



REGION 2 PLANNING & DEVELOPMENT COUNCIL

2017 Multi-Jurisdictional
Hazard Mitigation Plan

REGION 2
PLANNING & DEVELOPMENT COUNCIL
MULTI-JURISDICTIONAL
HAZARD MITIGATION PLAN UPDATE 2017



PREPARED BY
JH CONSULTING, LLC OF WEST VIRGINIA
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1.0 INTRODUCTION

2017 UPDATE

The *Region 2 PDC Hazard Mitigation Plan* has been updated for current information, expanded upon, reformatted, and reorganized to present a more cohesive plan for the region. In general, more stakeholders were included in the process, more public outreach was conducted, and committee members were actively involved in the outcome of the plan.

All sections of this plan have been updated to include the most up-to-date information available, historical occurrences, and mapping was updated to reflect changes in hazard areas. The committee worked to update each jurisdiction's asset inventory and gathered several times to discuss the direction of the plan.

PLAN INTRODUCTION

The *Region 2 Hazard Mitigation Plan* details natural and human-caused hazards that threaten Cabell, Lincoln, Logan, Mason, Mingo, and Wayne Counties and their various municipalities. The plan fulfills the requirements set forth by the Disaster Mitigation Act of 2000 (DMA, 2000). This Act requires counties to formulate a hazard mitigation plan in order to be eligible for mitigation funds made available by the Federal Emergency Management Agency (FEMA).

PLAN AUTHORITY

This multi-jurisdictional plan has been completed in accordance with Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000. The guidelines for the completion of this plan appear in the Code of Federal Regulations under Title 44: Emergency Services, Part 201.6. Specific reference is made to the Local Mitigation Planning Handbook (USDHS/FEMA, 2013).

PLAN SCOPE

The *Region 2 Hazard Mitigation Plan* includes all unincorporated areas of Cabell, Lincoln, Logan, Mason, Mingo, and Wayne Counties as well as all municipalities within the counties. All hazards that have or can affect the residents of Region 2 have been analyzed. Hazard mitigation objectives, goals and projects are discussed, as are project lead agencies



and potential funding sources.

PLAN PURPOSE

The purpose of the *Region 2 Hazard Mitigation Plan* is to identify and evaluate all natural and human-caused hazards that can and may affect Cabell, Lincoln, Logan, Mason, Mingo, and Wayne Counties and to describe mitigation strategies to address these hazards.

PLAN PRIORITIES

The 2017 update represents the first update to the regional hazard mitigation for the Region 2 Planning and Development Council (PDC) area. It represents the first effort at truly considering the document from a regional perspective, as opposed to the 2012 effort to consolidate existing plans from the county level. As such, the PDC and the steering committee participating in the update outlined several priorities for this version.

PRIORITY 1: A PLAN FOR PRACTICAL USE.

At its core, the mitigation planning process is a regulatory endeavor. The PDC and committee recognized this, yet set a planning priority of creating a document that can be used in practice. As such, the 2017 update attempted to identify and include relevant information from participating jurisdictions about efforts they are already doing that complement mitigation (e.g., National Flood Insurance Program [NFIP] management, outreach to residents, etc.). This update also adds non-traditional hazards that substantially impact the area. For example, the region is heavily affected by the opioid addiction crisis. Drug use, in many ways, debilitates the population and would likely hinder a recovery effort should a major disaster occur. Committee members thus felt that acknowledging, supporting, and contributing to efforts to address the drug problem could serve as an indirect mitigation effort should a large-scale incident occur.

PRIORITY 2: INTEGRATE EXTENDED STAKEHOLDERS INTO THE PROCESS.

Historically, mitigation planning in West Virginia has emanated from the emergency management community. Naming regional planning and development councils as the custodial agencies for mitigation planning in 2012 added expertise from more traditional community planning sectors. The Region 2 PDC and its steering committee recognized the potential for even more stakeholders to have an interest in the process, such as floodplain managers, community watershed groups, etc. The 2017 update represents a first attempt at



inviting those players into the process. Floodplain managers served on the steering committee and watershed groups participated through public forums.

PRIORITY 3: ENGAGE THE PUBLIC.

Public involvement in mitigation planning has historically been minimal. The PDC and steering committee attempted to engage a wider segment of the population for the 2017 update by moving beyond traditional town hall-style meetings. This update includes the issuance of two online surveys, shared via social media platforms.

1.1 THE PLANNING PROCESS

§201.6(b) and
201.6(c)(1)

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.

[The plan shall document] 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.

2017 UPDATES

This section has been updated to reflect the 2017 plan update process. It includes brief descriptions of committee and public meetings held throughout the process. This section also details how each jurisdiction has participated in the process and the different tasks they have completed to update and improve the plan. It includes a timeline for completion of this plan as well as a general description of resources utilized for research purposes.

Additional stakeholders participated in the process; one example is the City of Huntington's Green Infrastructure Project that was woven into mitigation efforts. The Region 2 Planning and Development Council (PDC) and the committee members reached out to community members in person and online in efforts to garner information regarding hazards and mitigation projects in the area.

1.1.1 Committee Involvement

For the update of this hazard mitigation plan, the Region 2 Planning and Development Council (PDC) sought the services of JH Consulting, LLC, henceforth referred to as the consultant. There were two committees, the full committee, formed by members of the Region 2 PDC, and the steering committee. The steering committee was formed with representatives from each county within the Region 2. In total, the PDC held five meetings at different stages throughout the process.

TABLE 1.1.1.A MEETING DESCRIPTIONS		
Type of Meeting	Date	Description
Full Committee #1	June 2, 2017	The consultant provided the full committee an overview of the previous plan and the process for the update of this year's plan. The consultant also presented the responsibilities each party would have throughout the entire process.
Steering Committee #1	August 9, 2017	The steering committee met for the first time and reviewed the hazard mitigation plan process. They reviewed hazards and provided historical data on hazards in their communities.
Full Committee #2	October 4, 2017	The consultant provided an overview of the existing and proposed hazards to the full committee and handouts about local hazard mitigation and its importance.
Steering Committee #2	October 6, 2017	The committee reviewed and approved new goals and objectives for the hazard mitigation plan. The committee received links for public surveys and posted them on their websites and social media pages. The committee also reviewed the tasks to be completed: project status updates, new projects, asset inventory updates.
Steering Committee #3	December 12, 2017	The committee discussed new projects relevant to their jurisdictions. They also discussed methods for keeping the plan current throughout the following years.

Committee members attended meetings and maintained constant communication with the consultant and Region 2 throughout the plan update. The following is a table that outlines the committee members' participation in the process.

TABLE 1.1.1.B JURISDICTIONAL PARTICIPATION						
Jurisdiction/Agency	Contact	Title	On Steering Committee	Held and/or Attended Public Meeting	Direct Contact With the Consultant Via Phone or Email	Posted Public Surveys on Websites or Social Media
Cabell County	Jack Barker	Commissioner	Yes	Yes		
	Jerry Beckett	OES	Yes	Yes	Yes	Yes
	Gordon Merry	OES	Yes	Yes		
Barboursville, Village of	Danny Porter	Floodplain Manager	No	No	Yes	N/A
Huntington, City of	Sherry Wilkins	Stormwater Utility	Yes	No		
	Cathy Burns	City Manager	No	No	Yes	Yes
	Bre Shell	Floodplain Manager/City Planner	No	No		
Milton, City of	Tom Canterbury	Mayor	No	No		
	Randy Rutledge	Floodplain Manager	No	No	Yes	N/A
Lincoln County	Rick Helton	Floodplain Manager	Yes	Yes	Yes	Yes
	Francis Holton	OES	Yes	Yes		
Hamlin, Town of	David Adkins	Mayor	No	No	Yes	N/A
West Hamlin, Town of	Joanna Cardwell	Recorder	No	No	Yes	N/A
Logan County	Roger Bryant	OEM	Yes	Yes		
	Ray Perry	Commissioner/Floodplain Manager	Yes	Yes	Yes	Yes

TABLE 1.1.1.B JURISDICTIONAL PARTICIPATION

<i>Jurisdiction/Agency</i>	<i>Contact</i>	<i>Title</i>	<i>On Steering Committee</i>	<i>Held and/or Attended Public Meeting</i>	<i>Direct Contact With the Consultant Via Phone or Email</i>	<i>Posted Public Surveys on Websites or Social Media</i>
	Danny Ellis	Commissioner	No	Yes		
	Danny Godby	Commissioner	No	Yes		
	LaDonna Blankenship	OEM	No	Yes		
Chapmanville, Town of	Raamie Barker	Mayor	No	No	Yes	N/A
	Terrilyn Wilson	Recorder	No	No		
Logan, City of	Serafino Nolletti	Mayor	No	No		
	Scott Beckett	Fire Chief/Floodplain Manager	No	No	Yes	N/A
	Amber Viars	Clerk	No	No		
Man, Town of	Jim Blevins	Mayor/Floodplain Manager	No	No	Yes	N/A
Mitchell Heights, Town of	James Motes	Mayor	No	No		
	Vicky Hale		No	No	Yes	N/A
	Miller Cope	Floodplain Manager	No	No		
West Logan, Town of	Darren Akers	Mayor/Floodplain Manager	No	No	Yes	N/A
Mason County	Dennis Zimmerman	OES	Yes	Yes		
	Scott Donley	EMA	Yes	No	Yes	Yes
	Matthew Gregg	OES	Yes	No		
	Rick Handley	Commissioner	No	Yes		
Hartford, Town of	Gordon Spencer	Mayor	No	No	Yes	N/A
	Misty Young	Floodplain Manager	No	No		
Henderson, Town of	Jack McCoy	Mayor/Floodplain Manager	No	No	Yes	N/A
Leon, Town of	Bruce Riffle	Mayor	No	No	Yes	N/A
	Ray Gordon	Floodplain Manager	No	No		
Mason, Town of	Donna Dennis	Mayor/Floodplain Manager	No	No	Yes	N/A
	Darlene Roach	Water Clerk	No	No		
New Haven, Town of	Jerry Spradling	Mayor	No	No	Yes	N/A
	Roberta Hysell	Recorder	No	No		
Point Pleasant, Town of	Brian Billings	Mayor	No	No		
	Amber Tatterson	Clerk	No	No	Yes	N/A
	JR Spencer	Fire Department	No	Yes		
	Randall Hall	Floodplain Manager	No	No		
Mingo County	Doug Goolsby	HSEM	Yes	Yes	Yes	No
	Amanda Starr	Floodplain Manager	Yes	Yes		
Delbarton, Town of	John Preece	Accountant	No	No	Yes	N/A
Gilbert, Town of	Vivian Livingood	Mayor	No	No	Yes	N/A
Kermit, Town of	Charles Sparks	Mayor	No	No	Yes	N/A
Matewan, Town of	Sheila Kessler	Mayor	No	No	Yes	N/A
	Chris Hall	Water Plant Manager	No	No		
Williamson, City of	Charles Hatfield	Mayor	No	No	Yes	N/A
	Joey Carey	Fire Department	No	Yes		
Wayne County	James Cooper	OEM	Yes	Yes	Yes	No
Ceredo, Town of	Paul Billups	Mayor	No	No		
	Otis Adkins	Floodplain Manager	No	No	Yes	N/A
	Lynn	Clerk	No	No		
Fort Gay, Town of	Joetta Hatfield	Mayor	No	No	Yes	N/A

TABLE 1.1.1.B JURISDICTIONAL PARTICIPATION

<i>Jurisdiction/Agency</i>	<i>Contact</i>	<i>Title</i>	<i>On Steering Committee</i>	<i>Held and/or Attended Public Meeting</i>	<i>Direct Contact With the Consultant Via Phone or Email</i>	<i>Posted Public Surveys on Websites or Social Media</i>
	Sheila Bowen	Recorder	No	No		
Kenova, Town of	Lisa Palmer	Clerk	No	No	Yes	N/A
Wayne, Town of	Danny Grace	Mayor	No	No	Yes	N/A
	Randy Fry	Floodplain Manager	No	No		
Region II PDC	Chris Chiles		Yes	No		
	Kathy Elliott		Yes	Yes	Yes	Yes
	Lisa Wells		No	Yes		
WVDHSEM	Greg Fuller	Region 6 Liaison	Yes	No	Yes	N/A
	JD Whitesel		No	Yes		

Additionally, a variety of other agencies from throughout the region, state, and neighboring counties in Kentucky also participated in this process. This section lists those organizations.

TABLE 1.1.1.C ADDITIONAL AGENCY PARTICIPATION IN THE PLANNING PROCESS

<i>Government Agencies</i>	<i>Quasi-Governmental Agencies</i>	<i>Critical Infrastructure</i>
<ul style="list-style-type: none"> • Federal Emergency Management Agency • National Weather Service • U.S. Army Corps of Engineers • U.S. Environmental Protection Agency • West Virginia Department of Environmental Protection, Watershed Improvement Branch • West Virginia Division of Homeland Security & Emergency Management • West Virginia Senate (Mason County Representative) • West Virginia Silver Jackets • West Virginia State Fire Marshal's Office (Mingo County) • Ohio Emergency Management Agencies for: Meigs, Gallia and Lawrence Counties. • Kentucky Emergency Management Agencies for: Boyd, Lawrence, Martin, and Pike Counties. • Virginia Emergency Management Agency for: Buchanan 	<ul style="list-style-type: none"> • KYOVA Metropolitan Planning Organization • Mid-Ohio Valley Regional Council • Region 1 Planning & Development Council • Regional Intergovernmental Council (i.e., Region 3 PDC) 	<ul style="list-style-type: none"> • Huntington Sanitary Board • Huntington Storm Water Utility • Pea Ridge Public Service District (PSD) • Salt Rock PSD • West Virginia American Water Company

Higher Education	Non-Profit Sector	Private Sector
<ul style="list-style-type: none"> • Marshall University • Southern West Virginia Community & Technical College 	<ul style="list-style-type: none"> • Fourpole Creek Watershed Association • Guyan Conversation District • Lincoln Nursing & Rehabilitation Center • Williamson Memorial Hospital 	<ul style="list-style-type: none"> • Port of Huntington Tri-State • JH Consulting, LLC

1.1.2 Public Involvement

Reaching the public of Region 2 and getting their input on the plan is an essential part of what makes this plan successful. For this reason, the committee decided to take two different approaches to reaching out to the public; the first, taking advantage of today's influence of social media, by creating two online surveys, and the second, a traditional in-person public meeting schedule.

For the online public survey approach, various jurisdictions posted and pushed two surveys relating to the hazard mitigation plan. The first survey focused on hazards in the community, their level of concern about them, how officials delivered warning notifications, home emergency kits and insurance, if homeowners had made any improvements to their homes to reduce their risk, and general demographic information. The survey was open and available at the beginning of October of 2017. As of the submittal of this plan to WVDHSEM and FEMA in December of 2017, there were 404 responses to the survey.

The second online public survey went more in depth into mitigation projects and activities; it focused on gathering information about how supportive the public would be of additional regulations, use of tax dollars for grant programs, upgrading water systems, and providing incentive programs for jurisdictional mitigation projects. The survey was open and available at the beginning of November of 2017. As of the submittal of this plan to WVDHSEM and FEMA in December of 2017, there were 194 responses to the survey.

Full online public survey results are included in [Appendix 3: Public Participation](#).

The committee scheduled six in-person public meetings, one in every county in Region 2. The following is a description of events and discussions that took place at each meeting. Meeting announcements and sign in sheets are included in [Appendix 3: Public Participation](#).

- At the **first** scheduled public meeting on November 28, 2017, at the courthouse in Logan County, there were representatives from the county, Region 2 PDC, and WVDHSEM; no members of the public attended. The consultant reviewed the

- planning process, tasks the committee had to complete, and a summary of NCEI weather events for the county. Attendees discovered that events included on the NCEI database did not accurately depict the actual cost of the events within the county; they mentioned that the dollar amount was actually much higher than recorded. The conversation steered toward the opioid epidemic problem and the difficulty in aiding vulnerable populations during hazards in the county. Attendees made reference to several projects that could be included as part of the hazard mitigation plan that officials were already working on.
- The **second** public meeting took place on November 28, 2017, at the 911 Center in Lincoln County during a regularly scheduled LEPC meeting. Several regular members of the LEPC attended, as well as a Region 2 PDC representative; no members of the public attended. The consultant reviewed the planning process, the status of the plan, and general public survey results. Attendees indicated that the number one hazard in the county is flooding and flash flooding and a close second is the opioid epidemic that is affecting first responders and crime rates. EMS representatives noted that another concern was responding to patients with functional and access needs during hazard events. There was discussion about the possibility and difficulty of creating a registry of these patients to keep a record at the Office of Emergency Management.
 - The **third** public meeting on November 30, 2017, took place during the LEPC meeting in Mingo County. Attendees discussed various hazards to include in the plan, such as flooding, hazardous materials, and the opioid epidemic. Attendees also discussed a joint project with American Electric Power (AEP), through which street lighting in Williamson is being assessed. As a part of that project, AEP and local officials are exploring persistent outage issues and seeking to strategically update the electricity infrastructure in the area.
 - The **fourth** public meeting was on December 5, 2017, in Cabell County. This meeting took place concurrently with a session sponsored by the U.S. Environmental Protection Agency (EPA) as part of its community effort to discuss incorporating green infrastructure and low-impact development into hazard mitigation planning (see Section 1.1.3 below for additional information). Eleven (11) citizens attended this meeting. Though the mitigation plan was a single agenda item, attendees were very interested in the process; as such, the PDC's consultant (who was also in

attendance) spoke at length about the update. Citizens had questions about the planning process; the consultant provided links for participation in the surveys (noted above) and discussed local points of contact with whom to follow-up. Generally, attendees provided input on site-specific flooding hazards, general hazards (e.g., pipeline construction) to consider for inclusion on the plan, and integrating West Virginia Silver Jackets and watershed planning into the process.

- The **fifth** public meeting took place on December 13, 2017, at the Wayne County Courthouse. Public attendance was minimal but committee members who attended discussed various hazards specific to their communities. Issues such as private bridge crossings, and flash flooding were the main topics of conversation during the meeting.
- The **sixth** and final public meeting occurred on December 13, 2017, at the public library in Mason County. Few members of the public attended. The consultant explained the hazard mitigation plan, its importance, and the process to complete it. The consultant stressed the importance of public input and involved the attendees in a discussion revolving around winter storms and other hazards facing the county. The emergency manager mentioned that the most critical problem in the county comes after winter and summer storms knock out power for extended periods of time.

1.1.3 Incorporation of Green Infrastructure into Hazard Mitigation Planning Element

In 2015, the U.S. EPA selected Huntington as one of 53 communities for its “Making a Visible Difference in Communities Initiative.” This selection included the facilitation of a community forum, primarily focused on revitalizing the city’s Brownfields, developing and changing the city’s riverfront, and dealing with areas of blight. Through those initial discussions, a partnership of stakeholders from Huntington and Cabell County emerged and began meeting regularly to discuss stormwater management and the flooding associated with overdriven stormwater systems. Ultimately, the U.S. EPA Region III utilized this partnership to produce a summary report on integrating green infrastructure and low-impact development into hazard mitigation planning.

This group began discussing such integration in the summer of 2016. Initial meetings focused on conceptual matters, including examples of green infrastructure projects, discussions of the flood hazard and its impacts on the city, etc. However, as these

discussions evolved, they began to include more strategic elements about actually incorporating material related to the green infrastructure approach into this plan as a mitigation option, particularly for site-specific, nuisance flooding.

Organizers included an update on the regional mitigation plan update (i.e., this document) on every meeting agenda. Thus, the plan was considered by a wide variety of stakeholders prior to and throughout the update. Meetings occurred on:

- July 19, 2016,
- July 28, 2016,
- November 30, 2016,
- December 14, 2016,
- January 18, 2017,
- February 8, 2017,
- April 13, 2017,
- May 24, 2017,
- July 12, 2017,
- August 30, 2017, and
- December 5, 2017.

Green infrastructure elements will thus be included as appropriate in the sections that follow, per the discussions held throughout the EPA-led process.

1.1.4 Research Conducted

The research conducted for the risk assessment phase of this update included data from federal, state, higher education, and mass media sources. The research aim was primarily to validate and describe the hazards included for consideration in this plan. Specific sources relative to individual hazards are listed in [Appendix 5: Citations](#).

The consultant reviewed a number of existing plans and reports to (a) identify any obvious inconsistencies between other development and mitigation efforts, (b) as baseline information for such sections as Analyzing Development Trends, and (c) to support discussions surrounding mitigation projects. Those documents included the following.

TABLE 1.1.4.A GENERAL RESEARCH		
Document Type	Document Citation	How Incorporated Into Plan
Technical Information	USDHS FEMA Region 2I. (July, 2015). <i>Plan Integration: Linking Local Planning Efforts</i> . Federal Government: Washington, D.C.	Used as guidance on incorporating local planning efforts/plans into the planning process.
Technical Information	USDHS FEMA. (June, 2016). <i>National Mitigation Framework</i> . Federal Government: Washington, DC	Used as general guidance on mitigation planning.
Technical Information	USDHS FEMA. (May, 2005). <i>Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning</i> . Federal Government: Washington, D.C.	Used as general guidance for incorporating historic property and cultural protection.
Technical Information	USDHS FEMA. (March, 2013). <i>Local mitigation planning handbook</i> . Federal Government: Washington, D.C.	Used as general guidance on revised mitigation planning process
Technical Information	USDHS FEMA. (March, 2013). <i>Integrating Hazard Mitigation Into Local Planning</i> . Federal Government: Washington, D.C.	Used as general guidance on existing plan integration for hazard mitigation

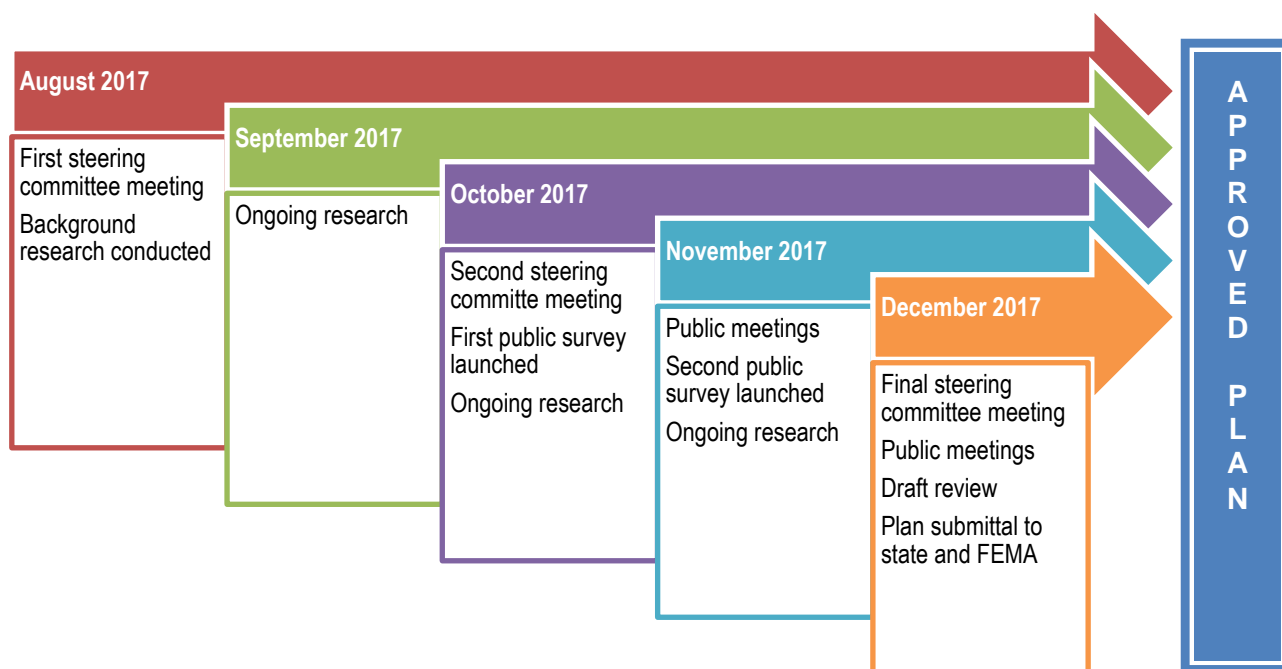
Many sources informed the hazard profiles. The following table briefly describes the major sources referenced for each hazard analyzed in this plan.

TABLE 1.1.4.B HAZARD RESEARCH	
Hazard	Research Sources
Acts of Violence	<ul style="list-style-type: none"> Appalachia High Intensity Drug Trafficking Areas (HIDTA) National Gang Center Local Law Enforcement Offices
Dam Failure	<ul style="list-style-type: none"> Association of State Dam Safety Officials National Performance of Dams Program National Inventory of Dams
Drought	<ul style="list-style-type: none"> USDA Census of Agriculture National Integrated Drought Information System National Centers for Environmental Information (NOAA)
Earthquake	<ul style="list-style-type: none"> Association of American State Geologists United States Geological Service
Extreme Temperatures	<ul style="list-style-type: none"> National Centers for Environmental Information (NOAA)
Flood	<ul style="list-style-type: none"> Federal Emergency Management Agency Flood Rate Map National Centers for Environmental Information (NOAA) U.S. Environmental Protection Agency
Hazmat	<ul style="list-style-type: none"> Federal Railroad Administration Pipeline and Hazardous Materials Safety Administration National Transportation Safety Board National Pipeline Mapping System USCG National Response Center
Land Subsidence	<ul style="list-style-type: none"> United States Geological Service West Virginia Division of Highways

TABLE 1.1.4.B HAZARD RESEARCH	
Hazard	Research Sources
Opioid Crisis	<ul style="list-style-type: none"> Centers for Disease Control and Prevention Local County Health Departments Local Law Enforcement Offices Local Emergency Medical Services West Virginia Department of Health and Human Resources
Reportable Disease Epidemic	<ul style="list-style-type: none"> Centers for Disease Control and Prevention Local County Health Departments West Virginia Department of Health and Human Resources
Severe Summer Weather	<ul style="list-style-type: none"> National Centers for Environmental Information (NOAA) Northeast Regional Climate Center
Severe Winter Weather	<ul style="list-style-type: none"> National Centers for Environmental Information (NOAA) Northeast Regional Climate Center
Wildfire	<ul style="list-style-type: none"> National Centers for Environmental Information (NOAA) West Virginia Division of Forestry

1.1.5 Project Timeline

The Region 2 PDC applied for a grant to write the hazard mitigation plan in July of 2015. In June of 2017 they procured the services of JH Consulting to begin the process of updating the plan. Research and committee meetings began in August of 2017. The following details the plan update process timeline from when the meetings began in August.



1.1.6 First Plan Update Process

The first plan update process was completed in late 2008 and early 2009. The Logan County Office of Emergency Management (LCOEM), the Mason County Office of

Emergency Services (MCOES), the Wayne County Floodplains Administration Office, the Mingo County Commission served as the coordinator of the plans development. To complete the work required, a consultant was hired – JH Consulting, LLC. JH Consulting was responsible for all the data collection and compilation tasks associated with the update.

The core planning committee met a total of nine times. The primary topics of conversation were to ensure that the consultant's proposed updates were consistent with local expectations. Other items, such as hazard vulnerability, updated risk assessment findings, and mitigation projects were also discussed. The meetings were advertised and open to the public. Although no members of the general public attended, the Offices of Emergency Services planned to release a press statement upon the completion and adoption of revisions. The statement will direct the general public as to where they can find a copy of the plan and encourage them to review and comment on it. Any public comments received can be included in the next formal update of the plan. Additionally, participating agencies intend to follow all public notification requirements when implementing mitigation projects (at the time they are implemented).

1.1.7 Original Plan Development Process

The *Region 2 Planning and Development Councils All-Hazard Mitigation Plan* was prepared by following the guidelines provided by FEMA and the West Virginia Division of Homeland Security and Emergency Management (WVDHSEM). The Region 2 Planning and Development Council core planning team was formed as an ongoing group of key officials throughout the counties of Cabell, Lincoln, Logan, Mason, Mingo and Wayne; as well as municipalities that have a stake in mitigation.

Local leaders core planning team within the Region 2 Planning and Development Council's area met a total of 19 times, including 10 additional public meetings for public comment. Individual counties had held public meetings and had little to no participation and yielded no comments on the local plan. Citizens of Cabell, Lincoln, Logan, Mason, Mingo and Wayne counties were interviewed using "Household Natural Hazards Preparedness Questionnaires" to get a sampling of what hazards are concerns to the citizens of each county. The public was involved through newspaper legal notices.

The Region 2 Planning and Development Council's core planning team consulted the completed county mitigation plans in order to create a fully completed and comprehensive regional mitigation plan to include all Region 2 counties that will adopt the plan.



1.2 DESCRIPTION OF THE PLANNING AREA

2017 UPDATE

The description of the planning area is largely similar to the previous plan but has been updated for recent, more accurate information and expanded upon where appropriate. New items include regional economy, regional infrastructure, regional services, disaster declarations, and the results of an online survey that committee members answered regarding their jurisdictional capabilities.

1.2.1 Regional History

The Region 2 Planning and Development Council was formed from parts of Cabell, Giles, Kanawha, and Tazewell counties in the early 1800's by an act of the Virginia Assembly. Region 2 PDC counties were named after Chief Logan from the Mingo Native American Tribe, George Mason who was one of the members of the convention that laid the framework for the U.S. Constitution, General "Mad Anthony" Wayne, Wallace J. Williamson because he owned the land where Williamson now stands, William H Cabell, who served as the Governor of Virginia in the early 1800's, and Abraham Lincoln.

French explorers were the first to stake claims in Region 2. Numerous battles have been fought in and around Region 2 and claims of property rights have been contested throughout its history. Region 2, which holds a significant place in history, began to prosper after the conclusion of the Revolutionary War and started its industrial growth when coal was discovered. Combined with coal and the supplies of timber, gravel, salt and fertile soils, Region 2 had the necessary makings for strong economic growth.

Coal production has since slowed considerably, but with ample reserves it still holds a tremendous value in the area. Various light industries have replaced revenue lost due to the decline of coal production and have bolstered the region's economy. Region 2's early economic prosperity was brought on by the abundance of coal in the area but soon demand fell and the population moved west to find employment. Region 2 does entertain a tourist population throughout the year, as there are many attractions both historic and cultural.

1.2.2 Regional Geography

The Region 2 Planning and Development Council covers a total land area of 2,564 square miles, and of that amount, around 30 square miles are water. It is located in the



southwest portion of West Virginia. Region 2 has an average median elevation of 609 feet above sea level.

The major rivers in the region include the Ohio River that runs along the western border of the state at Mason, Cabell, and Wayne Counties, Big Sandy River and Tug Fork that flow along the southwestern border of the state at Wayne and Mingo Counties, Guyandotte River that runs through Cabell, Lincoln, Logan, and part of Mingo Counties, and the Kanawha River that runs through Mason County. Region 2 is located mainly in the Allegheny Plateau, a hilly terrain rather than mountainous.

There are 25 incorporated municipalities in Region 2. The largest one of these is the City of Huntington located in Cabell and Wayne Counties.

<i>Cabell County</i>	<i>Lincoln County</i>	<i>Logan County</i>	<i>Mason County</i>	<i>Mingo County</i>	<i>Wayne County</i>
Barboursville	Hamlin	Chapmanville	Hartford	Delbarton	Ceredo
Huntington	West Hamlin	Logan	Henderson	Gilbert	Fort Gay
Milton		Man	Leon	Kermit	Kenova
		Mitchell Heights	Mason	Matewan	Wayne
		West Logan	New Haven	Williamson	
			Point Pleasant		

1.2.3 Regional Climate

The majority of Region 2 Counties' climate is very similar. The average temperature varies from around 30 degrees Fahrenheit in the winter to around 75 degrees in the summer. Typical precipitation throughout the year averages to about 42.5 inches.

1.2.4 Regional Demographics

Understanding a region's demographic composition is vital to planning activities. This information will be especially relevant when planning for vulnerable populations and, in some cases, calculating loss from hazards. The following table outlines the U.S. Census Bureau's data from July 1, 2016 population estimates.

TABLE 1.2.4.A REGION 2 DEMOGRAPHIC INFORMATION							
<i>Fact</i>	<i>Cabell County</i>	<i>Lincoln County</i>	<i>Logan County</i>	<i>Mason County</i>	<i>Mingo County</i>	<i>Wayne County</i>	<i>Total/Average</i>
Population estimates	95,987	21,232	33,700	26,825	24,647	40,531	242,922
Persons under 5 years	5.80%	6.00%	5.60%	5.30%	6.50%	5.20%	5.73%
Persons under 18 years	20.00%	22.40%	20.50%	21.10%	22.60%	21.20%	21.30%
Persons 65 years and over	17.70%	18.50%	18.90%	19.50%	16.80%	19.60%	18.5%
Female persons	51.00%	50.20%	50.80%	51.70%	50.70%	51.40%	50.97%

TABLE 1.2.4.A REGION 2 DEMOGRAPHIC INFORMATION

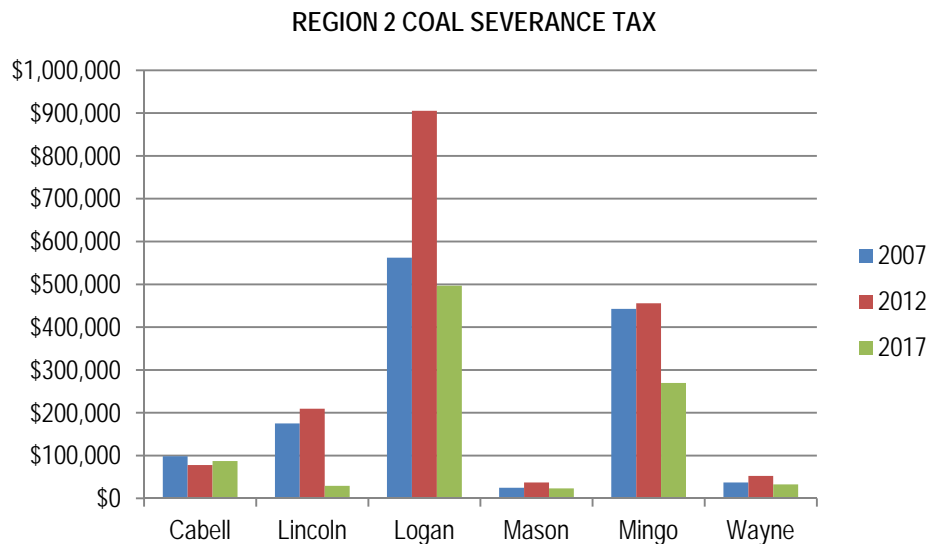
<i>Fact</i>	<i>Cabell County</i>	<i>Lincoln County</i>	<i>Logan County</i>	<i>Mason County</i>	<i>Mingo County</i>	<i>Wayne County</i>	<i>Total/Average</i>
White alone	91.10%	98.50%	96.80%	97.50%	96.40%	97.90%	96.37%
Black or African American alone	5.00%	0.30%	1.80%	0.90%	1.90%	0.40%	1.72%
American Indian and Alaska Native alone	0.20%	0.10%	0.10%	0.20%	0.10%	0.30%	0.17%
Asian alone	1.40%	0.20%	0.30%	0.30%	0.30%	0.40%	0.48%
Native Hawaiian and Other Pacific Islander alone	N/A	0.00%	N/A	0.10%	N/A	N/A	0.10%
Two or More Races	2.20%	0.90%	0.90%	1.20%	1.20%	0.90%	1.22%
Hispanic or Latino	1.40%	0.70%	0.90%	0.70%	0.80%	0.60%	0.85%
White alone, not Hispanic or Latino	90.00%	97.80%	96.00%	96.80%	95.80%	97.40%	95.63%
Veterans, 2012-2016	6,864	1,668	2,153	2,456	1,318	2,903	17,362
Foreign born persons, 2012-2016	1.70%	0.30%	0.40%	0.70%	0.40%	0.60%	0.68%
Housing units, (V2016)	46,474	9,785	16,689	12,921	12,615	19,153	117,637
Language other than English spoken at home, persons age 5 years+, 2012-2016	2.70%	1.00%	1.30%	0.80%	0.80%	1.50%	1.35%
High school graduate or higher, persons age 25 years+, 2012-2016	87.00%	79.10%	77.70%	84.70%	73.90%	79.40%	80.30%
Bachelor's degree or higher, persons age 25 years+, 2012-2016	26.10%	9.00%	8.90%	11.40%	9.90%	12.90%	13.03%
With a disability, under age 65 years, 2012-2016	15.10%	24.00%	23.50%	15.30%	25.40%	17.90%	20.20%
Persons without health insurance, under age 65 years	7.30%	8.30%	8.10%	6.90%	8.90%	7.40%	7.82%
In civilian labor force, total, population age 16 years+, 2012-2016	54.10%	46.80%	44.80%	45.50%	44.10%	47.70%	47.17%
Median household income (in 2016 dollars), 2012-2016	\$37,760	\$36,232	\$37,262	\$37,322	\$32,441	\$38,311	219,328
Per capita income in past 12 months (in 2016 dollars), 2012-2016	\$23,853	\$19,416	\$20,843	\$20,253	\$19,502	\$20,450	124,317
Persons in poverty	21.90%	24.20%	24.40%	17.90%	28.20%	21.50%	23.02%
Total employer establishments, 2015	2,398	195	622	324	388	509	4,436
Total employment, 2015	46,688	1,628	9,558	3,944	3,081	7,018	71,917
Total employment, percent change, 2014-2015	-1.30%	-17.10%	-4.70%	1.60%	-19.20%	-2.60%	-7.22%

1.2.5 Regional Economy

Various counties expressed concern about budgetary cuts that have affected them in the past several years. One of these is the Coal Severance Tax that all counties and jurisdictions receive quarterly. While not every county in West Virginia produces coal, all

counties receive a severance tax paid by the coal industry. This additional tax on coal is collected by the State Tax Commissioner. Seventy-five (75%) of the net proceeds is distributed to coal-producing counties; among them, Lincoln, Logan, and Mingo Counties in Region 2. The remaining twenty-five (25%) of the net proceeds are distributed to all counties and municipalities of the state, based on population (West Virginia State Treasurer's Office, n.d.). In some instances, the funds received from this severance tax is destined to first responder agencies such as law enforcement, emergency medical services, and fire departments. In recent years, there has been a steady decline in severance funds that has affected counties in Region 2.

The following graphic shows fund distribution data from the last ten years at five-year intervals (2017, 2012, and 2007). This is taken from the second quarter of each year, either June or July. The data shows that there was a spike in funds in 2012, but the overall funding has decreased significantly over the last ten years, even with the spike in 2012.



It is important to know the economy of a region. In mitigation, one of the assets that are included in each jurisdiction are top employers; this is because they provide a vast majority of the income for the population. When a disaster strikes and people are unable to work, this causes the obvious loss of income, but a loss in tax revenue for the counties. In 2014, top employers in every county in Region 2 were the county board of education, a type of medical facility, and Wal-Mart Stores. The following table outlines each county's top employers in Region 2.

TABLE 1.2.5.A TOP 10 EMPLOYERS PER COUNTY		
<i>Cabell</i>	<i>Lincoln</i>	<i>Logan</i>
<ul style="list-style-type: none"> • St. Mary's Medical Center • Cabell Huntington Hospital • Cabell County Board of Education • Marshall University • University Physicians & Surgeons • Huntington Alloys corporation • Wal-Mart Stores, Inc. • DirecTV Customer Service, Inc. • Alcon Research, LTD • AMZN WVCS, LLC 	<ul style="list-style-type: none"> • Lincoln County Board of Education • Coal River Mining, LLC • Lincoln County Opportunity Company • Lincoln County Primary Care Center • Lincoln County Commission • Lincoln County Nursing and Rehab. Center • Little General Store, Inc. • ACE Pipeline, Inc. • JAG Coal Services, LLC • WV Department of Health and Human Resources 	<ul style="list-style-type: none"> • Logan County Board of Education • Logan General Hospital • Cliffs Logan County Coal, LLC • Wal-Mart Stores, Inc. • Aracoma Coal Company, Inc. • Highland Mining Company • Logan County Commission • Trinity Healthcare Services, Inc. • Southern West Virginia Community College • Lowe's Home Center, Inc.
<i>Mason</i>	<i>Mingo</i>	<i>Wayne</i>
<ul style="list-style-type: none"> • Mason County Board of Education • Pleasant Valley Hospital, Inc. • Indiana Michigan Power Company • Bowen Engineering Corporation • Appalachian Power Company • Wal-Mart stores, Inc. • Bob's Market and Greenhouse, Inc. • Lakin State Hospital • Lakin Correctional Facility • M & G Polymers USA, LLC 	<ul style="list-style-type: none"> • Mingo County Board of Education • Mingo Logan Coal Company • Coal Mac, Inc. (Phoenix Coal Mac) • Brody Mining, LLC • Williamson Memorial Hospital, LLC • Vensure Employer Services • Unilin North America, LLC • Spartan Mining Company • Rockhouse Creek Development Corporation • Consol of Kentucky, Inc. 	<ul style="list-style-type: none"> • Huntington VA Medical Center • Wayne County Board of Education • Rockspring Development, Inc. • Wayne County Community Services Organization, Inc. • Alleward Sogefi USA, Inc. • Wal-Mart Stores, Inc. • Wayne County Commission • Diversified Assessment & Therapy Services • Braskem American, Inc. • Kanawha River Terminals, LLC

Source: 2014 Workforce West Virginia Profiles

1.2.7 Regional Infrastructure

Transportation

- **Roads:** Region 2 is interconnected with a network of interstates, US and State roads, and local county roads. Some of the major arteries through the region include:
 - I-64
 - US Route 23,
 - US Route 52,
 - US Route 60,
 - US Route 119,
 - State Route 2,
 - State Route 3
 - State Route 7,
 - State Route 10,
 - State Route 37,

- State Route 75,
- State Route 152, and
- State Route 214.

- **Rail:** CSX Corporation, Norfolk Southern and Amtrak operate a main line through the Region 2. The railway line provides rail connections for passengers and freight to all parts of the country.

- **River:** There are a number of ports in the Region 2 area, both public and private. Most of these are along the Ohio River that serves as a maritime transportation route to the Gulf of Mexico; one of the busiest arteries in the nation for water transportation. Other port locations are along Big Sandy River and the Kanawha River.
 - Cabell-Wayne Port District, Inc.
 - Port of Huntington Tri-State

- **Public:** There are a few options for traveling on public transportation in Region 2.
 - The Tri-State Transit Authority (TTA) operates buses in and around the Huntington area.
 - Tri-River Transit operates in bus service in Boone, Lincoln, Logan, and Mingo Counties as well as some portions of Wayne and Kanawha Counties.
 - Commercial buses such as Greyhound also have stations in Huntington that offer service to various locations.
 - Amtrak passenger rail service has one station stop in Huntington along the Cardinal rail line that goes from Chicago to New York.

- **Air:** The Huntington area is served by the Tri-State Airport. Tri-State Airport facilities and services include daily departures to hub centers in Pittsburgh, Pennsylvania and Atlanta, Georgia, as well as air cargo services, Charter service and general aviation. The Lawrence County Airport also provides facilities for general aviation.

Utilities

Region 2 is served by a variety of power, water, sewer, cable, telephone, and internet companies. For a detailed list of services, refer to the table below.

TABLE 1.2.7.A UTILITIES IN REGION 2

<i>Utility Type</i>	<i>Name</i>	<i>Cabell</i>	<i>Lincoln</i>	<i>Logan</i>	<i>Mason</i>	<i>Mingo</i>	<i>Wayne</i>
Cable/Internet	Armstrong Cable Services	X	X				
Cable/Internet	Cebridge Acquisition, LLC		X		X		X
Cable/Internet	Cequel III Communications I LLC		X				
Cable/Internet	Colane Cable Television			X		X	
Cable/Internet	Comcast Communications	X	X				X
Cable/Internet	Frontier West Virginia	X					
Cable/Internet	Lycom Communications, Inc.						X
Cable/Internet	Mikrotec CATV, LLC					X	
Cable/Internet	Shenandoah Cable Television, LLC		X	X		X	X
Cable/Internet	Time Warner Cable, Inc.				X		
Cable/Internet	Vogeler CATV		X				
Electric	Appalachian Power Company	X	X	X	X	X	X
Electric	Big Sandy Peaker Plant, LLC						X
Electric	Panda Culloden Power, L.P.	X					
Gas	Consumers Gas Utility Company	X					X
Gas	Hope Gas, Inc.		X				
Gas	Mountaineer Gas Company	X	X	X	X	X	X
Gas	Southern Public Service Company	X	X	X	X		
Gas	Union Oil & Gas Inc	X					
Sewer	Alva Lynn Vance, dba A. Vance Environmental	X					
Sewer	Boone County Public Service District			X			
Sewer	Buffalo Creek Public Service District			X			
Sewer	City of Huntington Sanitary Board	X					
Sewer	City of Huntington Sanitary Board						X
Sewer	City of Kenova						X
Sewer	City of Logan Sanitary Board			X			
Sewer	City of Milton	X					
Sewer	City of Point Pleasant				X		
Sewer	City of Williamson (Sewer)					X	
Sewer	Culloden Public Service District	X					
Sewer	Graham Meadows Service District, Inc.	X					
Sewer	Hamlin Public Service District		X				
Sewer	Hidden Valley Treatment, Inc.			X			
Sewer	Hubbard Heights Subdivision Homeowners Association						X
Sewer	Kermit Municipal Sewer Department					X	
Sewer	Linmont Sanitation System, Inc.	X					
Sewer	Logan County Public Service District			X			
Sewer	Mason County Public Service District	X					
Sewer	Mason County Public Service District				X		
Sewer	Mingo County Public Service District					X	
Sewer	Northern Wayne County Public Service District						X
Sewer	Pea Ridge Public Service District	X					
Sewer	Pleasant View Public Service District		X				

TABLE 1.2.7.A UTILITIES IN REGION 2

<i>Utility Type</i>	<i>Name</i>	<i>Cabell</i>	<i>Lincoln</i>	<i>Logan</i>	<i>Mason</i>	<i>Mingo</i>	<i>Wayne</i>
Sewer	Prichard Public Service District						X
Sewer	Salt Rock Sewer Public Service District	X					
Sewer	Sewage Systems, Inc.	X					
Sewer	Spring Valley Public Service District						X
Sewer	Town of Ceredo Sewer System						X
Sewer	Town of Chapmanville (Sewer)			X			
Sewer	Town of Delbarton (Sewer)					X	
Sewer	Town of Fort Gay						X
Sewer	Town of Gilbert (Sewer)					X	
Sewer	Town of Hartford				X		
Sewer	Town of Leon				X		
Sewer	Town of Man Sanitary Board			X			
Sewer	Town of Mason Sewer Department				X		
Sewer	Town of Matewan					X	
Sewer	Town of New Haven (Municipal Sewer System)				X		
Sewer	Town of Wayne						X
Sewer	Town of West Hamlin		X				
Sewer	Village of Barboursville	X					
Sewer	Wastewater Management, Inc.						X
Sewer	Williamsburg Sewer System, Inc.	X					
Telephone	Armstrong Telephone Company - West Virginia Division	X	X				
Telephone	Citizens Telecommunications Company of West Virginia	X	X		X		X
Telephone	Frontier West Virginia Inc.	X	X	X	X	X	X
Water	Boone County Public Service District			X			
Water	Branchland-Midkiff Public Service District		X				
Water	Branchland-Midkiff Public Service District						X
Water	Buffalo Creek Public Service District			X			
Water	Ceredo Municipal Water Department						X
Water	Chapmanville Municipal Water Works			X			
Water	City of Logan Municipal Water Department			X			
Water	City of Milton	X					
Water	City of Point Pleasant				X		
Water	City of Williamson (water)					X	
Water	Cottageville Public Service District				X		
Water	Crum Public Service District						X
Water	Fort Gay Municipal Water Department						X
Water	Gallipolis Ferry Water Association, Inc.				X		
Water	J-2-Y-35 Water Association, Inc.				X		
Water	Justice Public Service District					X	
Water	Kenova Water Department						X
Water	Kermit Municipal Water Department					X	
Water	Lavalette Public Service District						X
Water	Lincoln Public Service District		X				

TABLE 1.2.7.A UTILITIES IN REGION 2							
<i>Utility Type</i>	<i>Name</i>	<i>Cabell</i>	<i>Lincoln</i>	<i>Logan</i>	<i>Mason</i>	<i>Mingo</i>	<i>Wayne</i>
Water	Logan County Public Service District			X			
Water	Mason County Public Service District	X					
Water	Mason County Public Service District				X		
Water	Mingo County Public Service District					X	
Water	Salt Rock Water Public Service District	X					
Water	Town of Delbarton (Water)					X	
Water	Town of Gilbert Water Works					X	
Water	Town of Hartford Water Department				X		
Water	Town of Man			X			
Water	Town of Mason Water Department				X		
Water	Town of Matewan					X	
Water	Town of New Haven (Municipal Water Department)				X		
Water	Town of West Hamlin		X				
Water	Wayne Municipal Water Department						X
Water	West Logan Water Company			X			
Water	West Virginia-American Water Company	X	X	X	X		

Source: Public Service Commission of West Virginia

1.2.8 Regional Services

Medical

TABLE 1.2.8.A MEDICAL FACILITIES IN REGION 2					
<i>Cabell</i>		<i>Lincoln</i>		<i>Logan</i>	
<ul style="list-style-type: none"> • Cabell Huntington Hospital • St. Mary's Medical Center • Marshall University Medical Center • CHH Women's & Family Medical Center • Cabell Hunting Hospital • Cabell Family Center • Huntington VA Medical Center • Edwards Comprehensive Cancer Center • Grant Medical Center 		<ul style="list-style-type: none"> • Lincoln Primary Care Center • Valley Health – Harts • Alum Creek Medical Center • Prestera Mental Health Center • Thomas Memorial Hospital • Community Mental Health Center • St Mary's Physical Therapy – Hamlin • Autism Services Center 		<ul style="list-style-type: none"> • Logan Regional Medical Center • Prestera Center • Logan-Mingo Area Mental Health • Logan Regional Cancer Center • MedExpress Urgent Care • Vigo Family Health Care • Trinity Health Care Services – Logan • KVC Behavioral Healthcare 	
<i>Mason</i>		<i>Mingo</i>		<i>Wayne</i>	
<ul style="list-style-type: none"> • Pleasant Valley Hospital • Pleasant Valley Rehab Center • Point Pleasant Medical Center • Orestera Center • Family Medicine Clinic • Point Clinic • Valley Health – Point Pleasant Pediatrics 		<ul style="list-style-type: none"> • Trinity Health Care Services – Mingo • Logan Mingo Area Mental Health • Williamson Memorial Hospital • Logan Regional Medical Center • Tug Valley ARH Regional Medical Center • Family Medical Center • ARH Women's and Family Health Center • Family Medical Center 		<ul style="list-style-type: none"> • Valley Health – Various Locations • Three Rivers Medical Center • KVC Behavioral Healthcare 	

Communications

There are a variety of communication methods in every county in Region 2. The following table describes the print, radio stations, television stations, and cellular coverage in the region.

