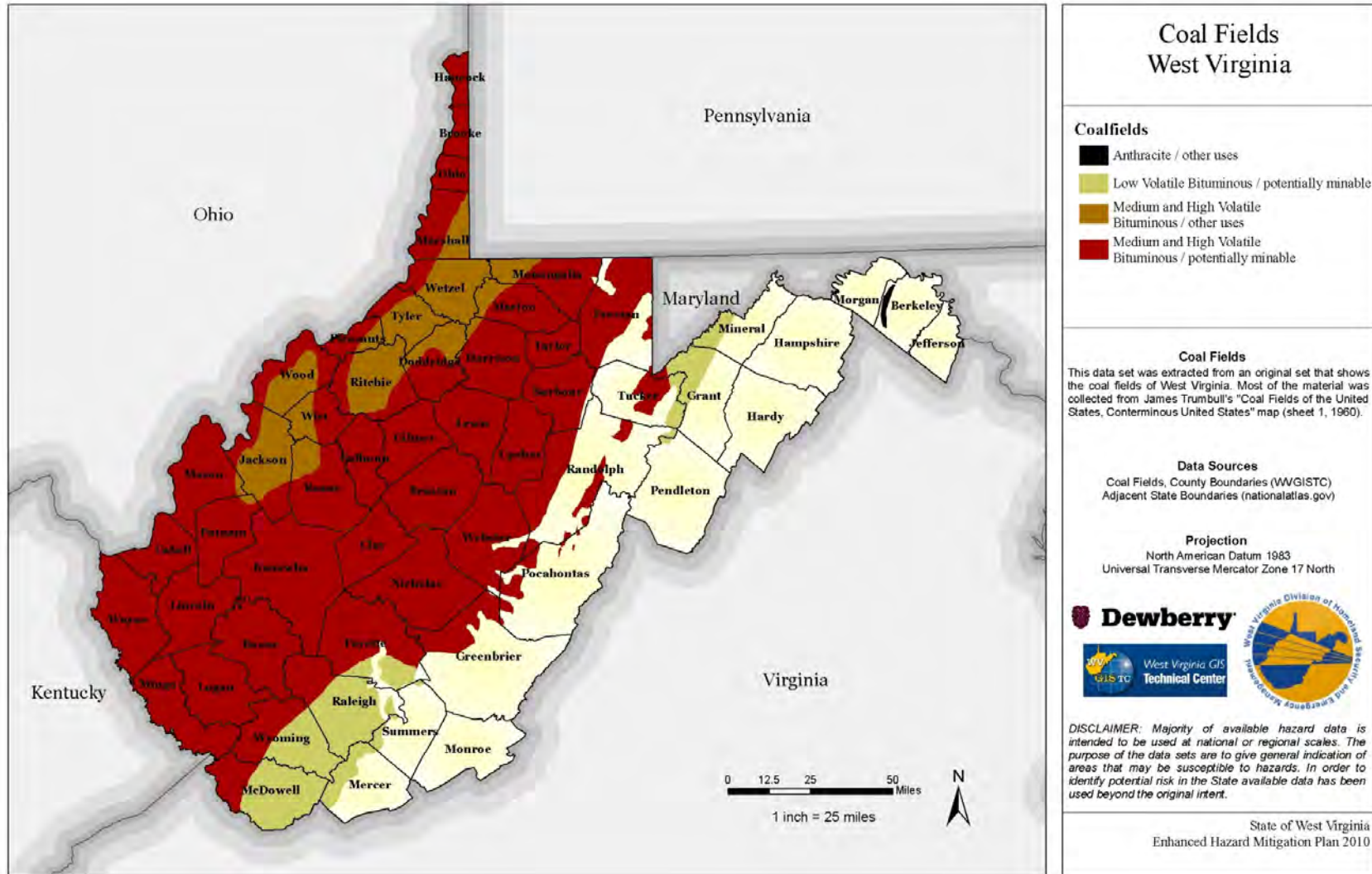


FIGURE 3-81. COAL FIELDS

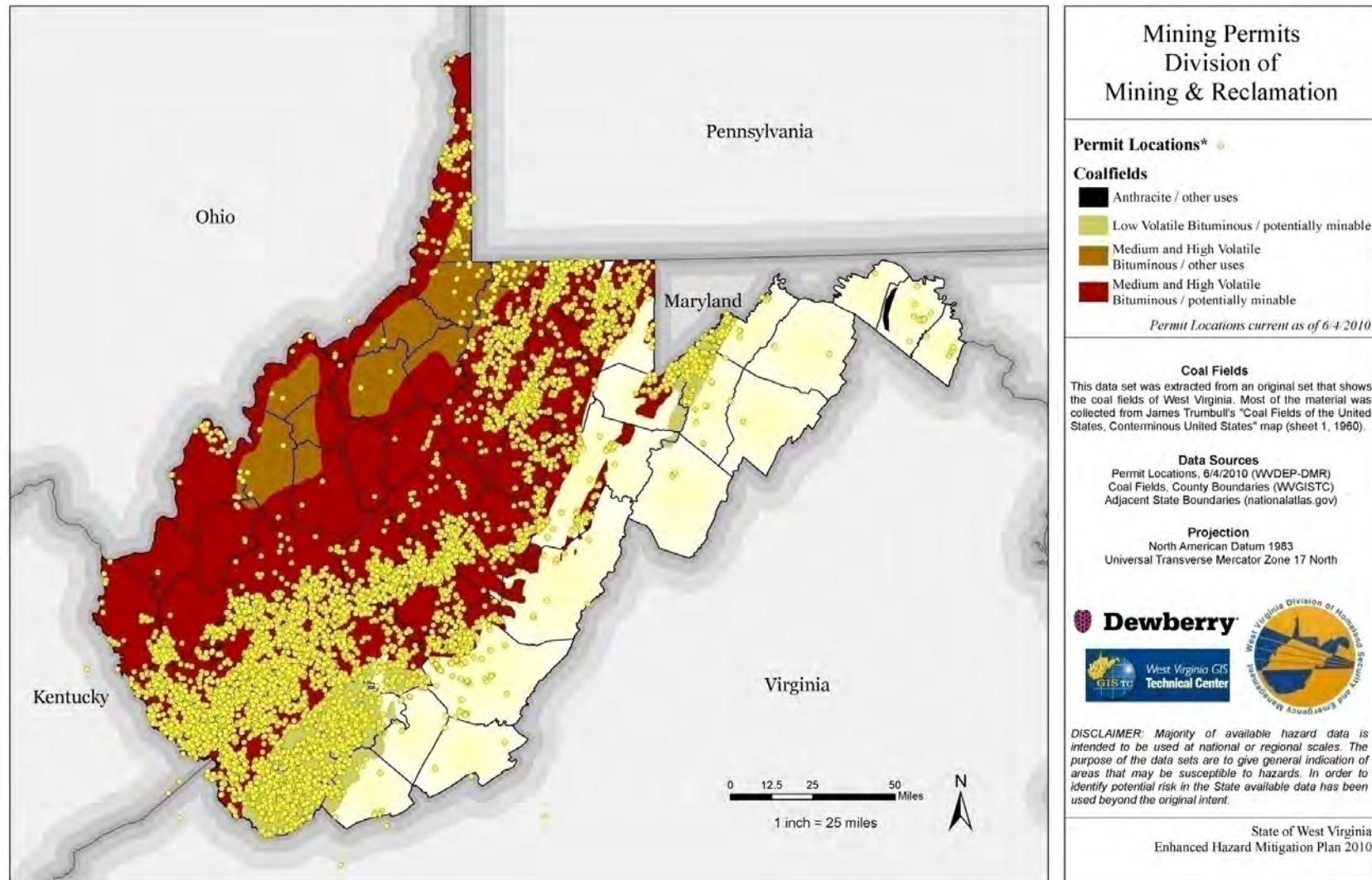


FIGURE 3-82. COALFIELDS AND MINING PERMIT LOCATIONS IN WEST VIRGINIA

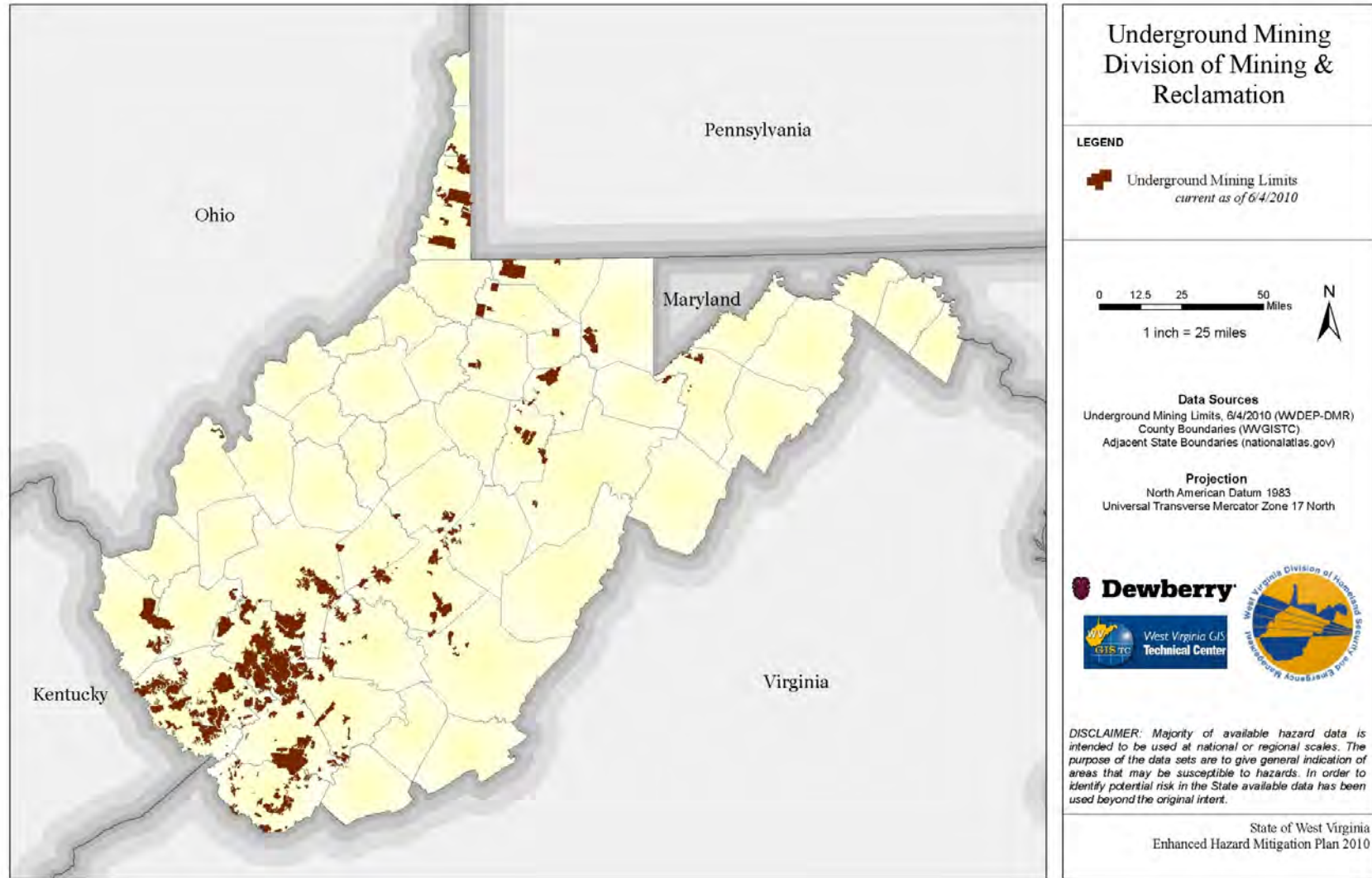


FIGURE 3-83. UNDERGROUND MINING LIMITS PERMITTED BY DIVISION OF MINING AND RECLAMATION

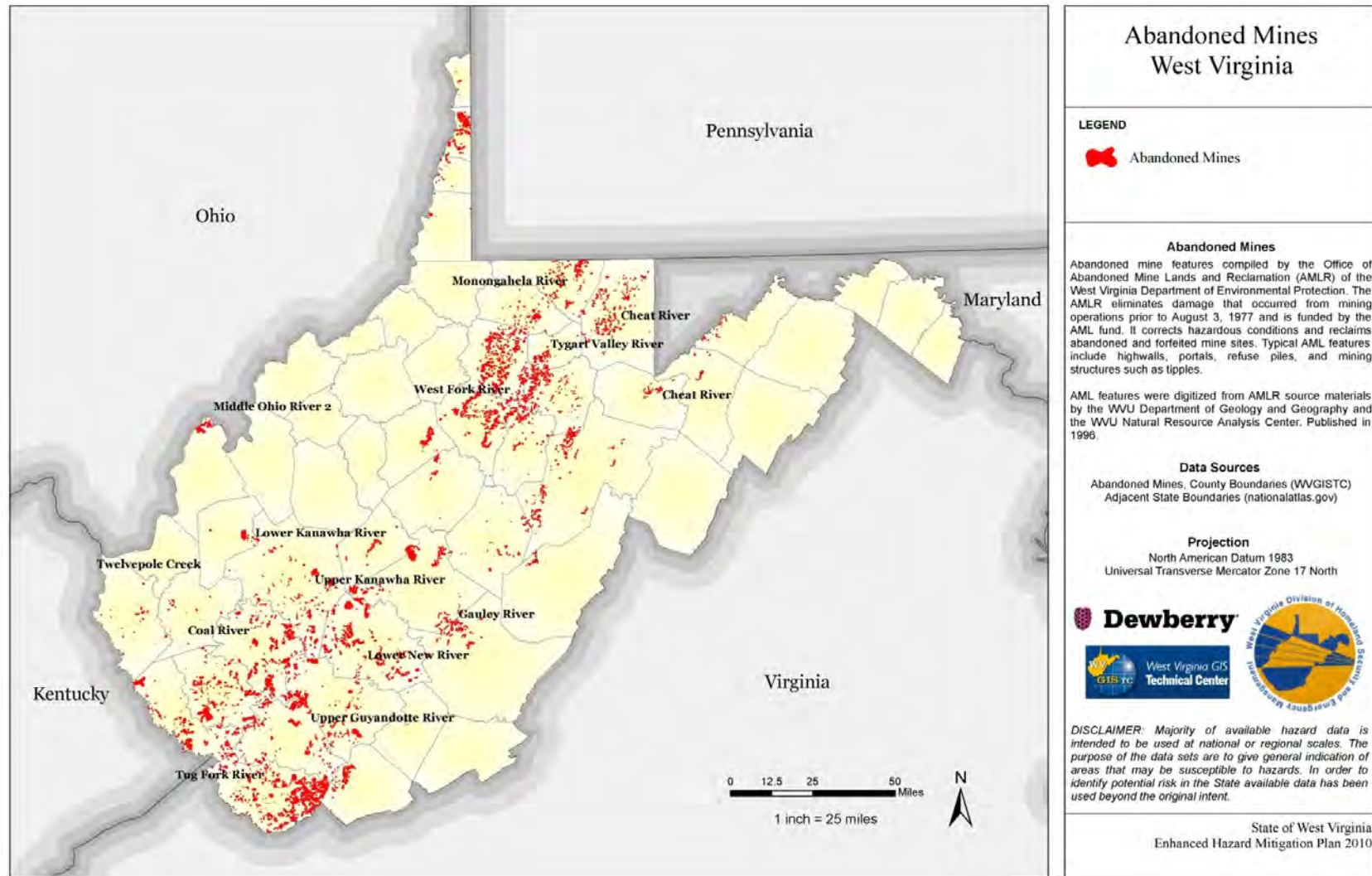