TABLE 1.2.8.B COMMUNICATIONS IN REGION 2	
Type	Station (Location)
Print	<ul style="list-style-type: none"> • Herald-Dispatch (Huntington) • Logan Banner (Logan) • Lincoln Journal (Hamlin) • Point Pleasant Register (Point Pleasant) • Wayne County News (Wayne) • Williamson Daily News (Williamson)
Radio	<ul style="list-style-type: none"> • WFGH 90.7 FM (Fort Gay) • WASP-LP 104.5 (Huntington) • WEMM-FM 107.9 FM (Huntington) • WKEE-FM 100.5 (Huntington) • WMUL 88.1 FM (Huntington) • WRVC 930 AM (Huntington) • WTCR-FM 103.3 FM (Huntington) • WVHU 800 AM (Huntington) • WVWV 89.9 FM (Huntington) • WYSN 1200 AM (Huntington) • WMGA 97.9 FM (Kenova) • WTCR 1420 AM (Kenova) • WVOW 1290 AM (Logan) • WVOW-FM 101.9 FM (Logan) • WHJC 1360 AM (Matewan) • WVKM 106.7 FM (Matewan) • WAMX 106.3 FM (Milton) • WZZW 1600 AM (Milton) • WBYG 99.5 FM (Point Pleasant) • WTHQ 1030 AM (Point Pleasant) • WVRP 88.1 FM (Point Pleasant) • WVWP-LP 101.1 FM (Wayne) • WBTH 1400 AM (Williamson) • WXCC 96.5 FM (Williamson)
Television	<ul style="list-style-type: none"> • WSAZ-TV NBC (Huntington) • WOWK-TV CBS (Huntington) • WVPB-TV PBS (Huntington) • W30DG-D HSN (Huntington) • WHJC-LP Retro TV (Williamson)
Cellular	<ul style="list-style-type: none"> • AT&T (most locations in Region 2) • Sprint (along I-64 and I-77) • T-Mobile (on western border of the state) • Verizon (along I-64, I-77, and US 119)

Source: Wikipedia & WhistleOut

1.2.9 Jurisdictional Capabilities

The counties and municipalities within Region 2 PDC have a number of capabilities that can support mitigation efforts including comprehensive plans, building codes, subdivision and land use ordinances, zoning ordinances, and floodplain regulations. The PDC's contractor worked with steering committee members to complete a "capabilities assessment." Steering committee members answered questions about the following plans, codes, and ordinances from the perspectives of their home jurisdictions.

- **Comprehensive Plans:** Comprehensive plans promote sound land use and regional cooperation among local governments to address planning issues. These plans serve as the official policy guide for influencing the location, type, and extent of future development by establishing the basic decision-making and review processes on zoning matters, subdivision and land development, land uses, public facilities, and housing needs over time.
- **Building Codes:** Building codes regulate construction standards for new construction and substantially renovated buildings. Standards can be adopted that require resistant or resilient building design practices to address hazard impacts common to a given community.
- **Subdivision and Land Use Development Ordinances:** Subdivision and land development ordinances (SALDOs) are intended to regulate the development of housing, commercial, industrial or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Within these ordinances, guidelines on how land will be divided, the placement and size of roads and the location of infrastructure can reduce exposure of development to hazard events.
- **Zoning Ordinances:** Zoning ordinances allow for local communities to regulate the use of land in order to protect the interests and safety of the general public. Zoning ordinances can address unique conditions or concerns within a given community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development and/or require land development to consider specific hazard vulnerabilities.
- **National Flood Insurance Program (NFIP) Participation and Floodplain Management Ordinances:** Through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to

existing structures located in the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas altogether. The National Flood Insurance Program (NFIP) establishes minimum ordinance requirements which must be met in order for that community to participate in the program. However, a community is permitted and encouraged to adopt standards which exceed NFIP requirements.

TABLE 1.2.9.A JURISDICTIONAL CAPABILITIES							
<i>Jurisdiction</i>	Comprehensive Plan	Building Codes	Participate in NFIP	Subdivision or Land Use Ordinance	Zoning Ordinance	Capital Budget Funds for Mitigation Projects	Public Works Budget for Mitigation projects
Cabell County	Yes	Yes	Yes*	No	No	No	No
Lincoln County	Yes	No	Yes*	No	No	No	No
Logan County	Yes	No	Yes	No	No	Yes	No [†]
Mason County	Yes	Yes	Yes	No	No	No	No
Wayne County	Yes	No	Yes	No	No	No	No
City of Huntington	Yes	Yes	Yes	Yes	Yes	No	No
* Exceeds the minimum standards of NFIP Requirements							
[†] No, but willing to consider for future projects							

Administrative and Technical Capability

Administrative capability is described by an adequacy of departmental and personnel resources for the implementation of mitigation-related activities. Technical capability relates to an adequacy of knowledge and technical expertise of local government employees or the ability to contract outside resources for this expertise to effectively execute mitigation activities. Common examples of skill sets and technical personnel for hazard mitigation include planners with knowledge of land development/management practices, engineers or professionals trained in construction practices related to buildings and/or infrastructure (e.g., building inspectors), planners or engineers with an understanding of natural and/or human caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in geographic information systems, resource development staff or grant writers, and fiscal staff to handle complex grant application processes.

Fiscal Capability

The decision and capacity to implement mitigation-related activities is often strongly dependent on the presence of local financial resources. While some mitigation actions are less costly than others, it is important that money is available locally to implement policies and projects. Financial resources are particularly important if communities are trying to take advantage of state or federal mitigation grant funding opportunities that require local-match contributions. Federal programs which may provide financial support for mitigation activities include, but are not limited to:

- Community Development Block Grant (CDBG),
- Disaster Housing Program,
- Emergency Conservation Program,
- Emergency Management Performance Grants (EMPG),
- Emergency Watershed Protection Program,
- Hazard Mitigation Grant Program (HMGP),
- Flood Mitigation Assistance Program,
- Non-Insured Crop Disaster Assistance Program,
- Pre-Disaster Mitigation Program,
- Repetitive Flood Claims Program (RFC),
- Section 108 Loan Guarantee Programs,
- Severe Repetitive Loss (SRL) Program, and
- Weatherization Assistance Program.

Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard events. The adoption of hazard mitigation measures may be seen as an impediment to growth and economic development. In many cases, mitigation may not generate interest among local officials when compared with competing priorities. Therefore, the local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions.

Self-Assessment

Representing the largest jurisdictions in Region 2, committee members completed a self-assessment for their jurisdictions to serve as representative capabilities within the

region to effectively implement hazard mitigation activities. As part of this process, the Region 2 consultant encouraged members to consider barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. In response to the survey questionnaire, local officials classified each of the capabilities as either “limited,” “moderate,” or “high.” [Table 1.2.9.C](#) summarizes the results of the self-assessment survey as a percentage of the eight responses received.

TABLE 1.2.9.B CAPABILITY SELF-ASSESSMENT			
<i>Capability</i>	<i>Limited</i>	<i>Moderate</i>	<i>High</i>
Planning & Regulatory	25%	75%	0%
Administrative & Technical	25%	62.5%	12.5%
Fiscal	62.5%	37.5%	0%
Political	25%	37.5%	37.5%

The 2017 self-assessment also included four questions to gauge community receptiveness to several types of mitigation strategies. [Table 1.2.9.C](#) details the results.

TABLE 1.2.9.C SELF-ASSESSMENT: PROJECT CONSIDERATIONS					
<i>Sample Mitigation Strategy</i>	<i>Very Much Unwilling</i>	<i>Unwilling</i>	<i>Neutral</i>	<i>Willing</i>	<i>Very Willing</i>
XYZ community guides development away from known hazard areas.	0%	0%	50%	37.5%	12.5%
XYZ community restricts public investments or capital improvements within hazard areas.	0%	12.5%	50%	25%	12.5%
XYZ community enforces local development standards (e.g., building codes, floodplain management ordinances, etc.) that go beyond minimum state or federal requirements.	0%	0%	37.5%	50%	12.5%
XYZ community offers financial incentives (e.g., through property tax credits) to individuals and businesses that employ resilient construction techniques (e.g., voluntarily elevate structures, employ landscape designs that establish buffers, install green infrastructure elements, etc.).	0%	12.5%	62.5%	25%	0%

1.2.10 Disaster and Emergency Declarations

When a hazard incident occurs in a state, and the capabilities exceed those of the state, after the preliminary damage assessment, the Governor can request that the President declare an emergency or a disaster.

- **Emergency Declarations:** The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed.

Emergency declarations supplement State and local or Indian tribal government efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States. The total amount of assistance provided for in a single emergency may not exceed \$5 million. The President shall report to Congress if this amount is exceeded.

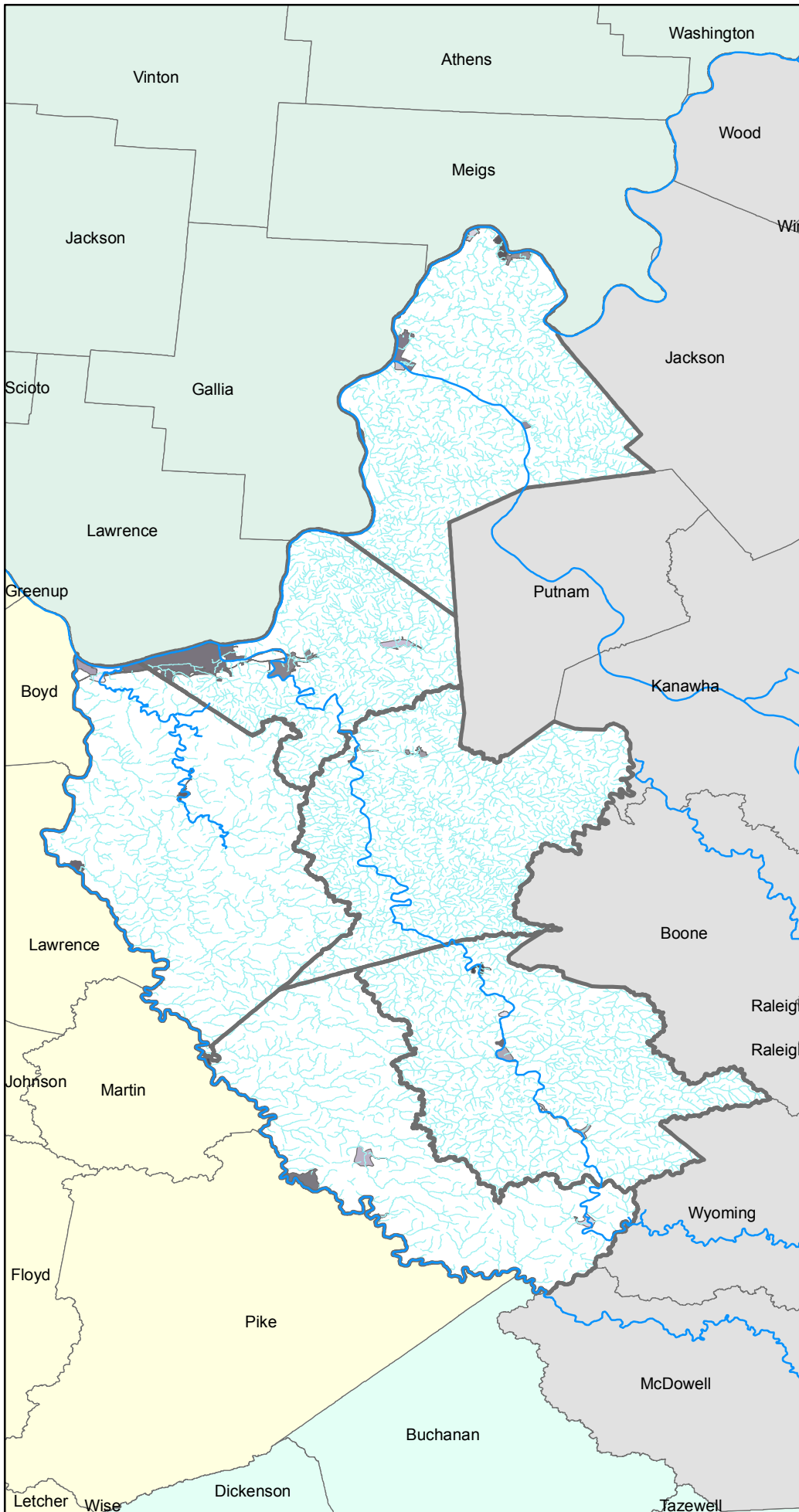
- **Major Disaster Declarations:** The President can declare a major disaster for any natural event, including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought, or, regardless of cause, fire, flood, or explosion, that the President determines has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. Assistance available under a major disaster declaration includes individual, public, and hazard mitigation.

West Virginia is no stranger to emergency and disaster declarations. The majority of the declarations that the state has had are due to severe storms and flooding. The table below outlines the declarations in Region 2 counties alone since 2009.

TABLE 1.2.10.A DISASTER DECLARATIONS IN REGION 2 COUNTIES				
<i>Declaration</i>	<i>Event Type</i>	<i>Incident Dates</i>	<i>Region 2 Counties Affected</i>	<i>Public Assistance*</i>
DR-4273	Severe Storms, Flooding, Landslides, and Mudslides	June 22, 2016 to June 29, 2016	Lincoln Wayne	\$116,188,107.02
DR-4236	Severe Storms, Straight-Line Winds, Flooding, Landslides, and Mudslides	July 10, 2015 to July 14, 2015	Lincoln Logan	\$9,113,323.58 \$22.77 per capita (Lincoln) \$15.65 per capita (Logan)
DR-4221	Severe Storms, Flooding, Landslides, and Mudslides	April 13, 2015 to April 15, 2015	Cabell	\$7,644,017.36 \$35.50 per capita (Cabell)
DR-4219	Severe Storms, Flooding, Landslides, and Mudslides	April 3, 2015 to April 5, 2015	Cabell Lincoln Logan Mingo Wayne	\$10,325,632.06 \$10.42 per capita (Cabell) \$113.29 per capita (Lincoln) \$19.02 per capita (Logan) \$10.22 per capita (Mingo)

TABLE 1.2.10.A DISASTER DECLARATIONS IN REGION 2 COUNTIES				
<i>Declaration</i>	<i>Event Type</i>	<i>Incident Dates</i>	<i>Region 2 Counties Affected</i>	<i>Public Assistance*</i>
				\$97.72 per capita (Wayne)
DR-4210	Severe Winter Storm, Flooding, Landslides, and Mudslides	March 3, 2015 to March 15, 2015	Cabell Lincoln Logan Mingo Wayne	\$32,442,296.53 \$32.87 per capita (Cabell) \$185.66 per capita (Lincoln) \$28.47 per capita (Logan) \$119.70 per capita (Mingo) \$51.05 per capita (Wayne)
EM-3366	Chemical Spill	January 9, 2014 to January 20, 2014	Cabell Lincoln Logan	\$1,639,099.39 \$0.09 per capita (Cabell) \$1.53 per capita (Lincoln) \$0.05 per capita (Logan)
DR-4132	Severe Storms and Flooding	June 13, 2013	Mason	\$3,503,873.80
EM-3358	Hurricane Sandy	October 29, 2012 to November 8, 2012	Cabell Lincoln Logan Mason Mingo Wayne	\$19,645.54
DR-4071 EM-3345	Severe Storms and Straight-Line Winds	June 29, 2012 to July 8, 2012	Cabell Lincoln Logan Mason Mingo Wayne	\$11,718,720.76 \$4.06 per capita (Cabell) \$6.82 per capita (Lincoln) \$6.23 per capita (Logan) \$5.87 per capita (Mason) \$7.26 per capita (Mingo) \$4.51 per capita (Wayne)
DR-4061	Severe Storms, Flooding, Mudslides, and Landslides	March 15, 2012 to March 31, 2012	Lincoln Logan Mingo	\$4,261,453.3 \$14.67 per capita (Lincoln) \$65.10 per capita (Logan) \$11.47 per capita (Mingo)
DR-4059	Severe Storms, Tornadoes, Flooding, Mudslides, and Landslides	February 29, 2012 to March 5, 2012	Lincoln Mingo Wayne	\$6,904,030.53 \$10.52 per capita (Lincoln) \$7.45 per capita (Mingo) \$11.06 per capita (Wayne)
DR-1918	Severe Storms, Flooding, Mudslides, and Landslides	June 12, 2010	Logan Mingo	\$5,659,644.93 \$44.71 per capita (Logan) \$25.55 per capita (Mingo)
DR-1881	Severe Winter Storm and Snowstorm	December 18, 2009 to December 20, 2009	Mingo	\$2,944,843.15 \$14.05 per capita (Mingo)

* First amount is total PA for declaration – individual county per capita impact outlined below when available.



REGION 2 HAZARD MITIGATION PLAN

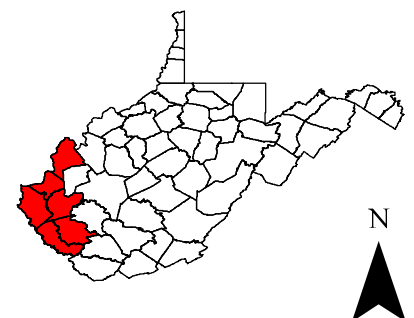
Rivers & Streams Network

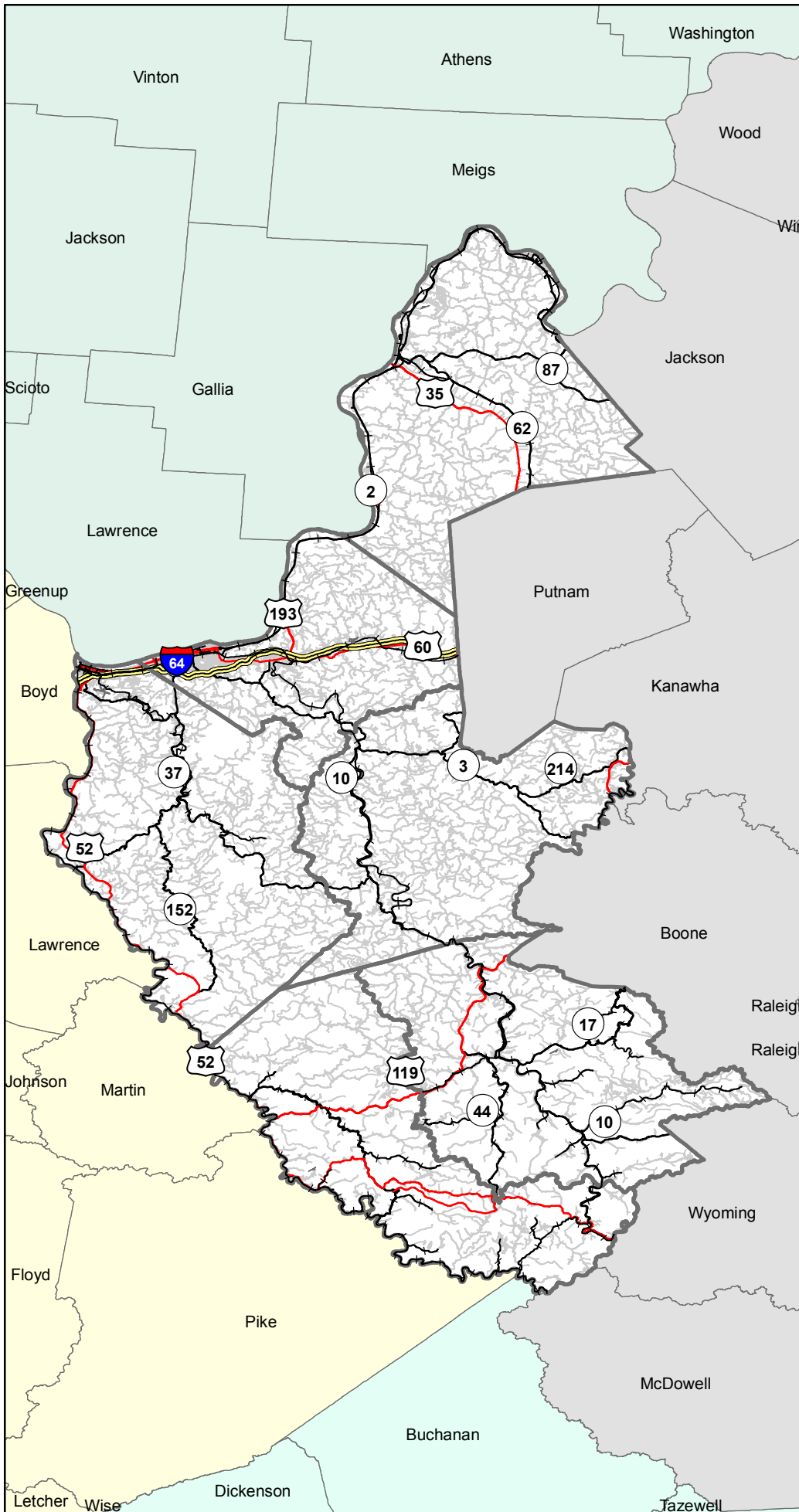
Data Source(s):
US Geological Survey
US Census (Tiger Data)

— Major Rivers
— Streams

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 HAZARD MITIGATION PLAN

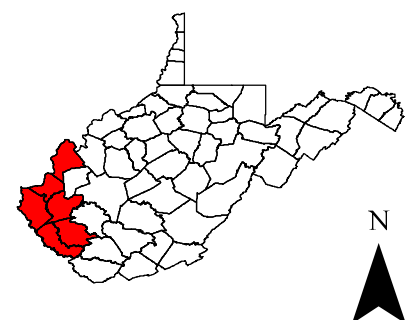
Transportation Network

Data Source(s):
US Census (Tiger Data)

- == Interstate 64
- US Routes
- State Routes

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



2.0 RISK ASSESSMENT

§201.6(c)(2)(i)

[The risk assessment shall include a] description of the...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.

2017 UPDATE

The risk assessment section of this plan has been expanded to include separate profiles for each hazard identified. Description of general risk and vulnerability is included at the beginning of this section and specific risk and vulnerability information is included in each profile; new hazards were identified and included in this update of the plan. In addition to hazard profiles, this section includes a description of complicating variables, the updated jurisdictional asset inventory as well as the development trends of the region. All the information, tables, and maps herein have been updated with the most up-to-date information available.

SECTION OVERVIEW

A risk assessment analyzes “the potential for damage, loss, or other impacts created by the interaction of hazards with community assets” (FEMA, 2013). The risk assessment section contains information on

- identified hazards that threaten the region in profiles,
- the vulnerability of the area as it relates to its assets,
- a list of community assets for Region 2, and
- an analysis of planned development.

2.1 RISK AND VULNERABILITY

§201.6(c)(2)(i)

[The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.

§201.6(c)(2)(i)

[The risk assessment shall include a] description of the...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.

2.1.1 Risk

One of the components of the risk assessment is determining both the probability of a hazard occurring and the potential severity of that hazard event. This process helps identify which hazards pose the most significant risk to Region 2 and its municipalities. The probability and severity of an event are largely based on historical research. The probability of an event happening is determined based on the number of events that have occurred within a certain timeframe. The timeframe is based on information available from different resources and varies depending on the data. Different sources provide data on the number of events throughout a period of years. This data is used to calculate probability.

The probability of occurrence is broken down into five categories as seen in the table to the right. The chance of occurrence of a hazard within the next year can be quantified based on historical data. This can be expressed in a numerical measure or as a percentage of 0-100 percent. It is calculated by adding the total occurrences of a specific hazard and dividing it by the years of data. For example, if there have been seven earthquakes in a region between 1950 and 2016 (66 years), the quantitative probability would be calculated by dividing seven events by 66 years. The result would be 0.10 or 10% chance of earthquake, roughly one every ten years. The percentage would then indicate an 'improbable' probability of occurrence, based on the information presented in the table above. This formula for calculating probability will be used when appropriate (i.e. historical data is available).

TABLE 2.2.1.A. PROBABILITY		
<i>Value</i>	<i>Description</i>	<i>Definition</i>
1.1+ (101%)	Frequent	Will occur several times during a year
.76 – 1.0 (76 – 100%)	Probable	Likely to occur a few times in a year
.51 - .75 (51 – 75%)	Occasional	Likely to occur sometime during a year
.26 - .50 (26 – 50%)	Remote	Unlikely to occur in a year
0 - .25 (0 – 25%)	Improbable	So unlikely that it can be assumed it will not occur in a year

$$\frac{\text{Number of events}}{\text{Number of years}} = \text{Probability} \quad \text{OR} \quad \frac{7}{66} = .101 \quad \text{OR} \quad 1 \text{ time every 10 years}$$

Although some hazards have zero recorded occurrences, the risk still exists. Since non-natural hazards generally do not depend on weather patterns to occur, they are not informed by this type of historical data. Non-natural and technological hazards are nearly impossible to assign a measurement of probability.

The severity of an event is based on three main factors: 1) the historical deaths, injuries, and property/crop damage; 2) the extent of potential secondary and/or cascading impacts of the hazard and; 3) the potentially impacted geographic area as determined through risk mapping. Generally, the severity estimations will be less exact than probability estimations. The four classifications of severity are shown above on the right.

TABLE 2.2.1.B. SEVERITY	
<i>Description</i>	<i>Definition</i>
Catastrophic	Death or major structural loss
Critical	Severe injury, severe illness, or marginal structural damage
Marginal	Minor injury, minor illness, or structural damage
Negligible	Less than minor injury, illness or structural damage

The combination of hazard probability and hazard severity results are shown in a table known as the Risk Assessment Matrix. There are many definitions for the level of risk (i.e. low or very low, high or very high); for the purposes of this plan, the determinations are made to follow the *2013 West Virginia Statewide Hazard Mitigation Plan Update* document so as to align this regional plan with the state's plan. The matrix is designed to show the hazards that are of most concern to Region 2 and its municipalities. Each profile details the level of severity and probability, therefore generating the level of risk.

TABLE 2.2.1.C. RISK ASSESSMENT MATRIX						
		PROBABILITY				
		<i>Frequent</i>	<i>Probable</i>	<i>Occasional</i>	<i>Remote</i>	<i>Improbable</i>
SEVERITY	<i>Catastrophic</i>	High	High	Medium High	Medium	Medium Low
	<i>Critical</i>	Medium High	Medium High	Medium	Medium Low	Low
	<i>Marginal</i>	Medium High	Medium	Medium Low	Low	Low
	<i>Negligible</i>	Medium	Medium Low	Medium Low	Low	Low

2.1.2 Vulnerability

Vulnerability is a “measure of propensity of an object, area, individual, group, community, country, or other entity to incur the consequences of a hazard” (Coppola, 2015, p. 33). There are many aspects that contribute to the vulnerability of a people; these can include income disparity, class, race or ethnicity, gender, age, disability, health, and literacy (Thomas & Phillips, 2013, p. 2, 3). The following is a brief description of how each of the aspects can contribute to vulnerability to disasters.

- **Income Disparity:** Income disparities produce different outcomes from disasters that can cause more human suffering, and requiring more external support.
- **Class:** Lower-income families tend to live in housing that suffers disproportionately during disasters.
- **Race or Ethnicity:** Warning messages tend to be issued in the dominant language with an expectation that people will take the recommended action immediately.
- **Gender:** Domestic and stranger violence increases after a disaster. Although women tend to be the ones most likely to secure relief aid for the family, they are underrepresented and underused in recovery efforts.
- **Age:** Elderly populations are frequently reluctant to seek assistance before and secure aid after a disaster out of concern that they may lose their independence.
- **Disability:** People with disabilities experience challenges in acquiring transportation to evacuate areas as well as to access appropriate shelters and post-disaster housing.
- **Health:** Disasters can disrupt access to care. Individuals on health services are faced with life threatening circumstances if these services cannot be accessed. Disasters tend to exasperate chronic and mental health conditions.
- **Literacy:** Many emergency preparedness materials are available in written form. Few options exist for people with low reading levels, other languages, or cognitive abilities.

2.1.3 Specific Region 2 Vulnerability

In the counties in Region 2 there are additional issues that make the geographical area vulnerable in one way or another. The following are two major issues that came up in meetings throughout the planning process.

- **Lack of or Limited Internet Access:** Of all 50 states, West Virginia ranks at 45 of

most connectivity. The table to the right shows broadband coverage in each county in Region 2; it describes the amount of coverage by percentage of access to 25 MBPS (megabytes per second), 100 MBPS, or one gigabit (GIG). On average, 70.5% of the region has access to at least 25 MBPS. However, the more MPBS, the less accessibility the region has, only 66.2% have access to 100+ MPBS and only 21.9% to 1 GIG, which is better than the state average of 6.9% access to 1 GIG. For a full list of providers in this area, refer to [Section 1.2.7 Regional Infrastructure](#).

County	25+ MBPS	100+ MPBS	1 GIG
Cabell	91.4%	91.4%	19.4%
Lincoln	76.3%	59.2%	9.1%
Logan	64.1%	64.1%	10.9%
Mason	47.4%	47.4%	47.2%
Mingo	65.7%	63.2%	12.7%
Wayne	78.6%	72.4%	32.6%

Source: BroadbandNow

- **Power Outages:** Extended power outages from severe weather events in the region can cause problems if not corrected. Many critical facilities do not have a backup power generator on site and rely on grid power. Not having generators at critical facilities such as emergency operations centers, fire stations, hospitals and clinics, law enforcement buildings, water and sewer treatment plants and key pump stations, and essential government facilities, makes response to emergencies and sustaining of life services a difficult if not an impossible task.

2.2 HAZARD PROFILES

§201.6(c)(2)(i) [The risk assessment shall include a] description of the...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.

A variety of natural and human-caused profiles were analyzed for inclusion in this plan. The following is a list of the hazards that were analyzed and how they are included or why they are excluded from this plan. Those included are described in the profiles in the following sections.

TABLE 2.2.A HAZARD INCLUSIONS AND EXCLUSIONS			
<i>Hazard</i>	<i>Type</i>	<i>Status</i>	<i>Description</i>
Avalanche	Natural	Not Included	Avalanches happen mainly in the western United States and Canada (Keller, Devecchio, 2015 p. 229).
Acts of Violence	Human-caused	Included	See Section 2.2.5
Coastal Erosion	Natural	Not Included	The Atlantic East Coast, where coastal erosion is nearest, is approximately 350 miles away and the Pacific West Coast is approximately 2,200 miles away (Google Earth).
Dam & Floodwall Failure	Natural	Included	See Section 2.2.10
Drought	Natural	Included	See Section 2.2.12
Earthquake	Natural	Included	See Section 2.2.11
Extreme Temperatures	Natural	Included	See Section 2.2.7
Flood	Natural	Included	See Section 2.2.2
Hail	Natural	Included	See Section 2.2.3
Hazardous Materials	Human-caused	Included	See Section 2.2.6
Hurricanes	Natural	Not Included	The Atlantic East Coast, where hurricane paths are nearest, is approximately 350 miles away and the Pacific West Coast is approximately 2,200 miles away (Google Earth).
Landslide	Natural	Included	See Section 2.2.8
Lightning	Natural	Included	See Section 2.2.3
Opioid Crisis	Human-caused	Included	See Section 2.2.1
Sea Level Rise	Natural	Not Included	Sea level rise occurs in the ocean; the Atlantic East Coast is approximately 350 miles away and the Pacific West Coast is approximately 2,200 miles away (Google Earth).
Storm Surge	Natural	Not Included	Storm surges occur in the ocean; the Atlantic East Coast is approximately 350 miles away and the Pacific West Coast is approximately 2,200 miles away (Google Earth).
Tornado	Natural	Included	See Section 2.2.3
Tsunamis	Natural	Not Included	The Atlantic East Coast, where tsunamis would be closest, is approximately 350 miles away and the Pacific West Coast is approximately 2,200 miles away (Google Earth).

TABLE 2.2.A HAZARD INCLUSIONS AND EXCLUSIONS			
<i>Hazard</i>	<i>Type</i>	<i>Status</i>	<i>Description</i>
Wind	Natural	Included	See Section 2.2.3
Winter Weather	Natural	Included	See Section 2.2.4
Wildfire	Natural	Included	See Section 2.2.9
Volcanoes	Natural	Not Included	The closest monitored volcano is in Yellowstone National Park in Wyoming (USGS) and is approximately 1,550 miles away (Google Earth).

The following table contains a summary of all the hazards analyzed in this plan. This is a summary of the analysis conducted in the profile hazards. For detailed information, refer to each hazard profile. Data within the table includes the following information:

- **Period of Occurrence:** The typical time of the year events of this type can occur.
- **Warning Time:** The amount of time that passes from when the event is detected to when it occurs.
- **Number of Years:** Actual number of years data is available based on the 'record years'.
- **Number of Events:** The times an event has occurred within the timeframe of the 'number of years' according to the sources.
- **Probability:** The calculation of occurrence of a certain event based on number of years and number of events.
- **Severity:** Based on historical impacts, damages, injuries and deaths.
- **Risk:** Very low, low, medium, high, or very high based on the risk assessment matrix.
- **Loss Estimate:** Amount in dollars of damages to property or cost of repair.

2.2.B HAZARD SNAPSHOTS

<i>Hazard</i>	<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Number of Years</i>	<i>Number of Events</i>	<i>Probability</i>	<i>Severity</i>	<i>Risk</i>	<i>Loss Estimate</i>
Opium Crisis	At any time.	Weeks to months to see trends go up or down.	N/A	N/A	Frequent	Catastrophic	High	\$99 million in West Virginia for health care costs alone.
Flood	At any time, typically following periods of extended precipitation such as rain and snow.	Days to hours, for floods, hours to minutes for flash floods.	57	290	Frequent	Critical	Medium High	\$109.5 million since 1966 per NCEI.
Severe Summer Weather	Typically during the summer months of the year	Days	62	2,367	Frequent	Critical	Medium High	Over \$20 million since 1996 per NCEI.
Severe Winter Weather	Typically during the winter months of the year.	Days	21	49	Frequent	Critical	Medium High	Approximately \$5 million since 1996 per NCEI
Acts of Violence	At any time.	N/A	11	29,906	Frequent	Critical	Medium High	Approximately \$50 per day per prisoner.
Hazmat	At any time.	Minutes if at fixed facilities, little to no warning time during transportation.	18	457	Frequent	Marginal	Medium High	Over \$2 million since 2000 per PHMSA.
Extreme Temperatures	At any time throughout the year when temperatures are 10 degrees F above or below the normal temperatures for 10 of more days.	Days to weeks	21	46	Frequent	Marginal	Medium High	Less than \$1 million since 1996 per NCEI.
Land Movements	At any time, possibly exacerbated by periods of extended precipitation.	Days to hours	N/A	N/A	Probable	Critical	Medium High	N/A
Wildfires	At any time, typically during hotter, dryer months of the year.	Minutes	9	1,747	Frequent	Negligible	Medium	\$7,507 per fire
Dam & Floodwall Failure	At any time, typically after periods of extended precipitation.	Months, weeks, days, hours depending on state of dam or floodwall.	N/A	N/A	Improbable	Critical	Low	\$292,630,000 for replacement cost only

2.2.B HAZARD SNAPSHOTS

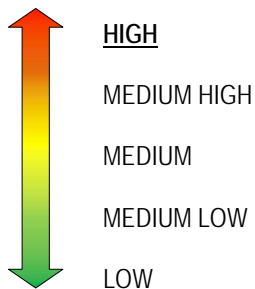
<i>Hazard</i>	<i>Period of Occurrence</i>	<i>Warning Time</i>	<i>Number of Years</i>	<i>Number of Events</i>	<i>Probability</i>	<i>Severity</i>	<i>Risk</i>	<i>Loss Estimate</i>
Earthquake	At any time.	None.	N/A	N/A	Improbable	Marginal	Low	Average of \$631 million in damages per county per HAZUS
Drought	At any time throughout the year, typically after extended periods of no or very low precipitation.	Weeks to months.	17	1	Improbable	Negligible	Low	Mainly agricultural losses

The following sections contain a profile of each hazard considered by this plan, which provides details on how the hazard impacts the area. Within each profile, research and historical data informs the following elements.

- **Hazard Overview:** Defines the hazard.
- **Possible Causes:** Describes a variety of causes that can contribute to the occurrence of a hazard.
- **Location & Extent:** Identifies the physical places in the region that are vulnerable to the hazard and the severity of a hazard in a given location.
- **Historical Occurrences:** Summarizes significant past events related to the hazard.
- **Committee Input:** Describes instances where committee members voiced concerns about the hazard or talked about previous mitigation efforts.
- **Impact & Vulnerability:** Describes impacts on different topics such as health, the environment, or infrastructure that may result from the hazard as well as specific populations that may be vulnerable.
- **Loss & Damages:** Outlines the methods used for loss amounts (of deaths, injury and/or property damage depending on information available) and estimates based on historical information and vulnerable populations, structures, and infrastructure.
- **Risk Calculations:** Detailed methods of calculating probability and severity of each hazard.
- **Risk Map:** Graphically shows the geographic locations in the counties that are vulnerable to each hazard when appropriate.

The profiles in the following section are organized by most frequent and catastrophic to most improbable and negligible in severity.

2.2.1 OPIOID CRISIS



"Opioids are a class of drugs that include the illegal drug heroin, synthetic opioids such as fentanyl, and pain relievers available legally by prescription, such as oxycodone hydrocodone, codeine, morphine, and many others".

- National Institute on Drug Abuse

HAZARD OVERVIEW

In the United States, what is commonly referred to as the 'opioid epidemic', not for being a spreadable or infectious disease, but by acting like one, has grown to alarming proportions. In 2015 alone, 12.5 million people misused prescription opioids. Opioids are drugs that are primarily used for pain relief; they include both legal and illegal substances. Legal, prescribed opioids include oxycodone, hydrocodone, and morphine. Illegal drugs include substances such as heroin and fentanyl. According to the Department of Health and Human Services, 2.1 million people misused prescription opioids for the first time, over 33K people died from overdosing on opioids; over 15K deaths were attributed to overdosing on commonly prescribed opioids. Around 828K people used heroin, 135K for the first time, and around 20K deaths were attributed to overdoses of synthetic opioids or heroin (DHHS, 2017).

The Centers for Disease Control and Prevention conduct studies on prescribing rates. Some of the findings include the following.

- After a steady increase in the overall national opioid prescribing rate from 2006, the total number of prescriptions dispensed peaked in 2012 at more than 255 million and a prescribing rate of 81.3 prescriptions per 100 persons.
- The overall national opioid prescribing rate declined from 2012 to 2016, and in 2016, the prescribing rate had fallen to the lowest it had been in more than 10 years at 66.5 prescriptions per 100 persons (over 214 million total opioid prescriptions).
- However, in 2016, prescribing rates continue to remain very high in areas across the country.
 - In about a quarter of U.S. counties, enough opioid prescriptions were dispensed for every person to have one.
 - While the overall opioid prescribing rate in 2016 was 66.5 prescriptions per 100

people, some counties had rates that were seven times higher than that.

- Prescribing rates for opioids vary widely across different states and counties. Emerging hotspot areas are identified by the darker colors on the maps.

Like many of the Eastern states, West Virginia sees problems with marijuana cultivation and consumption and abuse of pharmaceutical prescription drugs such as oxycodone, hydrocodone, methadone and Xanax. Other types of drugs include cocaine in both its powder and crack cocaine forms, and heroin. Very often, inner cities suffer from crack cocaine. In West Virginia, rural areas are the hardest hit by both crack use and the violence that accompanies it. Most heroin use is seen in the northern and central part of the state (Narconon, n.d.).

In general, there are a few different ways to acquire prescription drugs. According to the CDC, the sources, outlined from highest to lowest, are as follows:

- Given by a friend or relative for free
- Prescribed by a physician
- Bought from a friend or relative
- Bought from a drug dealer or stranger
- Stolen from a friend or relative
- Other

What this information indicates, is that the problem of consumption of prescription drugs is in fact not caused by purchasing drugs from strangers, but from acquiring them from addicts' own families and friends.

POSSIBLE CAUSES

There are a number of possible reasons why the population has increased their use of opioids. One simple explanation may be that it is easier to get high than it is to get help (Lopez, 2017). This is the culmination of various broken or dysfunctional systems in our society today. The following is a brief description of some of the reasons German Lopez identifies in his article *The opioid epidemic, explained* about why there has been an increase in the use of opioids in the U.S.

- Pharmaceutical companies market their drugs as safe and effective and spend large amounts of money on lobbyists in Washington.

- Doctors are pressured to treat pain more seriously and treat patients rapidly, often times resulting in overprescribing drugs, done with incentives from drug companies.
- Patients with chronic pain issues likely could benefit from alternative, non-opioid treatments but rarely do so due to high costs of or no coverage by health insurance.
- Losing access to legally prescribed painkillers, over time, contributed to the increase in use of illegal drugs such as heroin and fentanyl. A study by JAMA Psychiatry in 2014 found that 75% of heroin users in treatment started with painkillers, while the Centers for Disease Control (CDC) found in 2015 that people who are addicted to painkillers are 40 times more likely to be addicted to heroin.
- As the demand for painkillers increased, so did the demand for heroin; this allowed for people that were not addicted to painkillers before to have easier access. Painkillers at the same time have become less accessible due to the crack down on excessive prescriptions.
- Heroin is stronger (more addictive) than painkillers and fentanyl is stronger than heroin.

Doctors have reported that the composition of patients in addiction programs switched from 90% alcoholism in the 1990s to between 90% and 95% prescription painkiller addiction by 2002 (Jacobs, 2016) showing a social shift from addiction to alcohol to stronger substances like drugs.

Another explanation for the problem is a social and economic one. Many areas of the U.S., both rural and urban, find that unemployment, poverty and crime go hand in hand. Methamphetamine manufacturing in the home, garage, shack or even a moving car may increase in an area that has recently lost jobs and incomes. Meth is so easy to make, if one can acquire the materials necessary, some of which are illegal, that it can be a hard temptation to resist.

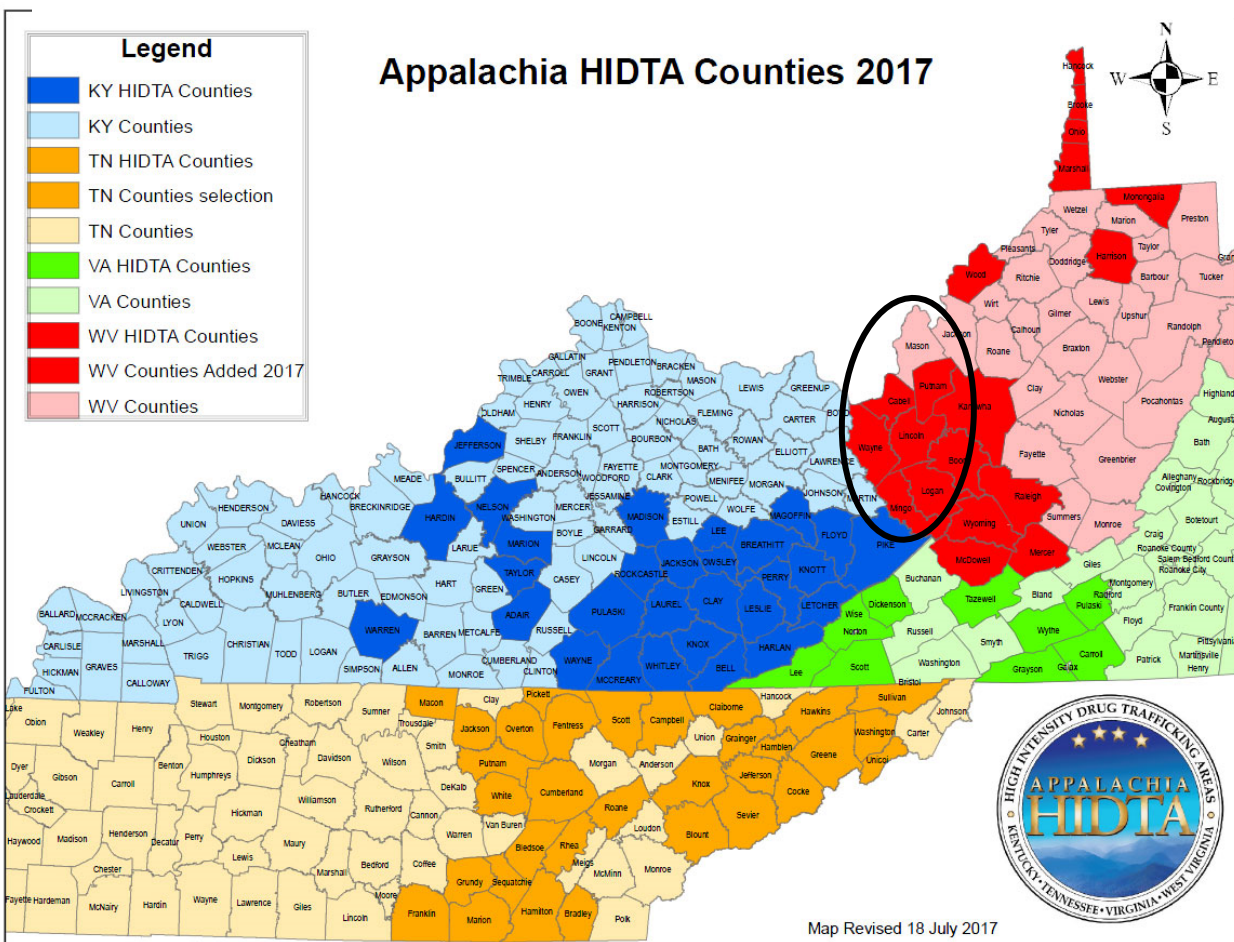
In addition to poverty and unemployment, West Virginia also sees high levels of adult illiteracy, broken families, teenage pregnancy and public corruption. These conditions plus a long-established tradition of illegal alcohol production create a tolerant atmosphere for illegal drug activities among some citizens (Narconon, n.d.). Low education levels, high rates of unemployment and job-related injuries are closely linked to abuse of alcohol, illicit drugs and prescription medications (Jacobs, 2016).

Recently, new regulations on mining methods have restricted the number of new

mines that can be opened. Thus more jobs and income to local communities are restricted or lost. Not surprisingly, the pattern of coal mines in West Virginia roughly matches the location of the state's High Intensity Drug Trafficking Areas (HIDTA) (Narconon, n.d.).

HIDTA is a drug enforcement program from the U.S. Office of National Drug Control Policy. There are several areas of geographical concentration; West Virginia falls under the Appalachia HIDTA along with Kentucky, Tennessee, and Virginia.

The 2017 Appalachia HIDTA map is shown below; the red counties correspond to those in West Virginia. In 2017, all counties in Region 2 except Mason County are considered to be HIDTAs; they mostly concentrate to the southwestern part of the state, northern panhandle and select counties along the I-79 corridor. The planning area is identified in the circle.



LOCATION & EXTENT

The opioid epidemic is one that has, in some way, reached into the lives of nearly

every person in the U.S. This “disease” does not have a preference for age, class, economic status, or even gender. It is difficult to pinpoint a specific location of this epidemic. However, the CDC maintains data on states’ and counties’ prescription rates.

From West Virginia, it’s easy to take the Interstates to Philadelphia, Baltimore, Pittsburgh or Washington, D.C. to obtain stocks of cocaine and heroin to sell to West Virginians (Narconon, n.d.). In committee meetings, members mentioned direct connections to places as far as Detroit, MI.

HISTORICAL OCCURRENCES

The Centers for Disease Control and Prevention maintain data relating to drug overdose death rates in the United States. In West Virginia, from 2013 to 2014 there was a 10.6% increase in deaths, and from 2014 to 2015, there was a 16.9% increase in deaths. West Virginia also has a high number of opioid prescriptions; between 96 and 143 prescriptions per 100 people – that’s more than one per person (CDC, 2017).

On December 15, 2017, the Governor of West Virginia ordered the West Virginia National Guard to provide more resources to assist the counter-narcotics program in Huntington by providing patrol of the city to free up resources for law enforcement. This came after the Huntington Police Department started its 19th homicide investigation this year, averaging more than one per month (Pierson & Zuckerman, 2017).

The County Health Rankings and Roadmaps website keeps track of how healthy a community is with the goal of building awareness about health. The table to the right shows the available data by county since 2014 of overdose deaths by county.

TABLE 2.2.1.A OVERDOSE DEATHS BY COUNTY					
County	2014	2015	2016	2017	Total
Cabell	167	201	125	177	670
Lincoln	46	58	22	24	150
Logan	103	116	57	65	341
Mason	40	45	26	26	137
Mingo	68	94	55	50	267
Wayne	52	73	48	52	225
Total	476	587	333	394	1,790

Source: County Health Rankings & Roadmaps

COMMITTEE INPUT

During committee and public meetings, committee members expressed concern about specific problems in their areas. The following is a summary of problems and what has been done so far to begin to mitigate the hazard.

- Cabell County: The crisis is growing and continues to overwhelm resources. It has caused deaths, first responder burnouts, and crime rates to rise, family disruption

and socio-economic problems. Needle give-away programs and quick response teams have been established.

- Lincoln County: There has been a toll on human, financial, and public assets due to the opioid crisis. Awareness campaigns and educational activities have been implemented. First responders respond to individual cases.

SOCIAL VULNERABILITY

There is very little population in West Virginia that can say that the drug and opioid crisis has not affected them, their friends, families, or someone they know. Addiction knows no economic, social, or educational boundaries.

LOSS & DAMAGES

According to a Matrix Global Advisors report in 2015, the health care cost of the opioid abuse crisis in West Virginia is of over \$99 million, accounting for around 0.4% of the total health care costs in the state, and a per capita health care cost of \$54. These calculations accounted for the population, cost of health care in the state, and the rate of opioid abuse.

The Council of Economic Advisers estimated the cost of the opioid crisis in 2015 to be around \$504 billion which took healthcare bills, criminal justice costs, and lost productivity into consideration (LaMagna, 2017).

- **Hospitals:** The Beth Israel Deaconess Medical Center in Boston studied the average cost of treating an opioid overdose patient in intensive care units. They found that the cost between 2009 and 2015 rose 58%. The average cost was around \$92K per patient.
- **Criminal Justice:** state and local governments have incurred costs of nearly \$8B in criminal justice-related activities. Around 45% of addicts will become repeat offenders within three years from their prison release.
- **Businesses:** Absenteeism and decreased job performance due to drug use has cost companies around \$20 billion.
- **Unseen costs:** Other costs related to drug overdoses that are difficult to quantify include impact on the quality of life, the pain endured by the people affected, loss of tax revenue, etc.

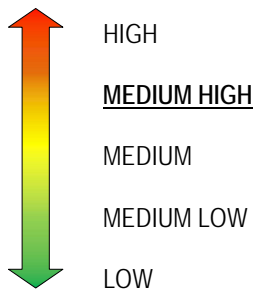
RISK CALCULATION

Several counties in the Region 2 Planning and Development Council consider the opioid crisis to be at the top of their list of hazards for their counties, second only to flooding.

TABLE 2.2.1.B OPIOID CRISIS RISK CALCULATION				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
FREQUENT		CATASTROPHIC		HIGH
Given that there are well over 300 deaths in the region every year – more than one a day – this hazard is frequent.	+	The severity definition table describes catastrophic as having a death or major structural loss. With the opioid epidemic, there is rarely if ever a structural loss. However, this hazard has claimed several lives.	=	The risk assessment matrix graphs the catastrophic severity and frequent occurrence of this hazard as a high risk to the county.



2.2.2 FLOOD



Flood is “a general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties”.

- FEMA

HAZARD OVERVIEW

Flooding and flash flooding are the top natural hazards that affect Region 2. Flooding is one of the most frequent of the natural hazards faced by communities across the country as well as one of the most costly. West Virginia is no stranger to flooding; in fact, it is the number one natural hazard in the state. The topography of the region is mountainous with many valleys and gorges with rivers and streams, making the region prone to flooding activity. There are several types of flood, each with their own characteristics and related dangers.

- **River Floods** typically develop over a period of days and occur when a river gradually rises and overflows its banks. These floods can be attributed to large amounts of rain or snowmelt both in the region impacted and upstream. Due to their nature of gradually building up, these types of floods will typically have a warning period of a few days.
- **Flash Floods** are the most common severe weather emergency in the United States according to the National Flood Insurance Program (NFIP) (2016). The NFIP also states that a flash flood is defined as, “a rapid flooding of low-lying areas in less than six hours, which is caused by intense rainfall from a thunderstorm or several thunderstorms” (2016).
- **Dam Failures** are the third type of flooding; this is discussed in more detail in [Section 2.2.4 Dam Failure](#).
- **Nuisance Flooding** is a repetitive type of flooding that doesn't cause much damage, but is an inconvenience because water levels rise and fall quickly. Nuisance flooding is typically localized and caused by old or inadequate infrastructure.

The NFIP is a governmental program administered through FEMA that, “aims to reduce impact on private and public structures... by providing affordable insurance to property owners and by encouraging communities to adopt and enforce floodplain management regulations” (FEMA). Each jurisdiction participating in the NFIP has a designated NFIP coordinator, sometimes referred to as the floodplain manager. This individual maintains the jurisdiction’s floodplain ordinance and ensures that development is compliant with that ordinance. Each local floodplain manager serves as the point of contact with FEMA regarding floodplain mapping. For more information on how each jurisdiction participates in the NFIP, refer to [Appendix 2 Committee Meetings](#).

The Community Rating System (CRS) is an additional program run by the NFIP to encourage additional community activities that exceed minimum NFIP requirements, with the goal of reducing flood risk. By participating in the CRS, a community can receive discounted flood insurance premiums. As of the latest published list of CRS communities in October of 2016, no counties or jurisdictions in Region 2 are participants.

TABLE 2.2.2.A JURISDICTIONS PARTICIPATING IN NFIP				
<i>Jurisdiction</i>	<i>Initial FHBM Identified</i>	<i>Initial FIRM Identified</i>	<i>Current Effective Map Date</i>	<i>Reg-Emer Date</i>
Cabell County	04/25/1975	09/30/1987	02/19/2014	09/30/1987
Barboursville	5/31/1974	06/03/1988	01/19/2017	06/03/1988
Huntington	05/06/1977	01/17/1990	02/19/2014	08/17/1981
Milton	05/06/1974	09/30/1987	06/16/2005	09/30/1987
Lincoln County	07/18/1975	09/18/1987	10/16/2013	09/18/1987
Hamlin	04/17/1974	09/14/1987	10/16/2013	09/04/1987
West Hamlin	05/31/1974	09/04/1987	10/16/2013	09/04/1987
Logan County	N/A	04/07/1972	02/06/2008	04/07/1972
Chapmanville	02/09/1971	08/27/1971	02/06/2008	08/27/1971
Logan	02/09/1971	07/16/1971	02/06/2008	07/16/1971
Man	09/15/1971	09/10/1971	02/02/2008	09/10/1971
Mitchell Heights	08/17/1971	08/13/1971	02/06/2008	08/13/1971
West Logan	06/03/1972	06/02/1972	02/06/2008	06/02/1972
Mason County	04/25/1975	01/02/1980	12/03/2013	01/02/1980
Hartford	11/22/1974	02/15/1978	12/03/2013	02/15/1978
Henderson	12/27/1974	05/15/1978	12/03/2013	05/15/1978
Leon	09/06/1974	08/15/1978	12/03/2013	08/15/1978
Mason	11/15/1974	02/15/1978	12/03/2013	02/05/1978
New Haven	11/15/1974	07/03/1978	12/03/2013	07/03/1978
Point Pleasant	02/07/1975	05/15/1978	12/03/2013	05/15/1978
Mingo County	12/20/1974	12/02/1980	08/17/2016	12/02/1980
Delbarton	03/02/1973	03/15/1977	10/02/2012	03/15/1977
Gilbert	05/31/1974	05/02/1977	10/02/2012	05/02/1977
Kermit	01/04/1974	03/01/1978	08/17/2016	03/01/1978
Matewan	N/A	02/03/1970	08/17/2016	02/03/1970
Williamson	05/13/1974	01/16/1981	08/17/2016	01/16/1981

TABLE 2.2.2.A JURISDICTIONS PARTICIPATING IN NFIP				
<i>Jurisdiction</i>	<i>Initial FFBM Identified</i>	<i>Initial FIRM Identified</i>	<i>Current Effective Map Date</i>	<i>Reg-Emer Date</i>
Wayne County	02/21/1975	09/18/1987	09/02/2016	09/18/1987
Ceredo	01/03/1975	05/17/1989	09/02/2016	05/17/1989
Fort Gay	09/13/1974	01/03/1979	09/02/2016	01/03/1979
Kenova	05/03/1974	05/17/1989	09/02/2016	05/17/1989
Wayne	01/10/1975	09/30/1987	01/02/2013	09/30/1987

Source: FEMA NFIP

POSSIBLE CAUSES

According to NOAA, some of the possible causes for flooding include the following.

- **Excessive Rainfall:** This is the most common cause of flooding. Water accumulates quicker than the soil can absorb resulting in flooding.
- **Snowmelt:** It occurs when the major source of water involved is caused by melting snow. Unlike rainfall that can reach the soil almost immediately, the snowpack can store the water for an extended amount of time until temperatures rise above freezing and the snow melts.
- **Ice or Debris Jams:** Common during the winter and spring along rivers, streams and creeks. As ice or debris moves downstream, it may get caught on any sort of obstruction to the water flow. When this occurs, water can be held back, causing upstream flooding. When the jam finally breaks, flash flooding can occur downstream.
- **Dam Breaks or Levee Failure:** Dams can overtop, have excessive seepage or have structural failure. For more information on this topic see [Section 2.2.10 Dam & Floodwall Failure](#).

LOCATION & EXTENT

Historically, flooding has occurred along many of the numerous streams, creeks, and rivers that wind through and around the counties of Region 2. Additional flooding (nuisance flooding) can occur due to inadequate storm drain capacity and/or ground saturation.

More specifically, for example, there are places in the City of Huntington that routinely flood after a quick downpour; many of the streets that cross the rail line under the tracks flood and do not allow for traffic to pass. Typically the 10th Street underpass floods first.

Another example includes the roads and homes at the southern part of Wayne County along Route 152 where the route is below the flood level and does not allow traffic to

pass when heavy rains cause flooding, essentially cutting off a neighborhood.

HISTORICAL OCCURRENCES

According to data from NCEI, there have been 156 recorded flash flood events in the counties of Region 2 since 1996 and 93 floods. From 1960 to 1995 there were approximately 42 recorded flooding events according to SHELDUS data. The total events are approximately 290 flooding events in Region 2 in 57 years; roughly 5 events every year. See [Appendix 1: Source Data](#) for a complete listing of events from NCEI and SHELDUS.

The following are brief descriptions of select events that took place in Region 2.

Huntington, July, 2017

In Huntington, just half an inch of rainfall in one hour caused localized flash flooding across Cabell County that closed roads and threatened homes as creeks and gutters swelled into gushing rivers and impassable ponds.

A sudden downpour brought the afternoon commute to a halt in Huntington as backwaters clogged the city's major thoroughfares, including 3rd, 4th and 5th avenues in the Highlawn area, Arlington Boulevard off Norway Avenue and the downtown underpasses, all of which are consistently prone to flooding. In Ona, Little Cabell Creek broke its banks and flooded Blue Sulphur Road north of Camp Arrowhead. The creek also closed Little Seven Mile Road in nearby Lesage, disrupting traffic between U.S. 60 and Route 2 (Nash, 2017).

Wayne County, June, 2016

Flash flooding occurred in parts of Wayne County that got into homes and garages, causing tens of thousands of dollars' worth of damage. A 16-mile stretch between Prichard and Fort Gay got up to 2 inches of rain in a short time (Colegrove, 2016).

Lincoln County, September, 2014

Creeks got out of their banks and covered roads in a few parts of the region. One of the areas that was hit was Frances Creek Road in the Harts area of Lincoln County. It had rained steadily from about a half hour. Flash flooding did some serious damage to part of the road, but the creek receded before any major damage was done to any of the homes (Colegrove, 2014).

COMMITTEE INPUT

During committee and public meetings, committee members expressed concern about specific problems in their areas. The following is a summary of problems and what has been done so far to begin to mitigate the hazard.

- **Cabell County:** An area has a repeated flood issues that causes difficulty to access the people who are stranded. The specific problem houses in the area have been identified.
- **Lincoln County:** There has been some flash flooding in non-compliant development areas. Flash flooding is based on rainfall. The waters carry debris that causes flash flooding and damage to bridges. The county has linked permitting requirements and service applications and improved the county mapping of floods.
- **Logan County:** There have been several flooding events in the county due to the nature of the topography. Some mitigation projects have been introduced through legislation.
- **Mingo County:** The creek comes out of its banks and bridges get blocked and/or damaged due to trees and debris. The water cannot drain properly and roads are blocked. The county has notified different agencies such as DOH, Conservation and DEP.
- **Wayne County:** Constant flooding of US Route 152 in the southern part of the county causes roadway closures and isolation of a community. The county has implemented a structure permit process and uses flood maps.
- **City of Huntington:** Flooding along Fourpole Creek affects hundreds of homes and transportation. Life and safety are the primary concerns. The watershed has been delineated, which is part of the problem of flooding along Fourpole Creek. Additionally, there are 17 flood pumping stations that are 75+ years old; parts and equipment are obsolete. Many mechanical and electrical systems/processes are antiquated, parts are not available, and overall the system does not function as efficiently as current technology affords. Identified the technology needed to upgrade the floodwall pump stations.

IMPACT & VULNERABILITY

One of the main concerns with health and floods is that many times floods can cause power outages that affect people who are dependent on power to run life-sustaining

equipment. During a flood, people and first responders run the risk of sustaining injuries related to saving people and property as well as the possibility of drowning. In rare circumstances, floodwater can carry bacteria that can be harmful.

Floods often disrupt many services including power, sewer, water, communications, and road access. Lacking these, it is difficult to continue critical services to the community. Damage to property, facilities, and infrastructure can range from minimal to total loss. The cost of recovery from floods can vary for everyone. Homeowners and businesses can claim insurance benefits if they have them, but may not be able to continue working due to devastation of the community or of their own property.

LOSS & DAMAGES

NCEI provides data on the amounts of deaths, injuries and property damage sustained during hazard events. [Table 2.2.2.B](#) shows a summary of these losses since 1996.

The HAZUS-MH program (2010) estimates that approximately 6,903 buildings would be at least moderately damaged (1-50% damage) by a 100-year flooding event within all occupancy categories. An estimated 3,456 of those buildings would be completely destroyed (substantially damaged). The county with the most buildings damaged would be Cabell, followed by Logan, Mason, Wayne, Mingo, and finally Lincoln Counties. The following tables summarize the HAZUS data for each county.

TABLE 2.2.2.B LOSS AND DAMAGES OF FLOODS			
County	Deaths	Injuries	Property Damage
Cabell	3	0	\$9,903,000
Lincoln	2	0	\$13,821,000
Logan	4	0	\$28,917,000
Mason	0	0	\$2,994,000
Mingo	0	1	\$43,722,000
Wayne	4	0	\$10,208,000
Total	13	1	\$109,565,000

Source: NCEI

TABLE 2.2.2.C EXPECTED BUILDING DAMAGE BY OCCUPANCY – CABELL COUNTY												
Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	2	0.00
Commercial	4	3.08	32	24.62	16	12.31	7	5.38	8	6.15	63	48.46
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	3	0.00
Government	0	0.00	3	13.64	0	0.00	0	0.00	0	0.00	19	86.36
Industrial	0	0.00	3	5.08	5	8.47	0	0.00	33	55.93	15	25.42
Religion	0	0.00	8	88.89	0	0.00	0	0.00	0	0.00	1	11.11
Residential	0	0.00	78	1.12	839	12.02	693	9.93	3,281	47.01	2,089	29.93
Total (7,205)	4		124		860		703		3,322		2,192	

TABLE 2.2.2.D EXPECTED BUILDING DAMAGE BY OCCUPANCY – LINCOLN COUNTY												
Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	1	100.0	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	1	100.0	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	4	1.54	50	19.31	26	10.04	106	40.93	73	28.19
Total (261)	0		6		50		26		106		73	

TABLE 2.2.2.E EXPECTED BUILDING DAMAGE BY OCCUPANCY – LOGAN COUNTY												
Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	5	83.33	0	0.00	0	0.00	0	0.00	1	16.67
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	1	100.0
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	37	2.37	426	27.27	169	10.82	459	29.39	471	30.15
Total (1,569)	0		42		426		169		459		473	

TABLE 2.2.2.F EXPECTED BUILDING DAMAGE BY OCCUPANCY – MASON COUNTY												
Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	2	40.0	0	0.00	0	0.00	2	40.0	1	20.0
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	4	100.0	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	1	0.19	47	9.04	33	6.35	210	10.36	229	44.04
Total (529)	0		3		47		33		216		230	

TABLE 2.2.2.G EXPECTED BUILDING DAMAGE BY OCCUPANCY – MINGO COUNTY												
Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	1	100.0	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	2	0.58	50	14.14	17	4.90	71	20.46	207	59.65
Total (348)	0		3		50		17		71		207	

TABLE 2.2.2.H EXPECTED BUILDING DAMAGE BY OCCUPANCY – WAYNE COUNTY												
Occupancy	1-10		11-20		21-30		31-40		41-50		Substantially	
	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%	Ct.	%
Agriculture	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Commercial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Industrial	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Residential	0	0.00	3	0.67	29	6.49	15	3.36	119	26.62	281	62.86
Total (447+)	0		3		29		15		119		281	

TABLE 2.2.2.I BUILDING DAMAGE TOTALS – ALL COUNTIES						
County	1-10%	11-20%	21-30%	31-40%	41-50%	Substantially
Cabell	4	124	860	703	3,322	2,192
Lincoln	0	6	50	26	106	73
Logan	0	42	426	169	459	473
Mason	0	3	47	33	216	230
Mingo	0	3	50	17	71	207
Wayne	0	3	29	15	119	281
Total	4	181	1,462	963	4,293	3,456

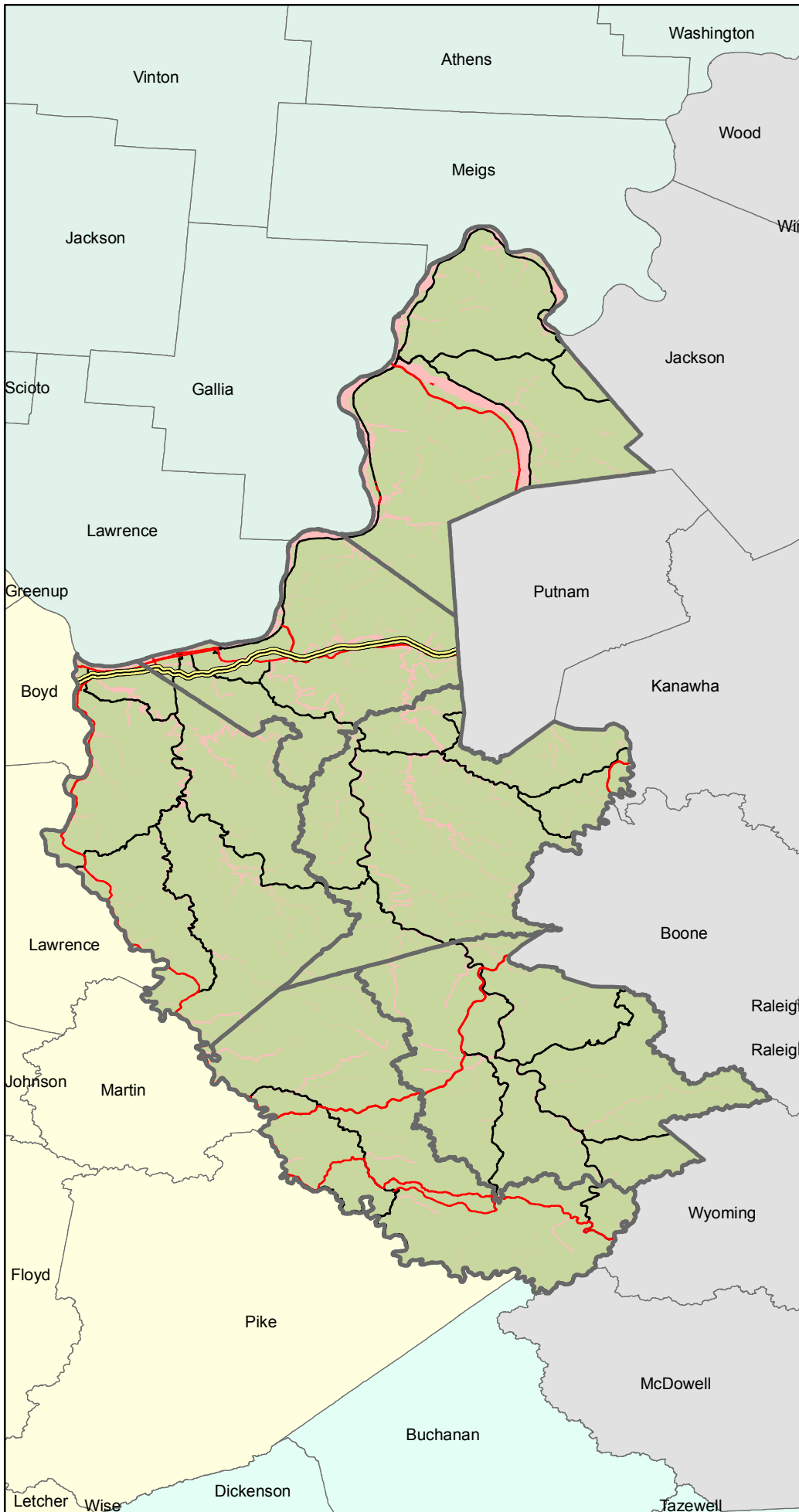
As in any community where flooding occurs regularly, here are repetitive losses in the counties of Region 2. The following table summarizes the repetitive loss properties by total number of properties, the amount of losses of those properties, how many properties are insured and the losses per type of occupancy of the buildings. Logan County is the county with most repetitive loss properties, followed by Cabell, Mingo, Wayne, Lincoln, and Mason Counties. This data is provided by WVDHSEM and is intended for planning purposes only.

TABLE 2.2.2.J REPETITIVE LOSS PROPERTIES IN REGION 2							
Item	Cabell	Lincoln	Logan	Mason	Mingo	Wayne	Totals
Total Number of Properties	63	21	241	12	64	26	427
Total Number of Losses	159	48	664	46	151	66	1,134
# of Insured Properties	37	10	94	8	13	13	175
2-4 Family	0	0	5	1	3	0	9
Condo	1	0	16	1	5	2	25
Non-Residential	8	4	108	4	13	1	138
Other Residential	0	0	4	0	0	0	4
Single Family	54	17	107	6	43	23	250
Unknown	0	0	1	0	0	0	1

RISK CALCULATION

TABLE 2.2.2.K FLOOD RISK CALCULATION						
Probability		+	Severity	=	Risk	
FREQUENT			CRITICAL		MEDIUM HIGH	
Events	290		= 5		The severity of flooding in Region 2 is critical. Even though there has been loss of life in the past, the mitigation actions that the region has implemented in recent years has reduced the severity of damage to each county overall.	The risk assessment matrix calculates the risk of flooding based on its probability and severity to be a medium high risk to the region.
Years	57					
Historically, there have been on average about five flood events in the region each year.						







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Risk Map: Flood

Data Source(s):
FEMA

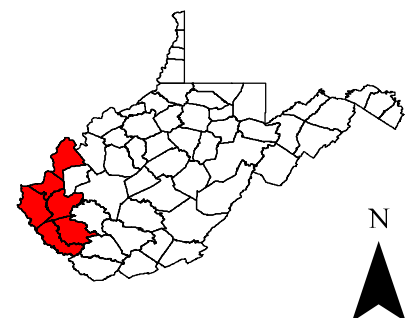
-  Zones A and AE
-  Low Risk Area

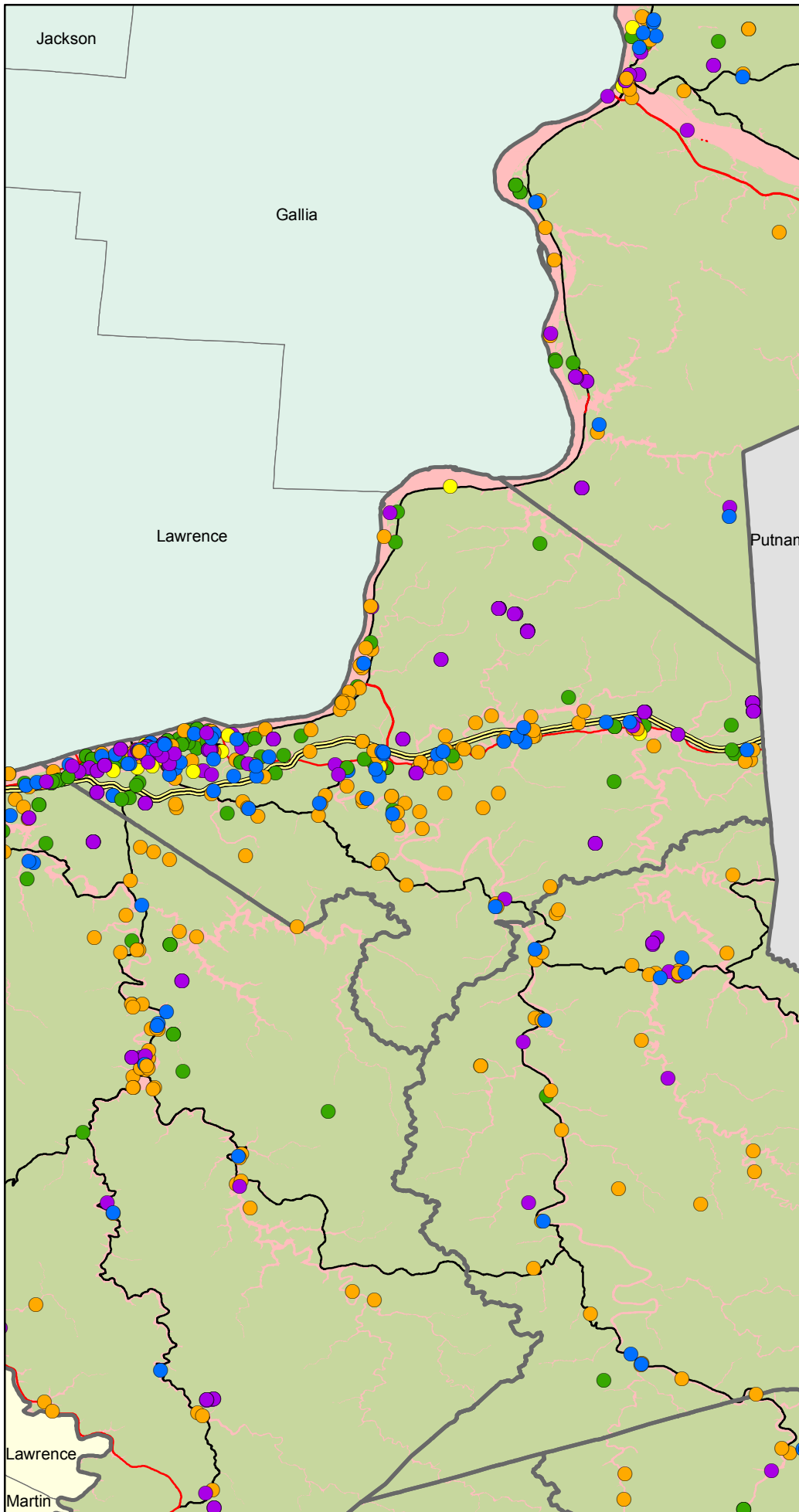
0 3 6 12 18 24
Miles

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H
Consulting, LLC












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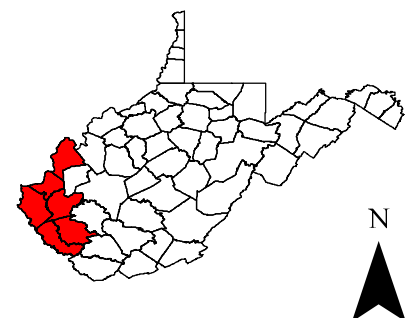
Cabell Risk Map: Flood

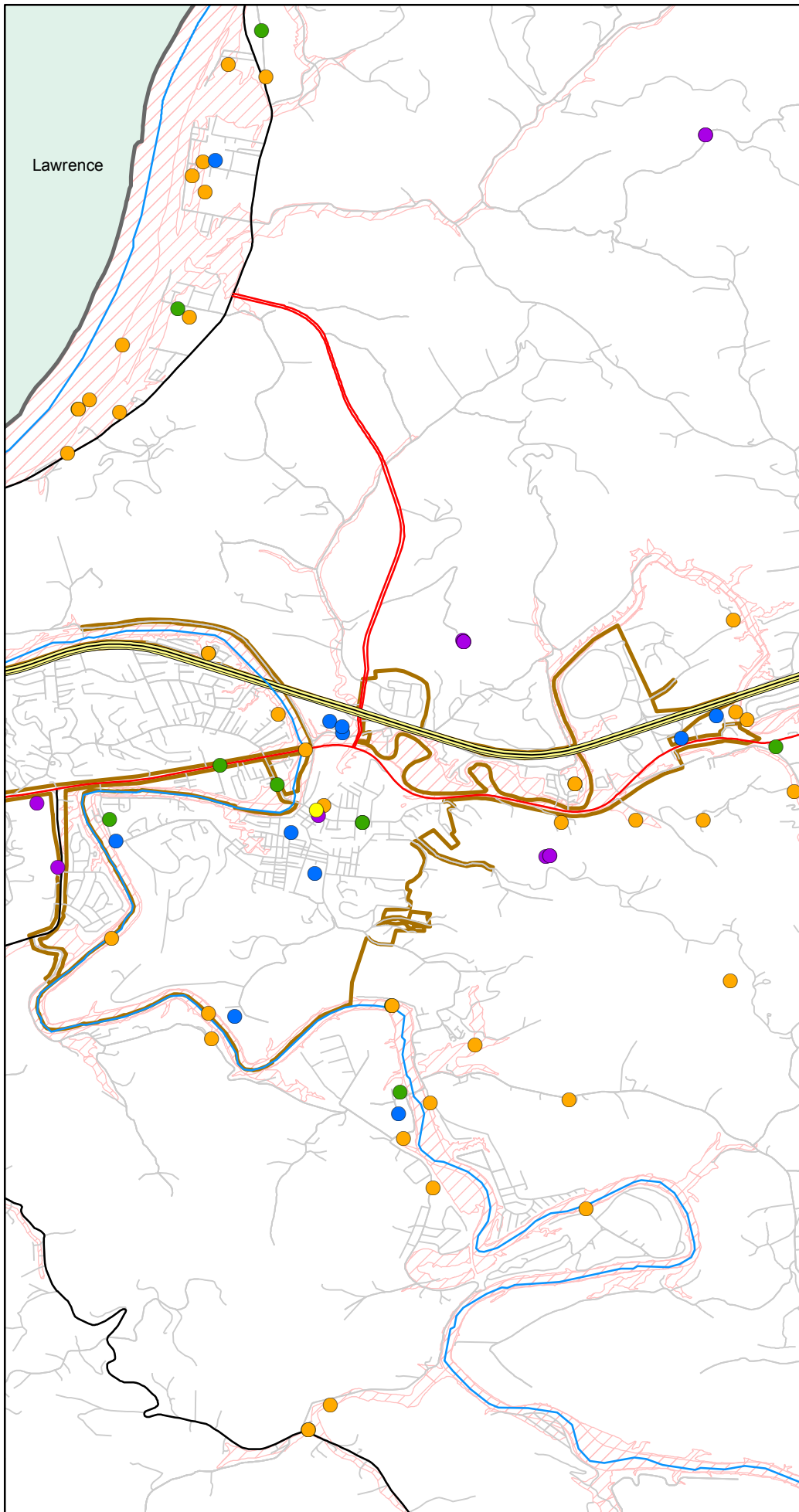
Data Source(s):
FEMA

-  Zones A and AE
-  Low Risk Area
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 1.25 2.5 5 7.5 10
Miles

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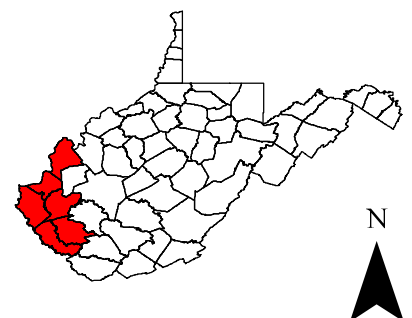
Barbourville Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.2 0.4 0.8 1.2 1.6
Miles

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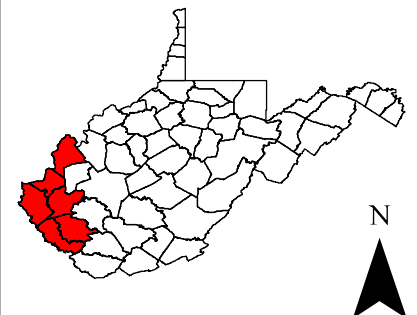
Huntington Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.35 0.7 1.4 2.1 2.8
 Miles

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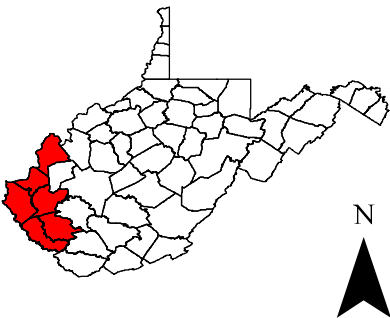
Milton Risk Map: Flood

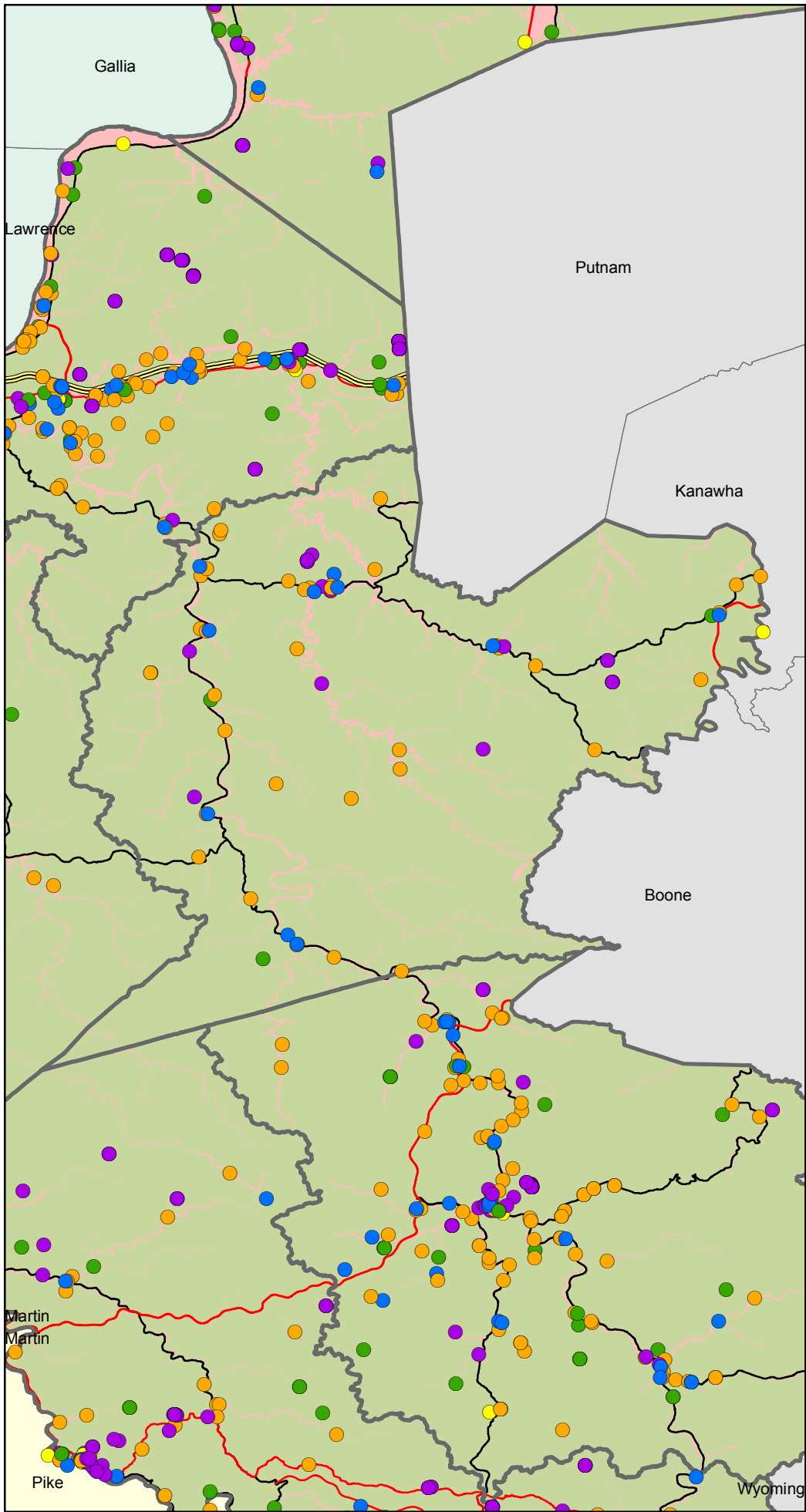
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0.3 0.6 0.9 1.2
Miles

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REGION 2 HAZARD MITIGATION PLAN

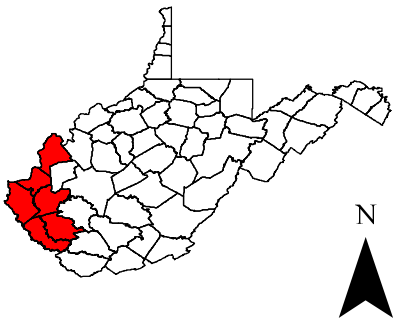
Lincoln Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Low Risk Area
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 1.5 3 6 9 12 Miles

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REGION 2 HAZARD MITIGATION PLAN

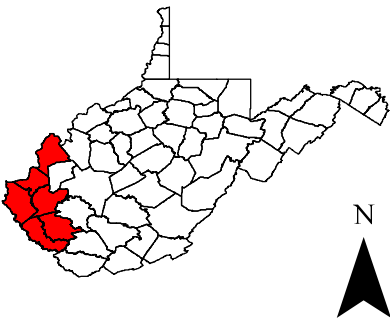
Hamlin Risk Map: Flood

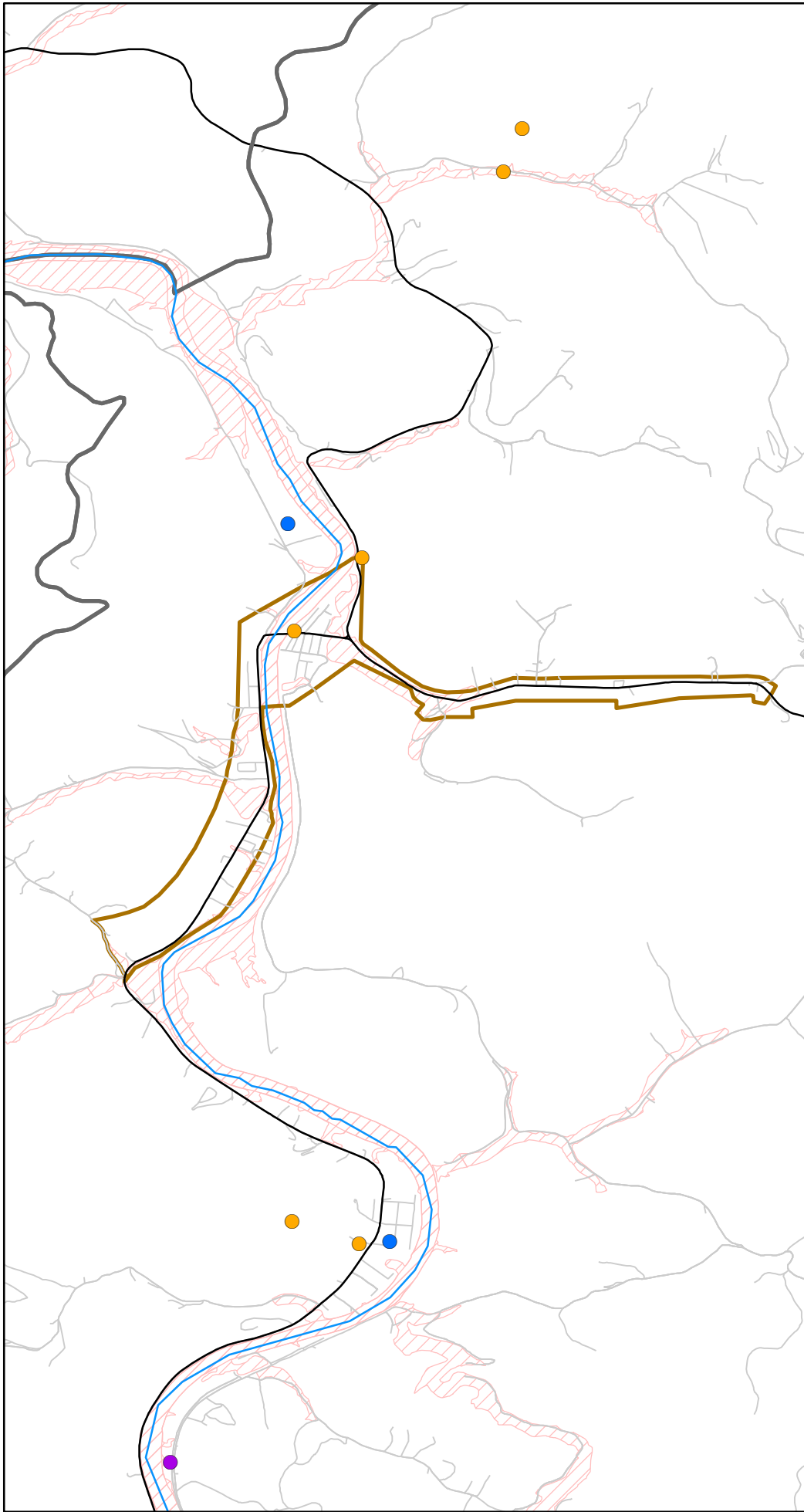
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.5 1 0.20 30.4
 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



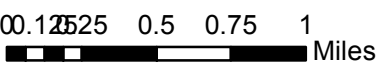


REGION 2 HAZARD MITIGATION PLAN

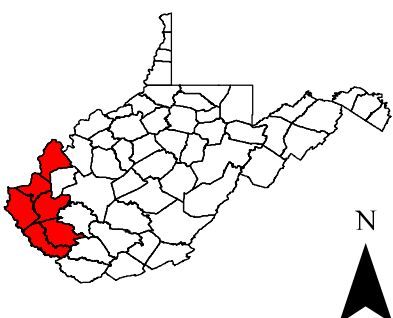
West Hamlin Risk Map: Flood

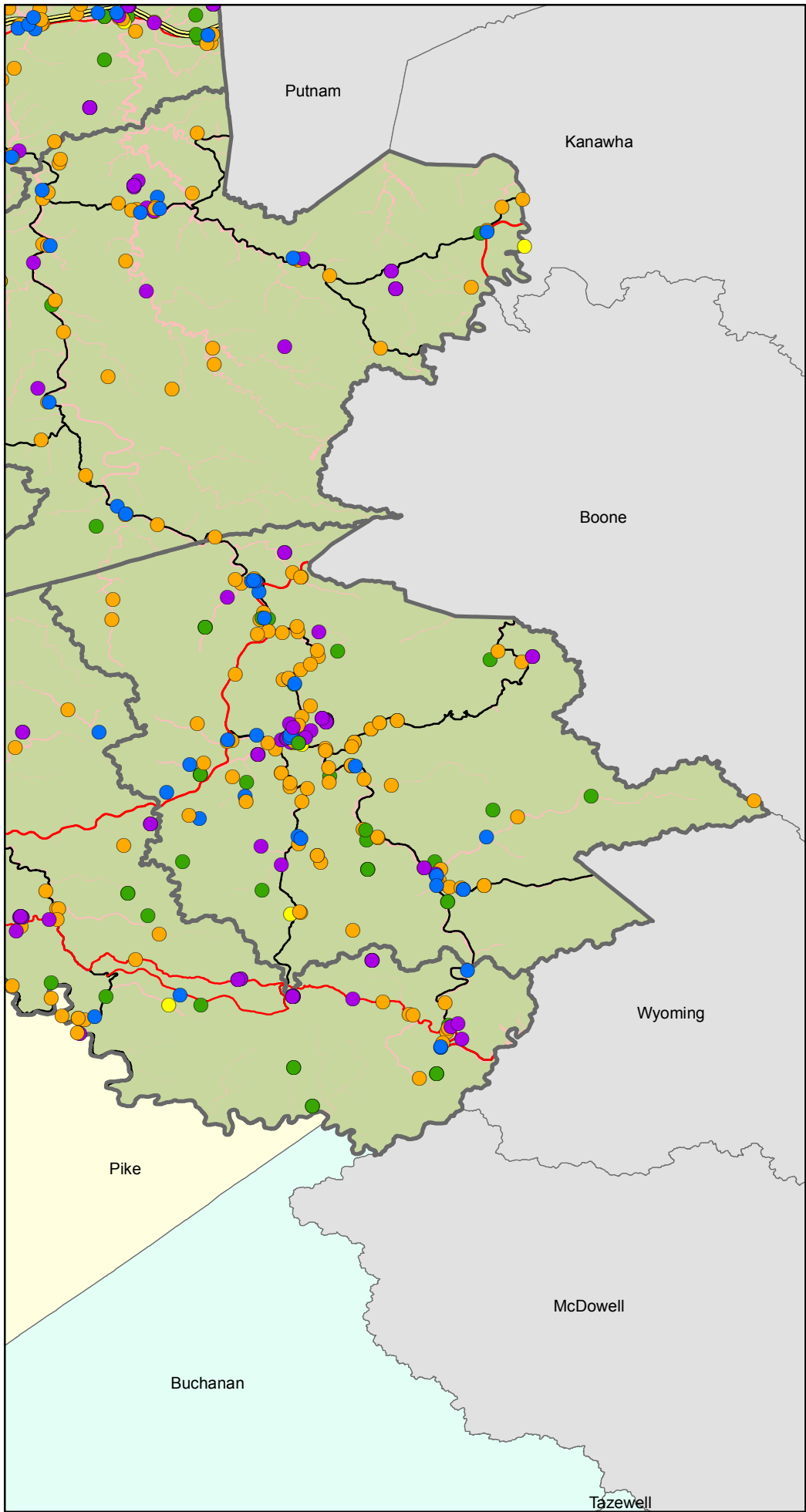
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations



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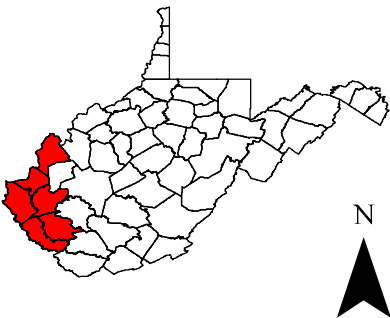
Logan Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Low Risk Area
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 1.5 3 6 9 12
 Miles

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REGION 2 HAZARD MITIGATION PLAN

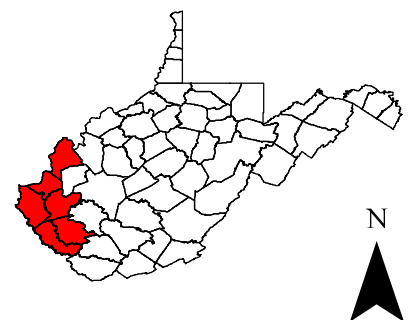
Chapmanville Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.5 1 0.20 30.4
 Miles

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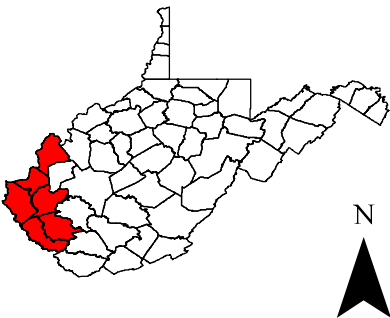
Logan Risk Map: Flood

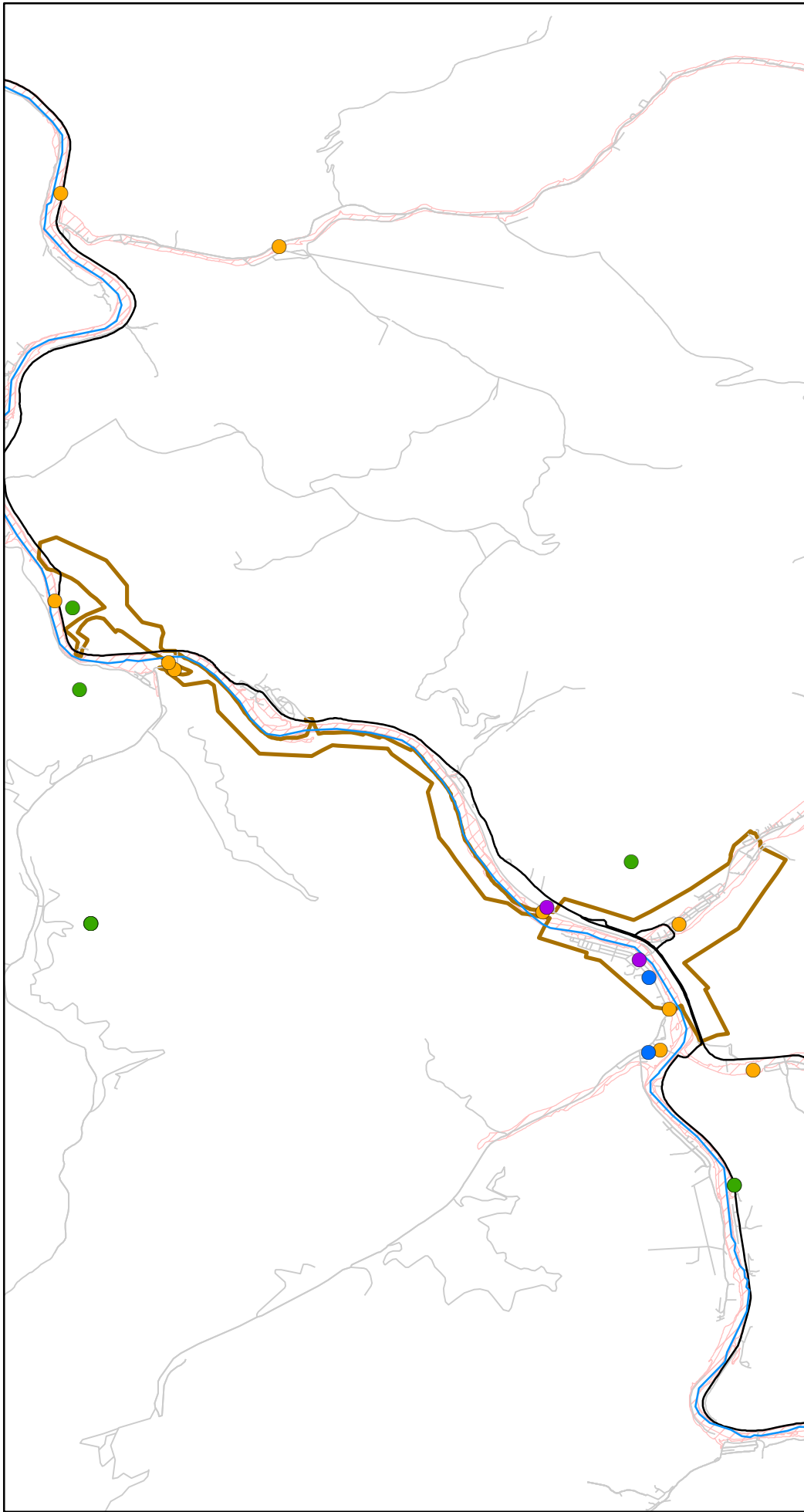
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.5 1 0.20 30.4
 Miles

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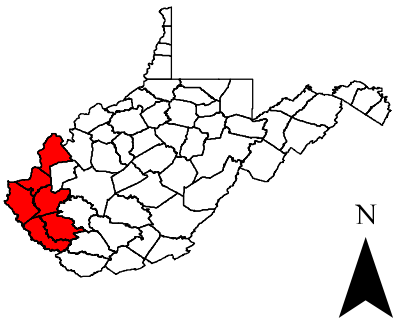
Man Risk Map: Flood

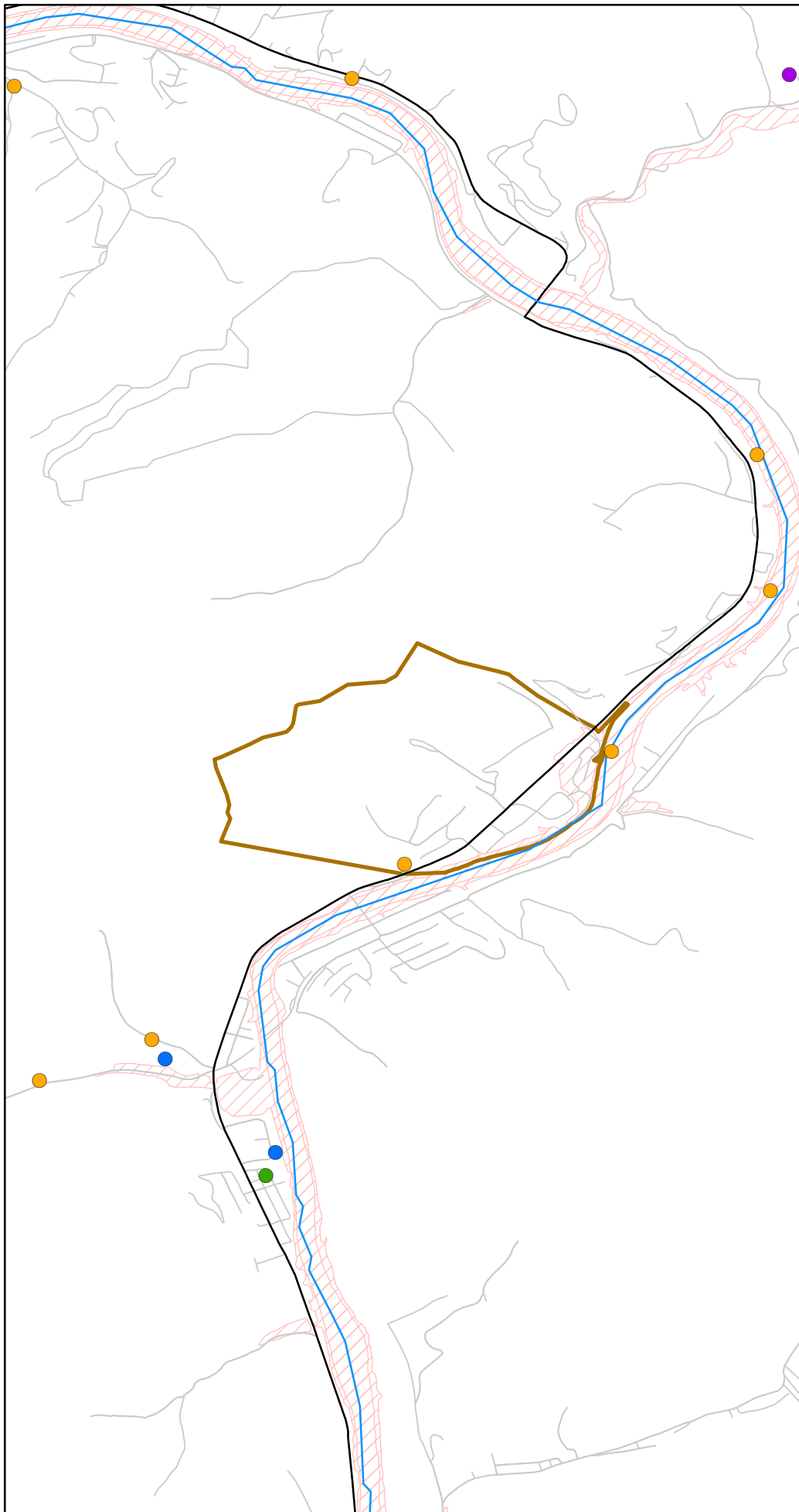
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.2 0.4 0.8 1.2 1.6
 Miles

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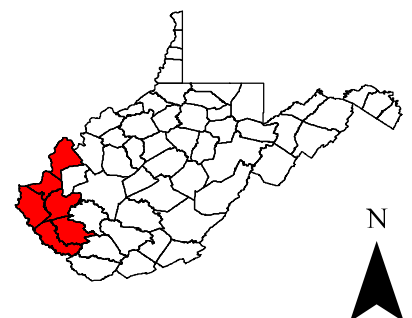
Mitchell Heights Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0.05 0.1 0.2 0.3 0.4
 Miles

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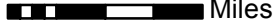


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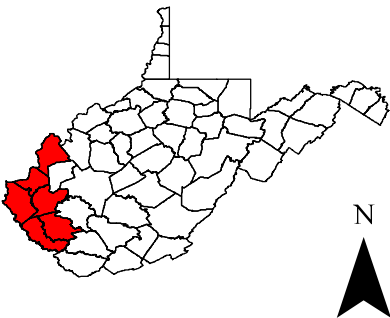
West Logan Risk Map: Flood