FIGURE 3-84. LOCATIONS OF ABANDONED MINES WEST VIRGINIA

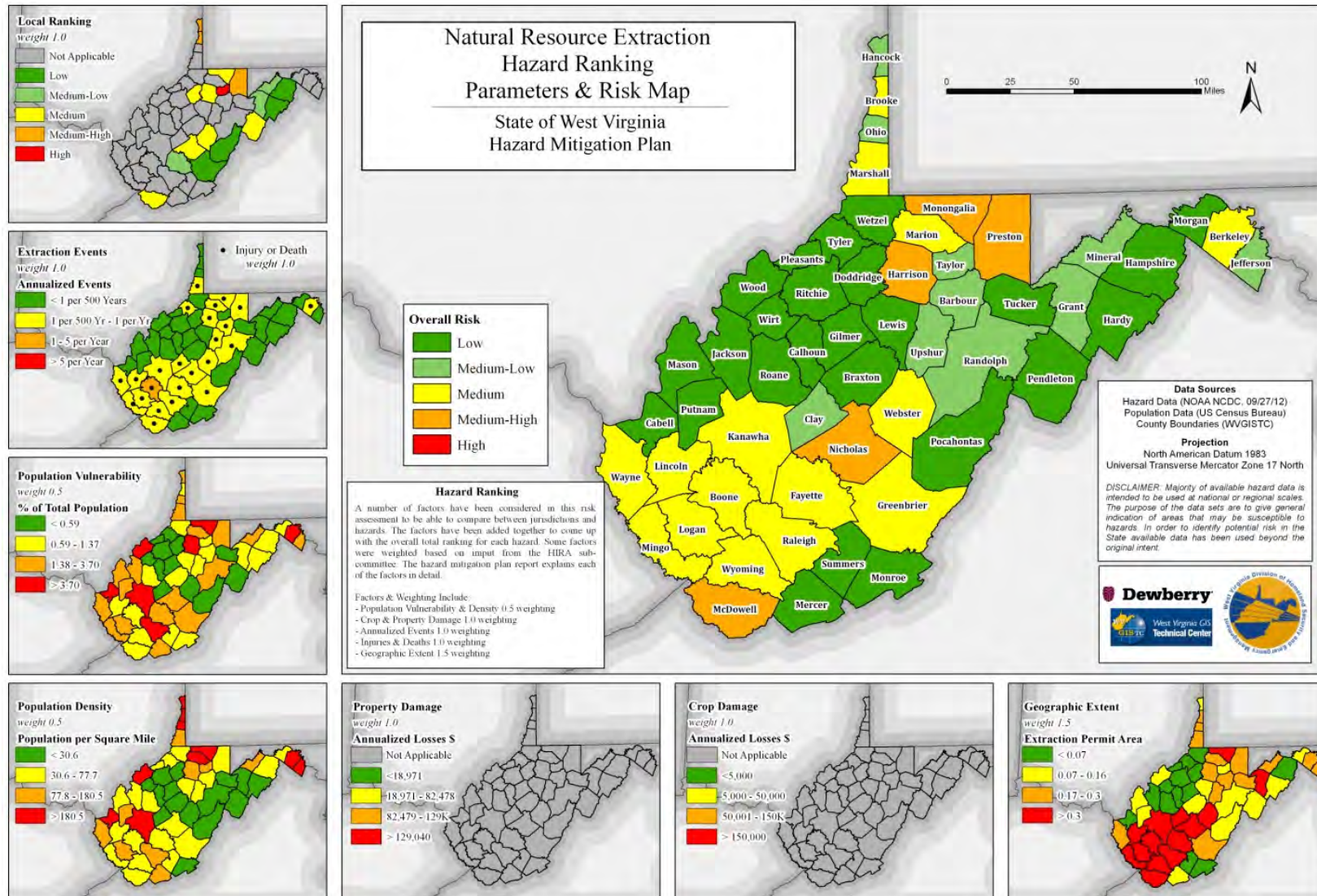


FIGURE 3-85. NATURAL RESOURCE EXTRACTION HAZARD RANKING PARAMETERS AND OVERALL RISK.

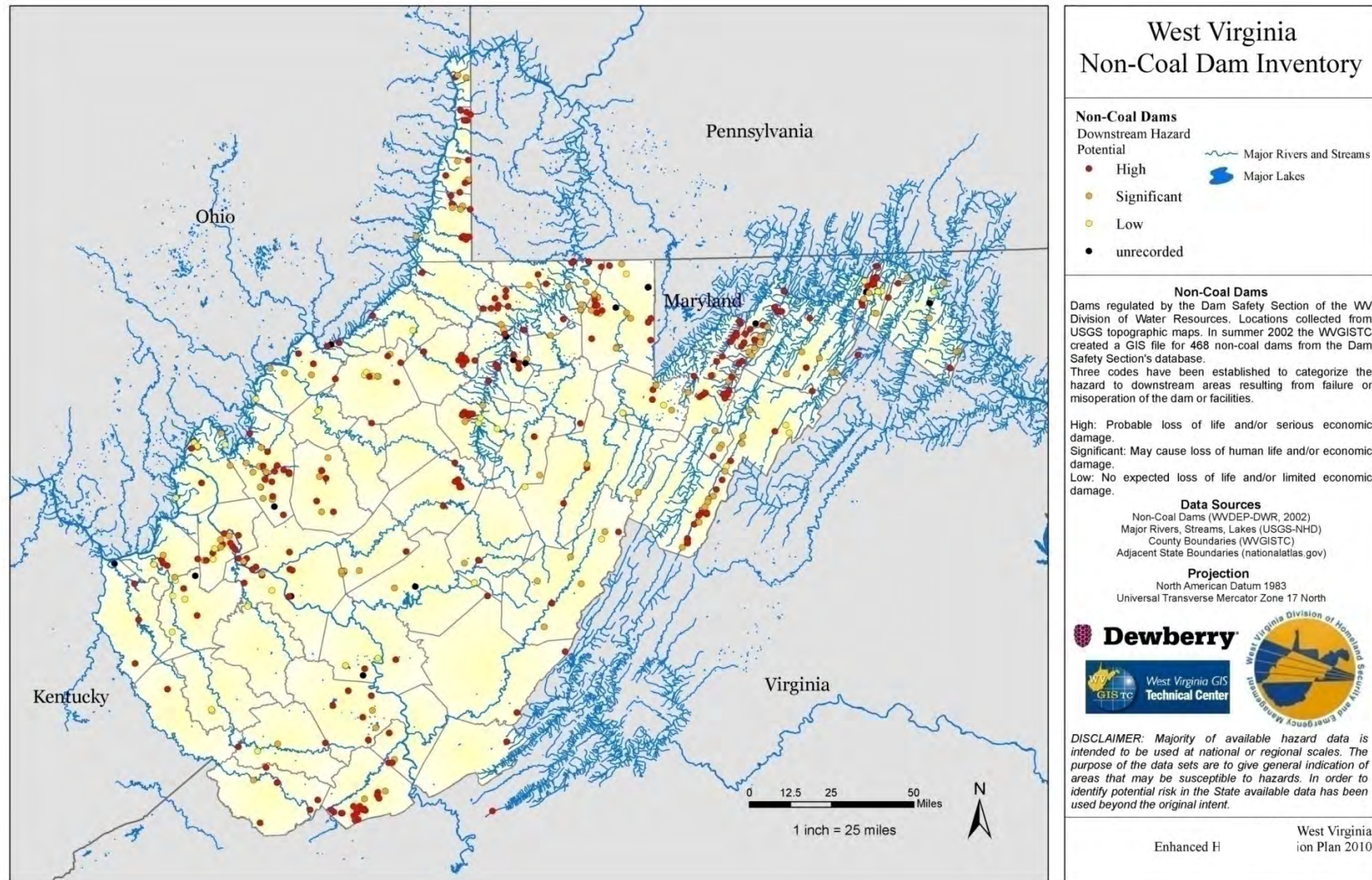


FIGURE 3-86. NON-COAL DAM INVENTORY DEVELOPED BY WVDEP DIVISION OF WATER RESOURCES

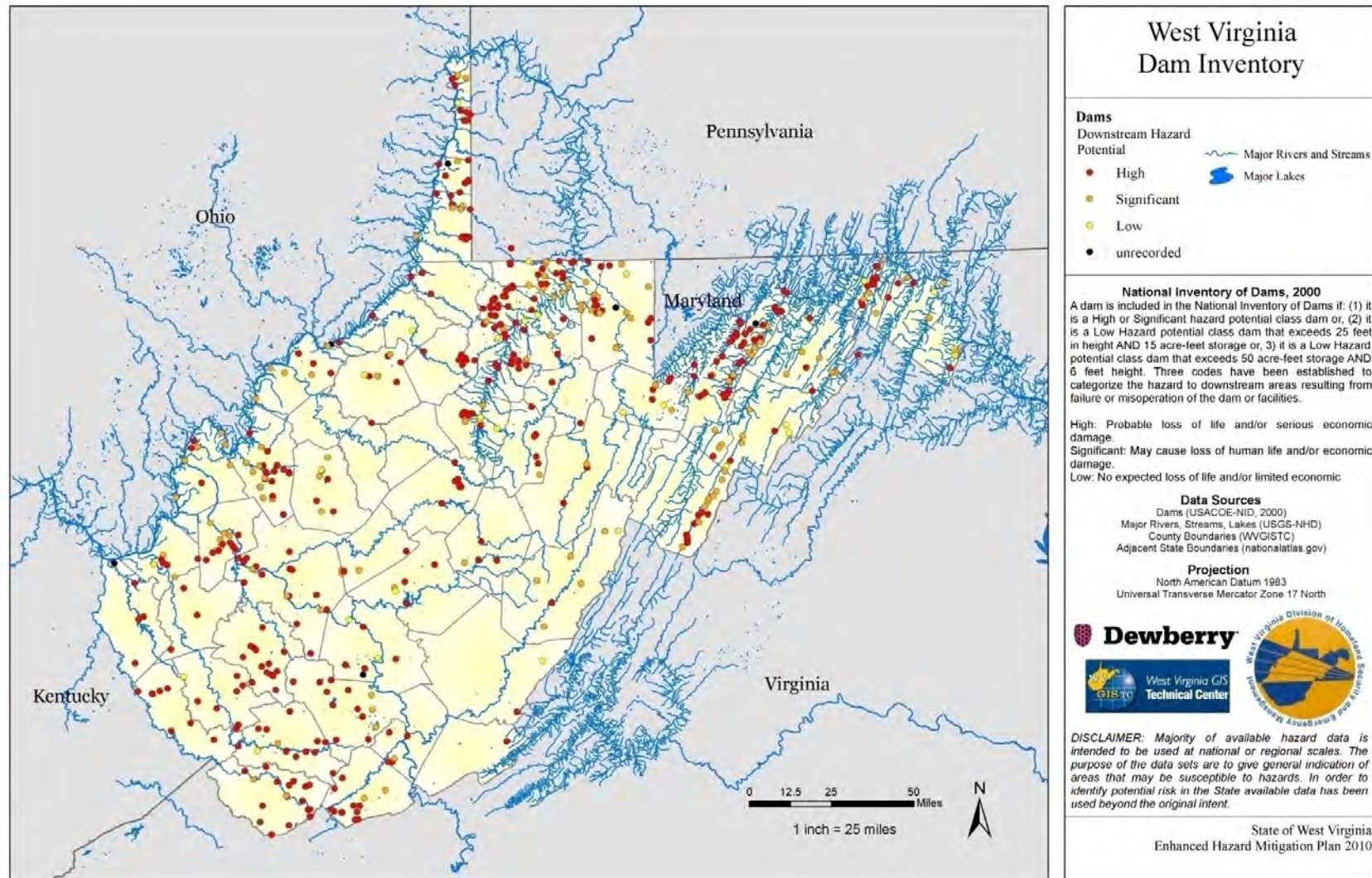