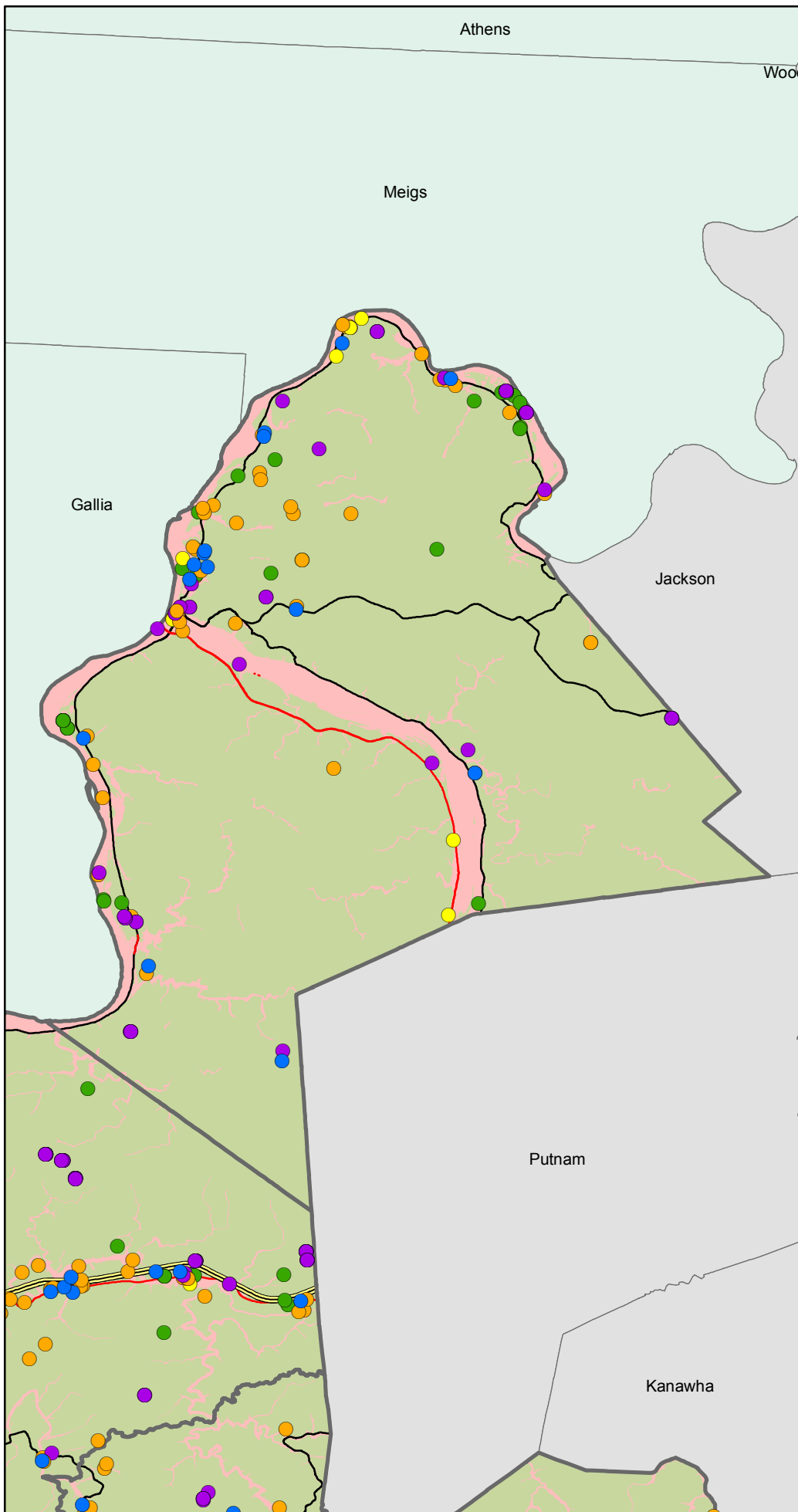
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0.05 0.1 0.2 0.3 0.4
 Miles

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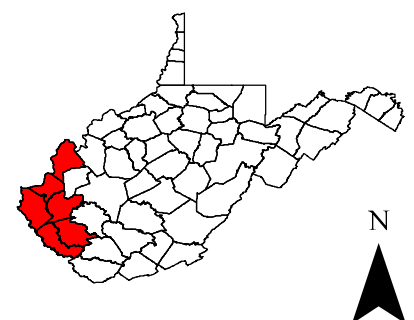
Mason Risk Map: Flood

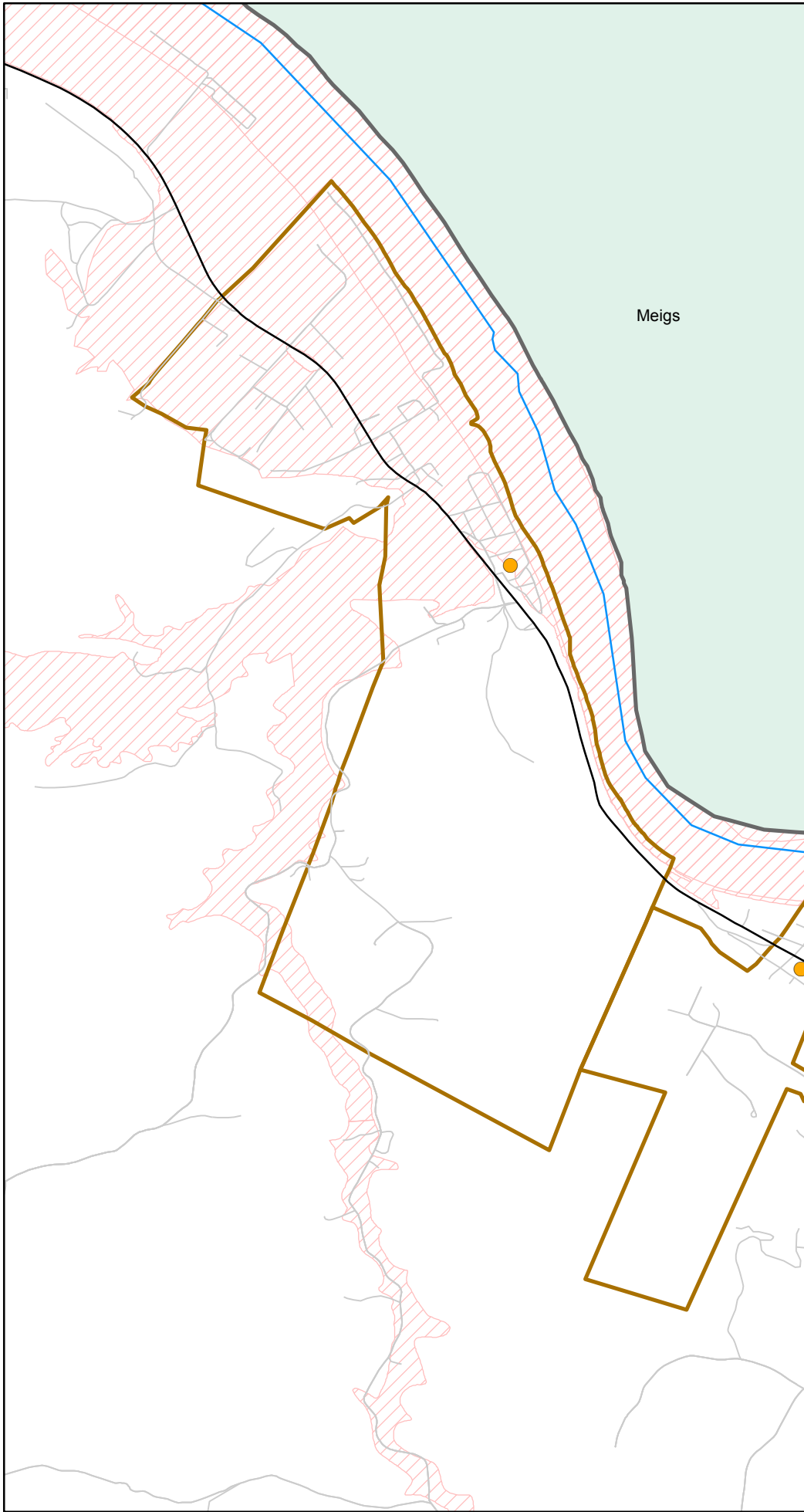
Data Source(s):
FEMA

-  Zones A and AE
-  Low Risk Area
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 1.25 2.5 5 7.5 10
Miles

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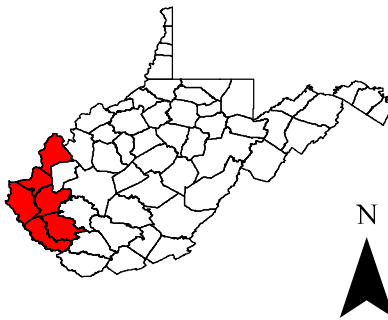
REGION 2 HAZARD MITIGATION PLAN

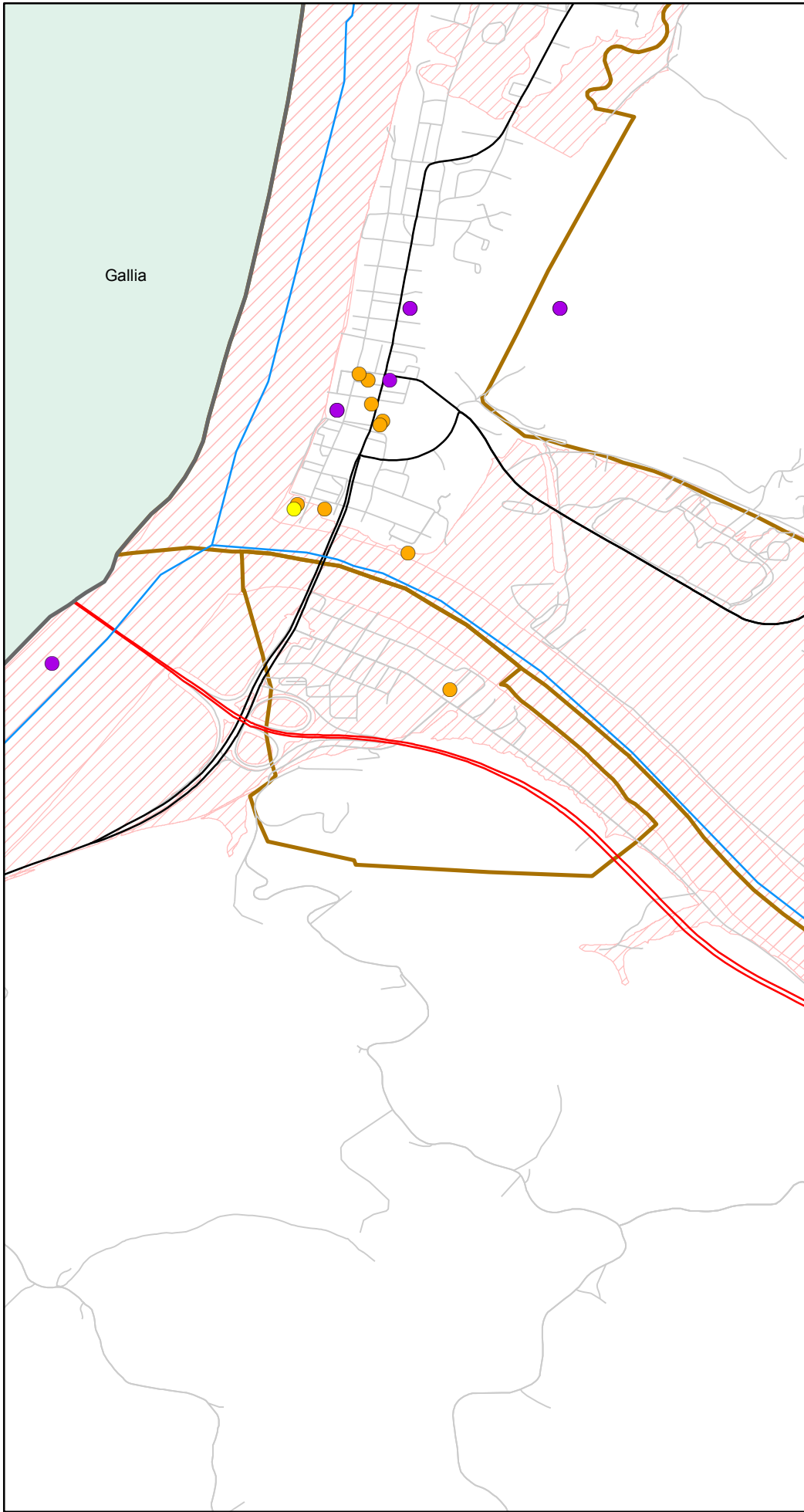
**Hartford
Risk Map:
Flood**
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0.05 0.1 0.2 0.3 0.4
Miles

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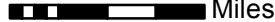


REGION 2 HAZARD MITIGATION PLAN

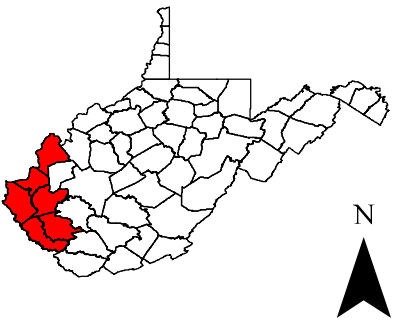
Henderson Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0.05 1 0.2 0.3 0.4
 Miles

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**REGION 2
HAZARD
MITIGATION
PLAN**

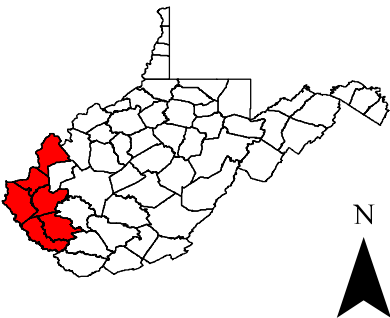
**Leon
Risk Map:
Flood**

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0.05 0.1 0.2 0.3 0.4
Miles

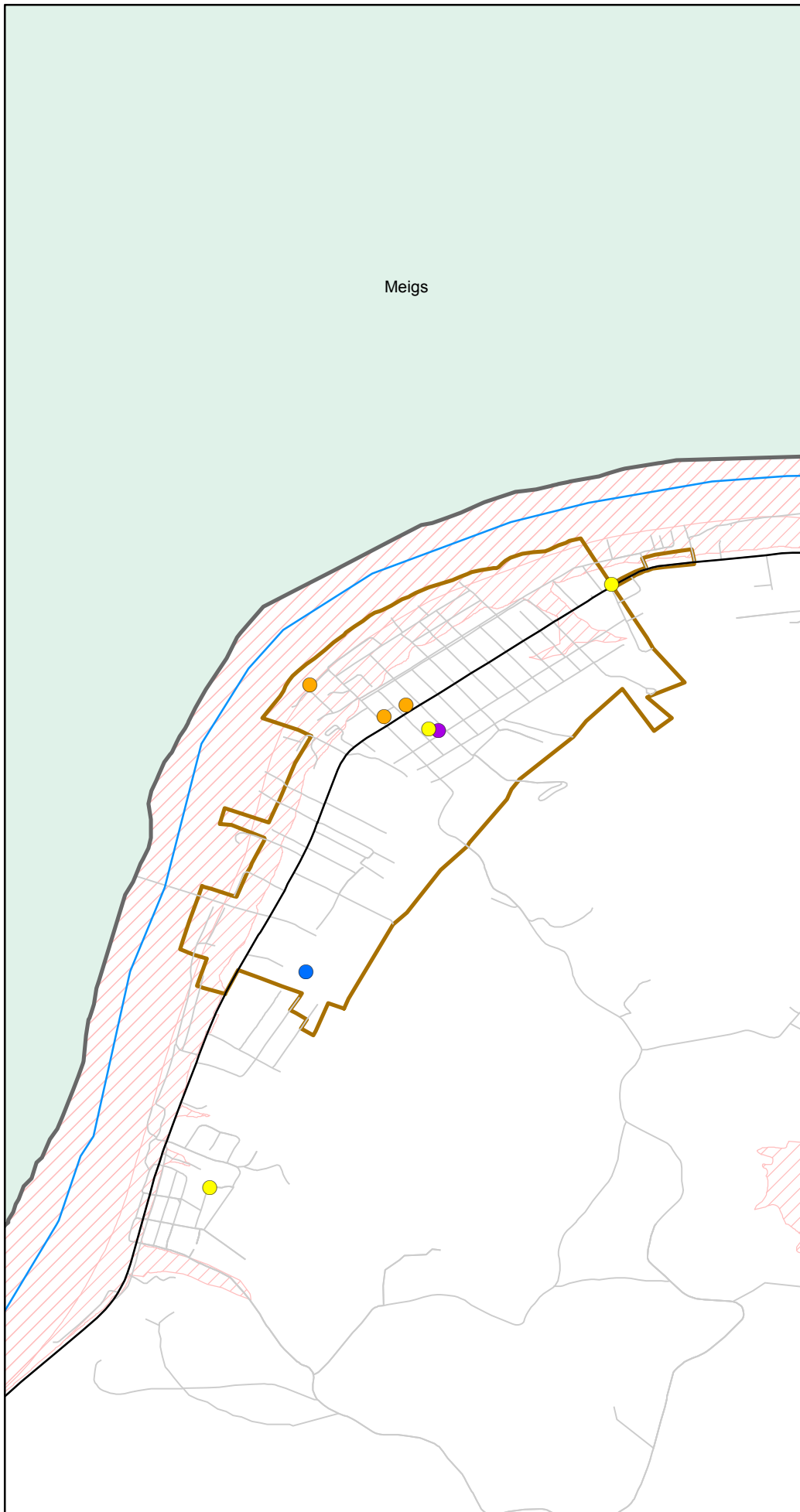
DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



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Mason Risk Map: Flood

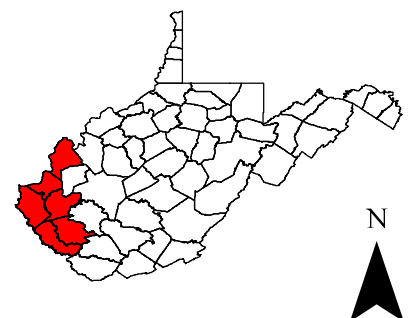
Data Source(s):
FEMA



- Zones A and AE
- Critical Facilities
- Vulnerable Populations
- Economic Assets
- Historic Assets
- Special Considerations

0.05 0.1 0.2 0.3 0.4
Miles

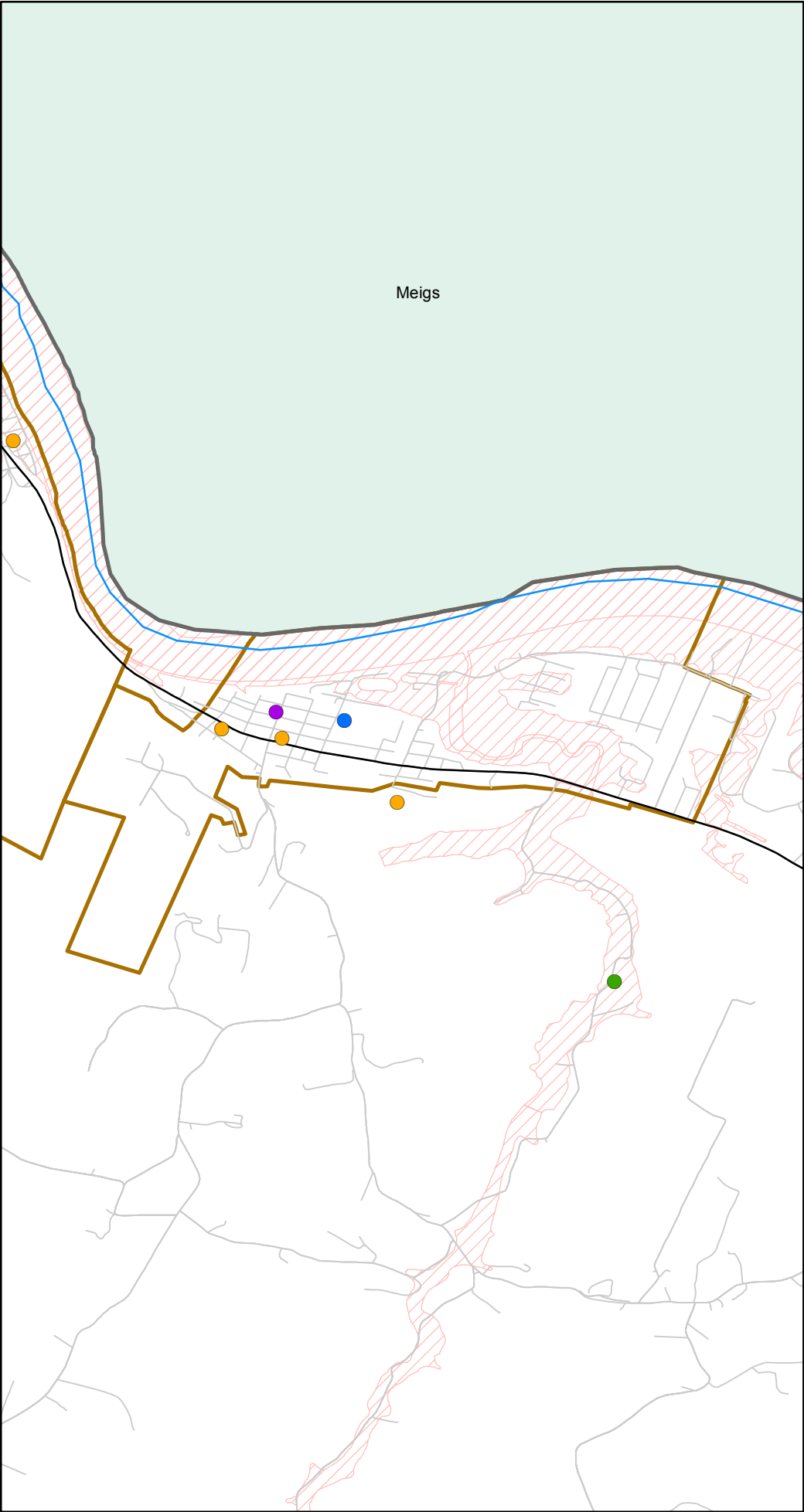
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New Haven Risk Map: Flood

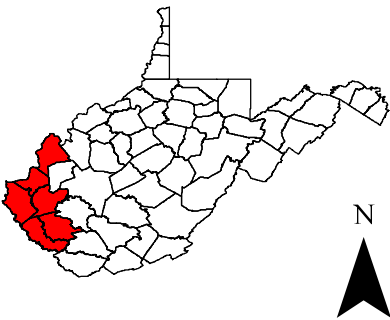
Data Source(s):
FEMA



- Zones A and AE
- Critical Facilities
- Vulnerable Populations
- Economic Assets
- Historic Assets
- Special Considerations

0 0.10.2 0.4 0.6 0.8
 Miles

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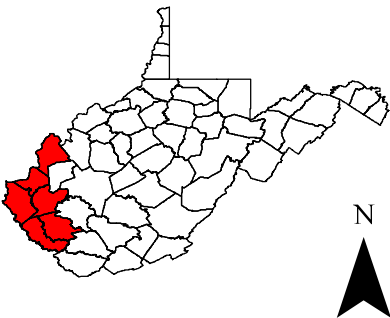
Point Pleasant Risk Map: Flood

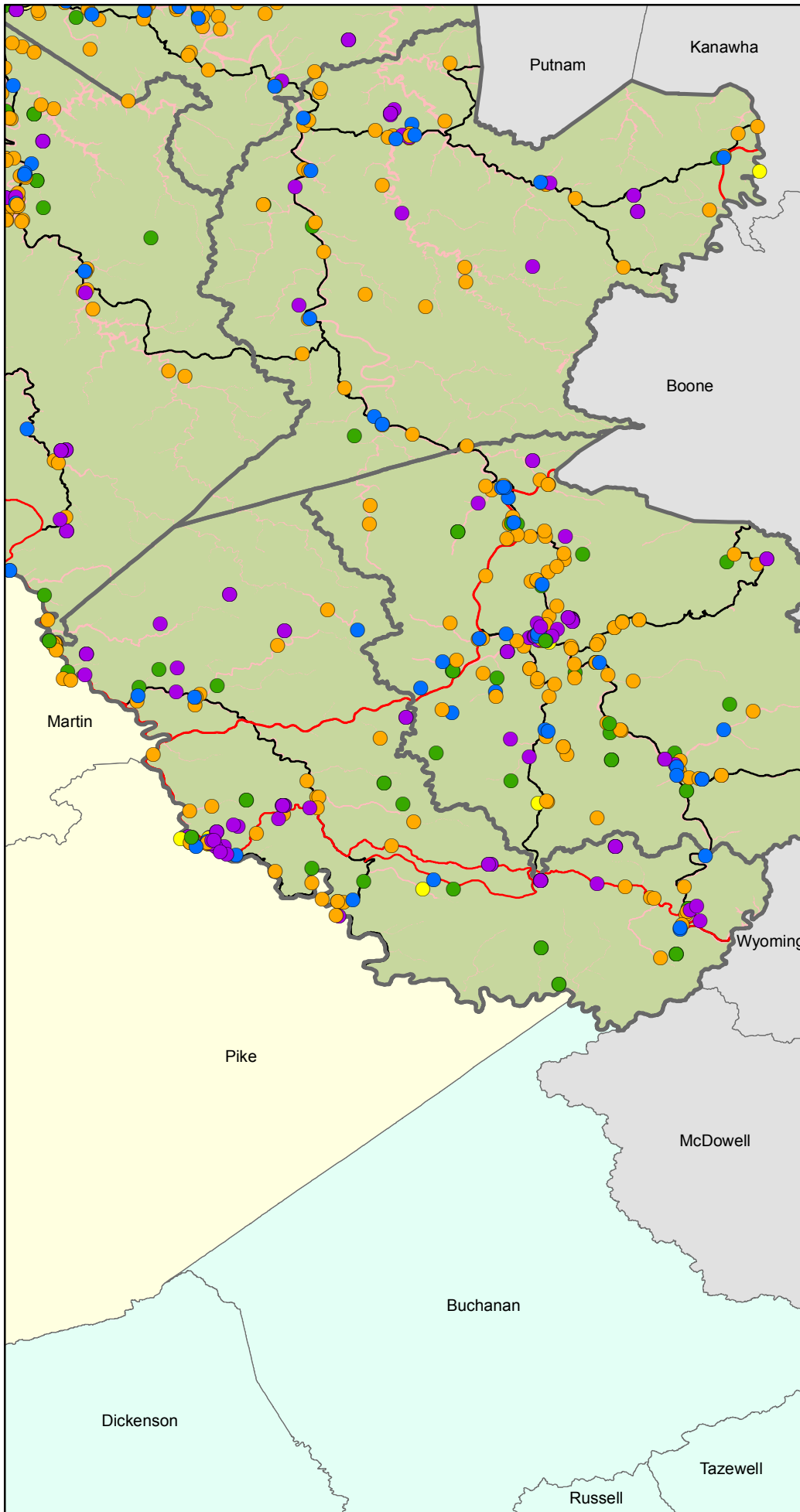
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.125 0.25 0.5 0.75 1 Miles

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REGION 2 HAZARD MITIGATION PLAN

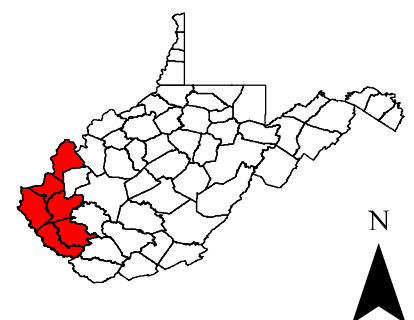
Mingo Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Low Risk Area
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

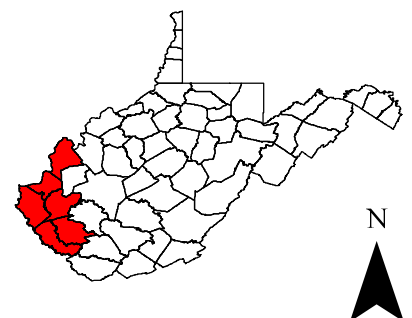
Delbarton Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.150.3 0.6 0.9 1.2
Miles

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REGION 2 HAZARD MITIGATION PLAN

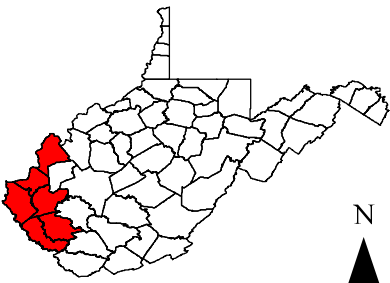
Gilbert Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.5 1 2 3 4
 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.

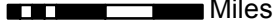


REGION 2 HAZARD MITIGATION PLAN

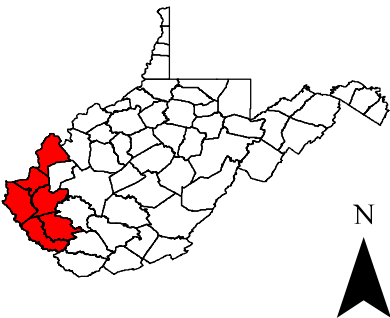
Kermit Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0.05 0.1 0.2 0.3 0.4
 Miles

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REGION 2 HAZARD MITIGATION PLAN

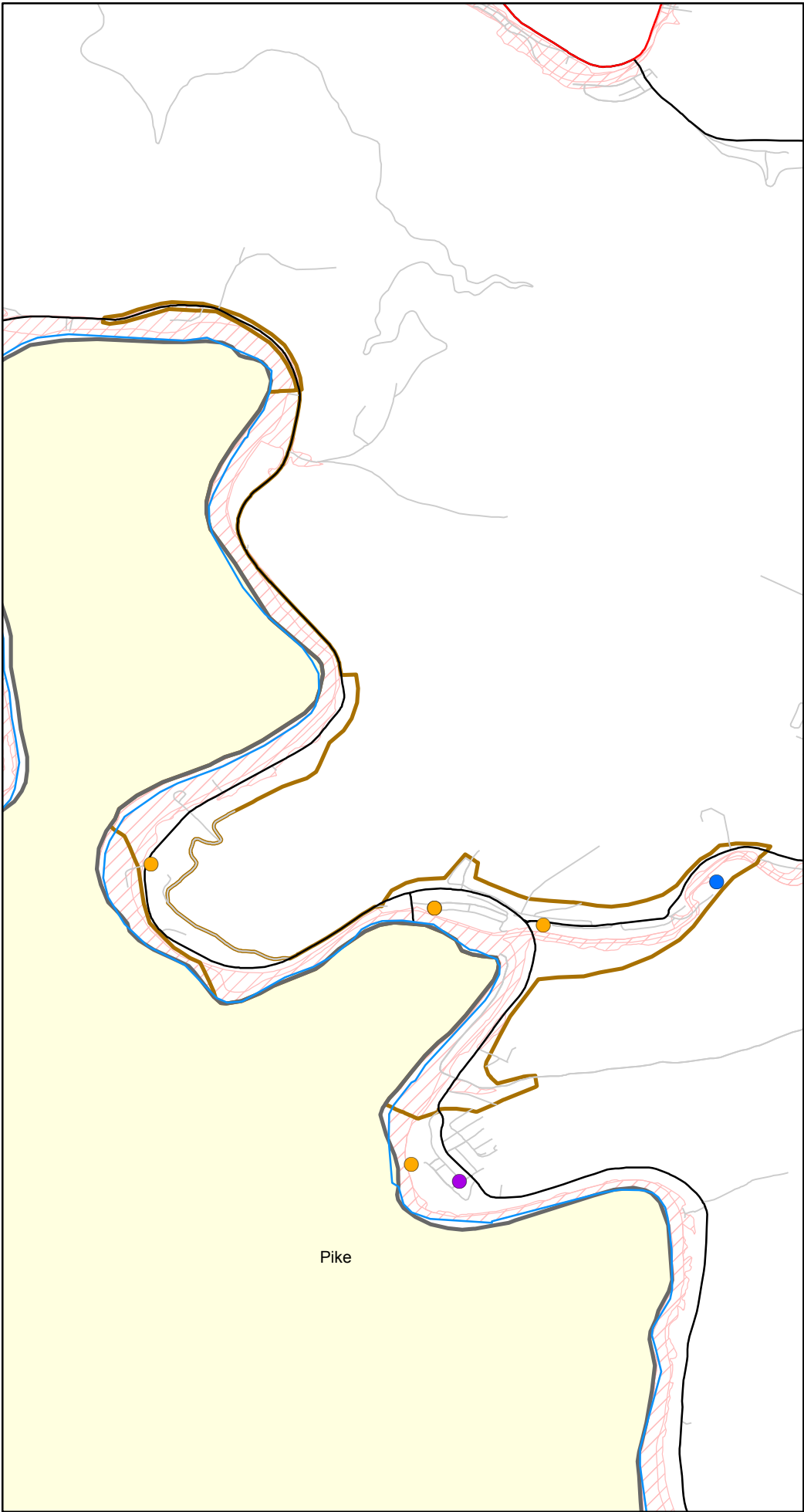
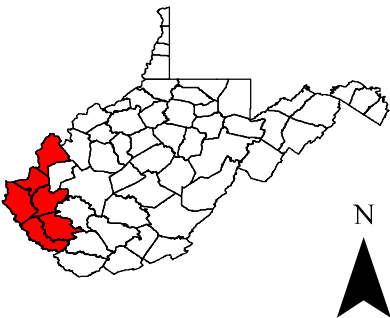
Matewan Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.5 1 2 3 4
Miles

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REGION 2 HAZARD MITIGATION PLAN

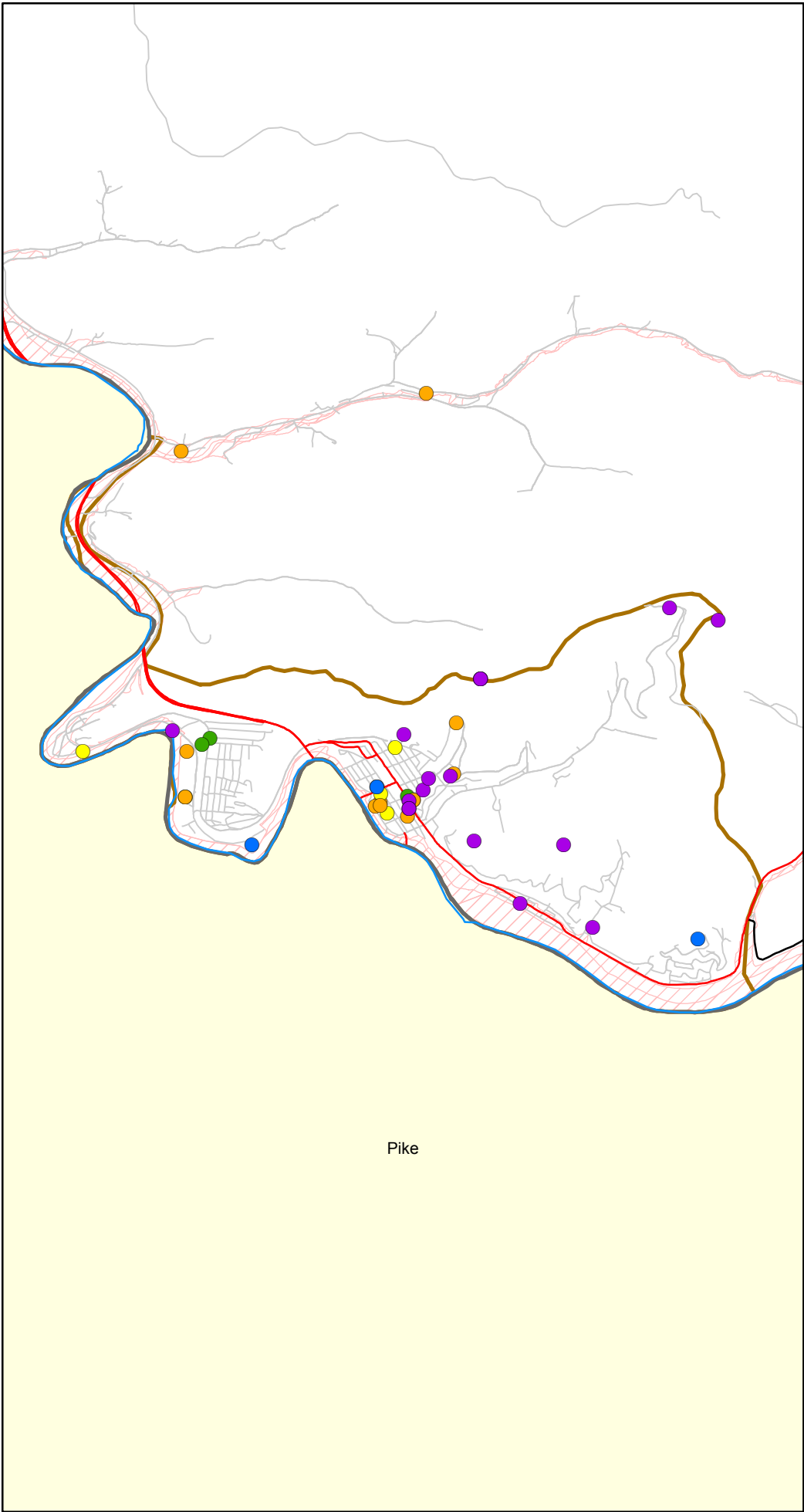
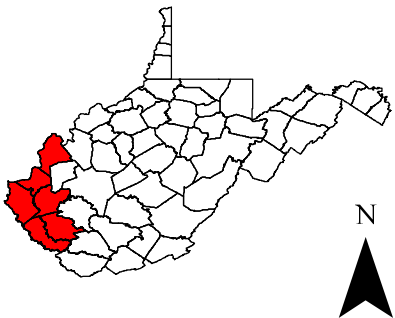
Williamson Risk Map: Flood

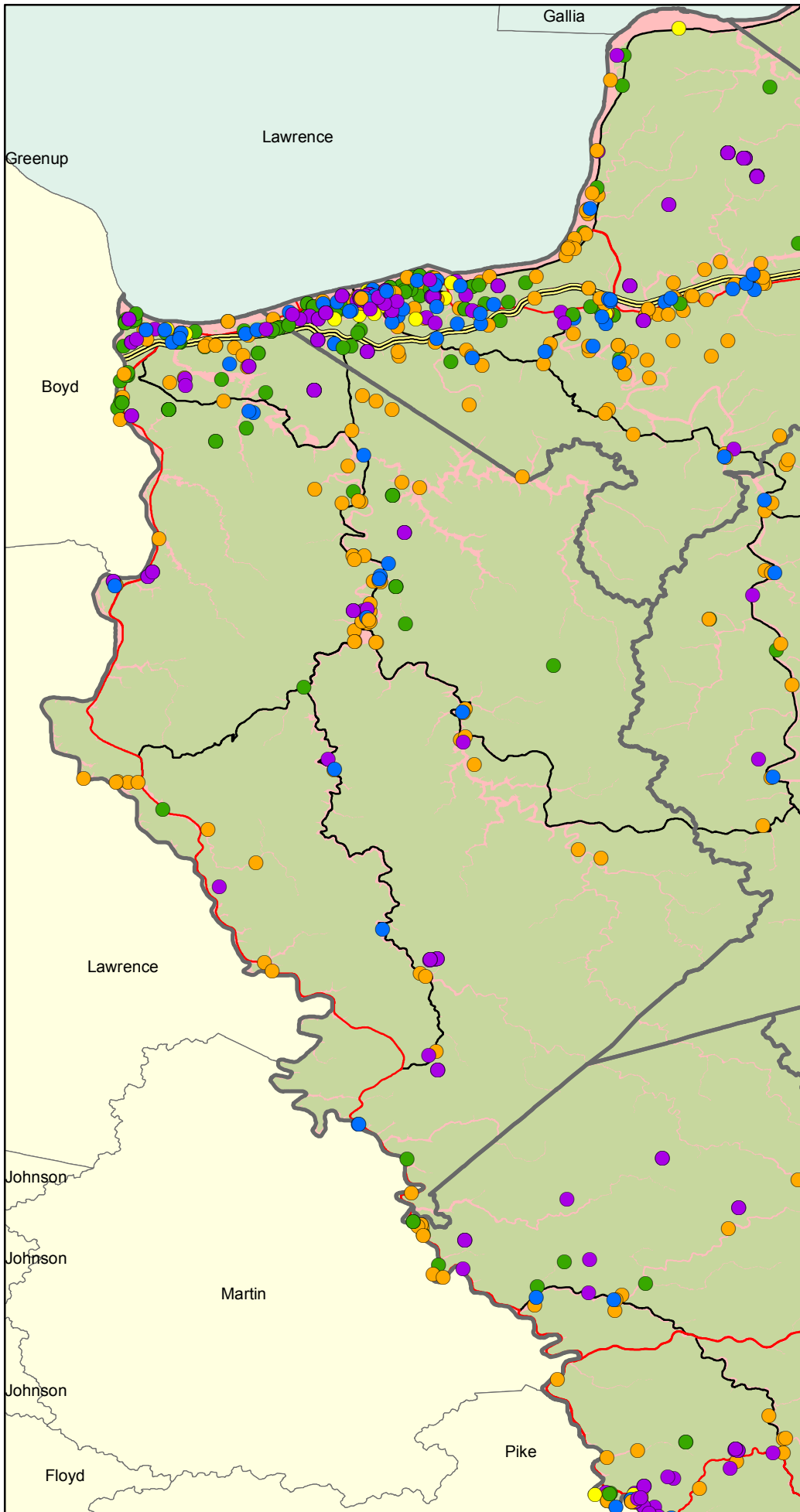
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.1 0.3 0.6 0.9 1.2
 Miles

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REGION 2 HAZARD MITIGATION PLAN

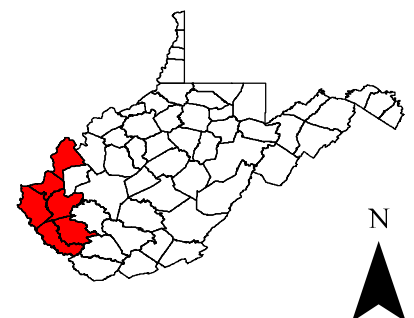
Wayne Risk Map: Flood

Data Source(s):
FEMA

- Zones A and AE
- Low Risk Area
- Critical Facilities
- Vulnerable Populations
- Economic Assets
- Historic Assets
- Special Considerations

0 1.25 2.5 5 7.5 10
Miles

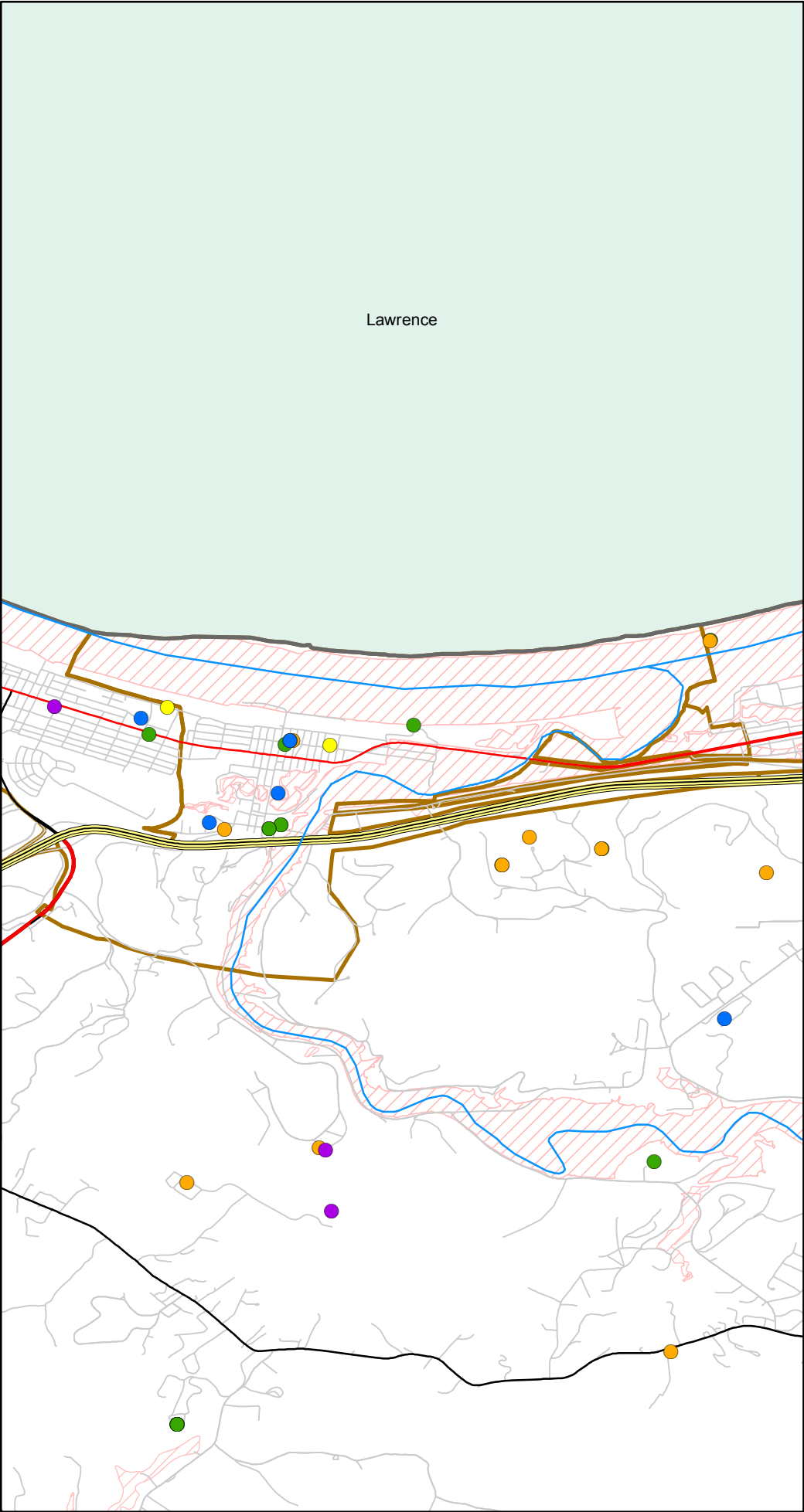
DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



REGION 2 HAZARD MITIGATION PLAN

Ceredo Risk Map: Flood

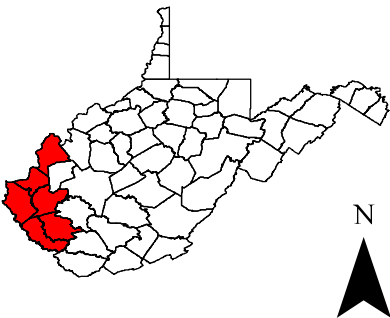
Data Source(s):
FEMA

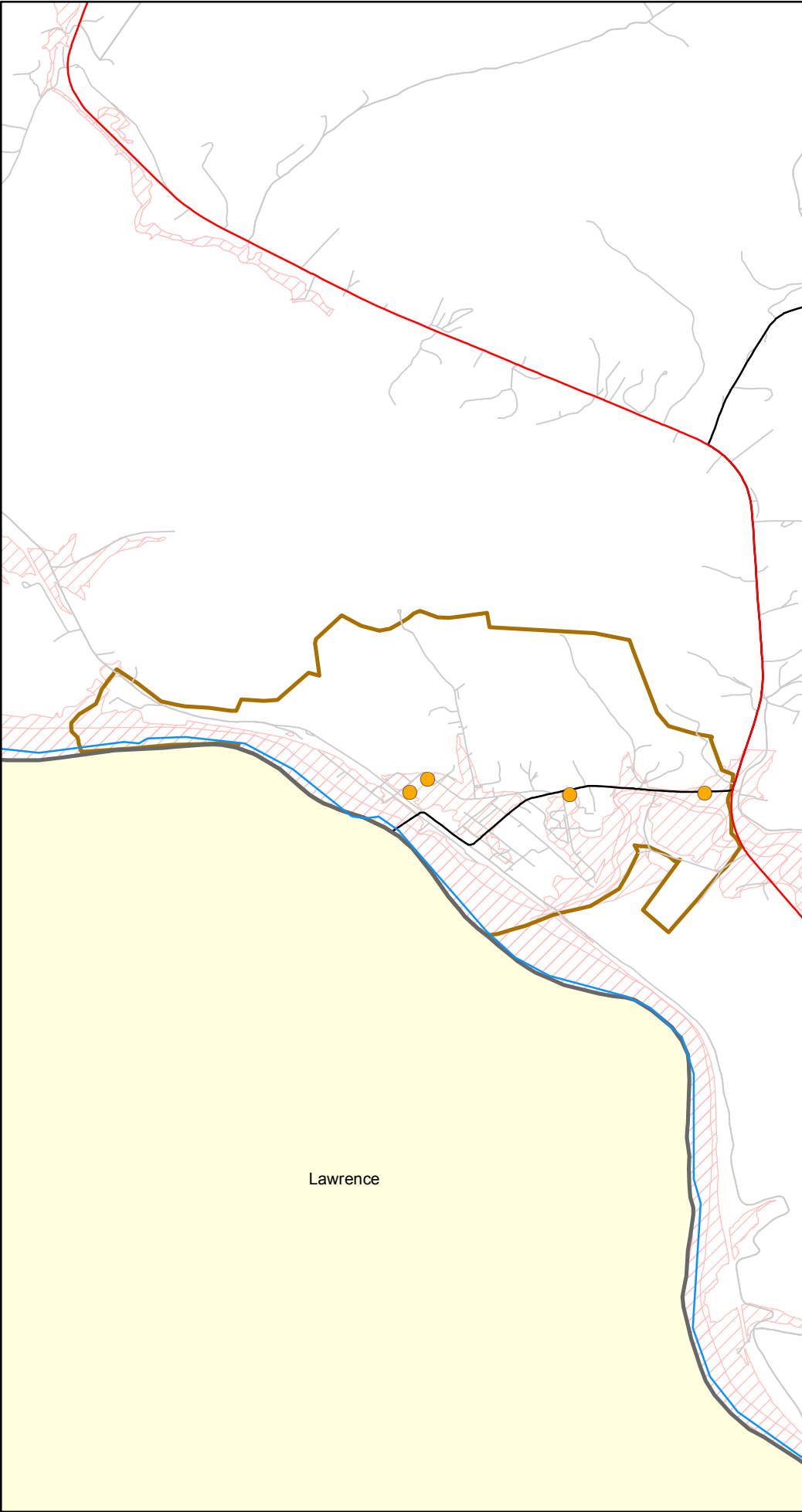


- Zones A and AE
- Critical Facilities
- Vulnerable Populations
- Economic Assets
- Historic Assets
- Special Considerations

0 0.150.3 0.6 0.9 1.2
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 HAZARD MITIGATION PLAN

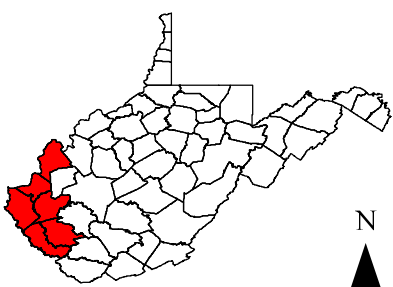
Fort Gay Risk Map: Flood

Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.5 1 0.20 30.4
Miles

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REGION 2 HAZARD MITIGATION PLAN

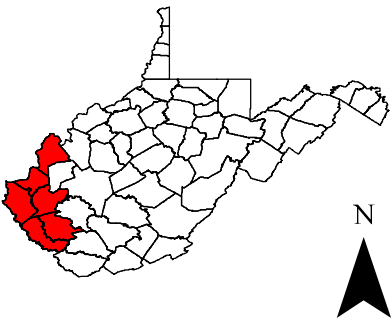
Kenova Risk Map: Flood

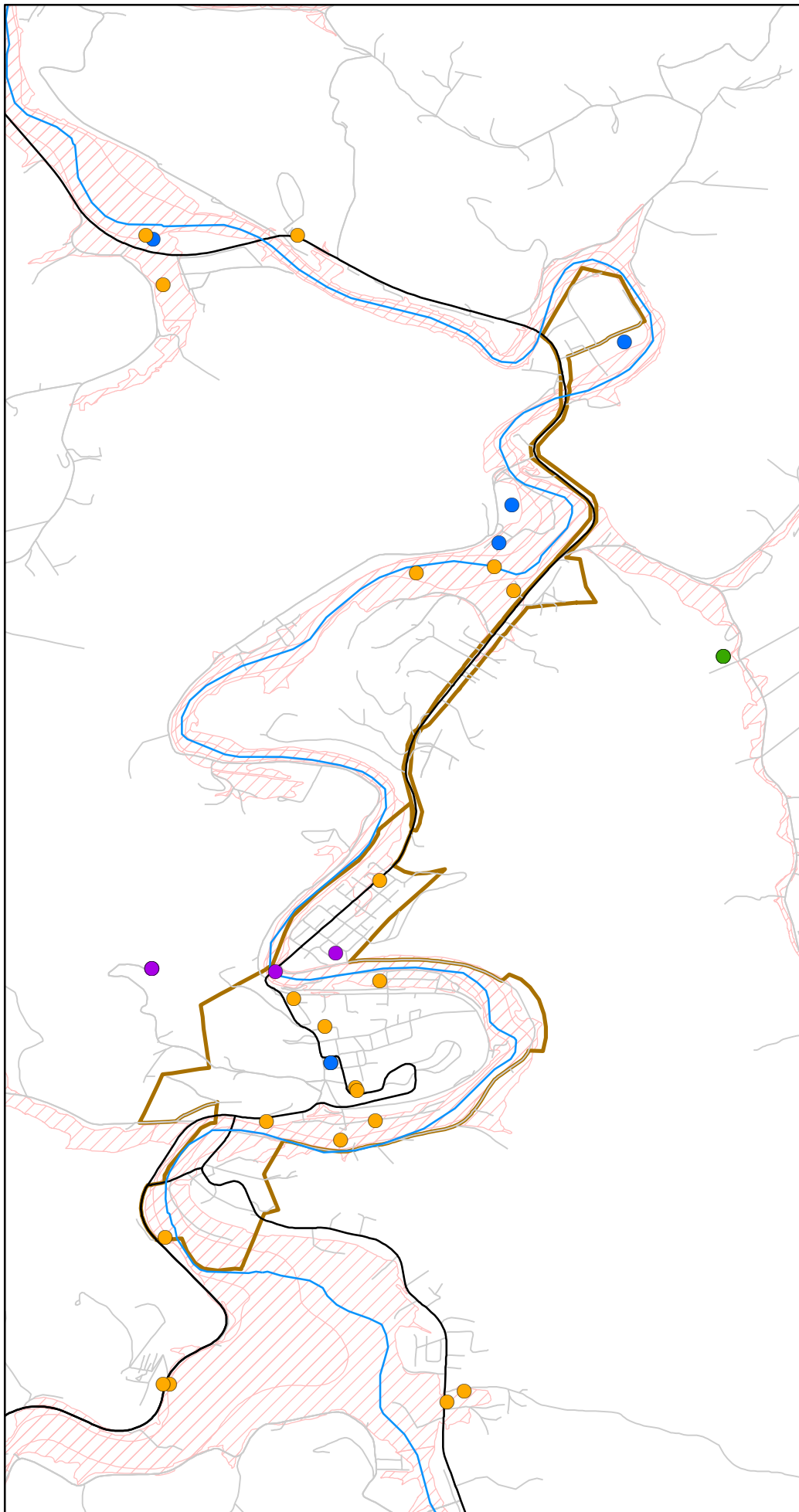
Data Source(s):
FEMA

-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0 0.10.2 0.4 0.6 0.8
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.