FIGURE 3-87. DAMS INCLUDED IN THE NATIONAL INVENTORY OF DAMS, 2000

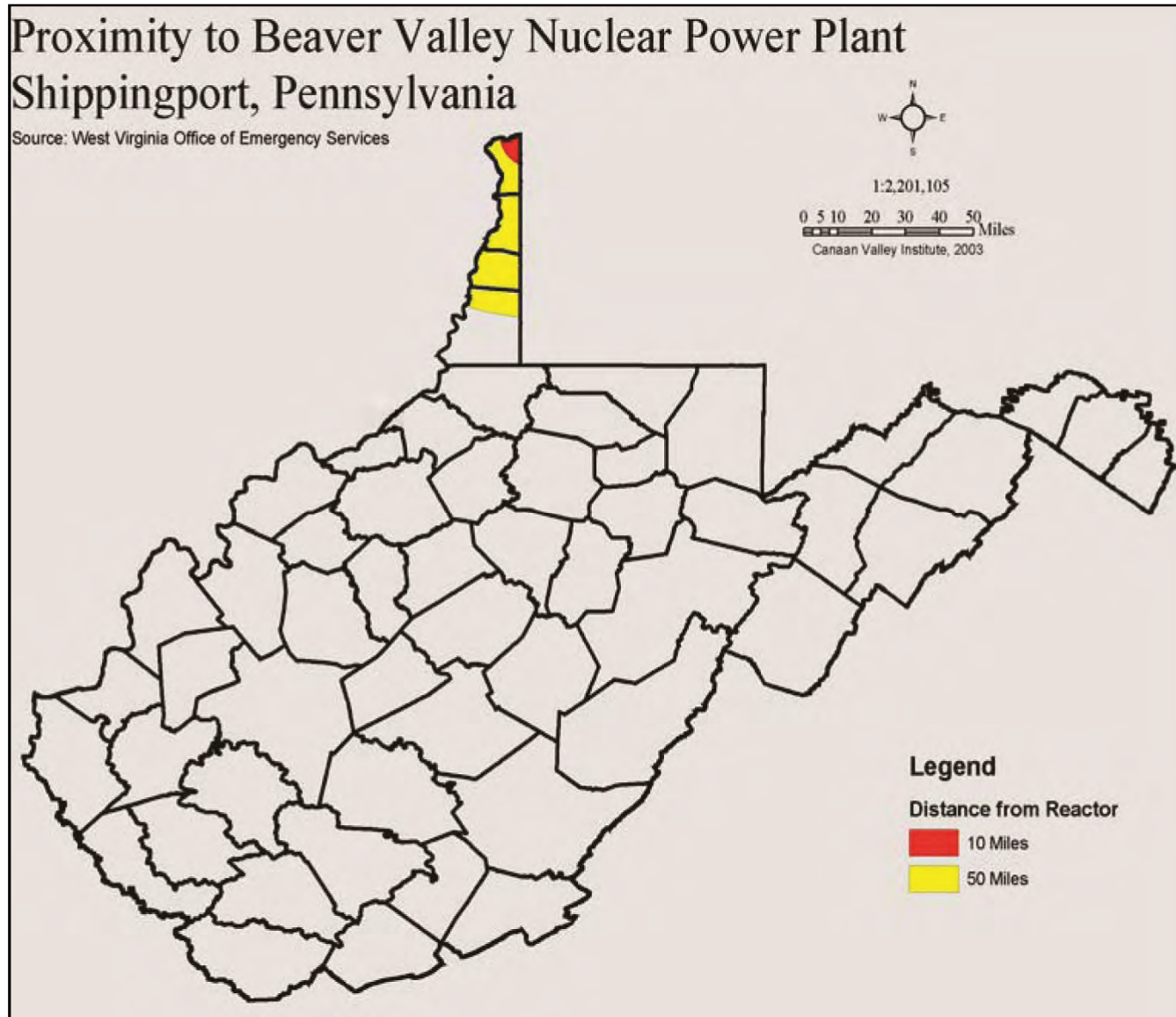
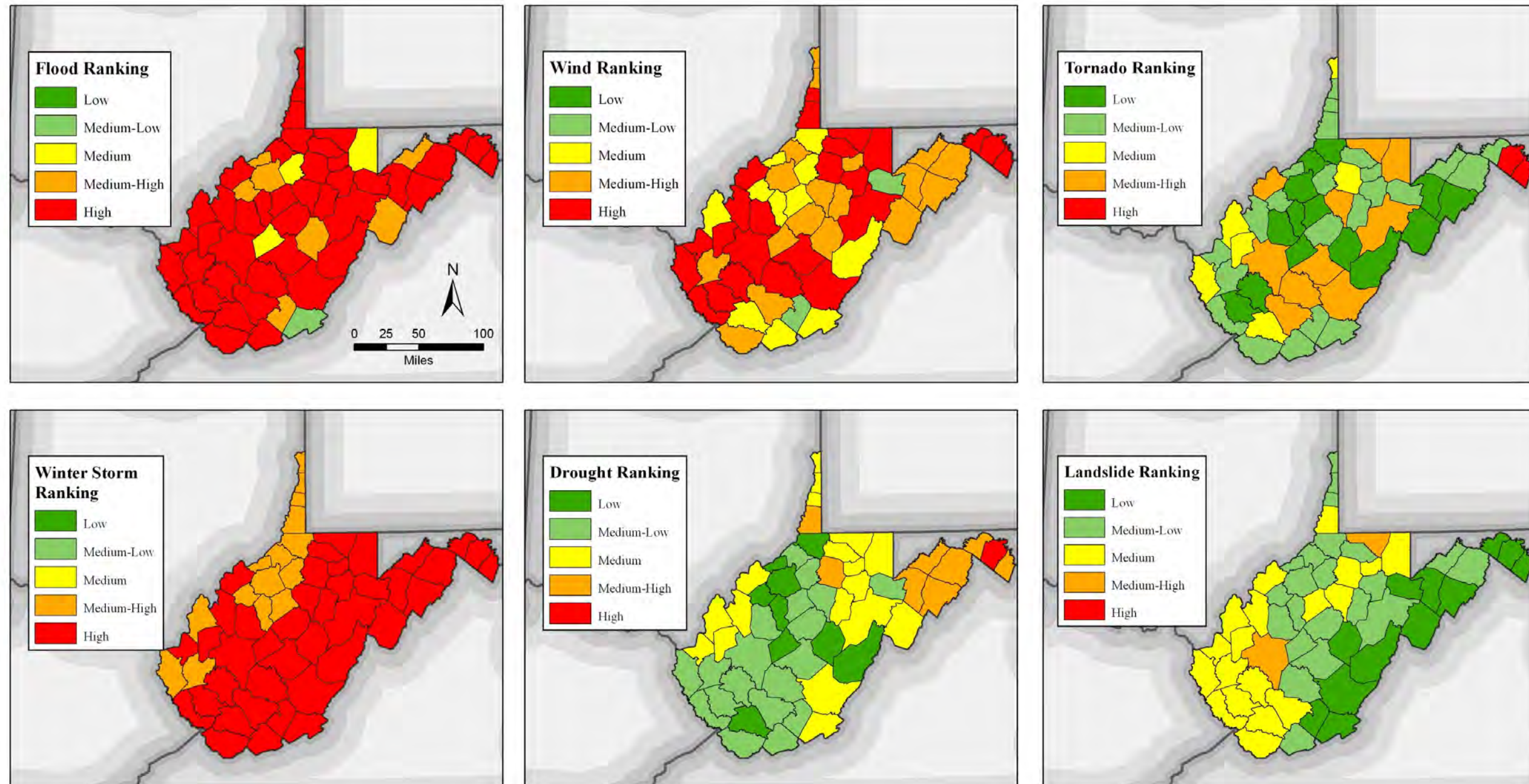


FIGURE 3-88. MAP OF PROXIMITY TO BEAVER VALLEY NUCLEAR POWER PLANT








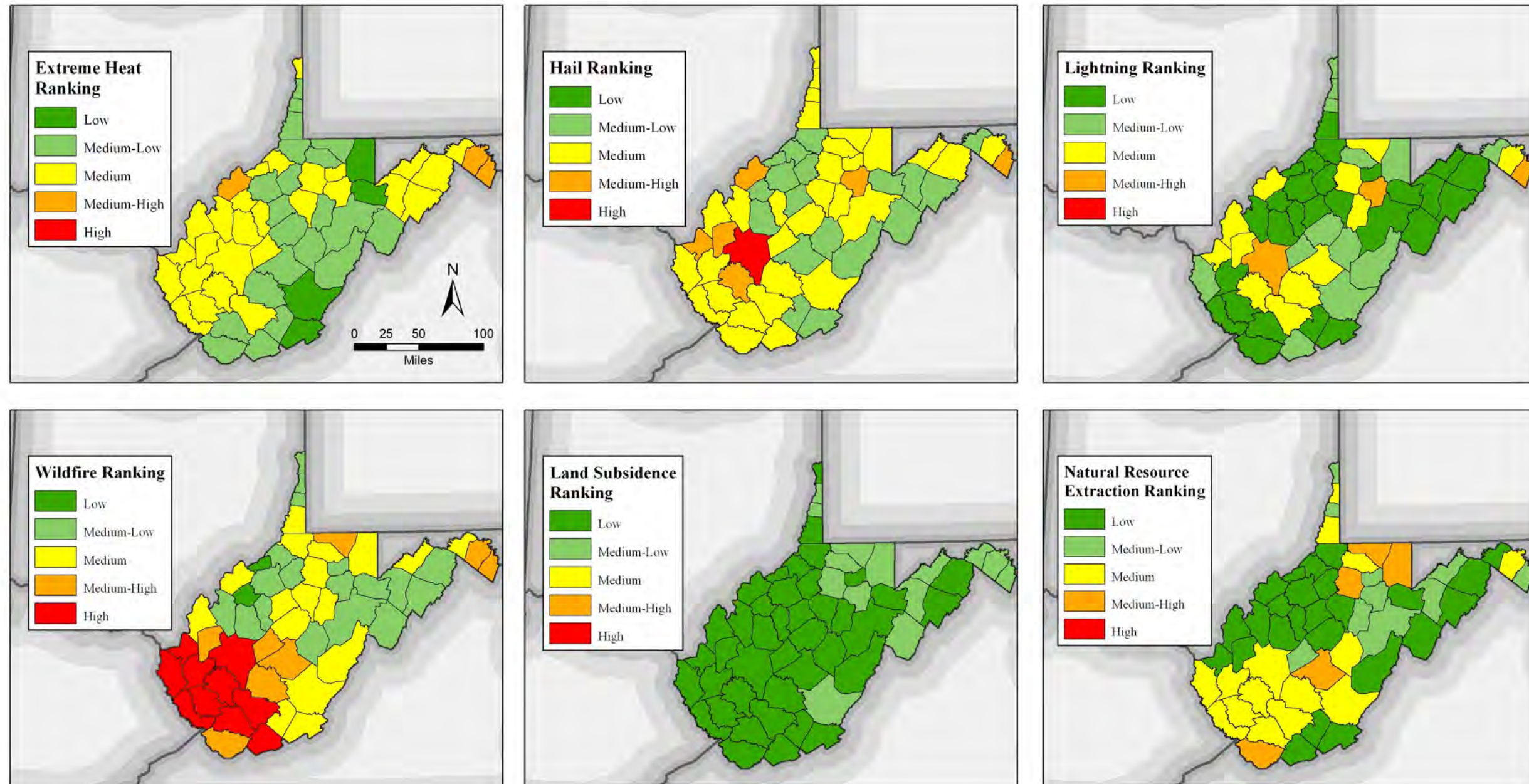
<p><b>Data Sources</b> West Virginia Approved Local Hazard Mitigation Plans County Boundaries (WCGISTC) State Boundaries (nationalatlas.gov)</p> <p><b>Projection</b> North American Datum 1983 Universal Transverse Mercator Zone 17 North</p>	<p><b>Hazard Identification &amp; Risk Assessment</b> These maps show hazard mitigation plan rankings by West Virginia county governments. Counties used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Additional information on local rankings and plans can be found in the methodology.</p>	<p><b>Hazard Ranking Risk Maps State of West Virginia</b></p>	  	<p><i>DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.</i></p> <p style="text-align: right;">State of West Virginia Hazard Mitigation Plan</p>
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FIGURE 3-89. HAZARD RANKING RISK MAPS 1