REGION 2 HAZARD MITIGATION PLAN

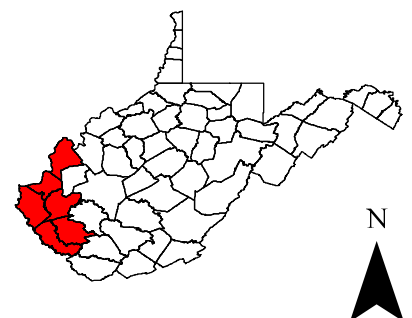
Wayne Risk Map: Flood

Data Source(s):
FEMA

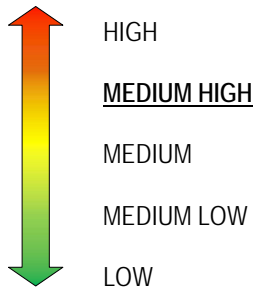
-  Zones A and AE
-  Critical Facilities
-  Vulnerable Populations
-  Economic Assets
-  Historic Assets
-  Special Considerations

0.0510.20.30.4
 Miles

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2.2.3 SEVERE SUMMER WEATHER



The Severe Summer Weather profile includes hail, lightning, thunderstorms, high winds, and tornadoes. These typically occur during the summer months of the year.

HAZARD OVERVIEW

For the purposes of this analysis, severe summer weather will include hail, hurricane, lightning, thunderstorm, tornado, and wind events that typically occur throughout the summer months in all counties in Region 2.

Hail

The National Severe Storms Laboratory (NSSL), a division of NOAA, defines hail as “a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into balls of ice” (Severe Weather 101.) Hail can damage aircraft, homes, cars, and can even injure or be deadly to livestock. Obviously, the larger the size of the hail the more potential it has to cause damage or injury. A hot summer afternoon thunderstorm is capable of transforming the landscape from verdant green to icy white with the onset of a hailstorm. The first sign that hail may be arriving is growing whitening among the shafts of rain. Soon a rattling sound is heard as hailstones strike roofs and pavements, and the ground whitens, becoming slippery as hailstones cover grass and roadways. A hailstorm can be the most damaging part of a thunderstorm, inflicting injury to both man and beast, and destroying crops, gardens, and property like a giant pummeling machine.

TABLE 2.2.3.A TORRO HAILSTORM INTENSITY SCALE				
	<i>Intensity</i>	<i>Typical Hail Diameter (mm)</i>	<i>Typical Damage</i>	<i>Example Size Description</i>
H0	Hard Hail	5	No damage.	Pea
H1	Potentially Damaging	5-15	Slight general damage to plants, crops.	Mothball

TABLE 2.2.3.A TORRO HAILSTORM INTENSITY SCALE				
	<i>Intensity</i>	<i>Typical Hail Diameter (mm)</i>	<i>Typical Damage</i>	<i>Example Size Description</i>
H2	Significant	10-20	Significant damage to fruit, crops, vegetation.	Marble, Grape
H3	Severe	20-30	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored.	Walnut
H4	Severe	25-40	Widespread glass damage, vehicle bodywork damage.	Pigeon's egg > squash ball
H5	Destructive	30-50	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries.	Golf ball > Pullet's egg
H6	Destructive	40-60	Bodywork of grounded aircraft dented, brick walls pitted.	Hen's egg
H7	Destructive	50-75	Severe roof damage, risk of serious injuries.	Tennis ball > Cricket ball
H8	Destructive	60-90	(Severest recorded in the British Isles) Severe damage to aircraft bodywork.	Large orange > Soft ball
H9	Super Hailstorms	75-100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.	Grapefruit
H10	Super Hailstorms	>100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open.	Melon

Lightning

Lightning, high winds, and occasionally tornadoes are associated with thunderstorms. The National Atmospheric and Oceanic Administration defines a thunderstorm as a local storm produced by a cumulonimbus cloud and accompanied by lightning and thunder. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud. Lightning has been known to strike up to 6-10 miles from the storm in an area of clear sky. It is estimated that more than 30,000,000 points on the ground in the continental 48 states are hit by lightning in a single year.

Thunderstorm

Thunderstorms are usually high intensity storms of short duration originating in a warm moist air mass that either is forced to rise by mountainous terrain or by colliding with a cooler dense air mass. The process of convection in the atmosphere brings about the release of moisture from the warm air mass as it rises, cools and condenses. This condensation proceeds until most of the moisture in the air mass has been precipitated. Since the motion of the air is nearly vertical, and attains high velocities, rainfall is intense

and generally concentrated over a small area in a short time frame. Thunderstorms can be 10-15 miles in diameter and normally last 20 to 30 minutes. The National Weather Service considers a thunderstorm to be severe only if it produces wind gusts of 58 mph or higher, large hail (3/4 in. diameter or larger), or tornadoes.

Tornado

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. Normally thunderstorms and associated tornadoes develop in warm, moist air in advance of strong eastward moving cold fronts in late winter and early spring. Tornadoes can also occur along a “dryline” which separates very warm, moist air to the east from hot, dry air to the west. Another way that tornadoes can be created occurs when warm moist air flows upslope. Under the right temperature and moisture conditions, intense thunderstorms can produce tornadoes in higher terrain. Tornadoes can occur in every state, although the mid-west states have by far the greatest potential for this type of event. Tornadoes are ranked by intensity using the Enhanced Fujita (EF) Scale, replacing the original Fujita Scale devised by Dr. Theodore Fujita at the University of Chicago in 1971. This scale is an update to the original scale and is listed in Table 31. The EF scale is broken into 6 categories from F-0 to F-5. F-0 relates to a tornado having a wind speed up to 72 miles per hour, while an F-5 tornado would have winds up to 318 mph.

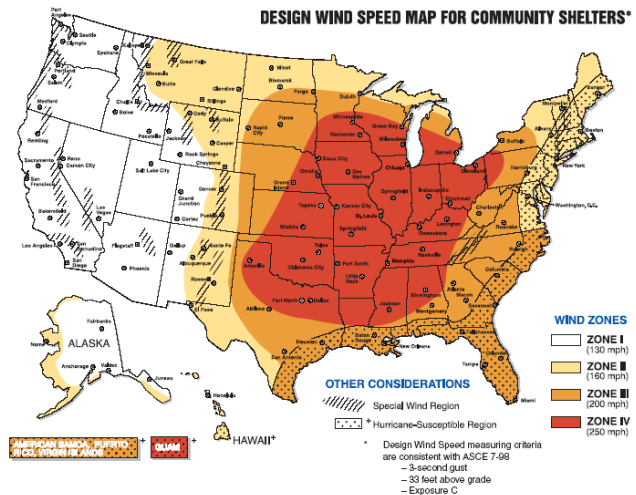
TABLE 2.2.3.B ENHANCED FUJITA SCALE		
#	3-Second Gust (mph)	Description
0	65-85	Light Damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards.
1	86-110	Moderate Damage. Surface peeled off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
2	111-135	Considerable Damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
3	163-165	Severe Damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
4	166-200	Devastating Damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
5	Over 200	Incredible Damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100-yards; trees debarked; incredible phenomena will occur.

Wind

“Downbursts” cause the high winds in a thunderstorm. Downburst winds result from the sudden descent of cool or cold air toward the ground. As the air hits the ground, it spreads outward, creating high winds. Unlike tornadoes, downburst winds move in a straight line, without rotation.

A wind event is typically not associated with other hazards, such as thunderstorms. Wind events will have little or no rain associated with them and may last considerably longer than other events like thunderstorm wind and tornadoes. The National Centers for Environmental Information (NCEI) records two types of stand-alone wind events: high wind events and strong wind events. (NWS Instruction 10-1605).

A wind storm is a severe weather condition indicated by high winds and with little or no rain. Localized geographical conditions can exacerbate the damages from high winds and cause increases in wind intensity. According to the above map, West Virginia is in Zone III for design wind speed. Wayne, Cabell and Mason Counties are just on the line of Zone IV.



POSSIBLE CAUSES

The types of severe weather described in this profile can be significantly altered by human activities. Some of these activities can be described as the following.

- **Urban Heat Island Effect:** a local climatic condition in which a metropolitan area may become as much as 22° F warmer than the surrounding countryside.
- **Burning of Fossil Fuels:** gasses emitted from burning of fossil fuels can linger in the atmosphere contributing to climate changes. (Keller, Devecchio, 2015, p 317).
- **Climate Change:** weather and climate change are closely related to the increase of occurrences in severe weather. For more complete information, refer to section [2.3 Complicating Variables](#).

LOCATION & EXTENT

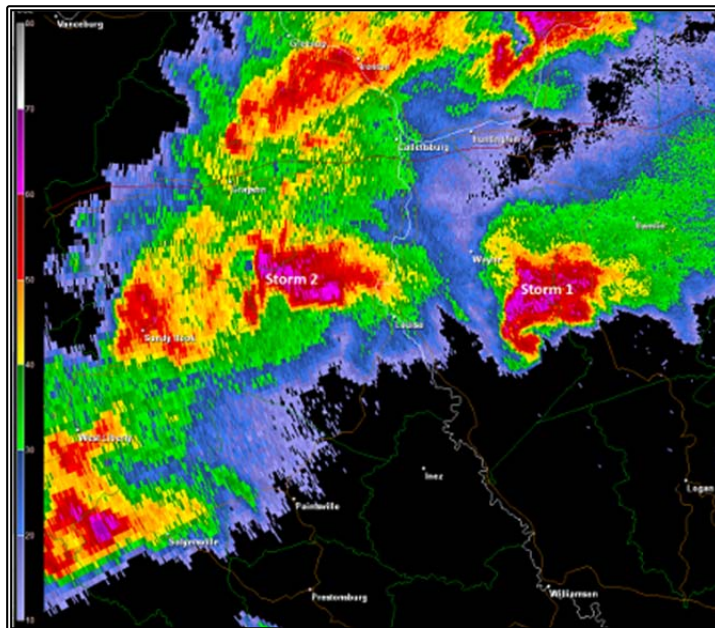
Severe summer weather can occur in all counties of Region 2 and cause similar

damages, destruction, or injuries.

HISTORICAL OCCURRENCES

Tornado, March, 2012

On March 2, 2012, tornadic supercells developed in central and eastern Kentucky and tracked into West Virginia. These storms were responsible for two deaths. A deep upper-level trough over the central plains began lifting northeastward into the Ohio River Valley, with maximum jet speeds of 125mph. At the surface, low pressure centered near Missouri began to deepen and move northeastward toward the southern Great Lakes region. By early afternoon, a warm front was positioned from southern Illinois, across Kentucky, southeastward into the Tennessee River Valley. In response to strong southerly flow, dew points across much of Kentucky began to exceed 60F.



Late in the afternoon, the cold front began moving across central Kentucky as the surface low began to occlude, and the warm front stalled over central West Virginia. A supercell entered the Lawrence County, KY warning area at approximately 6:10pm before dissipating over Lincoln County an hour later at approximately 7:10pm (NOAA, n.d.).

An EF3 tornado had a 53-mile path that day, there were also two EF1 tornadoes in Lincoln County, and one EF2 in Mingo County.

Thunderstorm Wind (Derecho), June, 2012

On the second day of a developing heat wave, under a sunny sky, afternoon temperatures reached record levels. The lowlands saw thermometers reach into the upper 90s and above 100 degrees. For example, both Huntington and Charleston had 103 degrees. Meanwhile, an area of multi-cellular convection had moved out of northern Illinois that morning. It continued to organize and strengthen, as it propagated east and southeast across northern Indiana into western Ohio during the afternoon. As it moved toward

southeast Ohio, it had already formed into a large arch of storms, or bow, with a developing cool pool in its wake.

The temperature contrast between the air ahead of the developing derecho, compared to that in its wake was reaching 30 to 35 degrees. The resultant wind shift in the cool pool resulted in strong moisture convergence on the leading edge of the complex. This in turn, helped drive the storms further southeast, away from the mid and upper level wind support. However, the complex was diving right into that hot air that had obtained large convective available potential energy. The complex streaked across southeast Ohio near the hottest time of the day and plowed into western West Virginia. The outflow, or gust front, had outraced the rain, as it moved through southeast Ohio. That gust front then moved southeast at 60 to 65 mph across West Virginia. The mature derecho caused the strong gusts to be longer in duration than found in most severe thunderstorms. In some cases the strong wind gusts lasted around 10 minutes. Due to the dry ground, dust and debris accompanied the gust front in some areas. The storms and showers that followed the strong wind gusts only provided about a quarter to a half inch of rain. A few areas even had less rain.

Widespread wind gusts of 60 to 80 mph were likely with the leading gust front, before weakening in the southern coal fields of West Virginia. A few favored and exposed locations may have seen gusts around 90 mph. Locations sheltered from the northwest had gusts less than 60 mph. The strongest measured gust was 77 mph from the Charleston airport. The Huntington airport had a gust to 59 mph. A spotter in Mason County reported a gust to 62 mph.

The wind caused numerous trees and large branches to fall in scattered locations throughout most counties. Luckily, there were no direct deaths. There were 3 indirect deaths that followed from the storms. There was only one direct injury. There was structural damage. Corrugated metal and siding were ripped off buildings. Trees fell onto houses or vehicles. Overall though, there was not a lot of physical damage to individual property. The fallen trees and power lines also caused roads to be temporarily blocked. However, the largest impact of the high winds was on the electric power grid. Prolonged power outages occurred as the heat wave continued during the first week of July. The workers restoring the electricity had to take frequent breaks due to the heat and the safety equipment they had to wear. The electric utility companies had regional transmission lines damaged. These had to be repaired in addition to the usual distribution system. One electric company had to replace over 1000 poles, 575 transformers and 172 miles of wire. That total does include a

few counties outside of West Virginia. The lack of electricity in the midst of the heat wave, disrupted the daily routines of most citizens for several days. The word, derecho, was introduced into many everyday conversations. Water and ice were in high demand. Family and retail refrigerated food lost was substantial (NCEI, n.d.).

COMMITTEE INPUT

During committee and public meetings, committee members expressed concern about specific problems in their areas. The following is a summary of problems and what has been done so far to begin to mitigate the hazard.

- **Mingo County:** Wind and high temperatures can cause power outages throughout the county. Trees fall across power lines causing outages and leaving families in dangerous heat conditions without A/C. The problem areas have been located.
- **Logan County:** Humidity and high temperatures in the summer affect the elderly and children disproportionately. Public outreach campaigns regarding staying safe during extended power outages in cold and hot weather.

IMPACT & VULNERABILITY

Severe summer weather can exacerbate existing illnesses and cause injury and, on rare occasion, death. The cascading effects of severe summer weather such as power and water outages are what most would affect continuity of operations and delivery of services. High wind, tornadoes, hail, and lightning have the potential for damaging trees, residences, and infrastructure alike.

If an event is severe enough, it may cause people to not be able to go to work causing losses for families and businesses. The cost of cleanup activities could be very high after a severe summer event. Weather events are part of what keeps the environment as it is; rain provides life to the flora and fauna. In severe events, the wind may cause erosion and downed trees; lightning may cause fires.

LOSS & DAMAGES

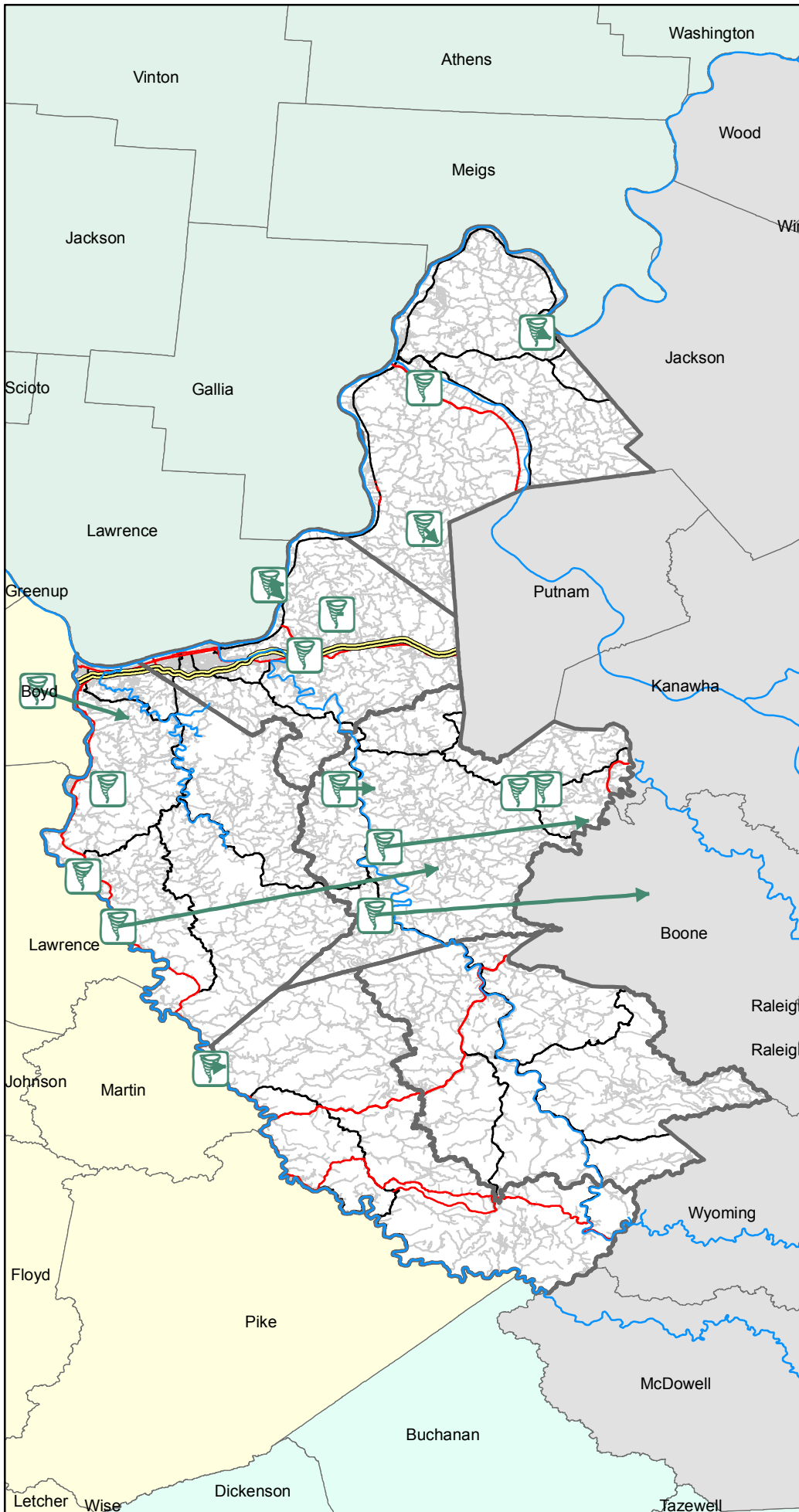
The NCEI database has records that in some instances go back to 1955 but more complete records have been kept since 1995. The SHELDUS database, on the other hand, has more records between the years of 1960 and 1995 than NCEI. However, data is included up to 2016. The following table is a summary of severe summer weather events from both databases that includes the amount of records per event, deaths, injuries and total

property damage for all recorded events. It is possible that some events may be included in both databases.

TABLE 2.2.3.C SEVERE SUMMER WEATHER EVENTS								
Event Type	Records	NCEI			Records	SHELDUS		
		Deaths	Injuries	Property Damage		Deaths	Injuries	Property Damage*
Tornadoes	16	0	4	\$3,216,500	18	0	4	\$3,738,637
Hail	355	0	0	\$2,347,000	83	0	30	\$2,349,464
Heavy Rain	71	4	0	\$482,000	N/A	N/A	N/A	N/A
Wind	659	2	11	\$14,158,000	457	3	37	\$8,744,255
Lightning	10	0	3	\$135,000	67	4	38	\$638,462
Severe Storm	N/A	N/A	N/A	N/A	631	5	9	\$11,405,963
Totals	1,111	6	18	\$20,338,500	1,256	12	118	\$26,876,781

RISK CALCULATION



TABLE 2.2.3.D SEVERE SUMMER WEATHER RISK CALCULATION							
Probability			+	Severity		=	Risk
FREQUENT				CRITICAL			MEDIUM HIGH
Events	2,367	=38.1		Due to the damages, injuries, and deaths caused by severe summer weather, the severity for this hazard is critical.			The risk assessment matrix puts this hazard at high risk to the region.
Years	62						
There are roughly 38 severe summer events recorded every year in the entire region.							



REGION 2 HAZARD MITIGATION PLAN

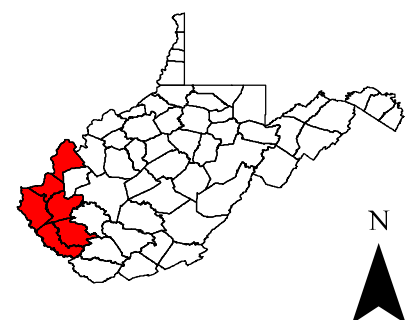
Risk Map: Tornado Paths

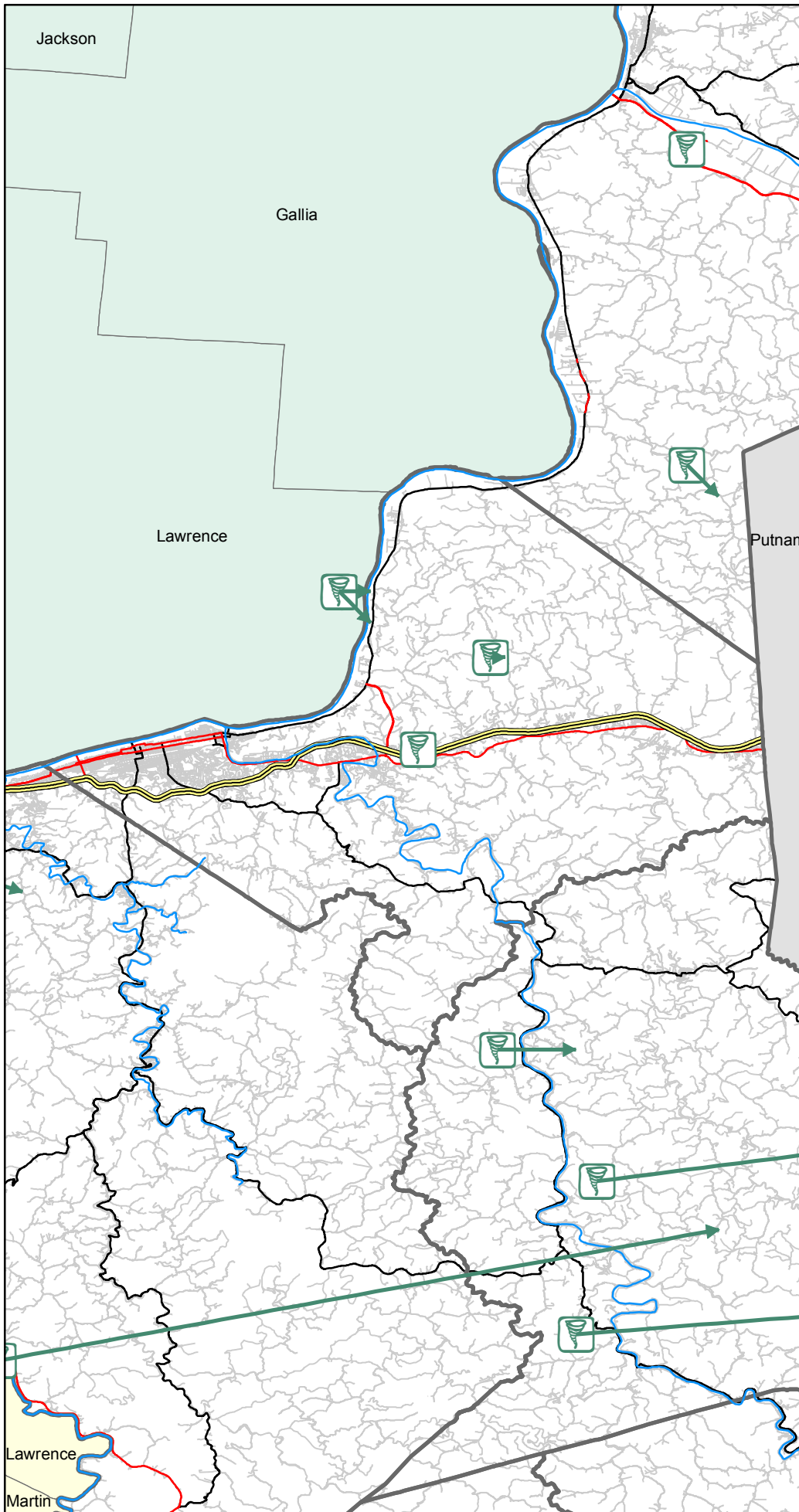
Data Source(s):
Tornado History Project

-  Tornado Path
-  Tornado Touch Down Point

0 3 6 12 18 24
Miles

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REGION 2 HAZARD MITIGATION PLAN

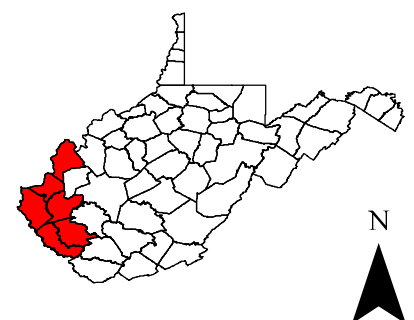
Cabell Risk Map: Tornado Paths

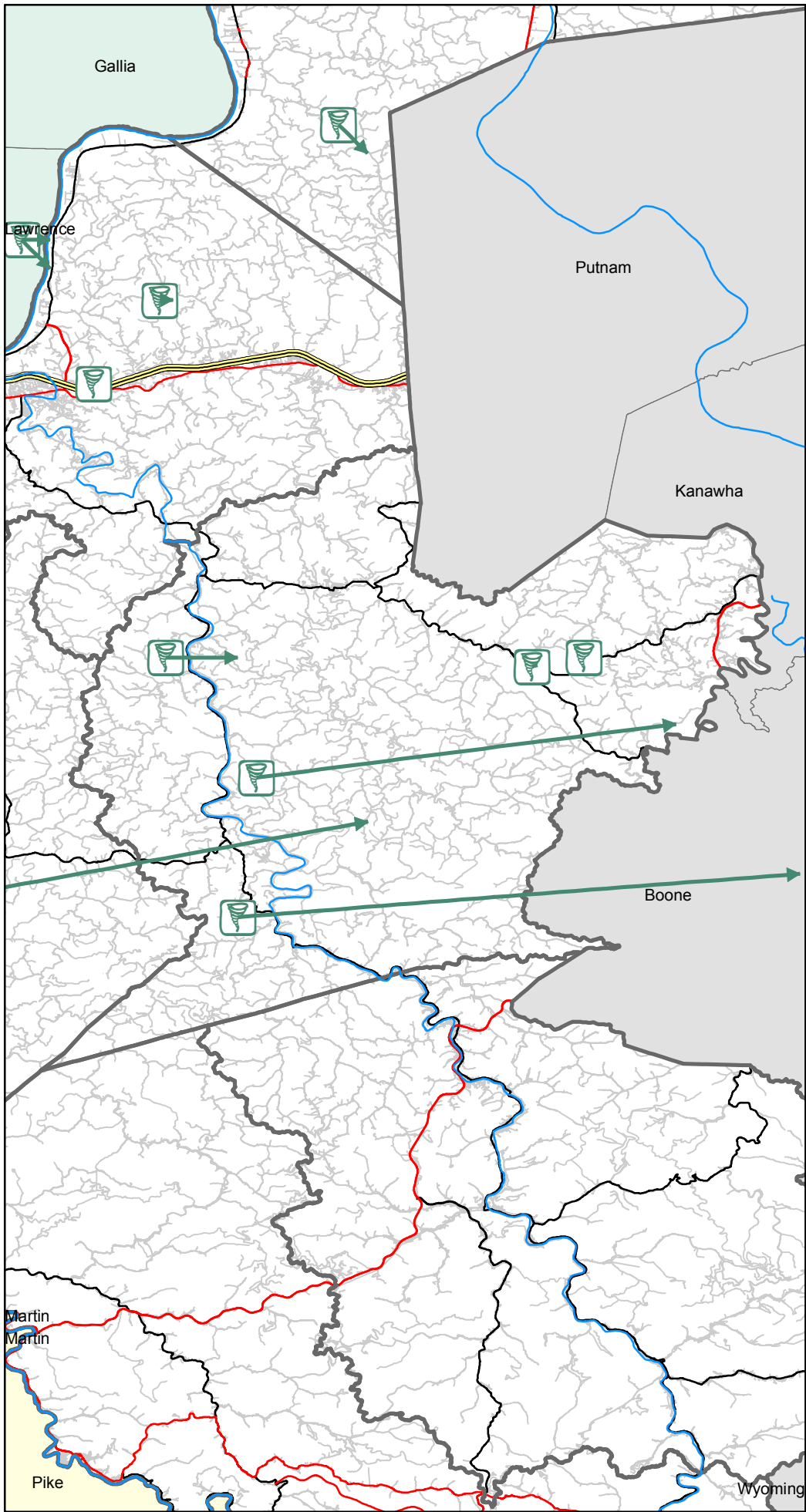
Data Source(s):
Tornado History Project

- Tornado Path
- 🌀 Tornado Touch Down Point

0 1.25 2.5 5 7.5 10
Miles

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REGION 2 HAZARD MITIGATION PLAN

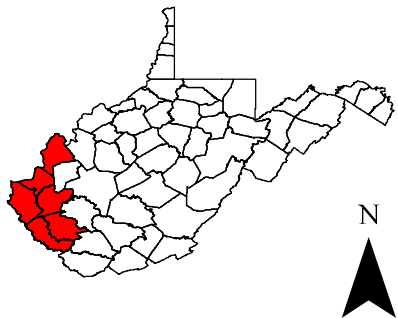
Lincoln Risk Map: Tornado Paths

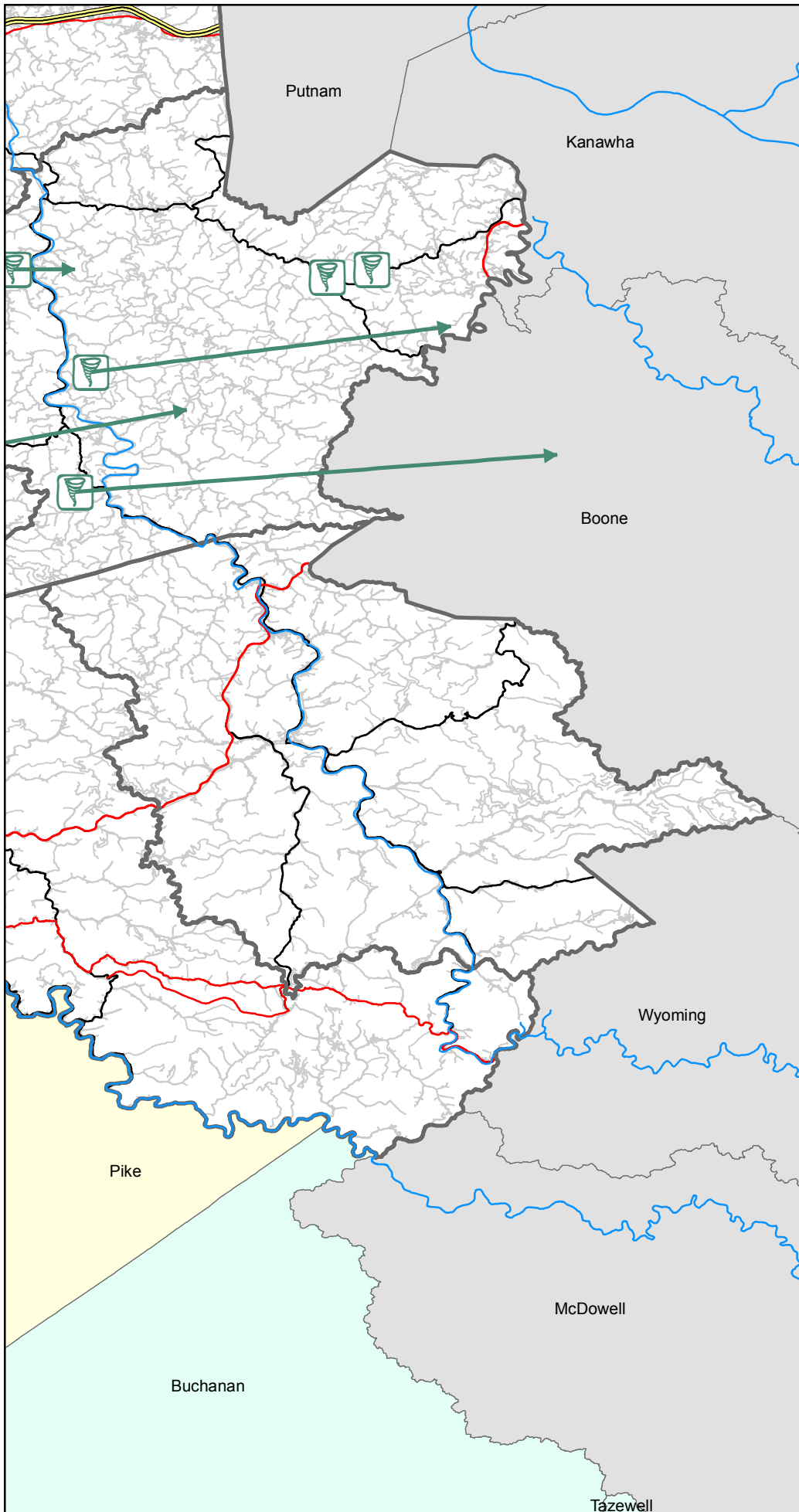
Data Source(s):
Tornado History Project

-  Tornado Path
-  Tornado Touch Down Point

0 1.5 3 6 9 12 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.






REGION 2 HAZARD MITIGATION PLAN

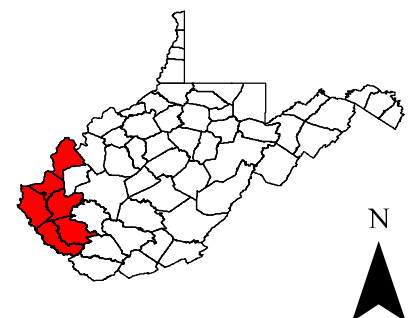
Logan Risk Map: Tornado Paths

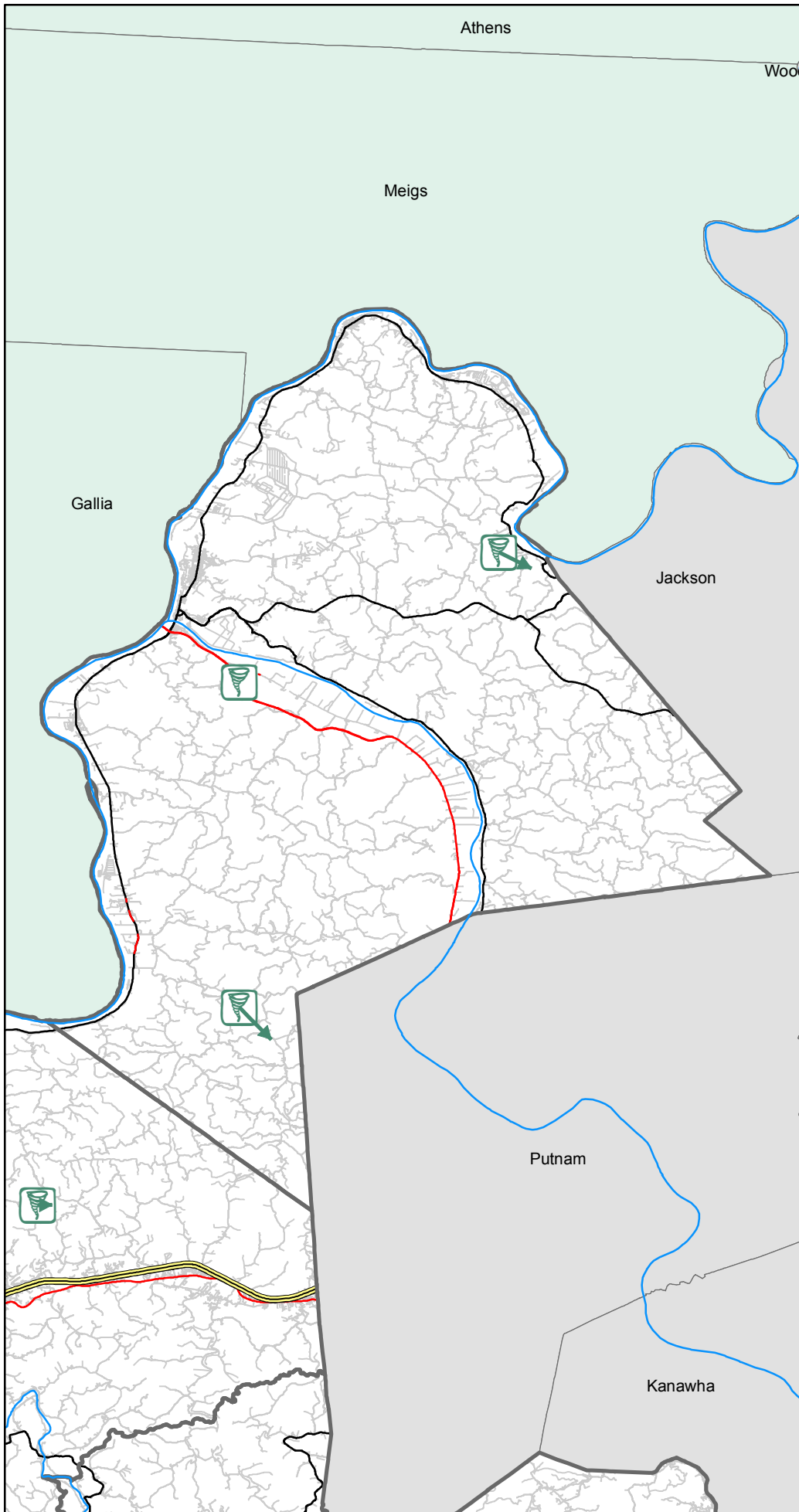
Data Source(s):
Tornado History Project

- Tornado Path
-  Tornado Touch Down Point

0 1.5 3 6 9 12
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.






REGION 2 HAZARD MITIGATION PLAN

Mason Risk Map: Tornado Paths

Data Source(s):
Tornado History Project

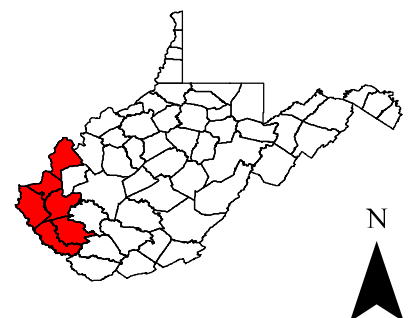
- Tornado Path
-  Tornado Touch Down Point

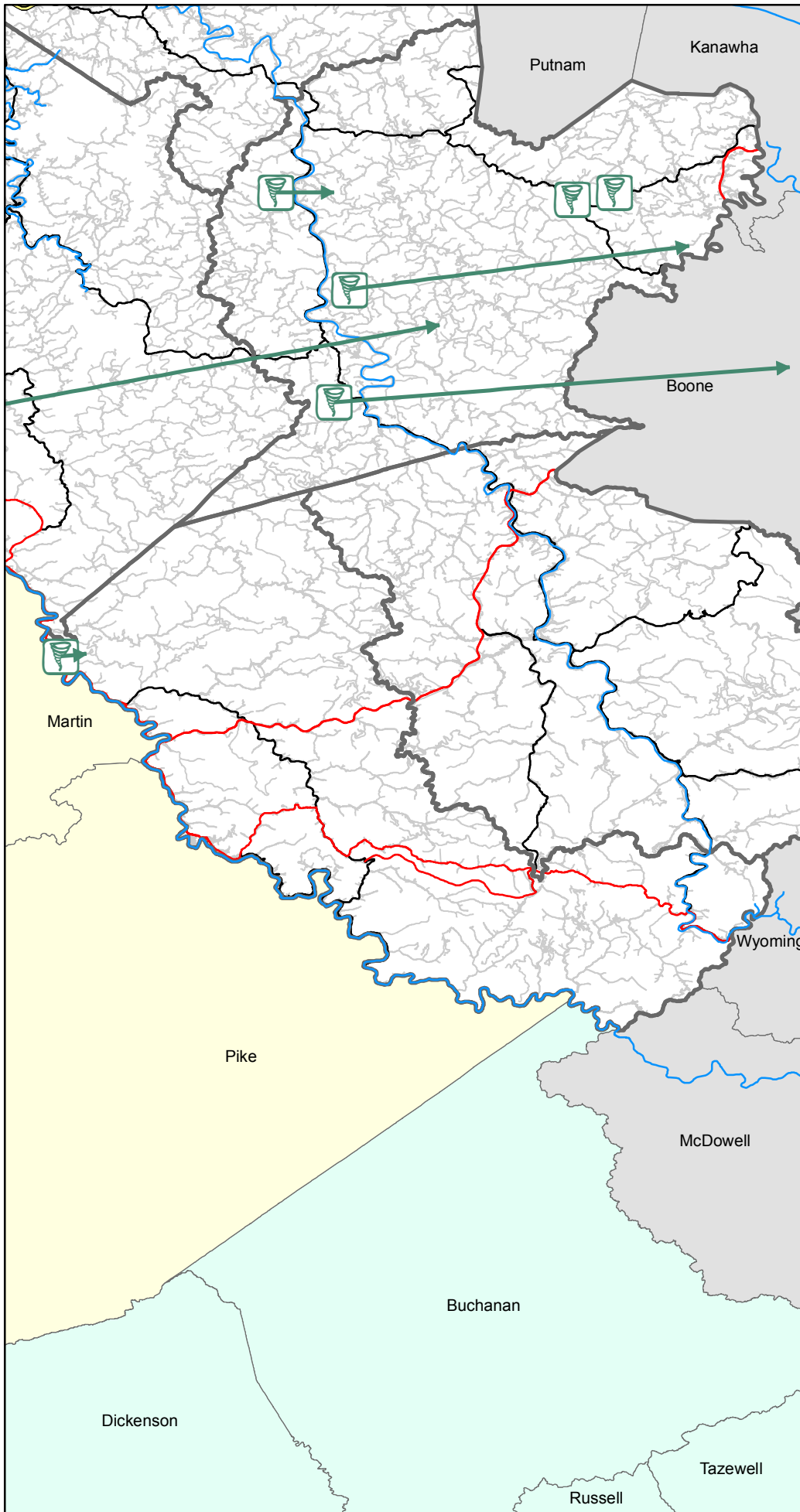
0 1.25 2.5 5 7.5 10
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



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Consulting, LLC







REGION 2 HAZARD MITIGATION PLAN

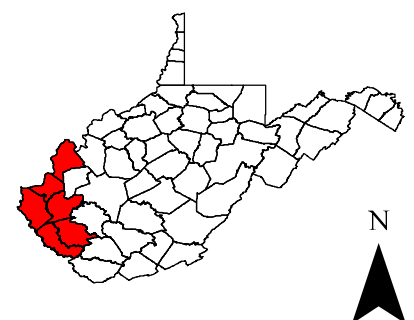
Mingo Risk Map: Tornado Paths

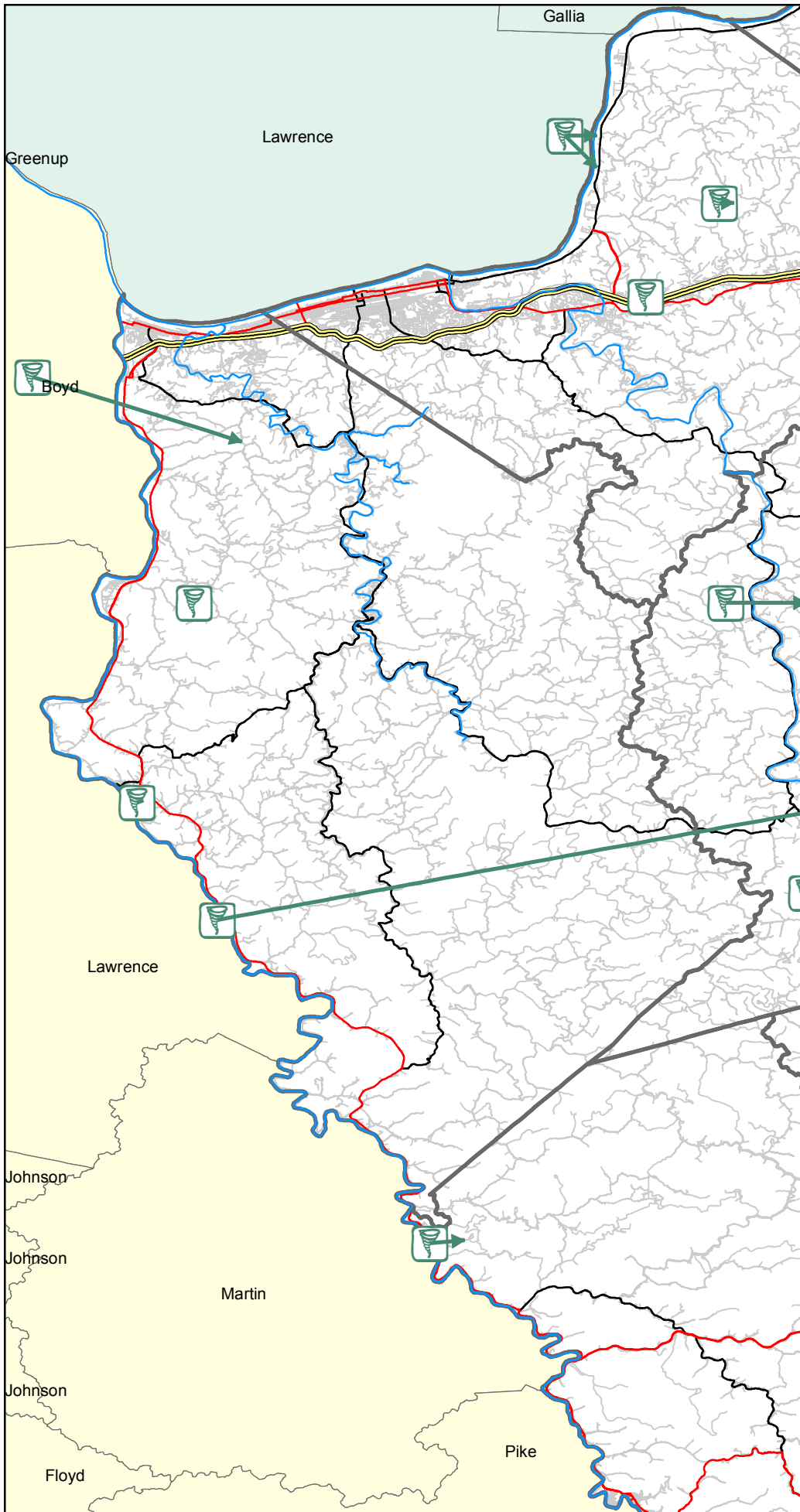
Data Source(s):
Tornado History Project

-  Tornado Path
-  Tornado Touch Down Point

0 1.5 3 6 9 12
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.