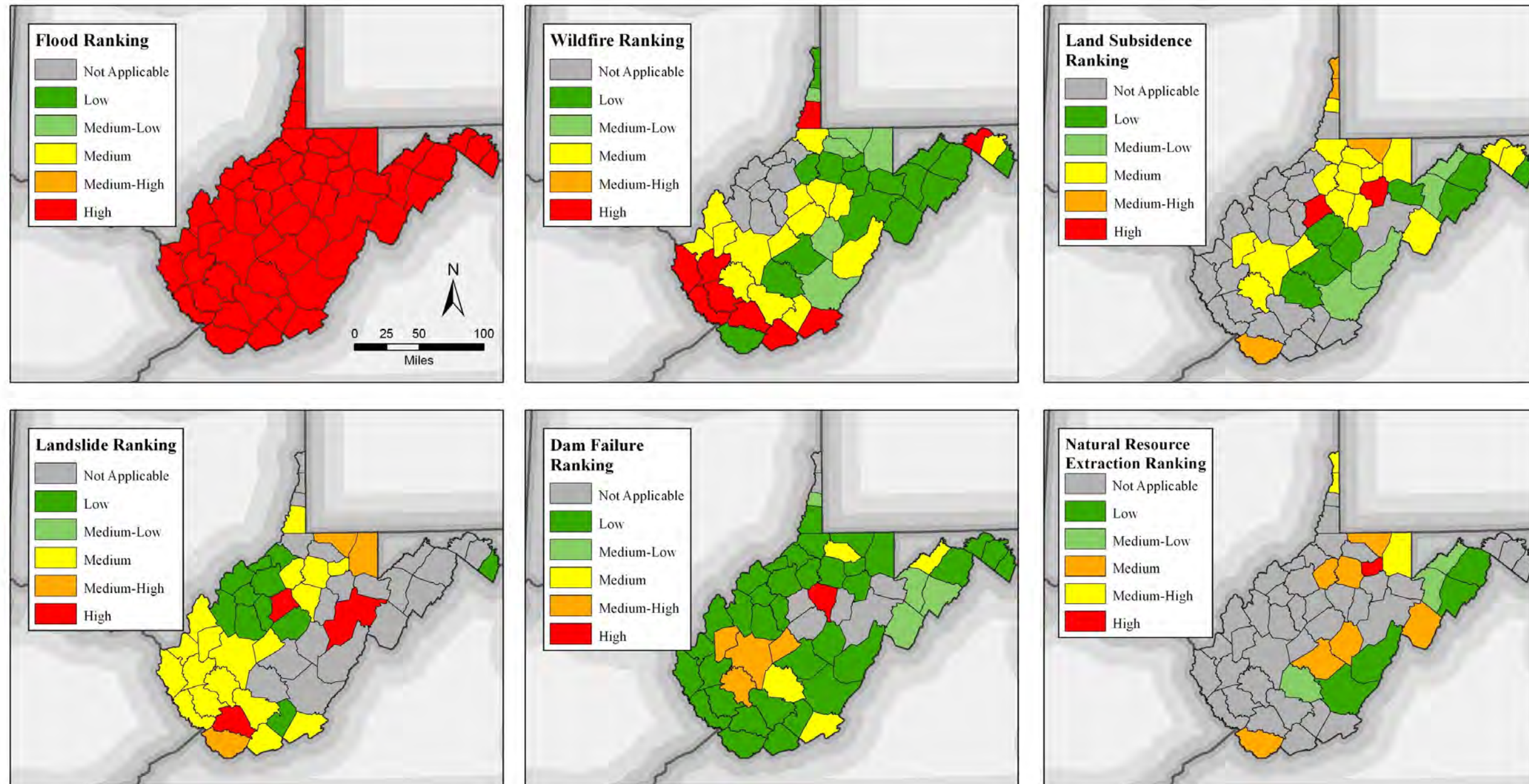
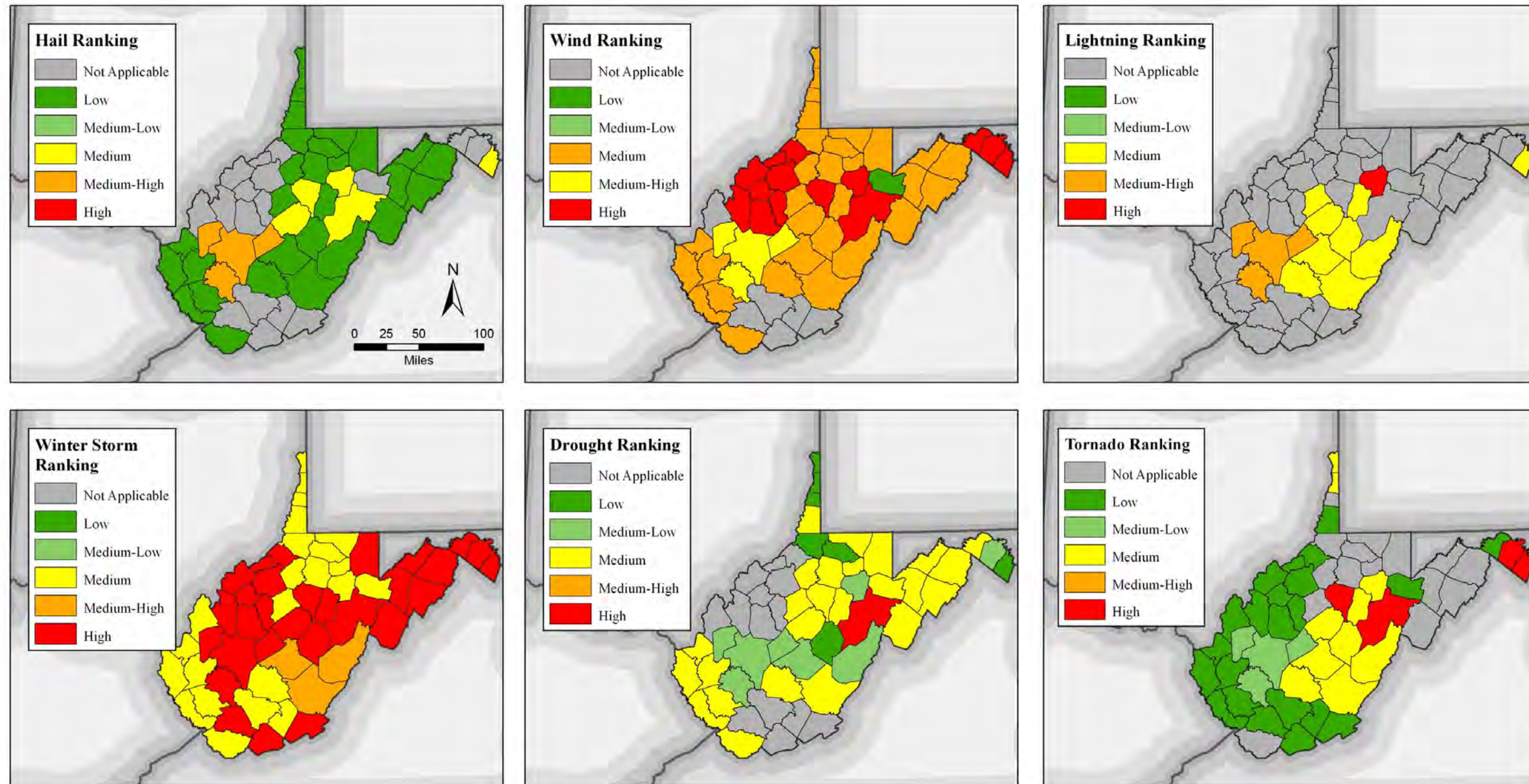
<p><b>Data Sources</b> West Virginia Approved Local Hazard Mitigation Plans County Boundaries (WCGISTC) State Boundaries (nationalatlas.gov)</p> <p><b>Projection</b> North American Datum 1983 Universal Transverse Mercator Zone 17 North</p>	<p><b>Hazard Identification &amp; Risk Assessment</b> These maps show hazard mitigation plan rankings by West Virginia county governments. Counties used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Additional information on local rankings and plans can be found in the methodology.</p>	<p><b>Hazard Ranking Risk Maps State of West Virginia</b></p>	  	<p><i>DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.</i></p> <p style="text-align: right;">State of West Virginia Hazard Mitigation Plan</p>
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FIGURE 3-90. HAZARD RANKING RISK MAPS 2



<p><b>Data Sources</b> West Virginia Approved Local Hazard Mitigation Plans County Boundaries (WCGISTC) State Boundaries (nationalatlas.gov)</p> <p><b>Projection</b> North American Datum 1983 Universal Transverse Mercator Zone 17 North</p>	<p><b>Hazard Identification &amp; Risk Assessment</b> These maps show hazard mitigation plan rankings by West Virginia county governments. Counties used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Additional information on local rankings and plans can be found in the methodology.</p>	<p>Local Plan Hazard Ranking Risk Maps State of West Virginia</p>		<p><i>DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.</i></p> <p style="text-align: right;">State of West Virginia Hazard Mitigation Plan</p>
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FIGURE 3-91. LOCAL PLAN HAZARD RANKING RISK MAPS 1



<p><b>Data Sources</b> West Virginia Approved Local Hazard Mitigation Plans County Boundaries (WCGISTC) State Boundaries (nationalatlas.gov)</p> <p><b>Projection</b> North American Datum 1983 Universal Transverse Mercator Zone 17 North</p>	<p><b>Hazard Identification &amp; Risk Assessment</b> These maps show hazard mitigation plan rankings by West Virginia county governments. Counties used a variety of approaches, ranging in complexity, to rank the hazards they identified as impacting their regions. Some plans used a blend of various techniques and discussions to arrive at their final ranking. Additional information on local rankings and plans can be found in the methodology.</p>	<p>Local Plan Hazard Ranking Risk Maps State of West Virginia</p>		<p><i>DISCLAIMER: Majority of available hazard data is intended to be used at national or regional scales. The purpose of the data sets are to give general indication of areas that may be susceptible to hazards. In order to identify potential risk in the State available data has been used beyond the original intent.</i></p> <p>State of West Virginia Hazard Mitigation Plan</p>
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FIGURE 3-92. LOCAL PLAN HAZARD RANKING RISK MAPS 2