REGION 2 HAZARD MITIGATION PLAN

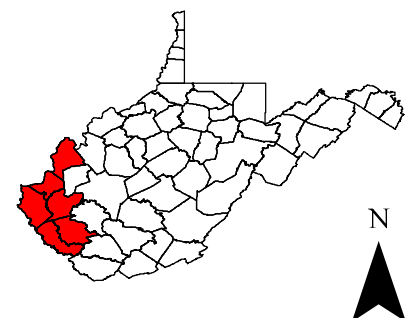
Wayne Risk Map: Tornado Paths

Data Source(s):
Tornado History Project

-  Tornado Path
-  Tornado Touch Down Point

0 1.25 2.5 5 7.5 10
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



Historical Hurricane Tracks

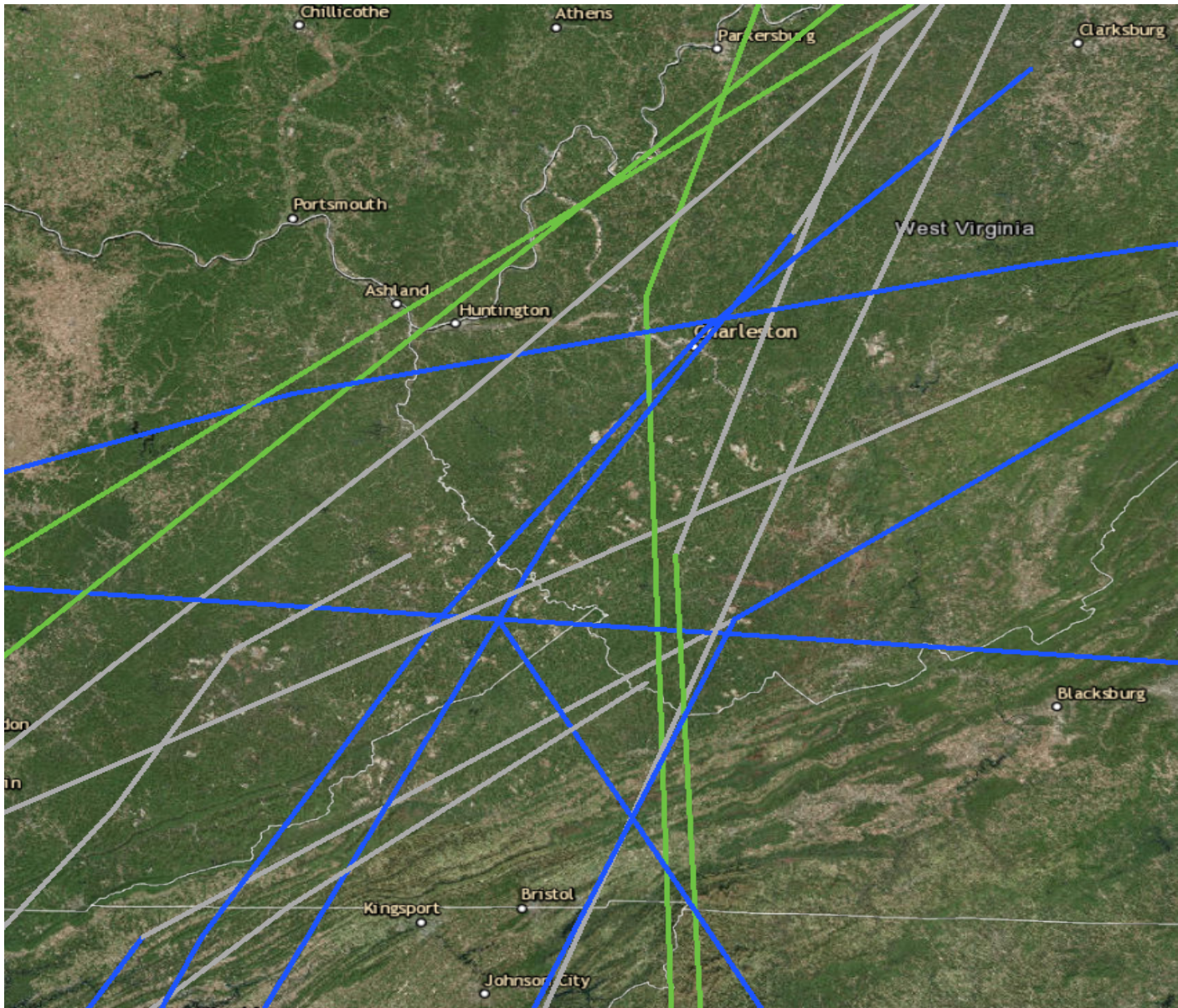
National Oceanic and Atmospheric Administration

Summary of Search

Location: 37.8507,-81.985

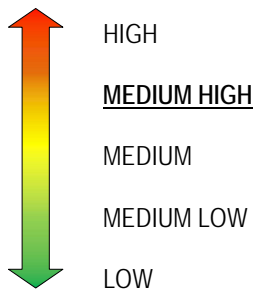
Buffer: 120380 Meters (65 Nautical Miles)

Search was not refined



Storm Name	Date
UNNAMED 1901	Sep 21, 1901 to Oct 02, 1901
UNNAMED 1915	Sep 21, 1915 to Oct 01, 1915
UNNAMED 1928	Aug 07, 1928 to Aug 17, 1928
UNNAMED 1932	Oct 07, 1932 to Oct 18, 1932
UNNAMED 1934	Jun 04, 1934 to Jun 21, 1934
UNNAMED 1939	Aug 07, 1939 to Aug 19, 1939
UNNAMED 1952	Aug 27, 1952 to Aug 28, 1952
AUDREY 1957	Jun 24, 1957 to Jun 29, 1957
GRACIE 1959	Sep 20, 1959 to Oct 02, 1959
CAMILLE 1969	Aug 14, 1969 to Aug 22, 1969
ELOISE 1975	Sep 13, 1975 to Sep 24, 1975
FREDERIC 1979	Aug 29, 1979 to Sep 15, 1979
HUGO 1989	Sep 10, 1989 to Sep 25, 1989
BERYL 1994	Aug 14, 1994 to Aug 19, 1994
FRANCES 2004	Aug 25, 2004 to Sep 10, 2004
FAY 2008	Aug 15, 2008 to Aug 28, 2008

2.2.4 SEVERE WINTER WEATHER



"A winter storm occurs when there is significant precipitation and the temperature is low enough that precipitation forms as sleet or snow, or when rain turns to ice."

- FEMA

HAZARD OVERVIEW

Severe winter weather, for the purposes of this analysis, will include the following types of events that typically occur throughout the winter months in all areas of Region 2.

- **Blizzard:** A winter storm which produces the following conditions for three hours or longer: a) sustained winds or frequent gusts 30 knots (35 mph) or greater, and b) falling and/or blowing snow reducing visibility frequently to less than 1/4 mile, on a widespread or localized basis (NCEI).
- **Ice Storm:** Ice accretion meeting or exceeding locally/regionally defined warning criteria (typical value is 1/4 or 1/2 inch or more), on a widespread or localized basis (NCEI).
- **Winter Storms:** A winter weather event which has more than one significant hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or exceeds locally/regionally defined 12 and/or 24 hour warning criteria for at least one of the precipitation elements, on a widespread or localized basis (NCEI).
- **Winter Weather:** A winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation but does not meet locally/regionally defined warning criteria. A winter weather event could result from one or more winter precipitation types (snow, or blowing/drifting snow, or freezing rain/drizzle), on a widespread or localized basis (NWS Instruction 10-1605).

POSSIBLE CAUSES

The types of severe weather described in this profile can be significantly altered by human activities. Some of these activities can be described as the following.

- **Urban Heat Island Effect:** a local climatic condition in which a metropolitan area may become as much as 22° F warmer than the surrounding countryside.
- **Burning of Fossil Fuels:** gasses emitted from burning of fossil fuels can linger in the atmosphere contributing to climate changes. (Keller, Devecchio, 2015, p 317).
- **Climate Change:** weather and climate change are closely related to the increase of occurrences in severe weather. For more complete information, refer to section [2.3 Complicating Variables](#).

LOCATION & EXTENT

All counties of Region 2 are equally susceptible to severe winter weather events.

HISTORICAL OCCURRENCES

According to NCEI, there have been 49 winter events in Region 2 since 1996. The following is a description from NCEI about some recent winter weather events.

Winter Weather, February, 2015

An arctic front swept through West Virginia during the early afternoon hours of the 18th of February. Snow showers formed ahead of the front. Bands of snow showers lingered into the evening over the central mountains and southern lowland counties as temperatures dropped into the single digits before midnight. Snow accumulations of 2 to 3 inches were common around Huntington on through the southern coal field counties and into the central mountains.

The diminishing winds and a clear sky developed first over southern counties of the state, then moved north during the overnight hours of the 19th into the 20th. With a fresh deep snow pack, temperatures dropped well below zero for dawn on Friday, the 20th. The official temperature records included minus 19 at East Lynn in Wayne County, minus 16 at Huntington. For example, the minus 17 at Huntington was the coldest since the minus 21 degrees back in January 1994.

Two deaths of young adults in the Smokehouse Fork area of Logan County were indirectly related to the cold temperatures. State police listed the cold as a contributing factor.

Heavy Snow, March, 2015

A warm front lifted north through West Virginia on the 3rd of March with a half inch to an inch of rain over the central mountain counties. Less rain fell elsewhere. Late afternoon and evening temperatures rose into the 50s and lower 60s over the lowlands. Winds and dew points also increased.

The rain maximum by early on the 4th was over the southern coal fields including the headwaters of the Guyandotte and Tug Fork Rivers. The Guyandotte River at Man even surged above flood stage early in the morning on the 4th. Small stream flooding, rock and mud slides were common during the day on the 4th as a steady rain fell. The most common problem was roads closures. Several roads were undermined by runoff channels or adjacent swollen streams. Culverts under roads were damaged. Damage to structures was limited. Rain rates were mostly 1 to 2 tenths of an inch per hour. Total rainfall of 1.5 to 2 inches became common by that evening.

A total snow accumulation of 10 to 13 inches was common from northern Wayne County on up the Ohio Valley Counties to Wood, Pleasants, and Tyler Counties. For example, the snowfall at Huntington was 12.8 inches with a measured accumulation of 1 foot. After transitioning from rain to snow, the wet snow accumulated on trees, especially evergreen trees. Prolonged power outages were common.

This was the highest water level in 15 years there. The Tug Fork River crested just under 40 feet at Williamson midday on the 5th. This was the 9th highest crest on record at Williamson. The city water plant was flooded. However, a flood wall protects most of the town. Further down the river, the estimated crest was 45.2 feet at Kermit, more than 6 feet over the 38 foot flood stage. This crest was the highest level at Kermit since the flood back in February of 2003. The Guyandotte crested around 34.6 feet at Branchland during the evening of the 5th. Flood stage is 30 feet. This Lincoln County crest was also the highest since the flood back February of 2003. The crest on the Big Coal River at Ashford was 23.6 feet on the 5th. Bank full is around 17 feet. The Coal River crested at 28.45 feet late in the afternoon on the 5th in the community of Tornado. These water levels were the highest on the lower Coal River in nearly 8 years. The Lincoln County water plant was damaged along the Big Coal River. Even rivers that did not reach flood stage were high enough to cause minor backwater flooding. One example was the Kanawha River at Charleston. Eventually, even the Ohio River had minor flooding from Point Pleasant on down through Huntington, Ceredo, and Kenova. Point Pleasant crested near 44.5 feet on the 6th. The crest at Huntington was about 1.5 feet above flood stage on Saturday the 7th.

To dampen the crest further down the Ohio River, the Corps of Engineers held back water at their projects on the Guyandotte River and Twelvepole Creek. As a result, the stored water raised the lake elevation about 102 feet in the vertical at R.D. Bailey Lake on the Guyandotte River. This set a new record pool elevation there. Mud and rock slides continued during the snow storm. In Mingo County, one slide near Gilbert pushed a house off its foundation, and jolted a woman out of her bed. Another slide near Nolan in Splint Hollow damaged at least 3 mobile homes.

COMMITTEE INPUT

During committee and public meetings, committee members expressed concern about specific problems in their areas. The following is a summary of problems and what has been done so far to begin to mitigate the hazard.

- **Logan County:** Low temperatures in the winter affect the elderly and children disproportionately. Public outreach campaigns regarding staying safe during extended power outages in cold and hot weather have been conducted.
- **Mingo County:** Wind and low temperatures can cause power outages throughout the county. Trees fall across power lines causing outages and leaving families in dangerous cold conditions without heat.

IMPACT & VULNERABILITY

Severe winter weather can exacerbate existing illnesses and can cause illness, injury and, on rare occasion, death. The cascading effects of severe winter weather include mostly power outages and road blockages resulting from severe storms; this is what most likely could affect continuity of operations and delivery of services.

Severe winter weather has the potential for damaging trees, infrastructure and buildings. If an event is severe enough, it may cause people not to be able to go to work causing losses for families and businesses. The cost of cleanup activities could be very high after a severe winter event. Winter weather events are part of what keeps the environment as it is; snow provides life to the flora and fauna. In severe events, the wind may cause erosion and heavy ice and snow may cause downed trees.

LOSS & DAMAGES

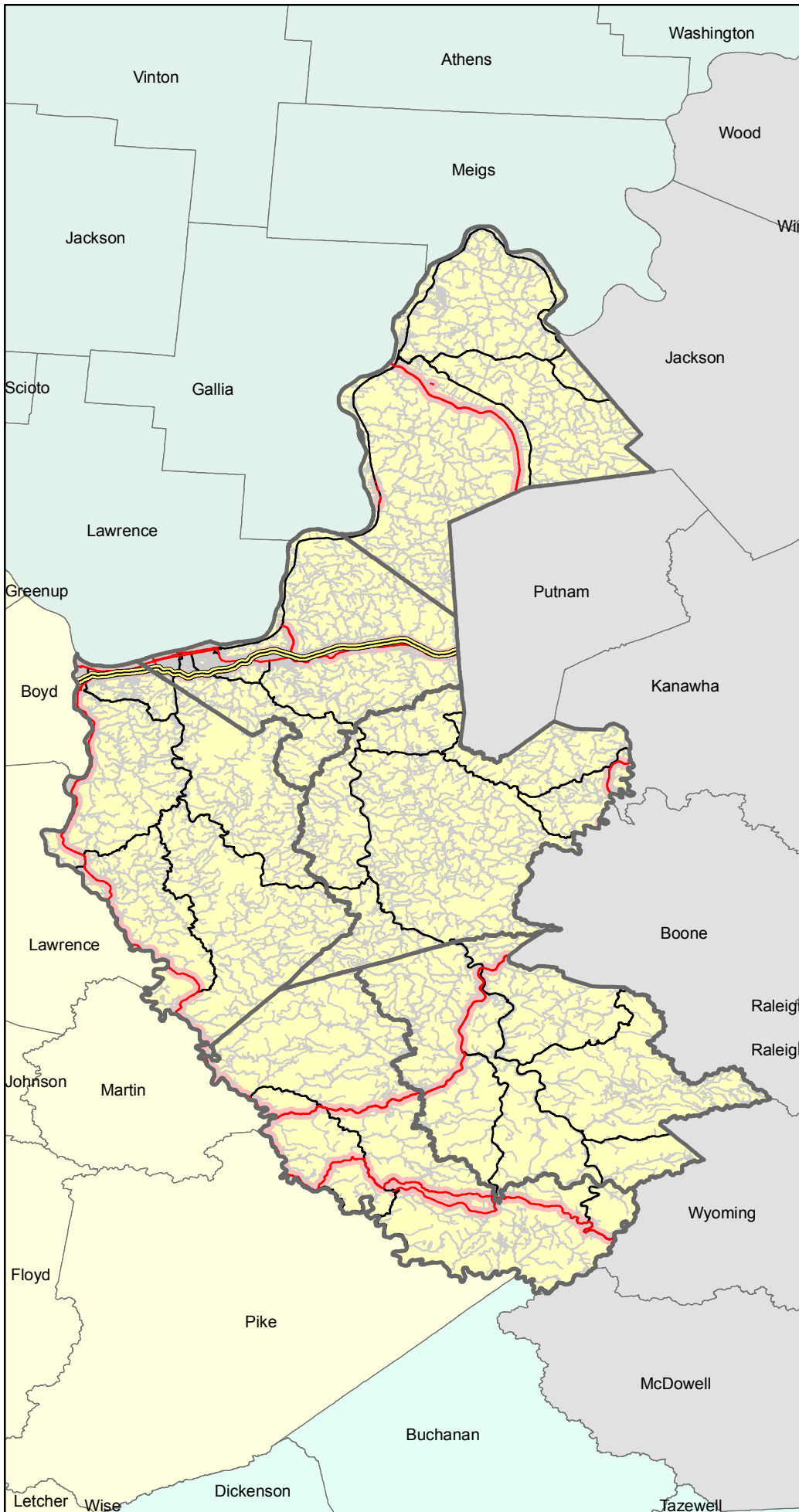
NCEI reports a total of around \$5 million in damages from winter weather events, although the number may be lower than actual damages caused since 1996. The SHELDDUS

database maintains 179 records of winter weather events between 1960 and 2016 with a total cost of damages of around \$11 million.

RISK CALCULATION

TABLE 2.2.4.A SEVERE WINTER WEATHER RISK CALCULATION					
Probability			Severity		Risk
FREQUENT			CRITICAL		MEDIUM HIGH
Events	49	=2.3	+	=	The risk assessment matrix determines this hazard to be medium high in the region.
Years	21				
Based on the NCEI database, there have been approximately two winter weather events per year in the Region.					





REGION 2 HAZARD MITIGATION PLAN

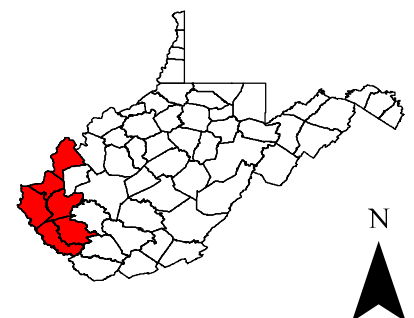
Risk Map: Severe Winter Weather

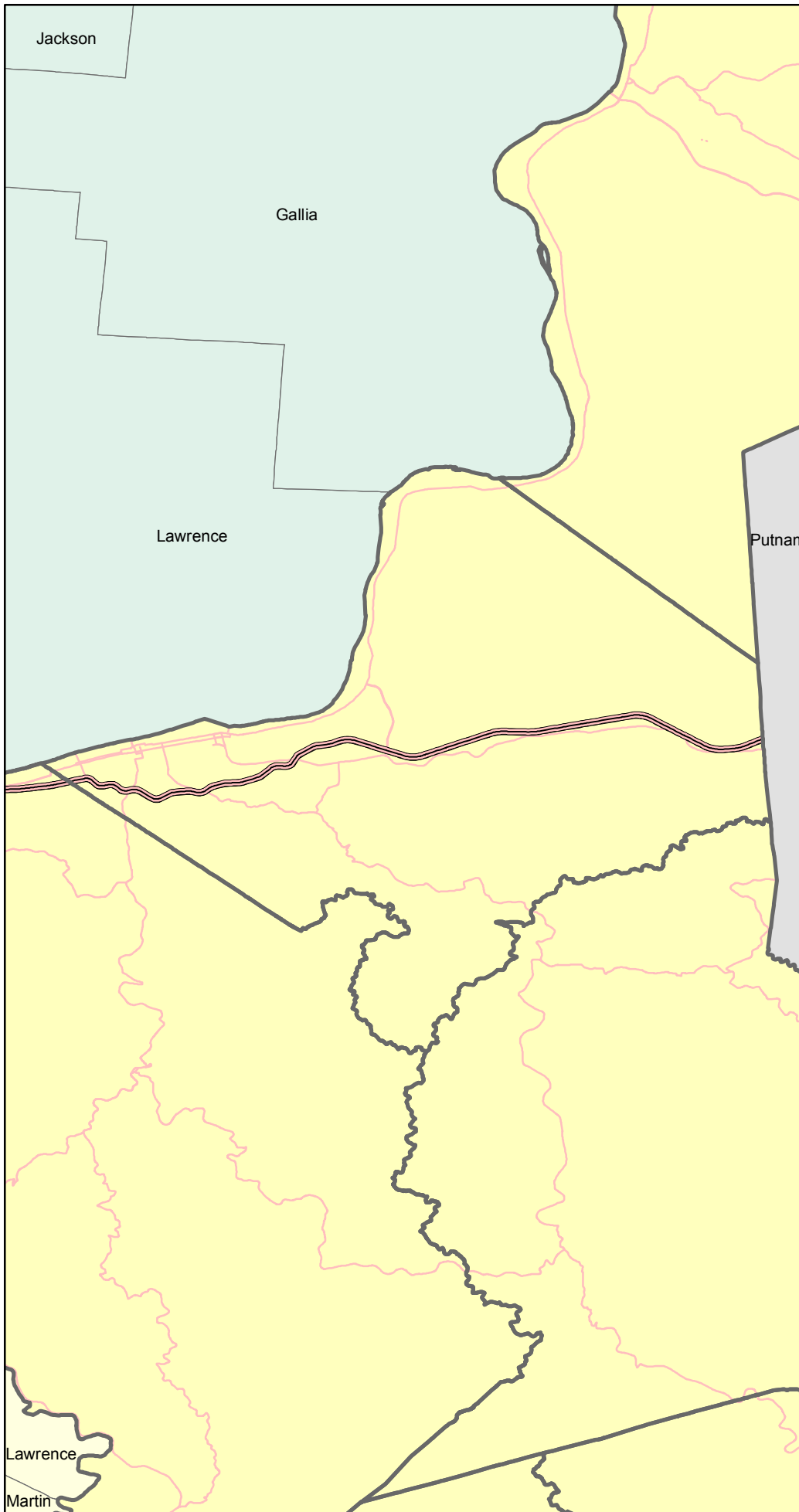
Data Source(s):
US Census (Tiger Data)

- High Risk Area
- Moderate Risk Area

0 3 6 12 18 24
Miles

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REGION 2 HAZARD MITIGATION PLAN

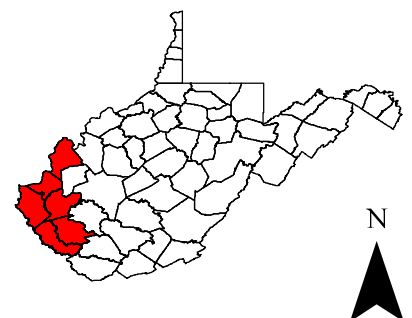
Cabell Risk Map: Severe Winter Weather

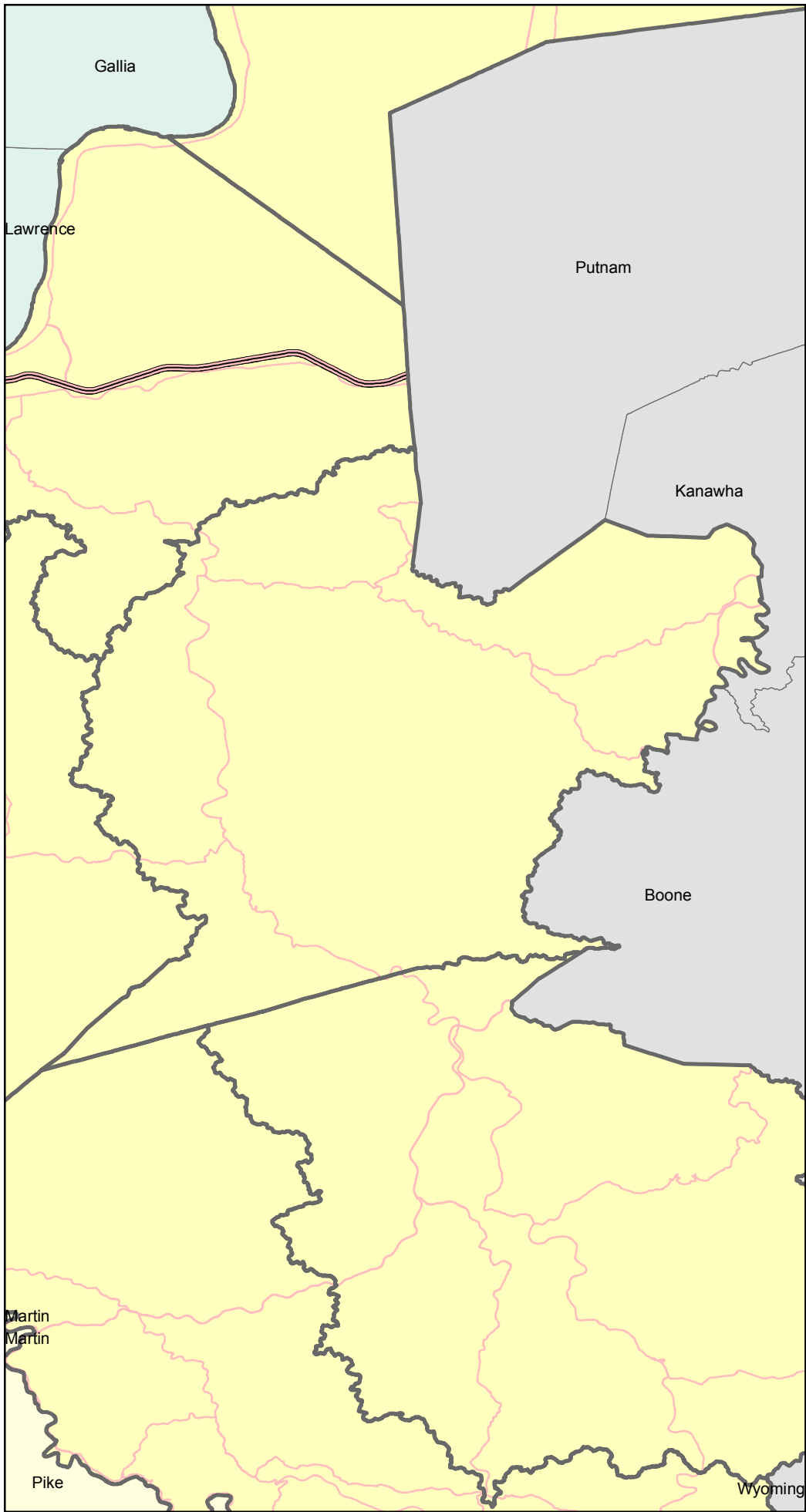
Data Source(s):
US Census (Tiger Data)

High Risk Area
Moderate Risk Area

0 1.25 2.5 5 7.5 10
Miles

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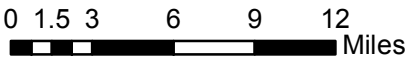


REGION 2 HAZARD MITIGATION PLAN

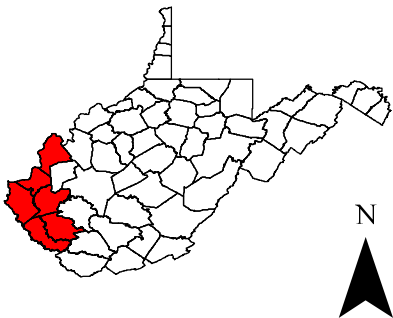
Lincoln Risk Map: Severe Winter Weather

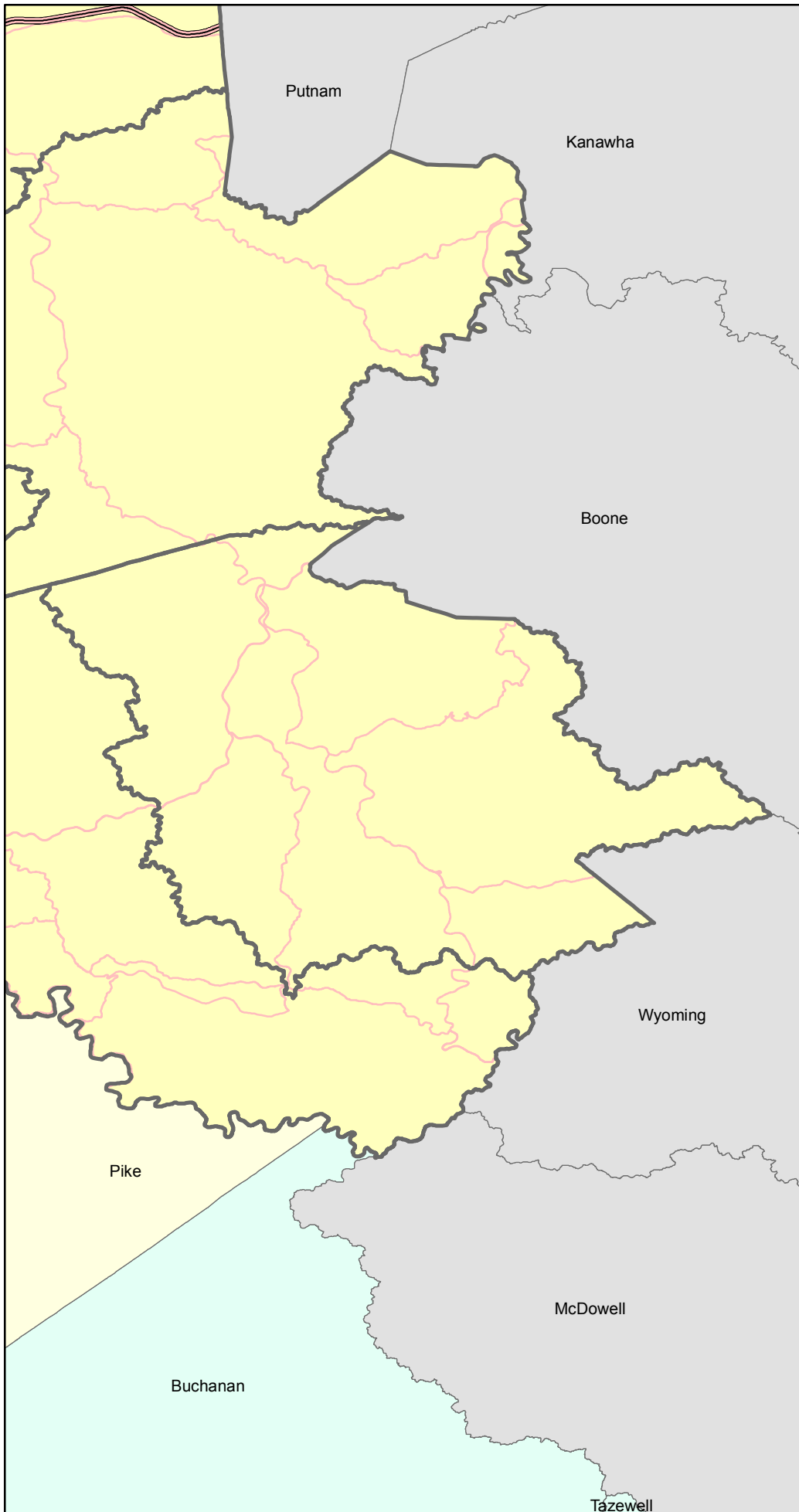
Data Source(s):
US Census (Tiger Data)

- High Risk Area
- Moderate Risk Area



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REGION 2 HAZARD MITIGATION PLAN

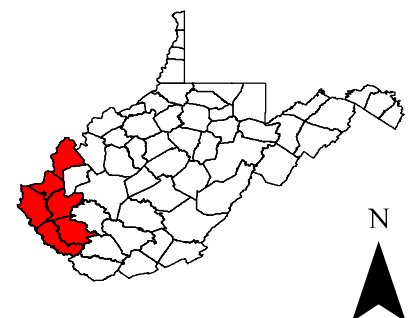
Logan Risk Map: Severe Winter Weather

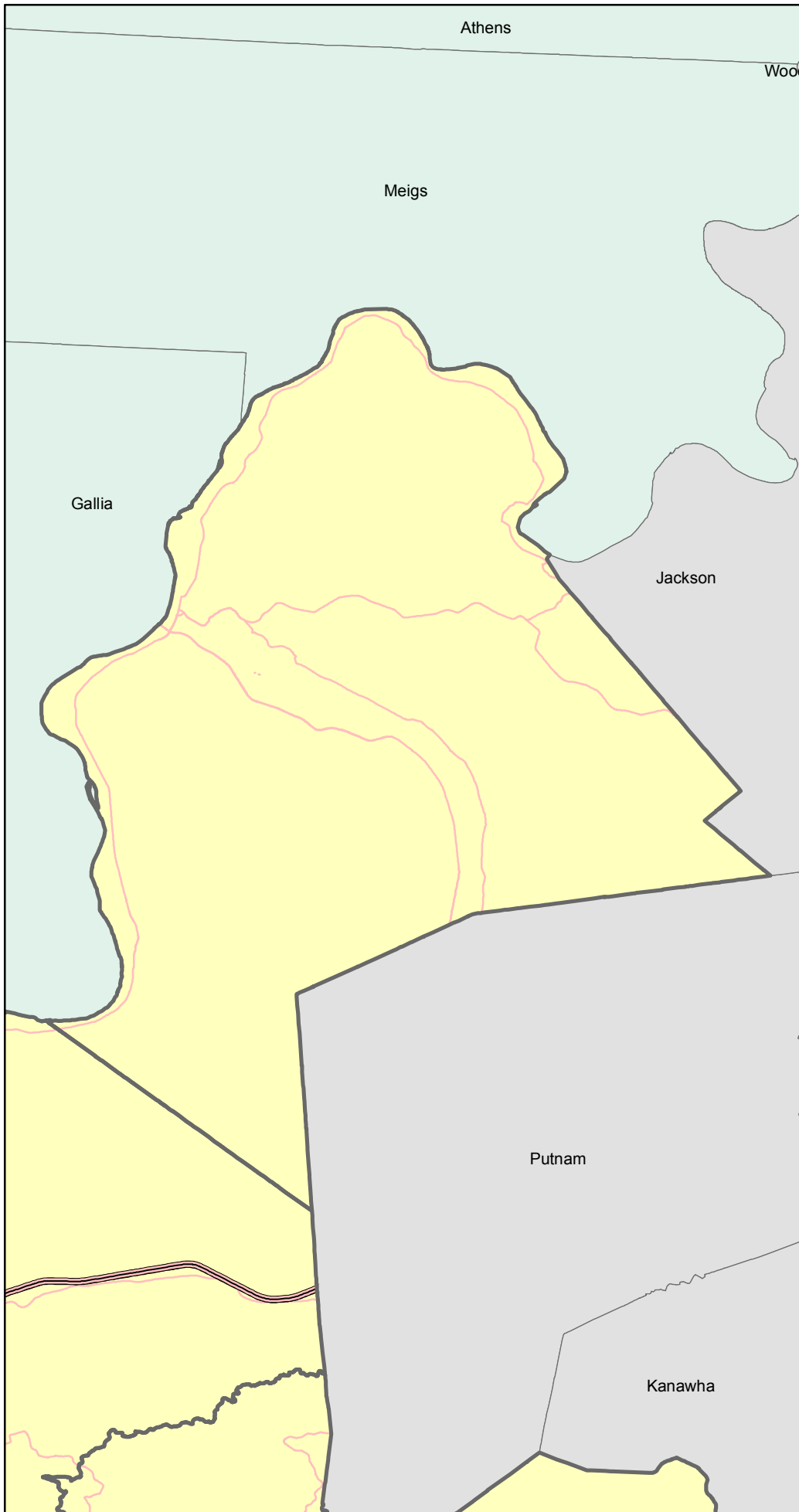
Data Source(s):
US Census (Tiger Data)

High Risk Area
Moderate Risk Area

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

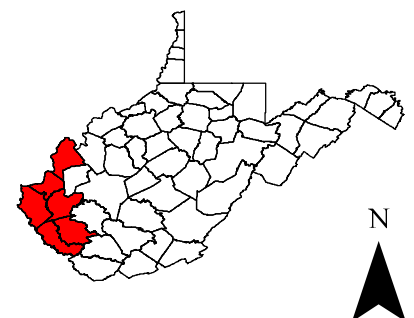
Mason Risk Map: Severe Winter Weather

Data Source(s):
US Census (Tiger Data)

High Risk Area
Moderate Risk Area

0 1.25 2.5 5 7.5 10
Miles

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REGION 2 HAZARD MITIGATION PLAN

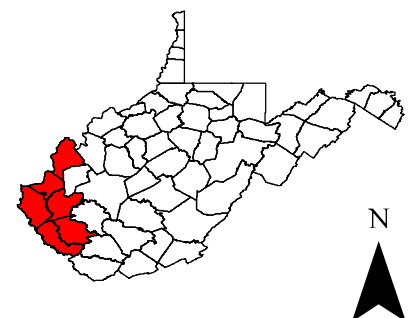
Mingo Risk Map: Severe Winter Weather

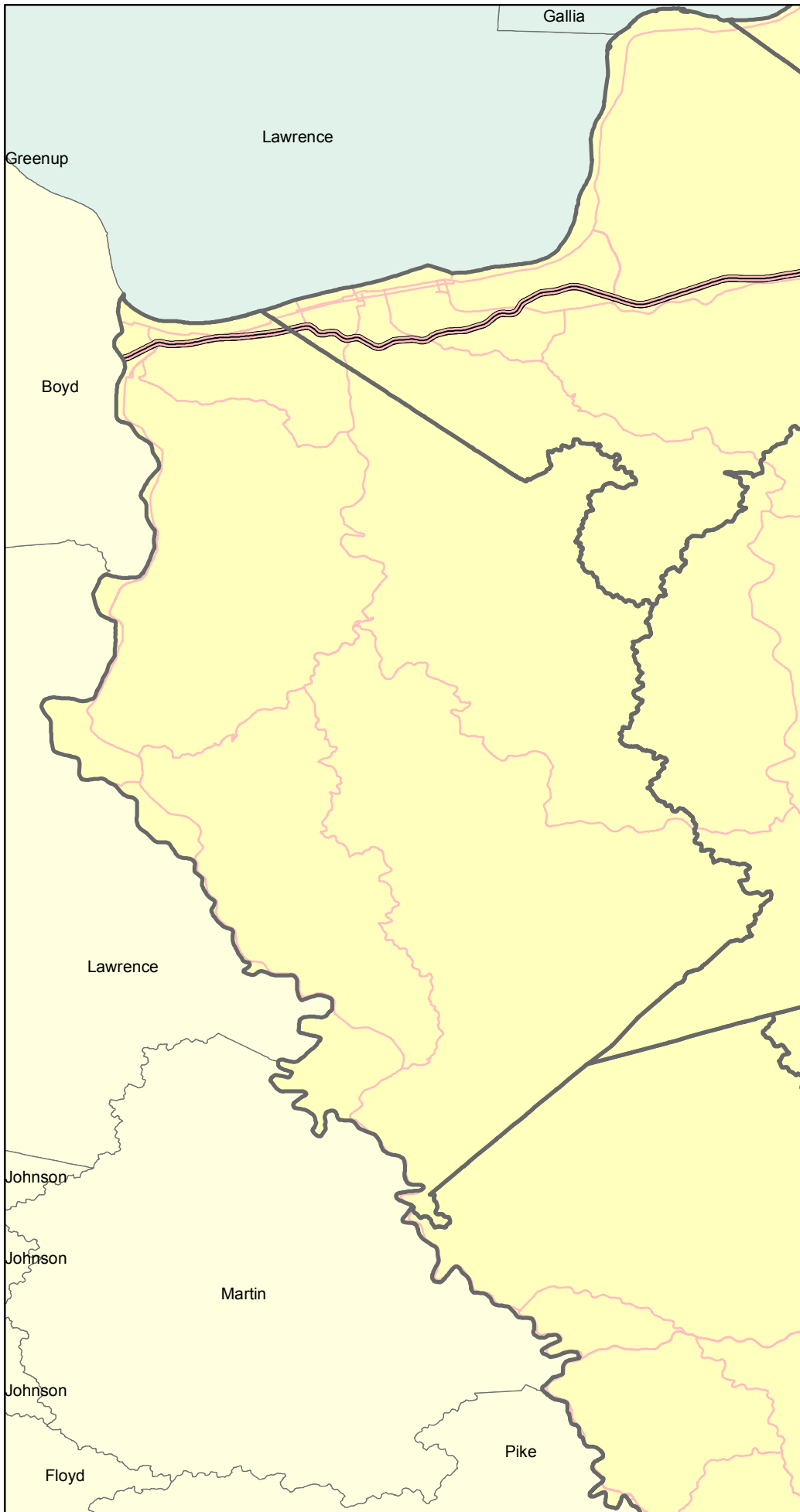
Data Source(s):
US Census (Tiger Data)

High Risk Area
Moderate Risk Area

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

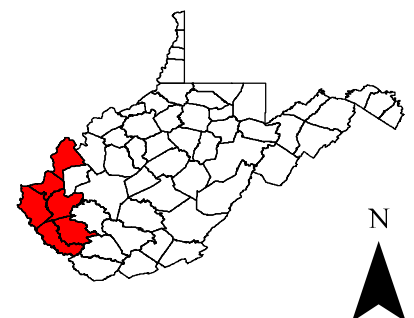
Wayne Risk Map: Severe Winter Weather

Data Source(s):
US Census (Tiger Data)

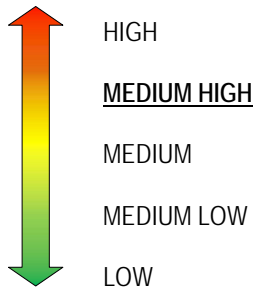
High Risk Area
Moderate Risk Area

0 1.25 2.5 5 7.5 10
Miles

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2.2.5 ACTS OF VIOLENCE



"Violence is a social and health problem for all who experience and witness it. Violence takes many forms; including family, peer group, sexual, community, or media violence, abuse of power, and hate and speech crimes".

- Humanillnesses.com

HAZARD OVERVIEW

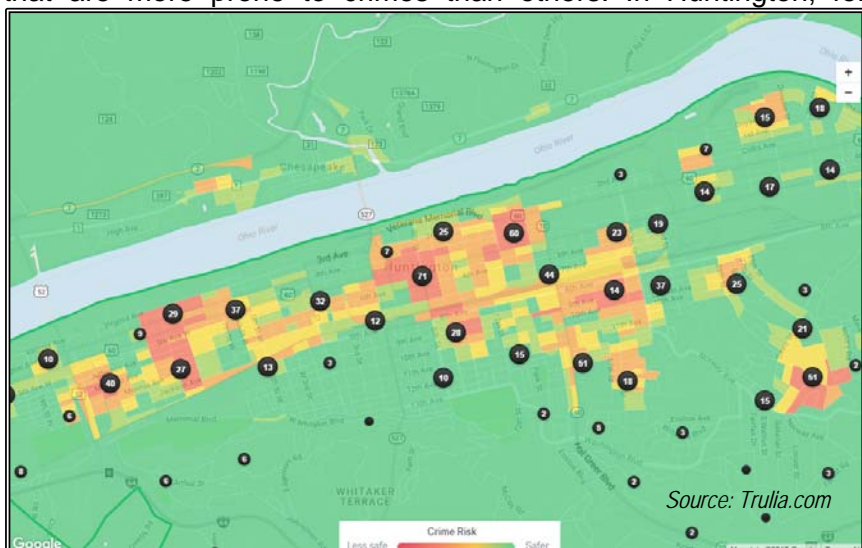
With the increase in violence countrywide, it is necessary to analyze the increasing trend of acts of violence Region 2 has recently seen. For the purposes of this analysis, acts of violence are considered to be routine law enforcement activities, robbery, homicides, kidnapping, sexual assault, or domestic disputes.

POSSIBLE CAUSES

In general, many of the committee members have attributed the increase in violent crimes to the opioid or drug crisis in the area.

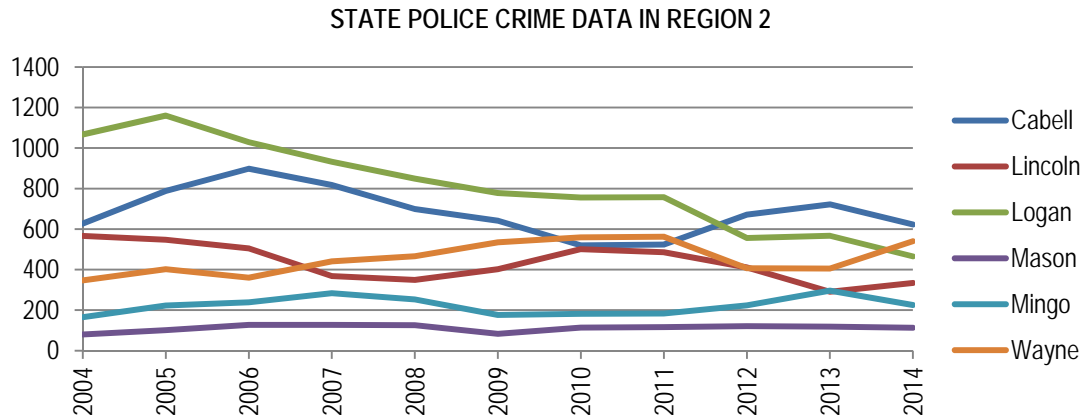
LOCATION & EXTENT

Acts of violence can occur in any location and affect a variety of people. However, there may be locations that are more prone to crimes than others. In Huntington, for example, there are pockets of places where the neighborhood is considered safer. The map below illustrates these areas; areas in red are considered less safe. According to an article in 2015, the City of Huntington is the most dangerous place to live in West Virginia (K., 2015).

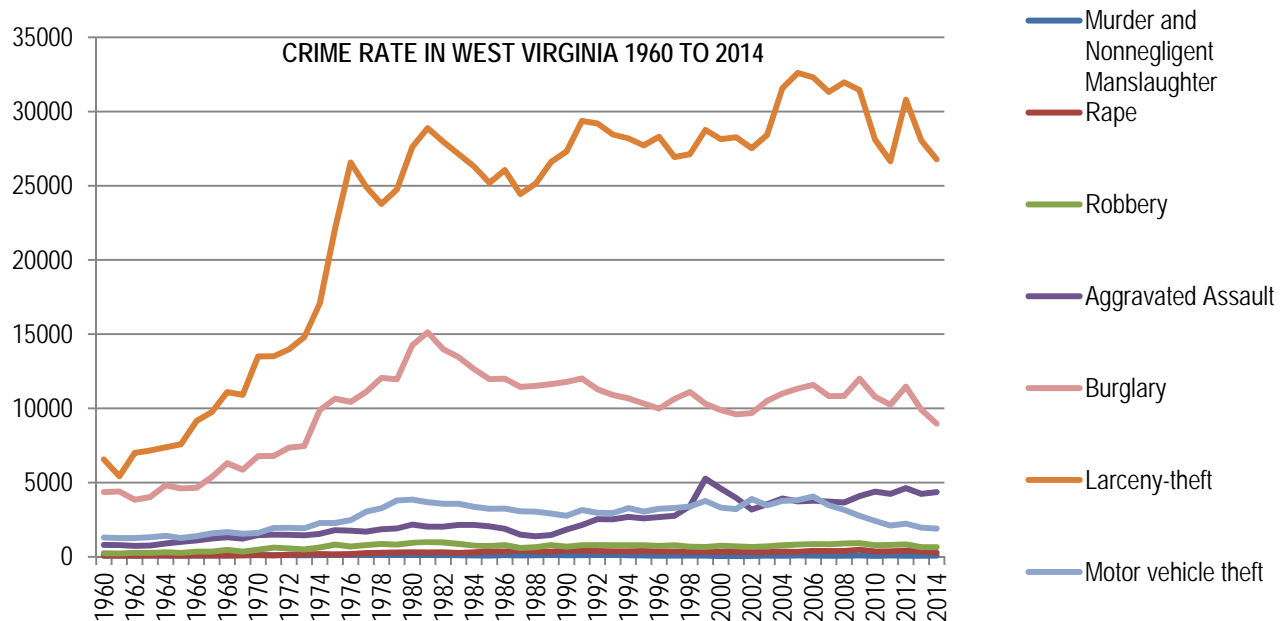


HISTORICAL OCCURRENCES

As the graph shows, the overall crime rate in West Virginia spiked in the early 1980s and then maintained a relative stable rate. In recent years the crime rate has tended downwards.



The West Virginia State Police keep records of crimes and produce annual reports for the state by county. In the graph below, the State Police detachments' data in each county in Region 2 is shown from 2004 to 2014. Logan County crimes have decreased the most over the ten reported years. Mason County has remained steady and is the county with lowest amount of crimes. All the other counties (Cabell, Lincoln, Mingo, and Wayne) have fluctuated up and down over the ten reporting years.



Because the City of Huntington is the most densely populated territory in the region, it was chosen as a representative of the region; data from the Huntington Police Department and Marshall University Police is shown below. Reports are only available up to 2014. The HPD did not report crime numbers for 2014. Overall, the data suggests a tendency of crime has reduced by almost half.

TABLE 2.2.5.A VIOLENT AND NON-VIOLENT CRIMES IN HUNTINGTON											
Year	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
Huntington Police Department											
Violent Crimes	0	417	871	975	975	866	968	1,010	1,139	1,120	1,157
Non-Violent Crimes	0	2,553	3,841	3,993	3,986	3,413	4,555	4,819	5,324	5,286	5,112
Subtotal	0	2,970	4,712	4,968	4,961	4,279	5,523	5,829	6,463	6,406	6,269
Marshall University Police											
Violent Crimes	12	16	21	23	22	16	19	23	21	25	4
Non-Violent Crimes	51	48	148	158	158	133	163	135	147	172	141
Subtotal	63	64	169	181	180	149	182	158	168	197	145
Total	63	3,034	4,881	5,149	5,141	4,428	5,705	5,987	6,631	6,603	6,414

Source: Crimes in West Virginia annual reports

Because there is limited data for the past three years, it is still difficult to accurately describe if crimes have increased, decreased, or remained similar to past years. However, the committee's perception of crime activities, especially as they relate to drug violence, is that the crime has increased.

COMMITTEE INPUT

During committee and public meetings, committee members expressed concern about specific problems in their areas. The following is a summary of problems and what has been done so far to begin to mitigate the hazard.

- Cabell County: The local drug crisis has caused an increase in crimes, specifically, shootings, robberies, and home invasions. Needle exchange programs have been implemented.
- Mingo County: The increase in violence has affected the county but residents still don't think increased violence is a problem. The Mingo Board of Education has each school prepare plans to address violence.

IMPACTS & VULNERABILITY

The obvious impacts of acts of violence include injury, death, damage or destruction of property. However, there may be some deeper, more difficult underlying effects to deal

with when exposed to violence. For example, “adolescents who are exposed to violence during childhood are at an increased risk for developing posttraumatic stress (PTS) symptoms... [which] may also have negative effects on school functioning. Adolescent violence exposure and victimization, in the community and home, are a major public health concern in the United States. Adolescents living in urban communities, marked by poverty, crime, and drug-related activities, are often at increased risk for violence exposure and victimization, including homicides, assaults, and physical altercations” (McGill et al, 2014).

LOSS & DAMAGES

According to the aforementioned West Virginia State Police reports, there have been around 44,000 non-violent crimes (larceny, burglary, destruction, damage or vandalism of property, motor vehicle theft, and shoplifting) in Huntington between 2004 and 2014. It is nearly impossible to estimate the amount of damages related to those crimes.

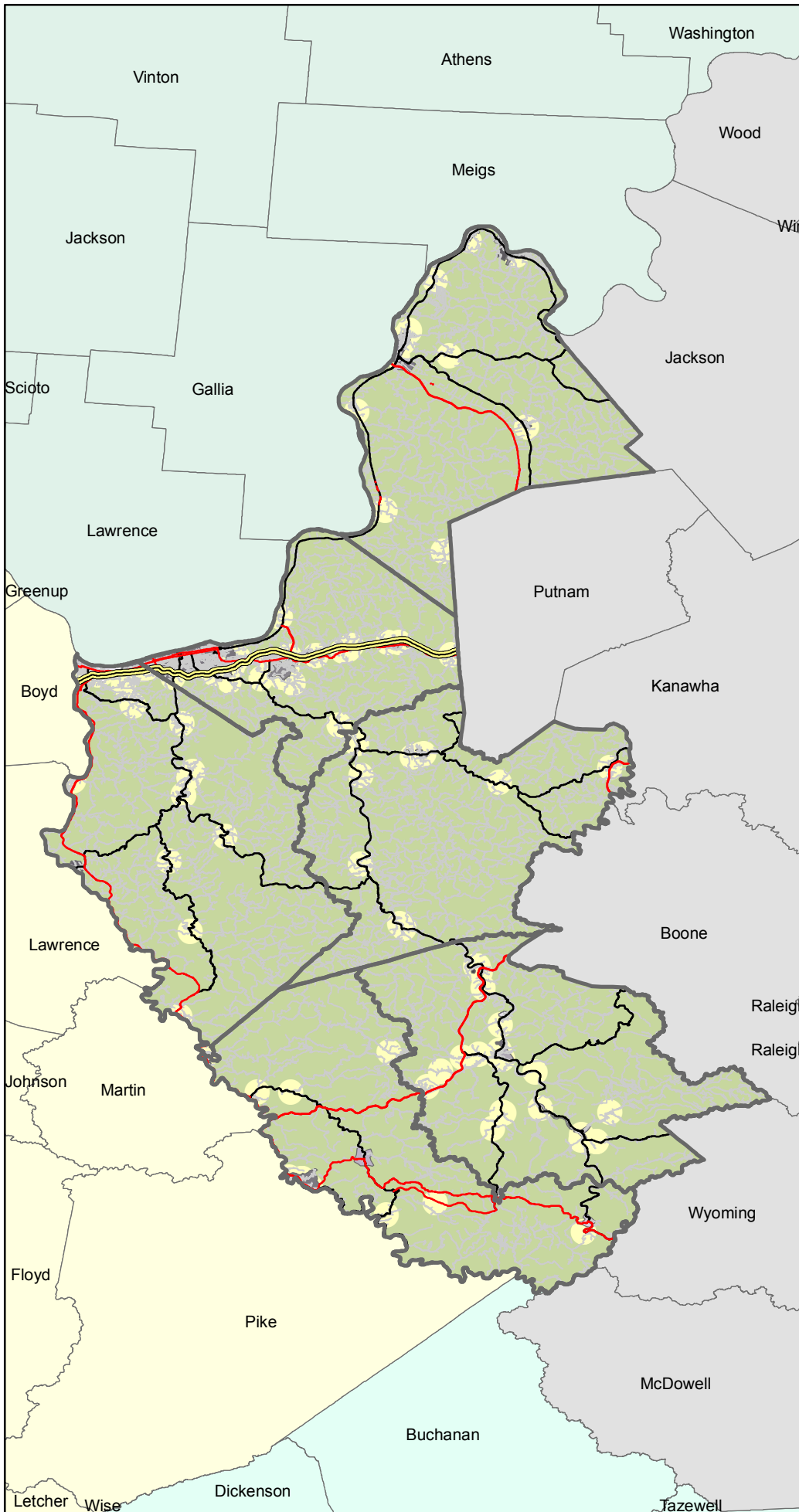
“Crime generates substantial costs to society at individual, community, and national levels. In the United States, more than 23 million criminal offenses were committed in 2007, resulting in approximately \$15 billion in economic losses to the victims and \$179 billion in government expenditures on police protection, judicial and legal activities, and corrections” (McCollister, French, & Fang, 2010).