## West Virginia Plan Updates As of May 24, 2010

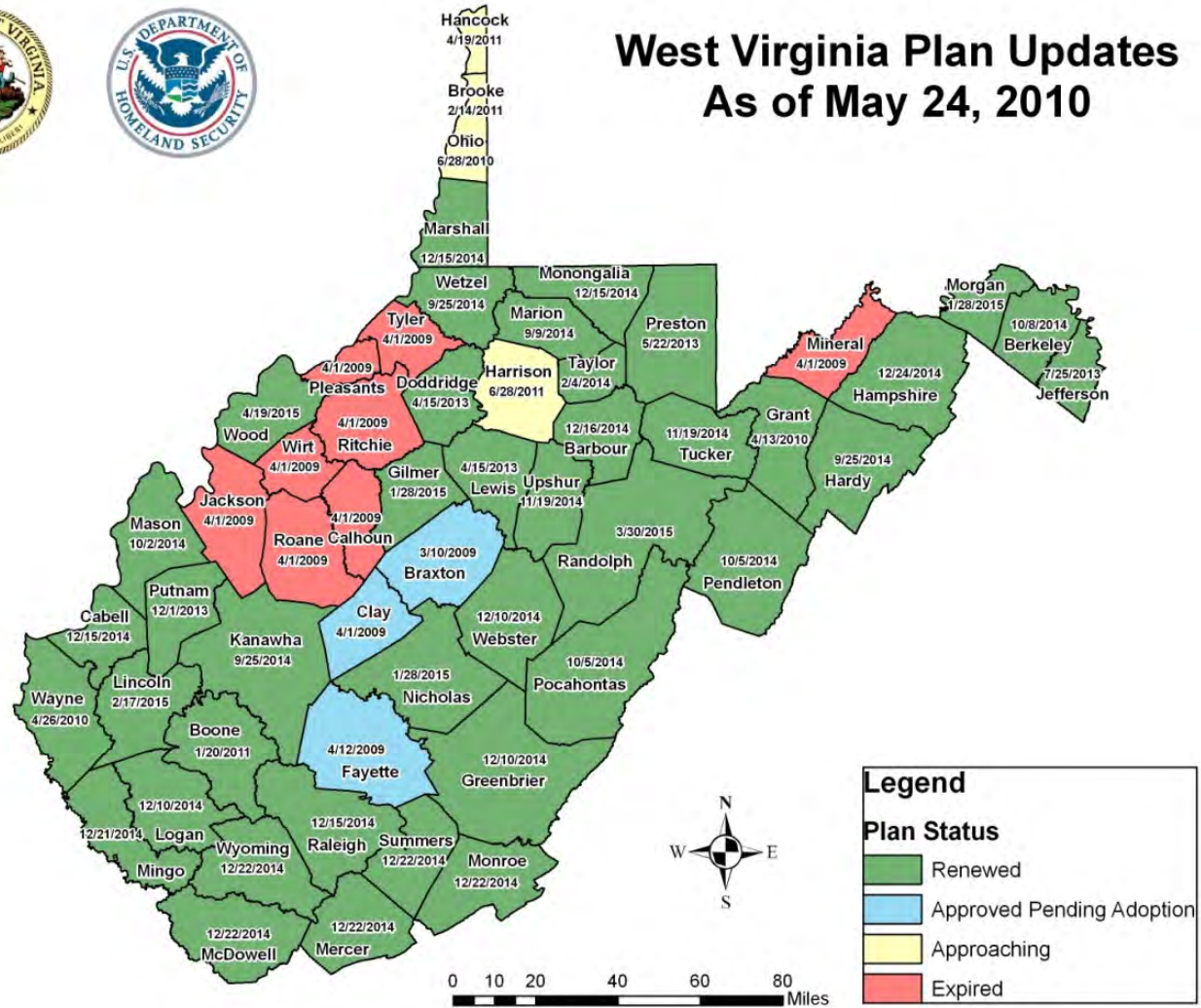


FIGURE 5-1. LOCAL MITIGATION PLAN STATUS, MAY 24, 2010

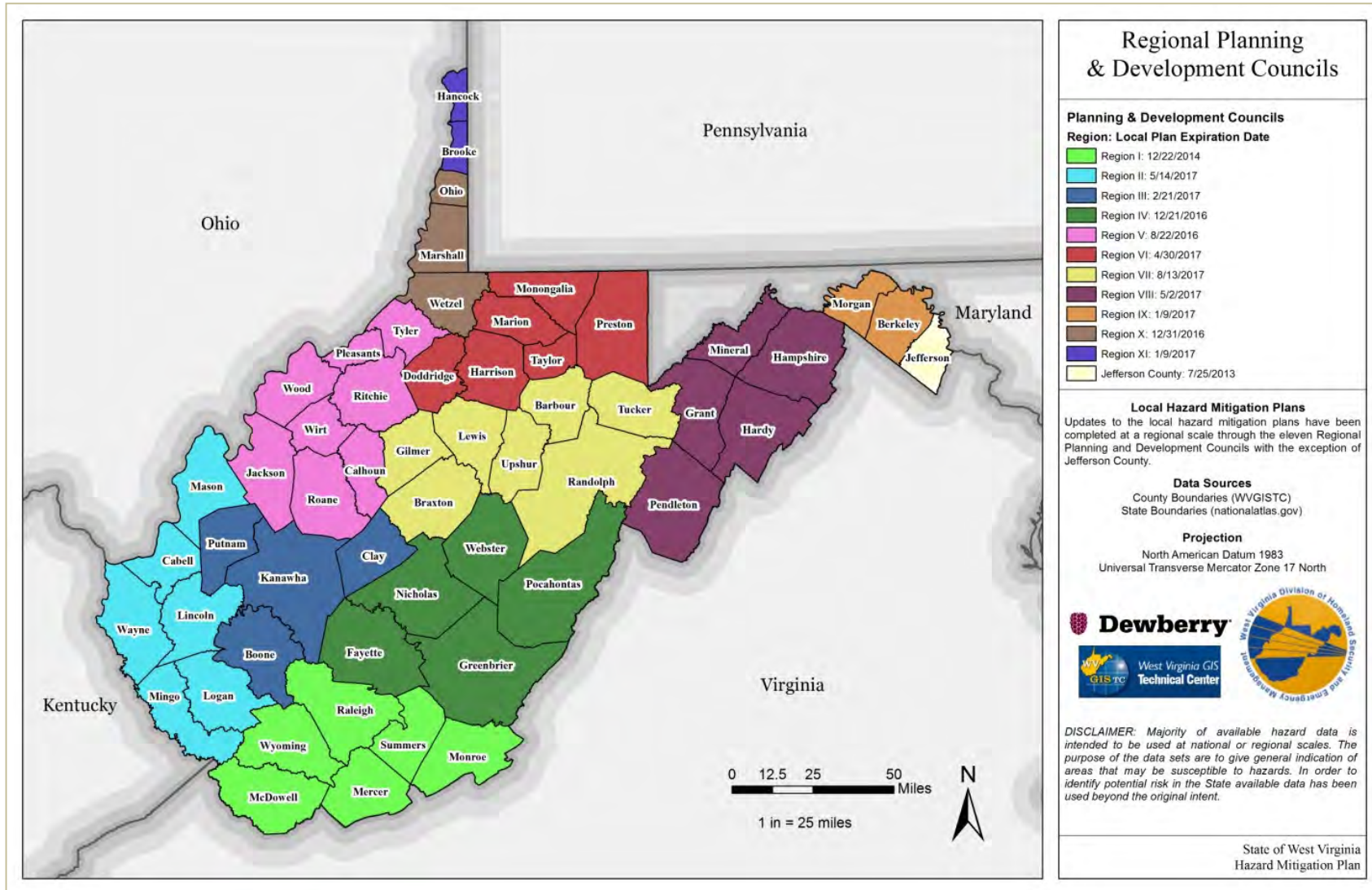


FIGURE 5-2. WEST VIRGINIA REGIONAL PLANNING AND DEVELOPMENT COUNCILS REGIONS