One way to see the cost of increased violence is to look to the judicial system, specifically, the cost of operating regional jails. For example, Cabell County’s bill for the regional jail is approximately \$2.8 million dollars – a \$48.25 per day per prisoner fee. Lincoln County owes around \$680,000. Lincoln and Cabell counties both feed into the Western Regional Jail, along with Wayne and Mason, which do not have jail bills more than 90 days past due (Mendez, 2017). Logan and Mingo Counties feed into the Southwestern Regional Jail.

RISK CALCULATION

TABLE 2.2.5.B ACTS OF VIOLENCE RISK CALCULATION							
Probability			+	Severity		=	Risk
FREQUENT				CRITICAL			MEDIUM HIGH
Events	29,906	= 2,718		The amount of budget that the counties have to set aside for jail bills alone is quite high. The majority of the impacts of crime are for property, although persons can also be affected by sustaining injuries or death.			The frequent occurrence and critical severity put this hazard at a medium high risk to the counties of Region 2.
Years	11						
From the data provided by State Police, there have been approximately 30,000 offenses in Region 2 over the span of 11 years. This includes both violent and non-violent crimes.							







REGION 2 HAZARD MITIGATION PLAN

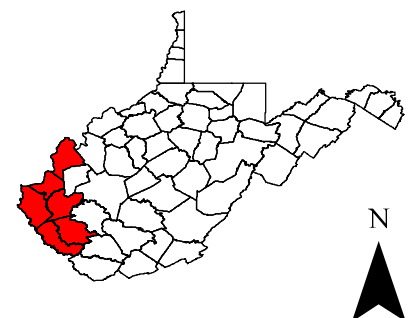
Risk Map: Acts of Violence

Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 3 6 12 18 24
Miles

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REGION 2 HAZARD MITIGATION PLAN

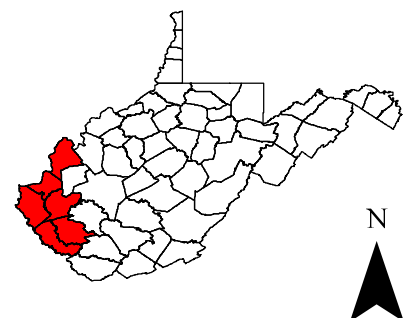
Cabell Risk Map: Acts of Violence

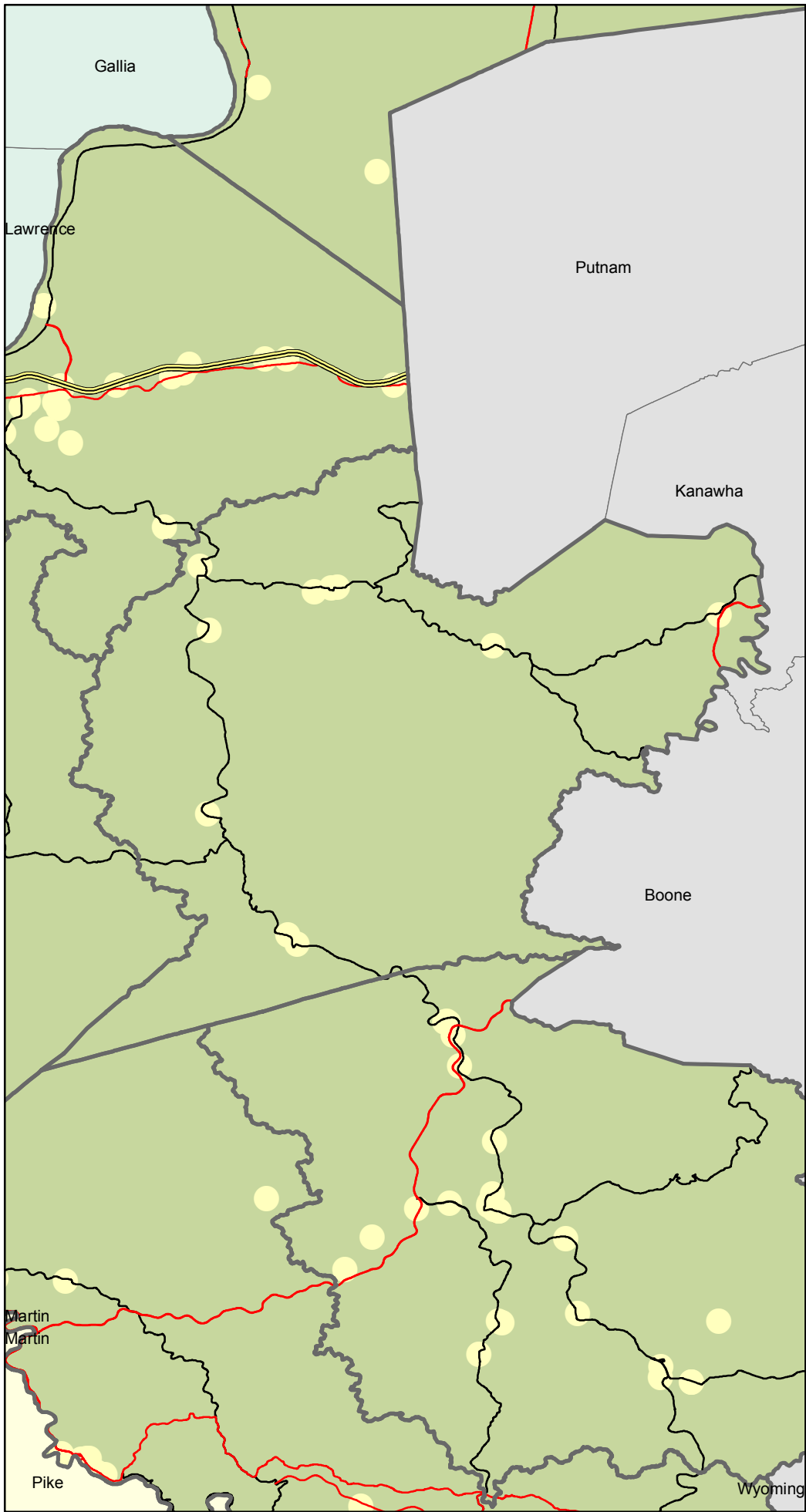
Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



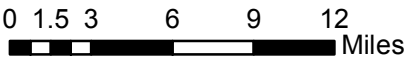


REGION 2 HAZARD MITIGATION PLAN

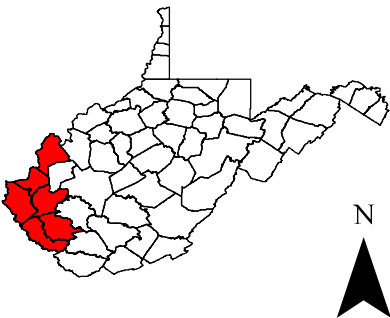
Lincoln Risk Map: Acts of Violence

Data Source(s):
WV GIS Tech Center

- Moderate Risk Area
- Low Risk Area



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REGION 2 HAZARD MITIGATION PLAN

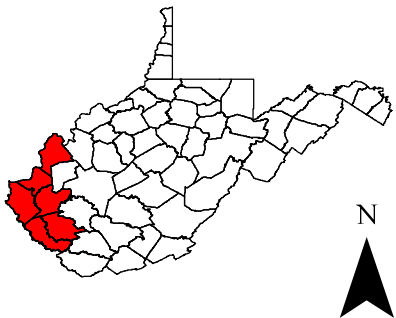
Logan Risk Map: Acts of Violence

Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 1.5 3 6 9 12
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.







REGION 2 HAZARD MITIGATION PLAN

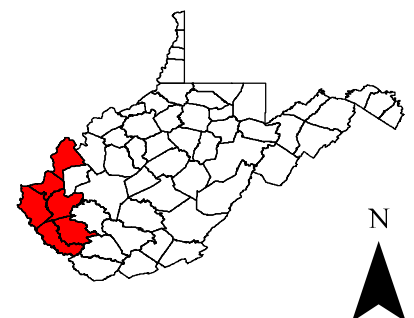
Mason Risk Map: Acts of Violence

Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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REGION 2 HAZARD MITIGATION PLAN

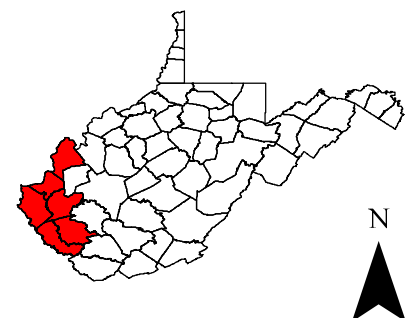
Mingo Risk Map: Acts of Violence

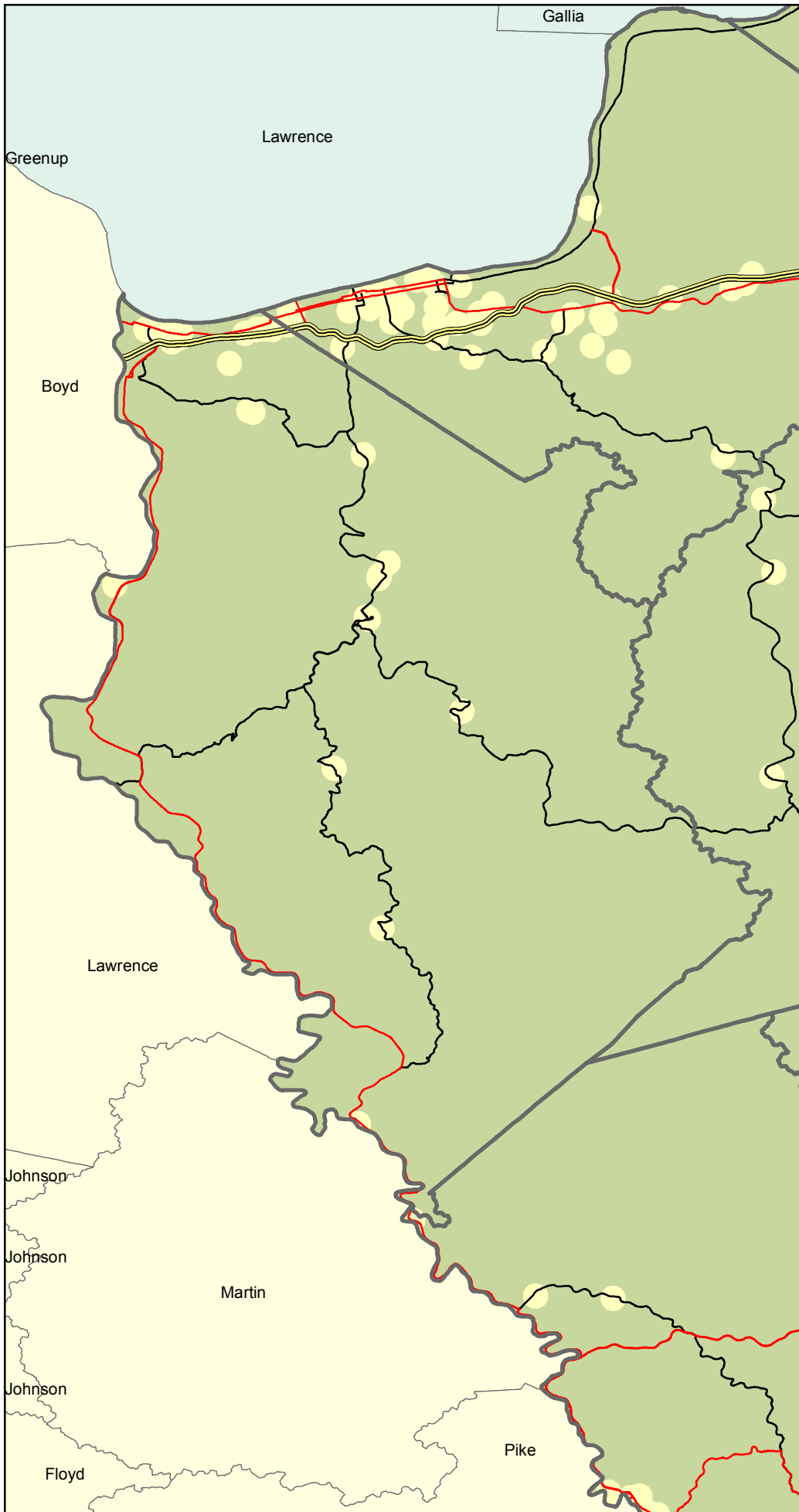
Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

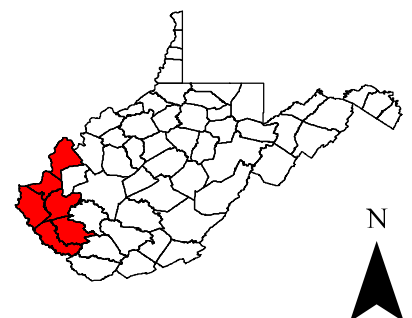
Wayne Risk Map: Acts of Violence

Data Source(s):
WV GIS Tech Center

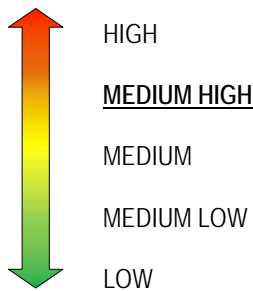
-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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2.2.6 HAZMAT



“A hazardous material is any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors”.

- Institute of Hazardous Materials Management

HAZARD OVERVIEW

A hazardous material may be defined as a substance or material, which, because of its chemical, physical or biological nature, poses a threat to life, health, or property if released from a confined setting. A release may occur by spilling, leaking, emitting toxic vapors, or any other process that enables the material to escape its container, enter the environment, and create a potential hazard. Several common hazardous materials include those that are explosive, flammable or combustible, poisonous or radioactive. Related combustible hazardous materials include oxidizers and reactive materials, while toxins produced by etiological (biological) agents are types of poison that can cause disease.

A hazmat release while in transit is of great concern to the U. S. Department of Transportation. While most hazardous materials are stored and used at fixed sites, these materials are usually produced elsewhere and shipped to the fixed facility by rail car, truck, or onboard ships or barges. Signs identify these vehicles or placards denoting the hazard, however, the possibility of release is present at any time. Hazardous materials are constantly being moved in West Virginia on interstate highways, the rail system and on shipping lanes in the Ohio River.

There are two major agencies that collect data as they relate to hazardous materials incidents the Pipeline and Hazardous Materials Safety Administration (PHMSA) governed by the U.S. Department of Transportation (DOT), and the National Response Center (NRC), governed by the U.S. Coast Guard (USCG).

POSSIBLE CAUSES

According to data from PHMSA and the NRC, the causes of the incidents include the following since 2000 in Region 2 counties:

- Other / Unknown: 222

- Equipment Failure: 139
- Operator Error: 60
- Dumping: 19
- Natural Phenomenon: 7
- Derailment: 6
- Sinking Vessel: 4

LOCATION & EXTENT

Hazardous materials spills, leaks, or accidents can occur at any location in all counties of Region 2. More specifically, they are more likely to happen on transportation pathways such as river, road, and railways, and at facilities that routinely handle hazardous materials such as gas stations, chemical companies, and other Tier II reporting facilities.

The extent of the damage from hazmat can be localized to just a cleanup on the road, or widespread, to include hazardous materials reaching source water via storm drains, and the river.

According to data from the NRC and PHMSA, there are several places where hazmat incidents can occur. The following are the locations described by the data:

- Rail: 176
- Fixed Facilities: 106
- Highway: 57
- Unknown Waterway Sheen: 54
- Vessel: 25
- Storage Tanks: 18
- Air: 14

HISTORICAL OCCURRENCES

Historically, there have been hazmat incidents in all Region 2 counties. The following summarizes data from NRC and PHMSA as to the county where incidents have occurred.

- Cabell County: 135
- Lincoln County: 10
- Logan County: 33
- Mason County: 52
- Mingo County: 117

- Wayne County: 110

Between both agencies there have been a total of 457 incidents (PHMSA: 55, and NRC: 402) reported from 2000 through the end of 2017. Some of the more costly events recorded by PHMSA are described below.

March, 2000

On March 8, 2000 a truck driver offloaded gasoline into an underground storage tank (UST) in Logan West Virginia. A release of approximately 60 gallons of gasoline occurred when the hose was unhooked from the UST after an apparent overfill. A local contractor was asked to respond. They arrived and cleaned absorbents oil dry and a small amount of soil along the edge of the parking lot. An unknown amount of gasoline reached a storm drain and eventually the city waste water treatment plant. Enviro pro assisted the plant operator with clean up and removal of the gasoline that made it to the plant. Damage amounted to around \$13,296.

March, 2003

The driver was turning onto a mine road as he negotiated the turn his right back trailer wheels dropped into a ditch and his trailer overturned. The driver reported the incident to the office and the emergency response team went to the scene. The release was contained. A contractor was hired to clean up the spill dispose of the contaminated materials. State and federal agencies were notified of the incident. Damage amounted to around \$27,599.

October, 2004

A rail tank car was loaded in north Birmingham, AL. The company did not check the internal bottom outlet valve for tool tightness as required under 49 CFR 173.31 (d) (I) (iv) leaving it in the open position. The outer redundancy valve was closed. The car was then shipped to a chemical company site in Huntington. Operators attempted to unload the rail tank car at the chemical company. Ultimately approximately 18,500 gallons of coal tar light oil was released through this bottom valve. Federal state and local responders and agencies were involved in the response from the inception. Damages amounted to approximately \$1,959,000.

COMMITTEE INPUT

During committee and public meetings, committee members expressed concern about specific problems in their areas. The following is a summary of problems and what has been done so far to begin to mitigate the hazard.

- **Cabell County:** With the transport routes in Cabell County (rail, river, road), the possibility of an incident is ever present. Incidents with significant release will tax first responders and equipment and personnel resources are very limited. Identified and equipped several shelters. The LEPC has sponsored a tabletop exercise and functional exercise every year.
- **Mason County:** There has been an increase of transport of hazardous materials by rail, road, and river. Road Commodity Flow Studies have been conducted and Tier II reporting facilities have been identified.
- **Wayne County:** Uncontrolled release of hazardous materials can threaten life and loss of property. Some training has been provided to first responders on chemical and radiological response.

IMPACT & VULNERABILITY

Due to the wide variety of substances that are used, transported and stored in the area, it is difficult to assign an overall impact of these substances to public health, the environment, the economy and the infrastructure. There are some spills that cause minor if any damage to the area. For example, spilling a few gallons of gasoline on concrete during transfer causes minimal economic impact; rarely does the spilled substance cause any environmental impacts. This is not to say that all spills are minor, some can be very harmful to human health and the environment and costs thousands, if not millions of dollars to clean up.

Spills into waterways and those that reach the groundwater are of particular concern due to the threat they impose to drinking water and subsequently public health, the environment, and fauna in the area.

Additionally, transportation-based hazard incidents have the potential to result in cascading impacts. For example, a rail-based incident could isolate the community of Henderson in Mason County as well as several other communities in the region. Officials from such operators as CSX Transportation concur. In a recent interview, the company's hazmat manager out of Pittsburgh noted that a significant problem associated with rail incidents, particularly those involving hazardous materials, is that a stopped train can block

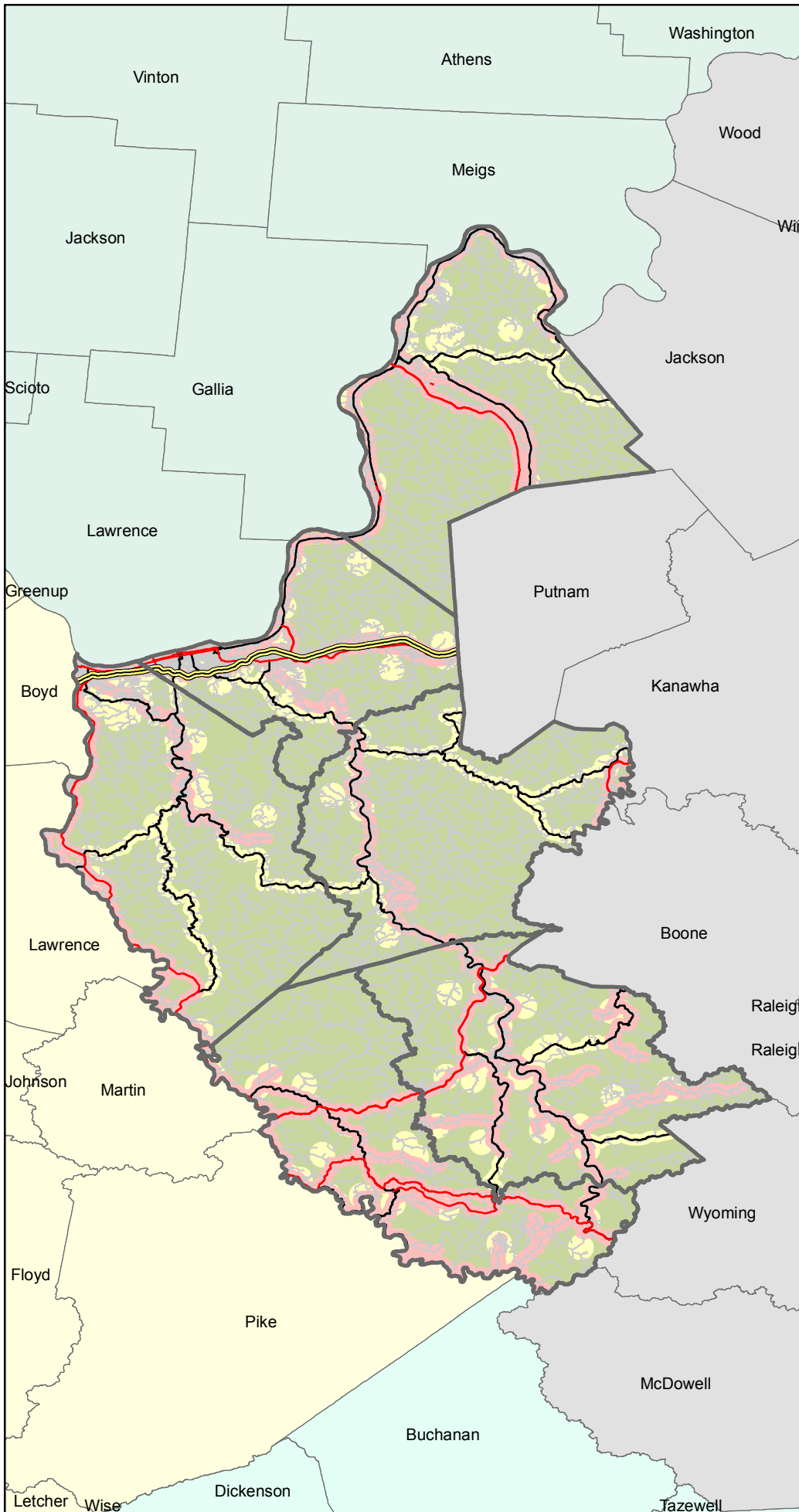
several roadway intersections, essentially cutting some areas off. These blocks not only hinder evacuation from those areas, but also emergency services access to those areas.

LOSS & DAMAGES

The NRC does not report losses or damages in their data. PHMSA reports a total of \$2,102,455 relating to hazmat incidents since 2000. This may only contemplate the costs of cleanup activities; however, there may be hidden costs that make an incident more costly, for example, health costs, environmental costs, etc.

RISK CALCULATION

TABLE 2.2.6.A HAZMAT RISK CALCULATION						
Probability		+	Severity	=	Risk	
FREQUENT			MARGINAL		MEDIUM HIGH	
Events	457		= 25.3		Because there have been few injuries associated with hazmat incidents according to the data, this hazard is of marginal severity.	The risk assessment matrix determines that this hazard is of medium high risk to the region.
Years	18					
On average, 25 hazmat incidents occur in Region 2 every year in a variety of locations.						



REGION 2 HAZARD MITIGATION PLAN

Risk Map: Hazardous Materials

Data Source(s):
WV GIS Tech Center
US Census (Tiger Data)

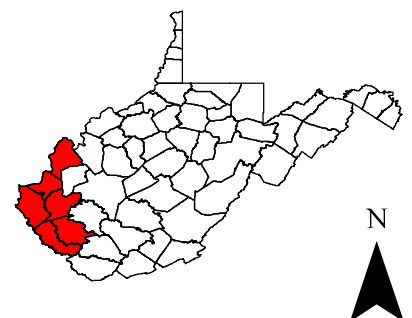
- High Risk Area
- Moderate Risk Area
- Low Risk Area

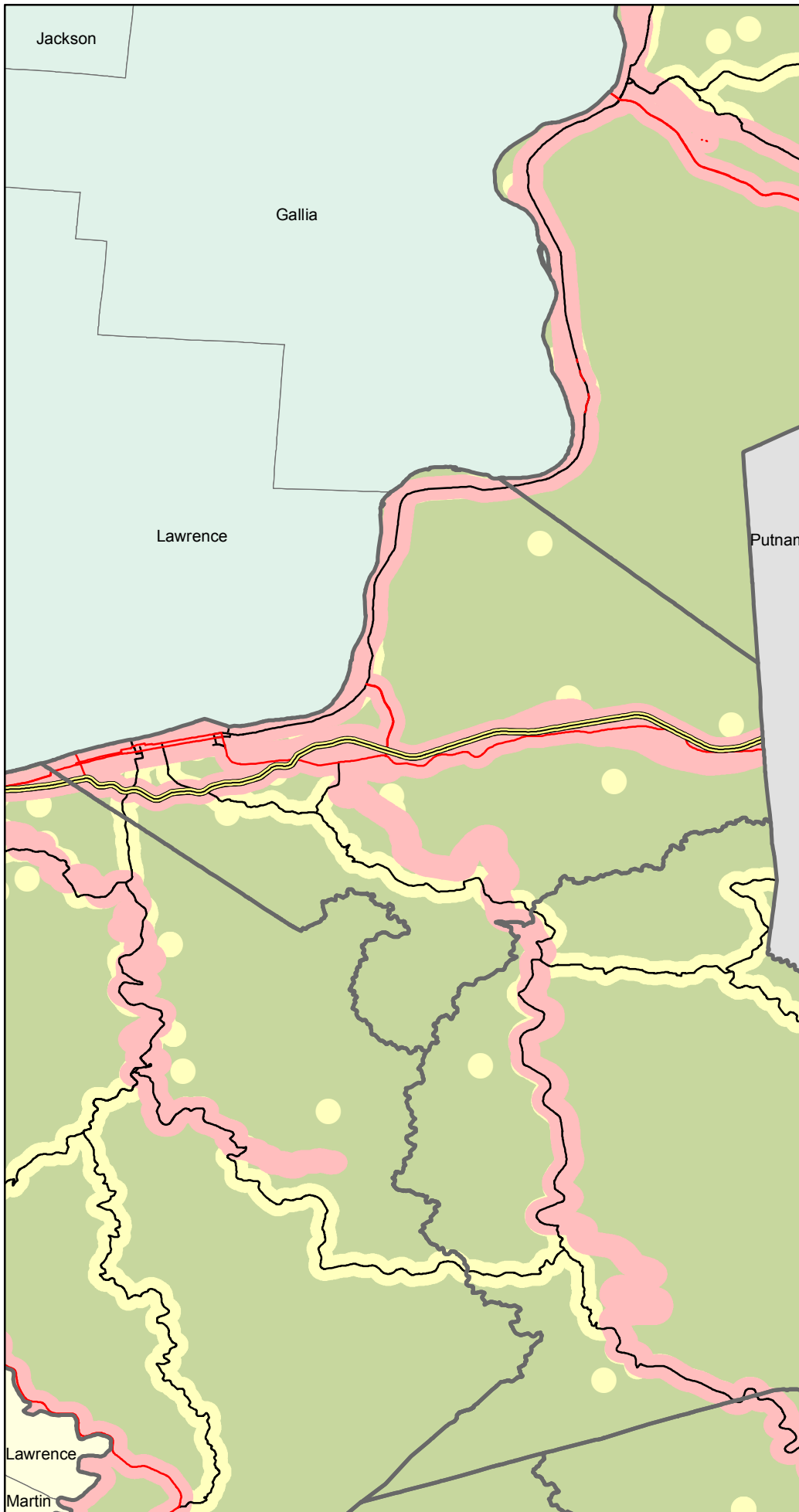
0 3 6 12 18 24
Miles

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Consulting, LLC





REGION 2 HAZARD MITIGATION PLAN

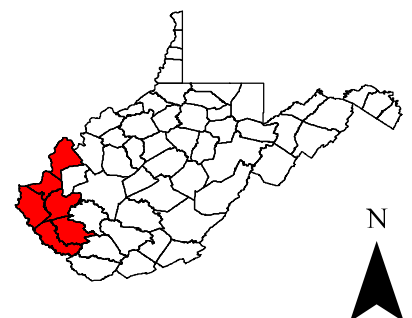
Cabell Risk Map: Hazardous Materials

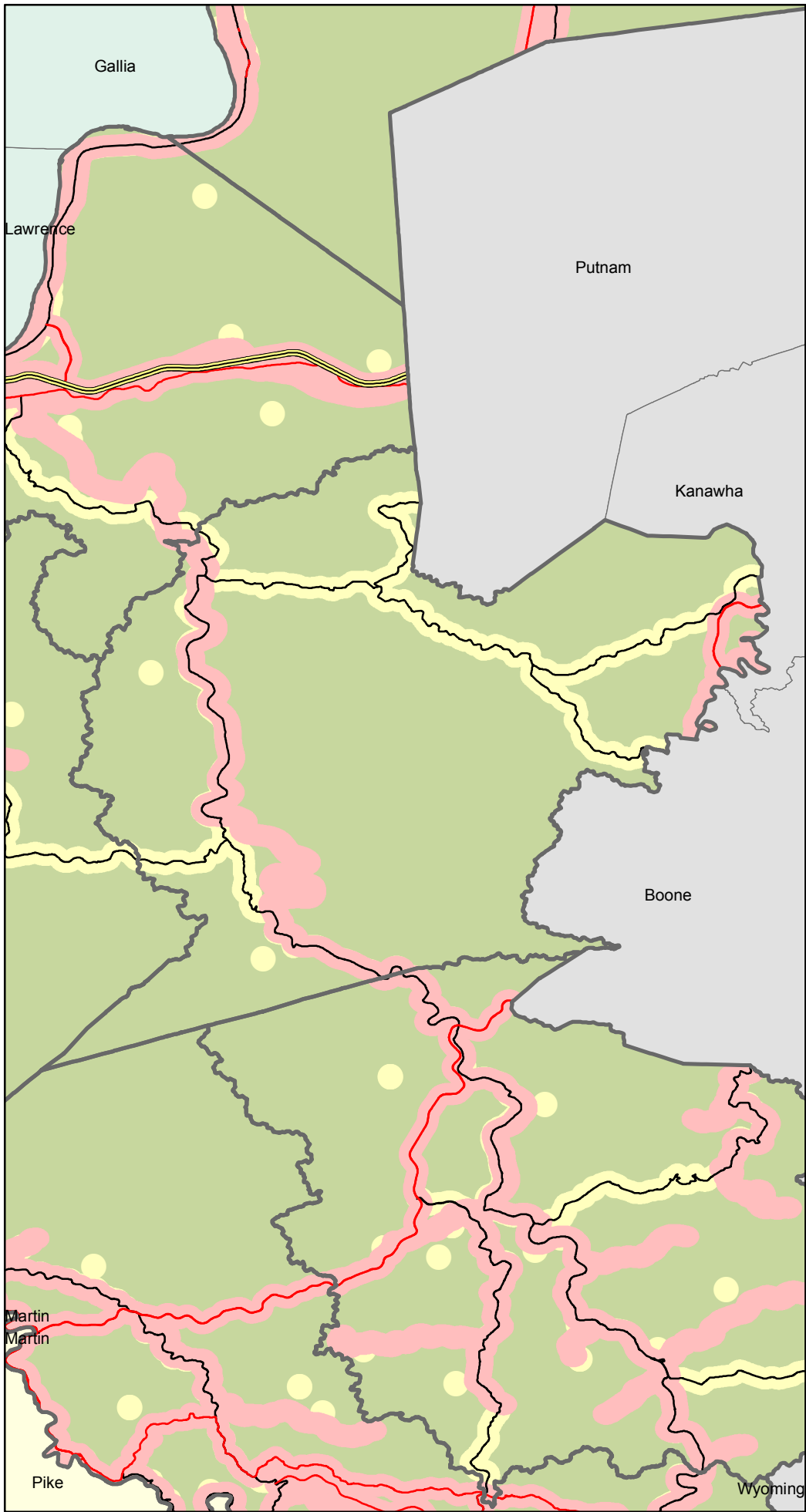
Data Source(s):
WV GIS Tech Center
US Census (Tiger Data)

- High Risk Area
- Moderate Risk Area
- Low Risk Area

0 1.25 5 7.5 10
Miles

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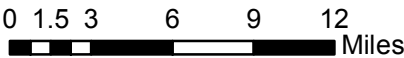


REGION 2 HAZARD MITIGATION PLAN

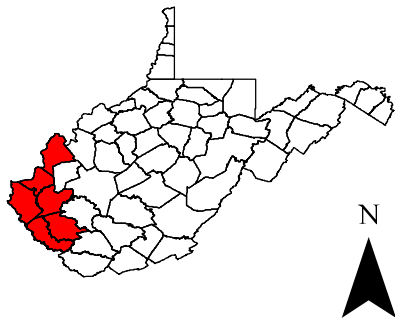
Lincoln Risk Map: Hazardous Materials

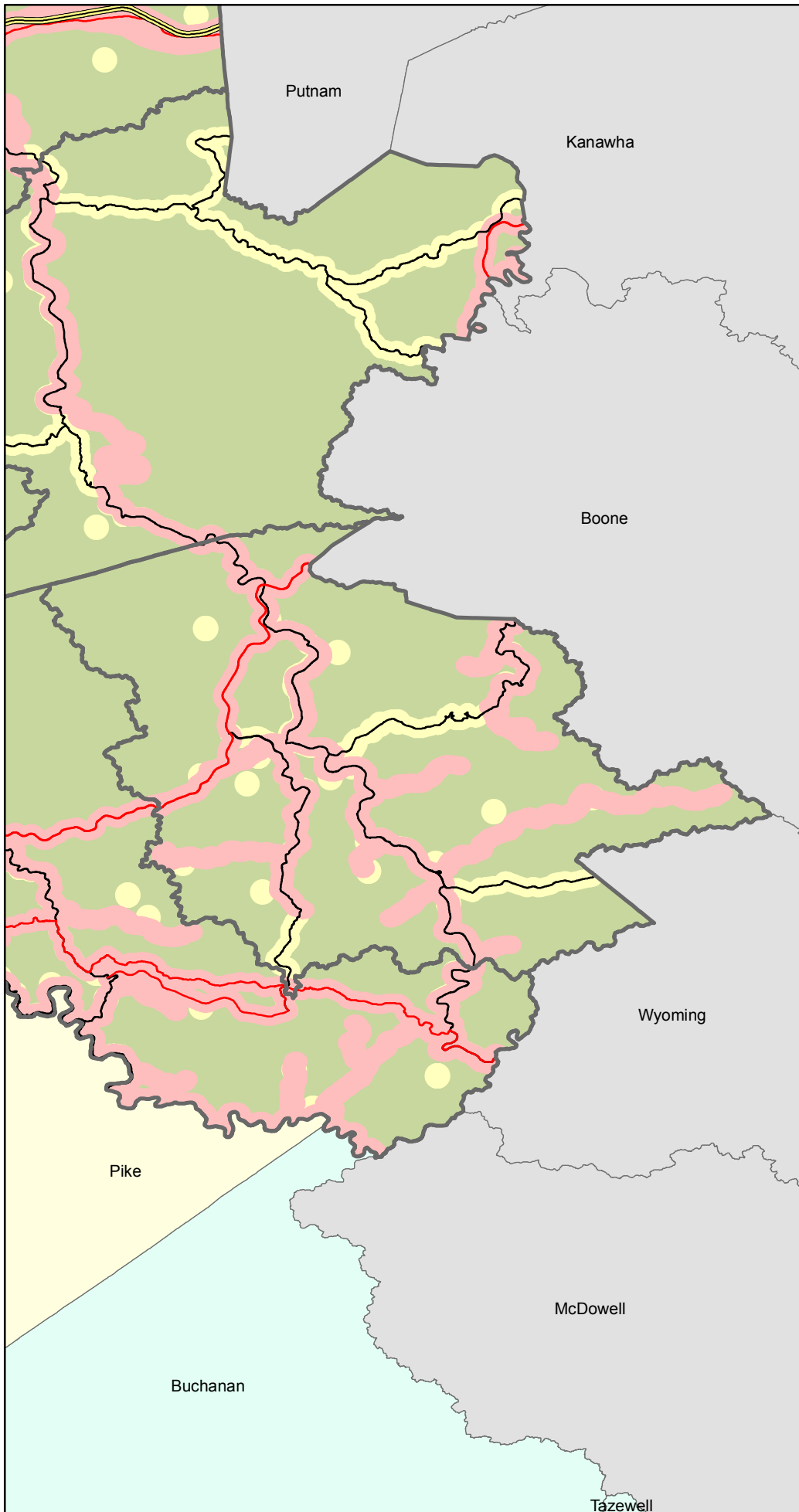
Data Source(s):
WV GIS Tech Center
US Census (Tiger Data)

- High Risk Area
- Moderate Risk Area
- Low Risk Area



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REGION 2 HAZARD MITIGATION PLAN

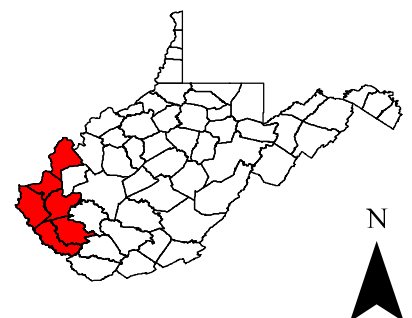
Logan Risk Map: Hazardous Materials

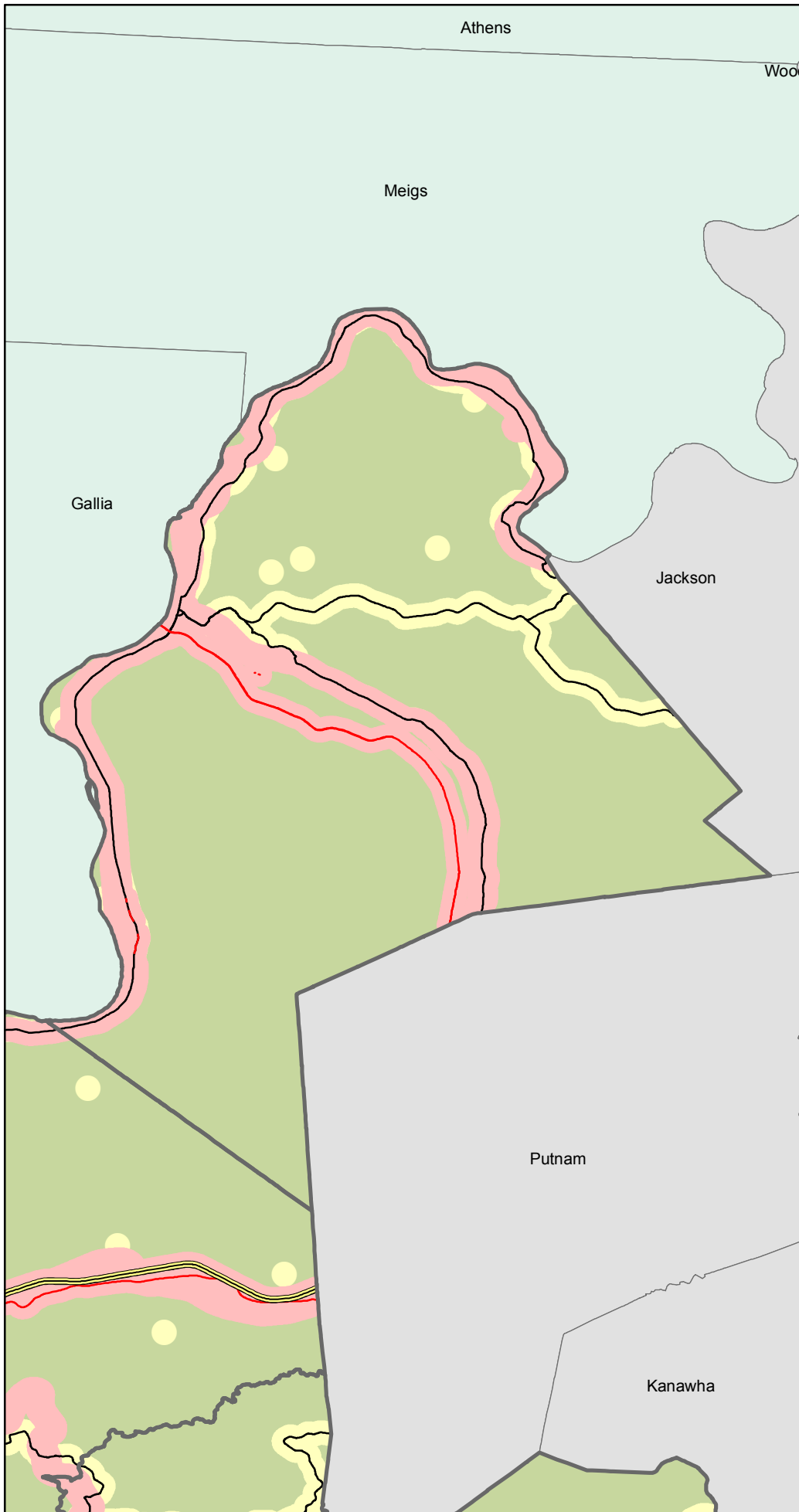
Data Source(s):
WV GIS Tech Center
US Census (Tiger Data)

- High Risk Area
- Moderate Risk Area
- Low Risk Area

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

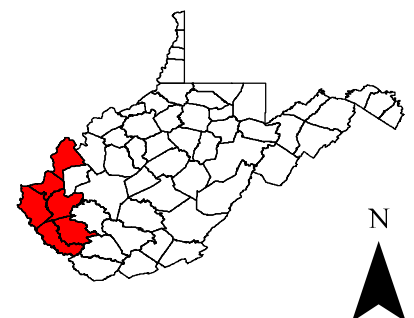
Mason Risk Map: Hazardous Materials

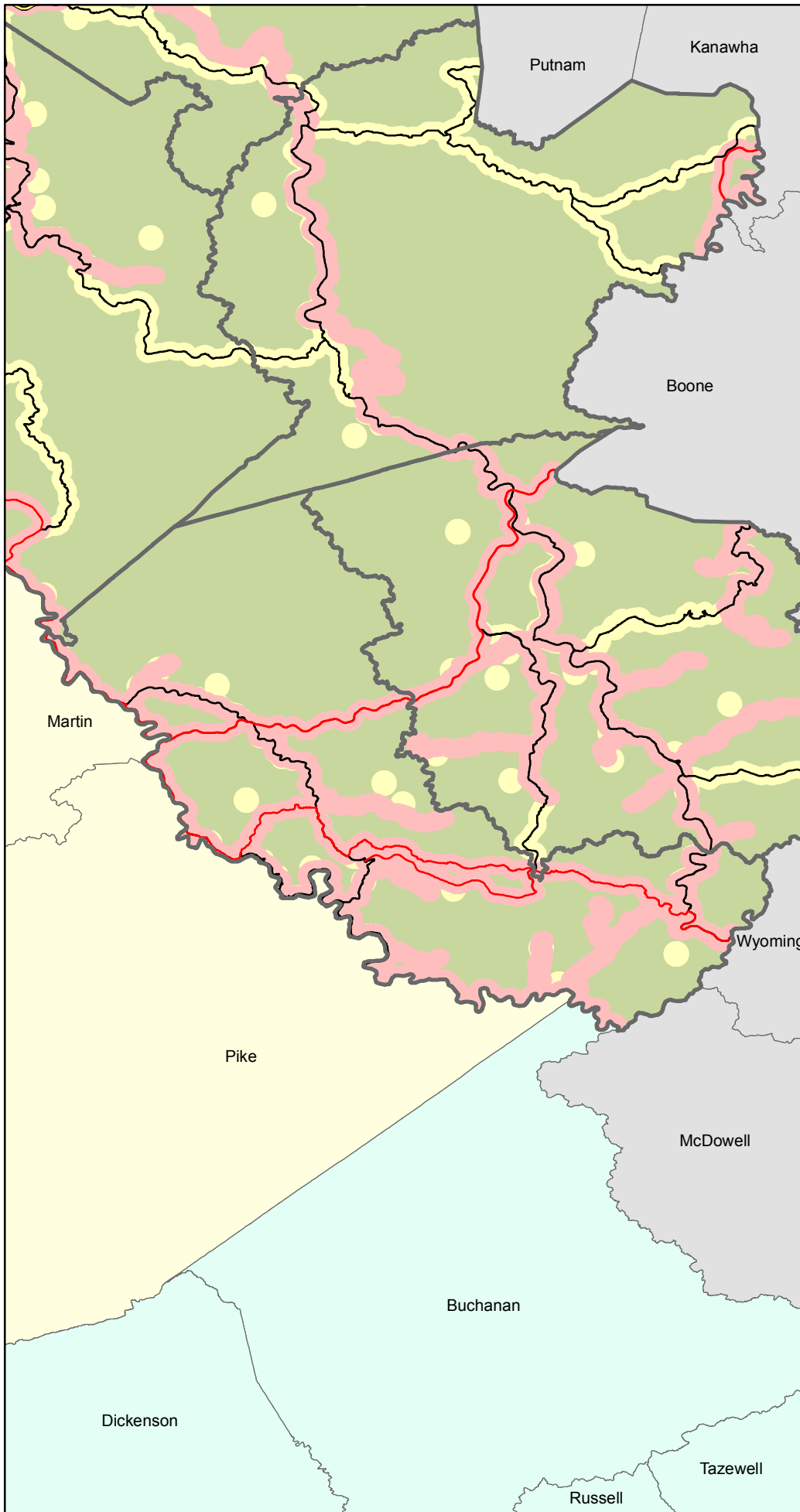
Data Source(s):
WV GIS Tech Center
US Census (Tiger Data)

- High Risk Area
- Moderate Risk Area
- Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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REGION 2 HAZARD MITIGATION PLAN

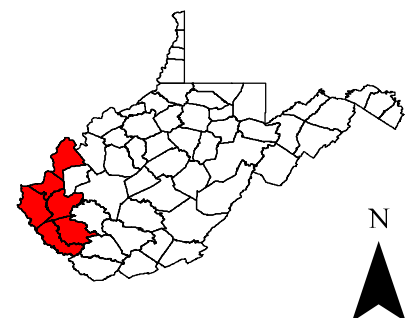
Mingo Risk Map: Hazardous Materials

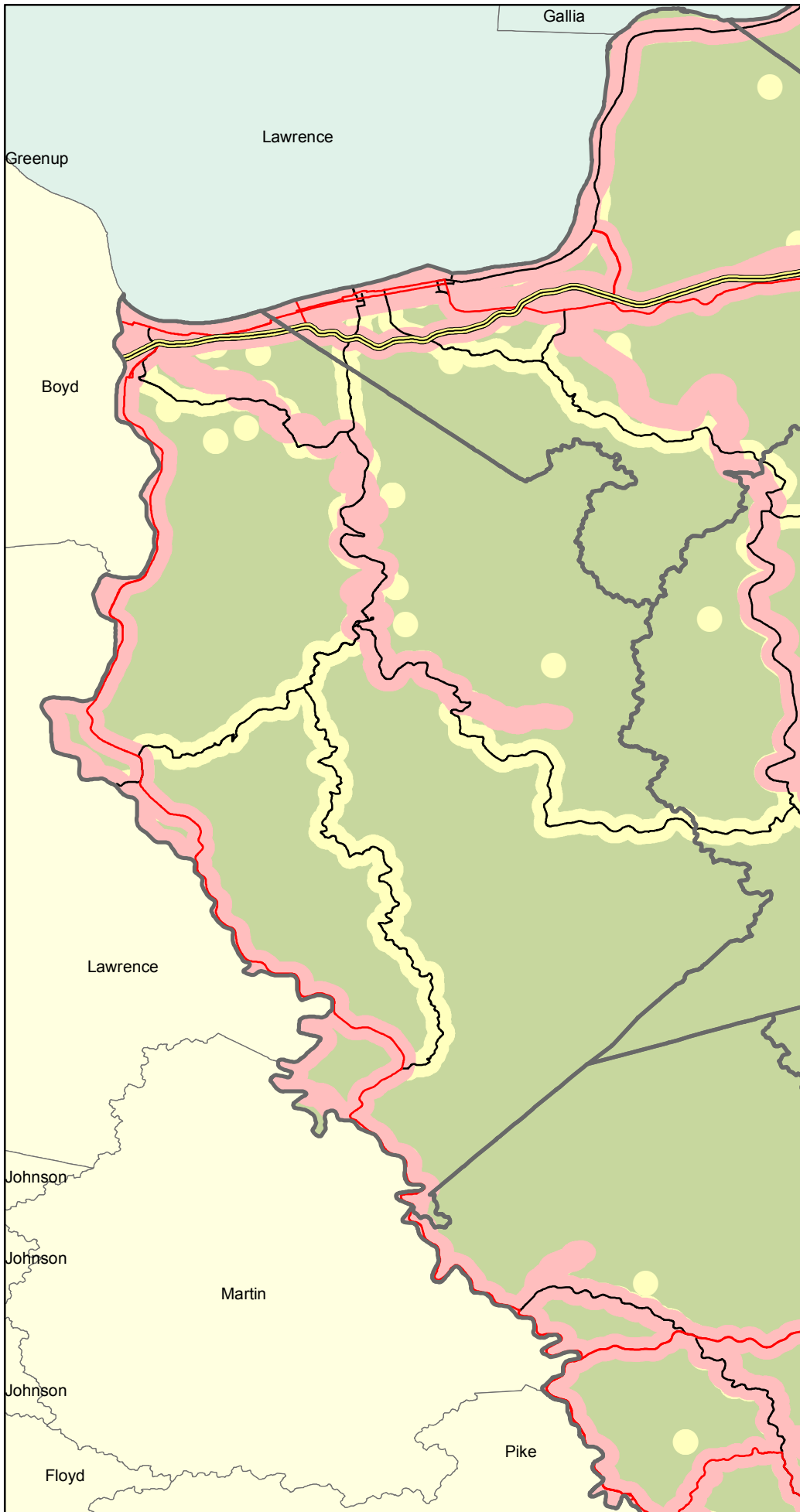
Data Source(s):
WV GIS Tech Center
US Census (Tiger Data)

- High Risk Area
- Moderate Risk Area
- Low Risk Area

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

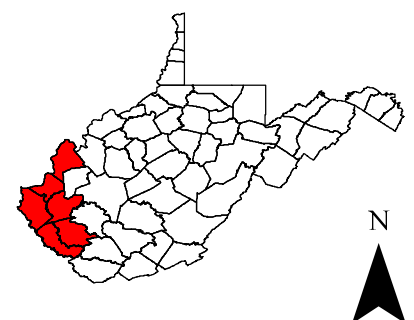
Wayne Risk Map: Hazardous Materials

Data Source(s):
WV GIS Tech Center
US Census (Tiger Data)

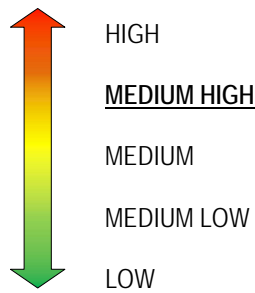
- High Risk Area
- Moderate Risk Area
- Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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2.2.7 EXTREME TEMPERATURES



"Heat kills by pushing the human body beyond its limits... Cold waves and extreme cold can immobilize an entire region".

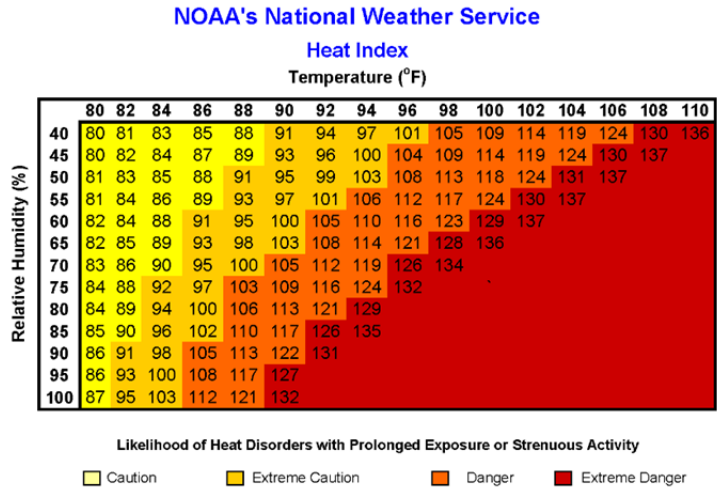
- International Federation of Red Cross and Red Crescent Societies

HAZARD OVERVIEW

Extreme temperatures, for the purpose of this profile will include both hot and cold temperature extremes.

Heat

Temperatures vary widely over the course of a year, but each season has average temperature ranges associated with them. Summer and winter have, generally, the highest and lowest range of temperatures, respectively. When the temperature is consistently greater than the normal in summer, meteorologists refer to it as a heat wave, which means, "temperatures of ten or more degrees above the average high temperature persist across the geographic region for several days or weeks" (Haddow, Bullock, & Coppola, 2014, p.51). These conditions can be a contributor to drought conditions when combined with a lack of rainfall. Excessive heat has a history of being deadly. In the United States "more than 1,500 die from exposure to excessive heat" (Haddow, Bullock, & Coppola, 2014, p.52). These conditions can also have serious impacts on crops, causing below average harvests. Repeated years of extreme temperatures can easily cause significant economic impacts on agricultural industries.



The National Centers for Environmental Information (NCEI) tracks two types of extreme heat temperatures.



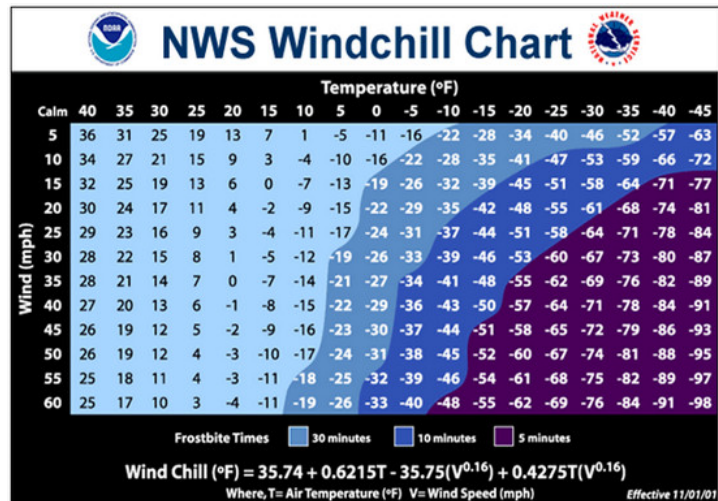
- **Heat:** A period of heat resulting from the combination of high temperatures (above normal) and relative humidity. A heat event occurs whenever heat index values meet or exceed locally/regionally established advisory thresholds or a directly-related fatality occurs due to the heat event.
- **Excessive Heat:** Excessive heat results from a combination of high temperatures (well above normal) and high humidity. An excessive heat event occurs when heat index values meet or exceed locally/regionally established excessive heat warning thresholds, on a widespread or localized basis (National Weather Service Instruction 10-1605, 2007).

Cold

While there is no widely accepted definition of extremely cold temperatures, periods of colder than average conditions can cause an array of negative consequences depending on their duration (Haddow, Bullock, & Coppola, 2014, p.51). Extremely cold temperatures are immediately dangerous to both humans and livestock by causing frostbite and hypothermia, which can lead to permanent injury and death. The chart on the next page shows how quickly frostbite can occur at different temperatures and wind speeds. In unprotected structures cold temperatures can freeze water pipes causing them to burst upon thawing, leading to significant damage. Cold snaps during typically warmer weather during the growing season can damage and destroy some crops, depending on their sensitivity to temperature.

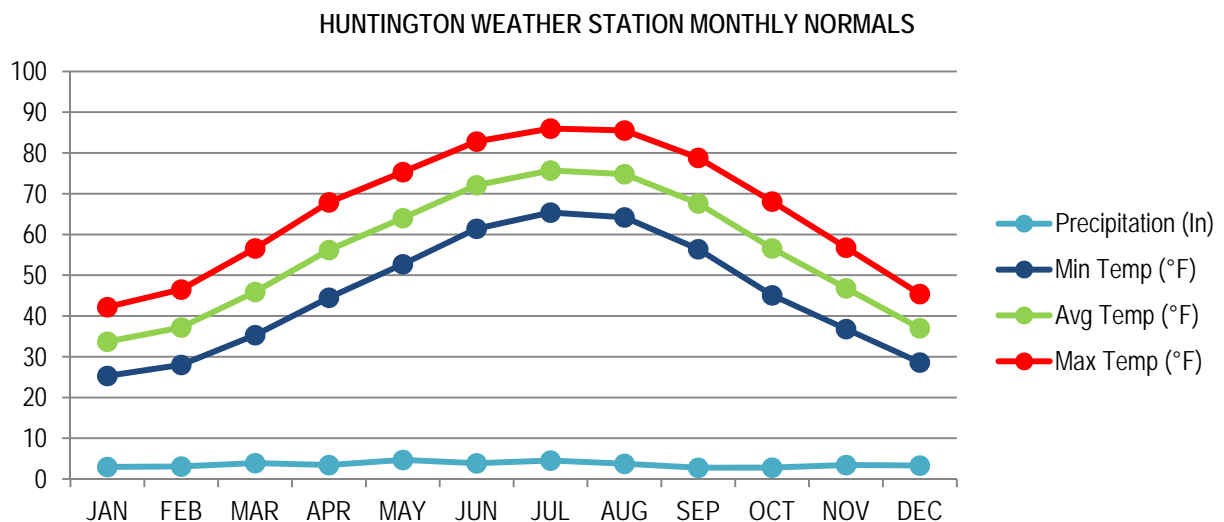
NCEI tracks two types of extreme cold temperatures.

- **Cold/Wind Chill:** Period of low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined advisory (typical value is -18° F or colder) conditions, on a widespread or localized basis. There can be situations where advisory criteria are not met, but the combination of seasonably cold temperatures and low wind chill values (roughly 15° F below normal) may result in a fatality.



- **Extreme Cold/Wind Chill:** A period of extremely low temperatures or wind chill temperatures reaching or exceeding locally/regionally defined warning criteria (typical value around -35° F or colder), on a widespread or localized basis. Normally these conditions should cause significant human and/or economic impact.

To know what range of temperature is considered extreme for the region, it is necessary to know what the average temperatures are throughout any given year. The National Oceanic and Atmospheric Administration (NOAA) can generate reports of monthly “normals” at its different stations. The data chosen for the region is from the Huntington WV Airport station (all station normal in the region are very similar). The following graphic shows average ranges of temperature from 1981 to 2010. Every month has a high, low average and mean temperature in degrees Fahrenheit. Extreme temperatures would be those either 10 degrees above or below the average high or low temperatures.



POSSIBLE CAUSES

Weather patterns throughout the year naturally cause temperatures to rise and fall in the summer and winter months due to the inclination of the Earth towards the sun. However, the extreme temperatures that have been experienced in the last decade are attributable to climate change. See [Section 2.2.3. Hazards and Climate Change](#).

LOCATION & EXTENT

Extreme temperatures, hot and cold, affect each county in Region 2 equally. Though the temperatures may vary slightly from day to day, the overall average of all the counties’

temperatures and susceptibility to extremes is very similar.

HISTORICAL OCCURRENCES

There have been 26 cold or extreme cold events in Region 2 since 1996, according to NCEI data. In addition, there were 20 heat or extreme heat events since 1996 in Region 2. See [Appendix 1: Source Data](#) for detailed information.

IMPACT & VULNERABILITY

The majority of the impacts of extreme temperatures affect the population's health rather than damage buildings. Some of the effects extreme temperatures could have on structures are minor compared to other hazards. Effects on buildings and infrastructure could include broken pipes, cracks in roads or bridges due to expansion and contraction, and power outages. In addition to impacts on health, extreme temperatures can also cause damages to transportation infrastructure, agriculture, energy, and water resources.

Extreme heat can cause a wide range of health problems or even make existing health problems worse. Some of the more mild symptoms include discomfort, skin eruptions and heat fatigue which can lead to heat cramps, heat exhaustion and heat stroke. Occasionally some people may require medical attention. Prolonged exposure to extreme heat can even cause death (CDC). Problems arising from prolonged exposure to the cold can include hypothermia, frostbite and non-freezing cold injuries such as chilblains and trench/immersion foot. Sunburn is also possible during extreme cold weather events (Army Public Health Center).

Although extreme temperatures affect everyone in the region, some people may be more vulnerable to their effects. For example, the homeless population could be more at risk simply for being exposed to the elements; children and the elderly population may be more susceptible to changes in temperature as well as the poor if they cannot afford to keep cool during an extreme heat event or to stay warm during an extreme cold event.

Approximately 400 people die each year from exposure to heat, according to the Centers for Disease Control and Prevention (CDC). Our bodies dissipate heat by varying the rate and depth of blood circulation, by losing water through the skin and sweat glands, and as a last resort, by panting, when blood is heated above 98.6°F.

Sweating cools the body through evaporation. However, high relative humidity retards evaporation, robbing the body of its ability to cool itself. When heat gain exceeds the level the body can remove, body temperature begins to rise, and heat-related illnesses and

disorders may develop.

The tables below describe the risks to human health relating to extreme heat and cold temperatures. Every few degrees up or down can have a great impact on health.

TABLE 2.2.7.A HEAT RISKS	
<i>Heat Index</i>	<i>Possible heat disorders for people in higher risk groups</i>
130°F or higher	Heatstroke/sunstroke highly likely with continued exposure.
105-130°F	Sunstroke, heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity.
90-105°F	Sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
80-90°F	Fatigue possible with prolonged exposure and/or physical activity.

TABLE 2.2.7.B COLD RISKS		
<i>Stage</i>	<i>Core Temperature</i>	<i>Signs and Symptoms</i>
Mild Hypothermia	99-97°F	Normal, shivering may begin.
	97-95°F	Cold sensation, goose bumps, unable to perform complex tasks with hands, shivering can be mild to severe, hands numb.
Moderate Hypothermia	95-93°F	Shivering, intense, muscles incoordination becomes apparent, movements slow and labored, stumbling pace, mild confusion, may appear alert. Use sobriety test, if unable to walk a 9 meter (30 foot) straight line, the person is hypothermic.
	93-90°F	Violent shivering persists, difficulty speaking, sluggish thinking, amnesia starts to appear, gross muscle movements sluggish, unable to use hands, stumbles frequently, difficulty speaking, signs of depression, withdrawn.
Severe Hypothermia	90-86°F	Shivering stops, exposed skin blue or puffy, muscle coordination very poor, inability to walk, confusion, incoherent/irrational behavior, but may be able to maintain posture and appearance of awareness
	86-82°F	Muscle rigidity, semiconscious, stupor, loss of awareness of others, pulse and respiration rate decrease, possible heart fibrillation.
	82-78°F	Unconscious, a heartbeat and respiration erratic, a pulse may not be obvious.
	78-75°F	Pulmonary edema, cardiac and respiratory failure, death. Death may occur before this temperature is reached.

Source: Canadian Centre for Occupational Health and Safety

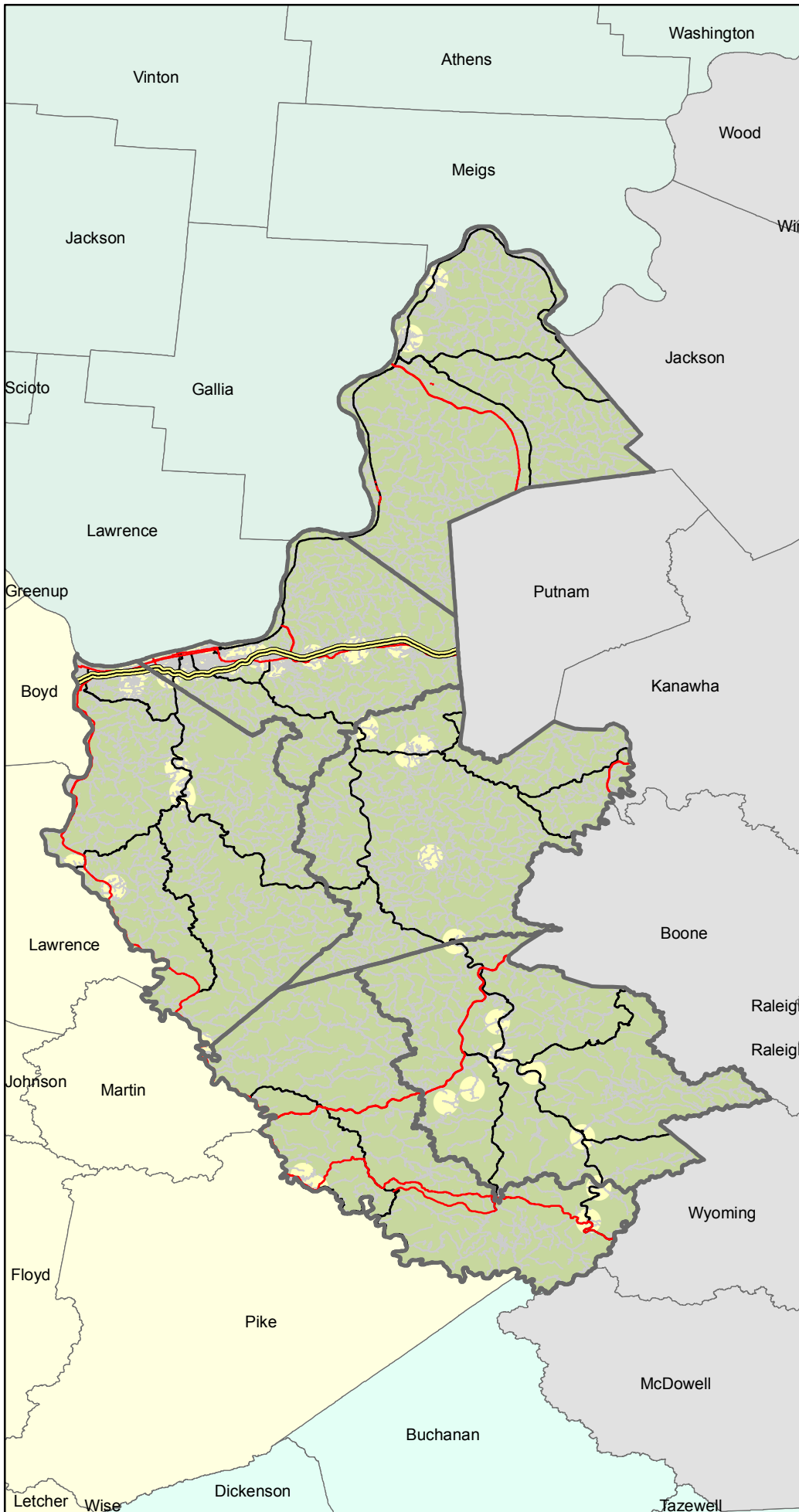
LOSS & DAMAGES

This region of the country has become accustomed to fluctuations in temperature that range from extreme heat to extreme cold throughout the year. Destruction of property and injury are typically not associated with these types of events; the NCEI reports a loss of \$955,000 for extreme temperature events, all cold related, since 1996. However, damages can be inflicted on properties if pipes freeze and burst.

RISK CALCULATION

TABLE 2.2.7.C EXTREME TEMPERATURE RISK CALCULATION					
Probability			Severity		Risk
FREQUENT			MARGINAL		MEDIUM HIGH
Events	46	=2.1	+	=	The risk assessment matrix classifies this hazard as medium high based on the probability and severity.
Years	21				
There is a high probability that an extreme temperature event will occur throughout any given year.					







REGION 2 HAZARD MITIGATION PLAN

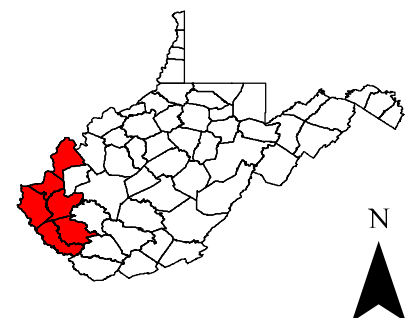
Risk Map: Extreme Temps.

Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.







REGION 2 HAZARD MITIGATION PLAN

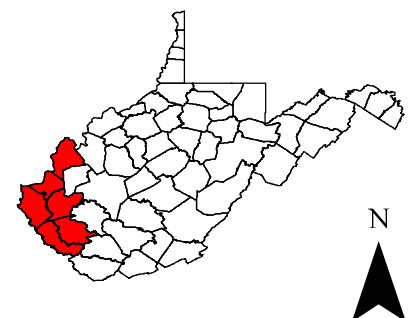
Cabell Risk Map: Extreme Temps.

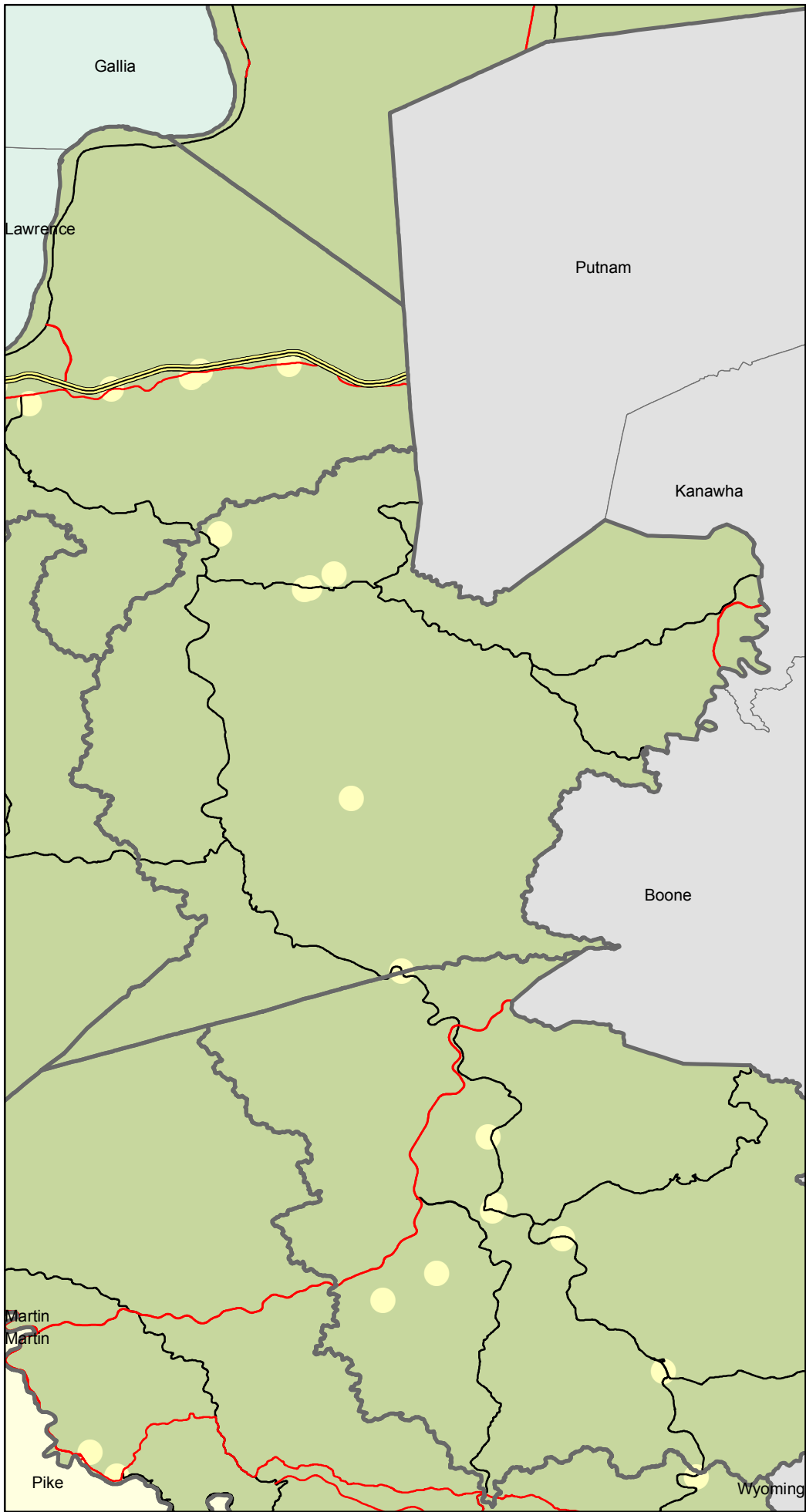
Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.







REGION 2 HAZARD MITIGATION PLAN

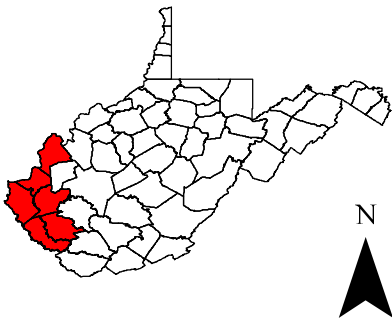
Lincoln Risk Map: Extreme Temps.

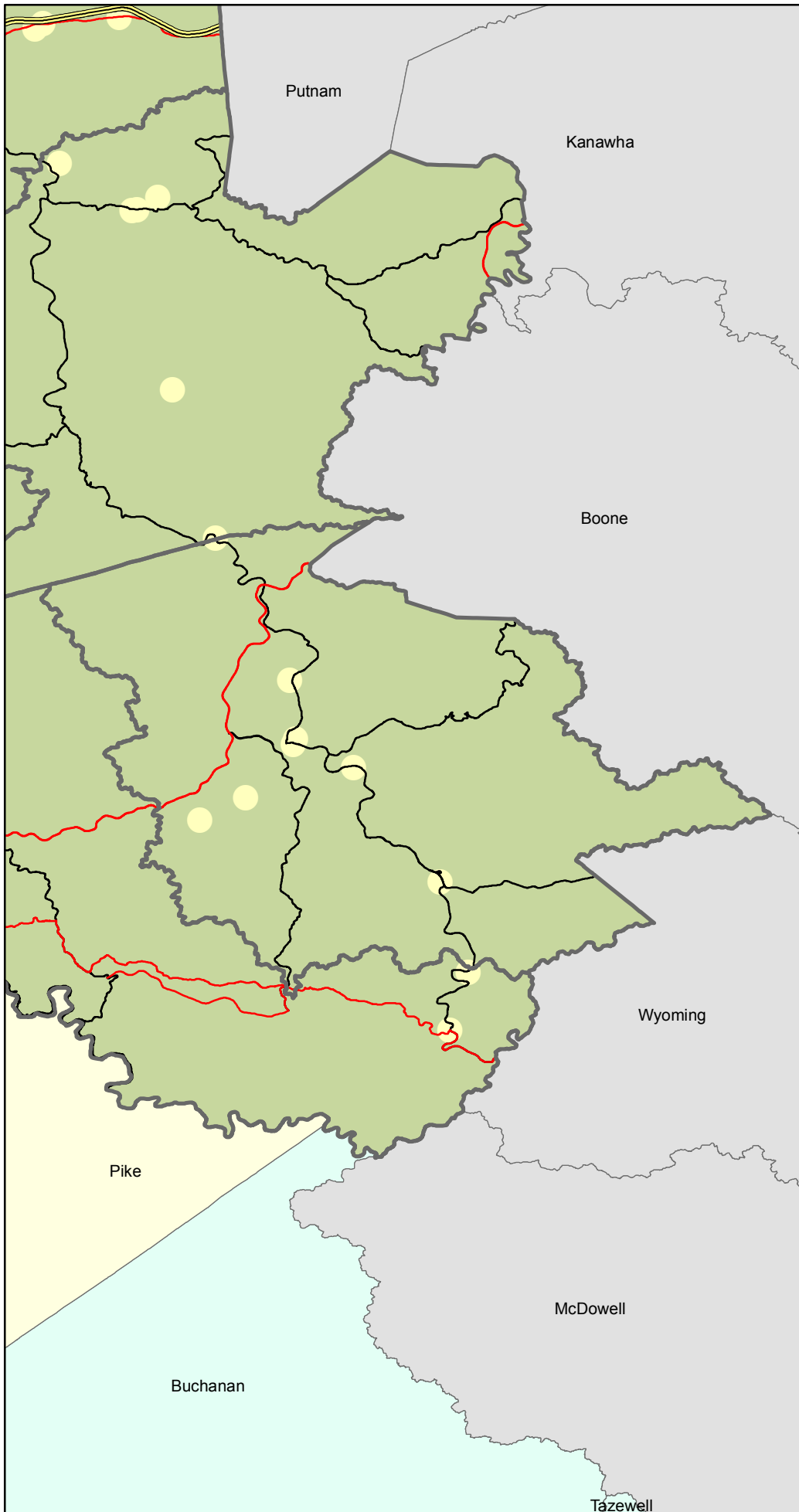
Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 1.5 3 6 9 12 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.







REGION 2 HAZARD MITIGATION PLAN

Logan Risk Map: Extreme Temps.

Data Source(s):
WV GIS Tech Center

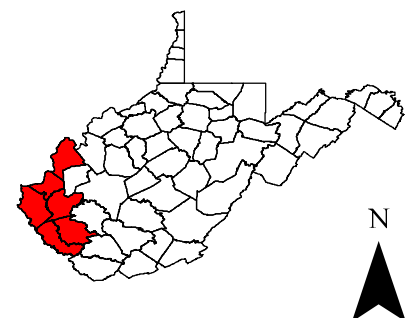
 Moderate Risk Area
 Low Risk Area

0 1.5 3 6 9 12
Miles

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Consulting, LLC







REGION 2 HAZARD MITIGATION PLAN

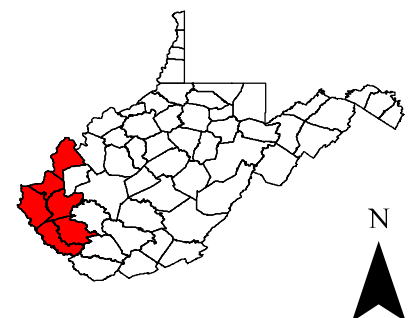
Mason Risk Map: Extreme Temps.

Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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REGION 2 HAZARD MITIGATION PLAN

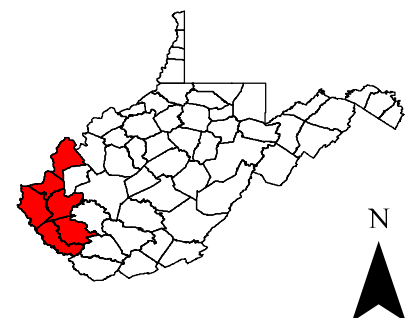
Mingo Risk Map: Extreme Temps.

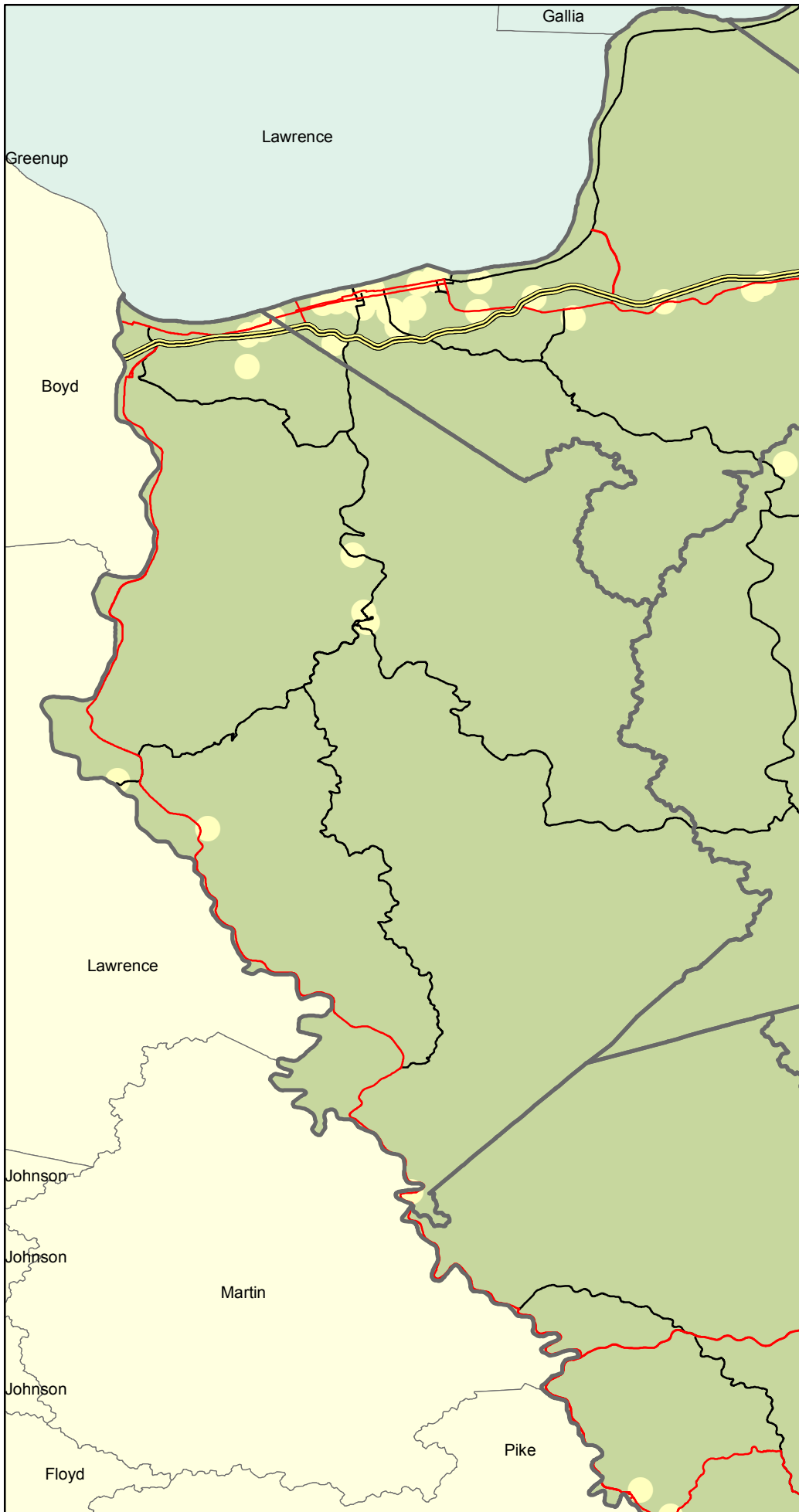
Data Source(s):
WV GIS Tech Center

-  Moderate Risk Area
-  Low Risk Area

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

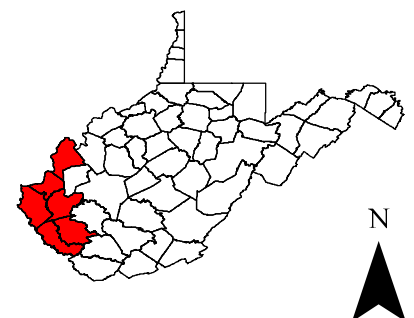
Wayne Risk Map: Extreme Temps.

Data Source(s):
WV GIS Tech Center

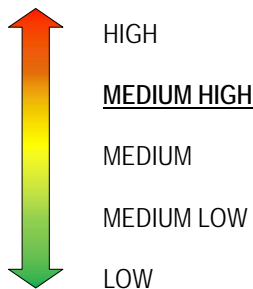
-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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2.2.8 LAND MOVEMENTS



“Although the physical cause of many landslides cannot be removed, geologic investigations, good engineering practices, and effective enforcement of land-use management regulations can reduce landslide hazard”.

- USGS

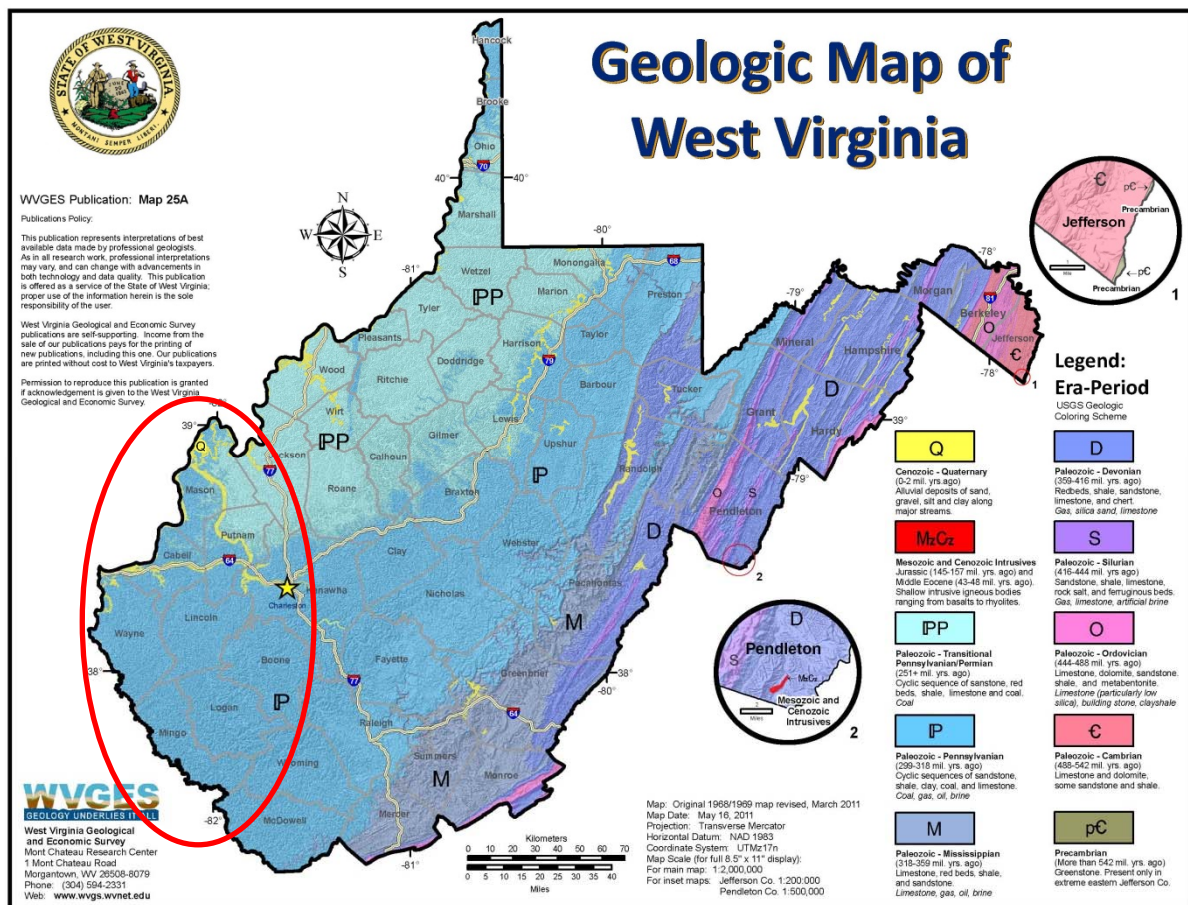
HAZARD OVERVIEW

Land movements include pushing, crushing or burying objects in their path and the damming of rivers and waterways (Haddow, Bullock, & Coppola, 2014, p.46.) There are numerous categories of mass movements: landslides, mudflows, rock falls, land subsidence and expansive soils. Because mitigation efforts are similar for these types of hazards, they were grouped under one common profile heading.

- **Landslides:** Landslides occur when areas of relatively dry rock, soil or debris move uncontrollably down a slope. Landslides may be localized or massive in size and can move at high rates of speed.
- **Mudflows:** Mudflows are water saturated rivers of earth, rock and debris. Mudflows develop when water rapidly accumulates in the material, such as during heavy rainfall or rapid snowmelt. Mudflows can develop and move quickly, giving little to no warning.
- **Rock Falls:** Rock falls occur when rocks or other materials detach from a slope or cliff and descend in a freefall, rolling or bouncing manner. Rock falls can occur naturally, through faults and seismic activity, or as a product of human activity, such as blasting.
- **Land Subsidence:** Land subsidence is the loss of elevation caused by the removal of support below the surface. These events can range in size from a large regional lowering to severe localized collapses, such as sinkholes. The primary cause of land subsidence is human activity such as mining and the extraction of groundwater or petroleum.
- **Expansive Soils:** Expansive soils are soils or soft rocks that will swell or shrink depending on their moisture content. The swelling and shrinking action can cause

extensive damage to transportation routes, such as highways and rail lines, and structures that are built over these areas.

As seen on the map below, West Virginia has a wide variety of types of soil. The entire state of West Virginia contains many steep slopes that have retaining walls or experience rock falls and road slips. The most prevalent types of soil in Region 2 Counties include the Paleozoic Pennsylvanian (sandstone, limestone, shale, coal) and Paleozoic Transitional Pennsylvanian (sandstone, limestone, clay, shale, coal, gas, oil) in most areas of the region, and Cenozoic Quaternary (sand, gravel, silt, clay) mainly along the rivers.



POSSIBLE CAUSES

Land movements can be secondary effects of heavy rainfall and earthquakes (WHO). Some of the causes attributed to land movements can include:

- intense deforestation and soil erosion,

- construction of human settlement in landslide prone areas,
- roads or communications lines in mountain areas,
- building with weak foundations,
- buried pipelines,
- mining, and
- lack of understanding of landslide hazards, and lack of warning systems.

LOCATION & EXTENT

In the counties of Region 2 alone there are over 5,700 underground and surface coal mines (WVMHS&T, 2017). This is many opportunities for mine cave-ins. Another location for land movements is along roads and highways where falling rocks and landslides can affect the transportation networks.

HISTORICAL OCCURRENCES

Data for land movements is limited. The following are some examples of mining accidents from the West Virginia Miner's Health Safety and Training webpage.

February 23, 2017, Mingo County

A piece of mine roof fell striking a section foreman in a mine. The victim died from complications of his injuries on April 6, 2017.

August 15, 2011, Logan County

The victim, a long wall move crewman, was fatally injured by falling rock while engaged in the removal of long wall mine roof support shields.

April 7, 2006, Mingo County

The victim was operating a locomotive when he was struck by falling support beam in a mine.

April 10, 2002, Wayne County

A 33 year old continuous miner operator was fatally injured in a roof fall accident. This was the third roof fall fatality in West Virginia this year.

August 8, 1998, Logan County

A roof bolter operator was fatally injured when a section of roof fell while he was installing permanent roof support. This was a new mine and had only been in operation for a few weeks.

IMPACT & VULNERABILITY

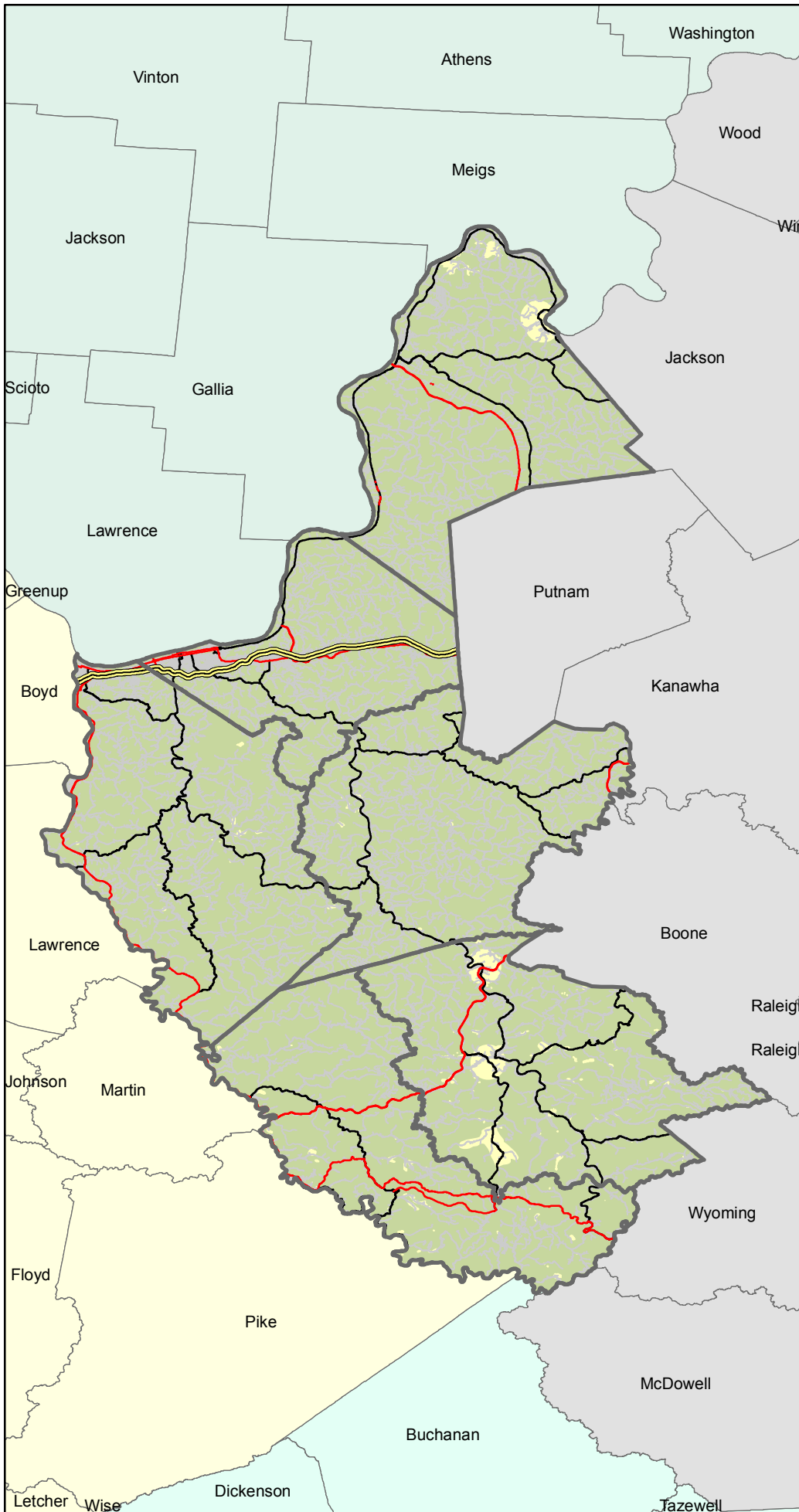
Although there have not been any instances of large, catastrophic land movements in Region 2, the potential for damage is still present. Generally, land movements cause death, injuries, trauma and suffocation from entrapment. Short and long-term mental health effects have been observed. Depending on the location, these events could cause loss or damage to homes, infrastructure and critical facilities and block whole communities off. There is potential for loss of property value, livestock and crops (WHO).

LOSS & DAMAGES

Due to the limited data available for this type of hazard it is difficult to accurately calculate the losses and damages sustained by land movements.

RISK CALCULATION

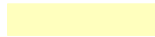

TABLE 2.2.8.A LAND MOVEMENTS RISK CALCULATION				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
PROBABLE		CRITICAL		MEDIUM HIGH
Although there is no concrete data, roads and highways experience slips on a regular basis. Mine cave-ins are less frequent but still occur. Overall land movements are probable in the region.	+	Typically this hazard does not cause much damage to property, deaths or injuries in this area of the country. However, due to mining, there has been loss of life.	=	The risk assessment matrix establishes the risk for this hazard as a medium high.




REGION 2 HAZARD MITIGATION PLAN

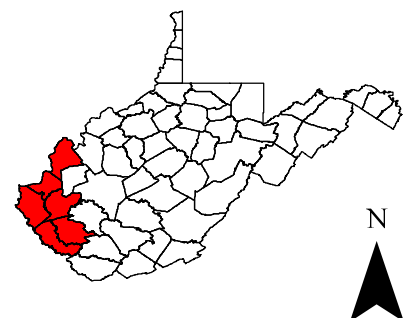
Risk Map: Land Movements

Data Source(s):
WVDEP
US Geological Survey

 Moderate Risk Area
 Low Risk Area

0 3 6 12 18 24
 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.








REGION 2 HAZARD MITIGATION PLAN

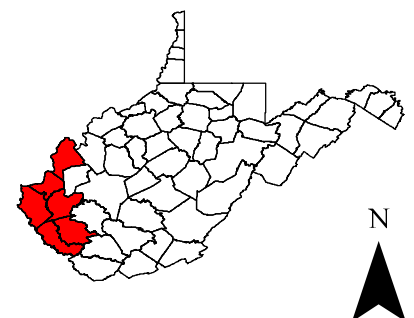
Cabell Risk Map: Land Movements

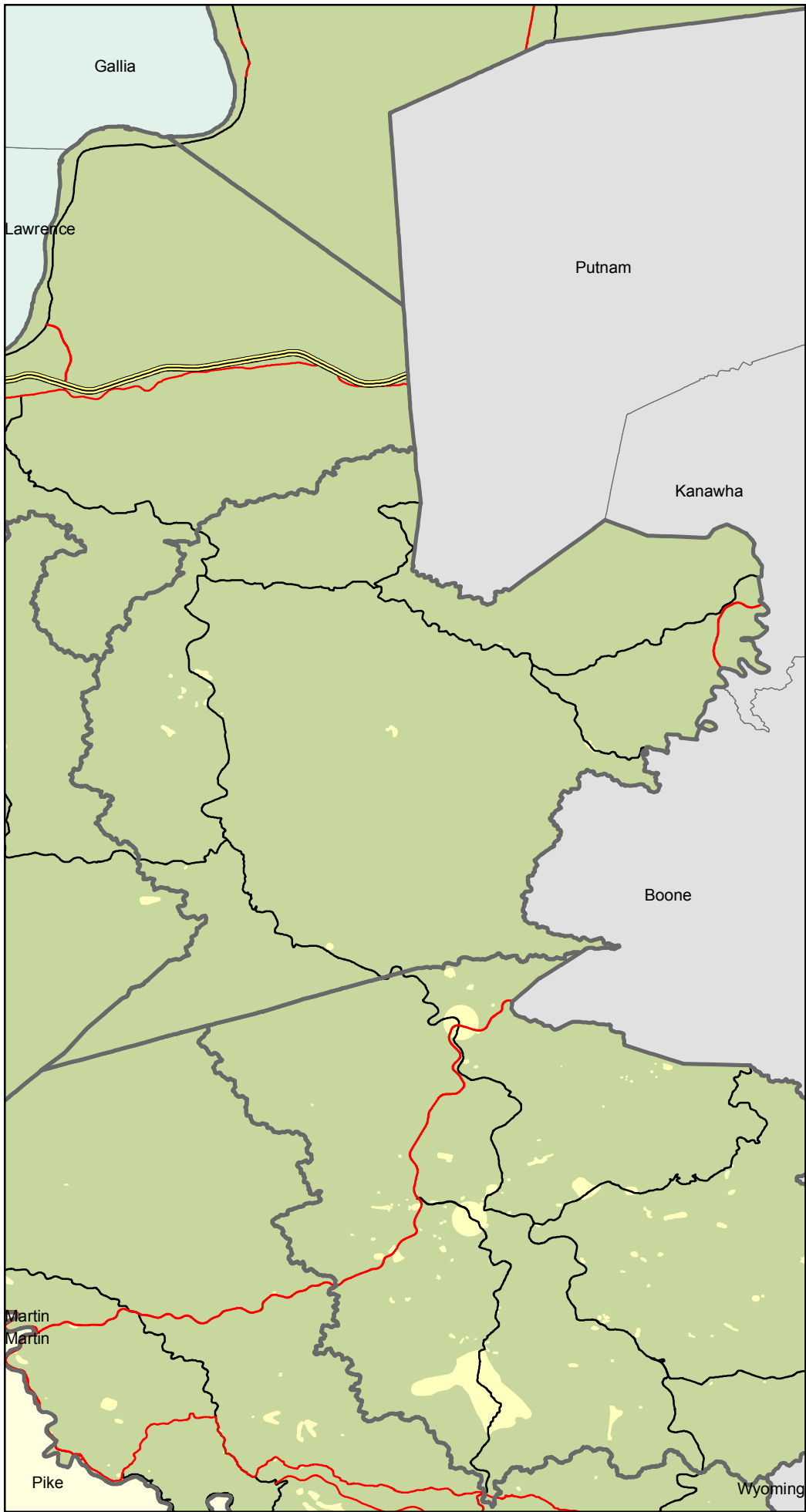
Data Source(s):
WVDEP
US Geological Survey

 Moderate Risk Area
 Low Risk Area

0 1.25 5 7.5 10
 Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



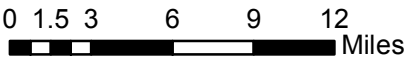


REGION 2 HAZARD MITIGATION PLAN

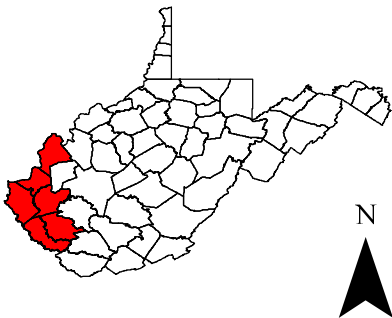
Lincoln Risk Map: Land Movements

Data Source(s):
WVDEP
US Geological Survey

- Moderate Risk Area
- Low Risk Area



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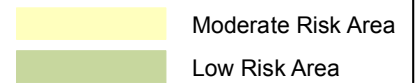




REGION 2 HAZARD MITIGATION PLAN

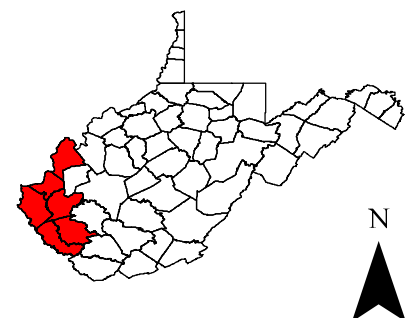
Logan Risk Map: Land Movements

Data Source(s):
WVDEP
US Geological Survey



0 1.5 3 6 9 12
Miles

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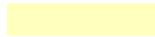





REGION 2 HAZARD MITIGATION PLAN

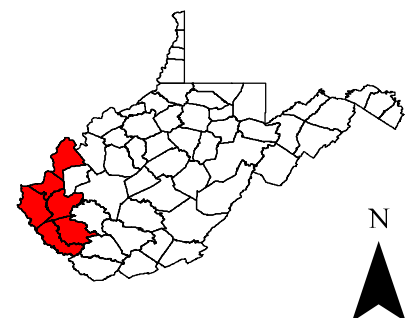
Mason Risk Map: Land Movements

Data Source(s):
WVDEP
US Geological Survey

 Moderate Risk Area
 Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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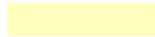






REGION 2 HAZARD MITIGATION PLAN

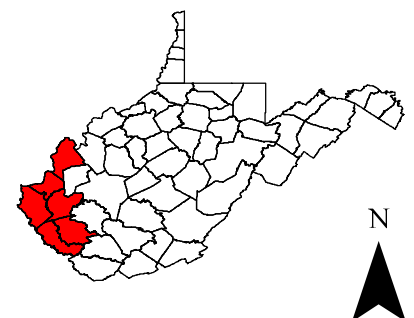
Mingo Risk Map: Land Movements

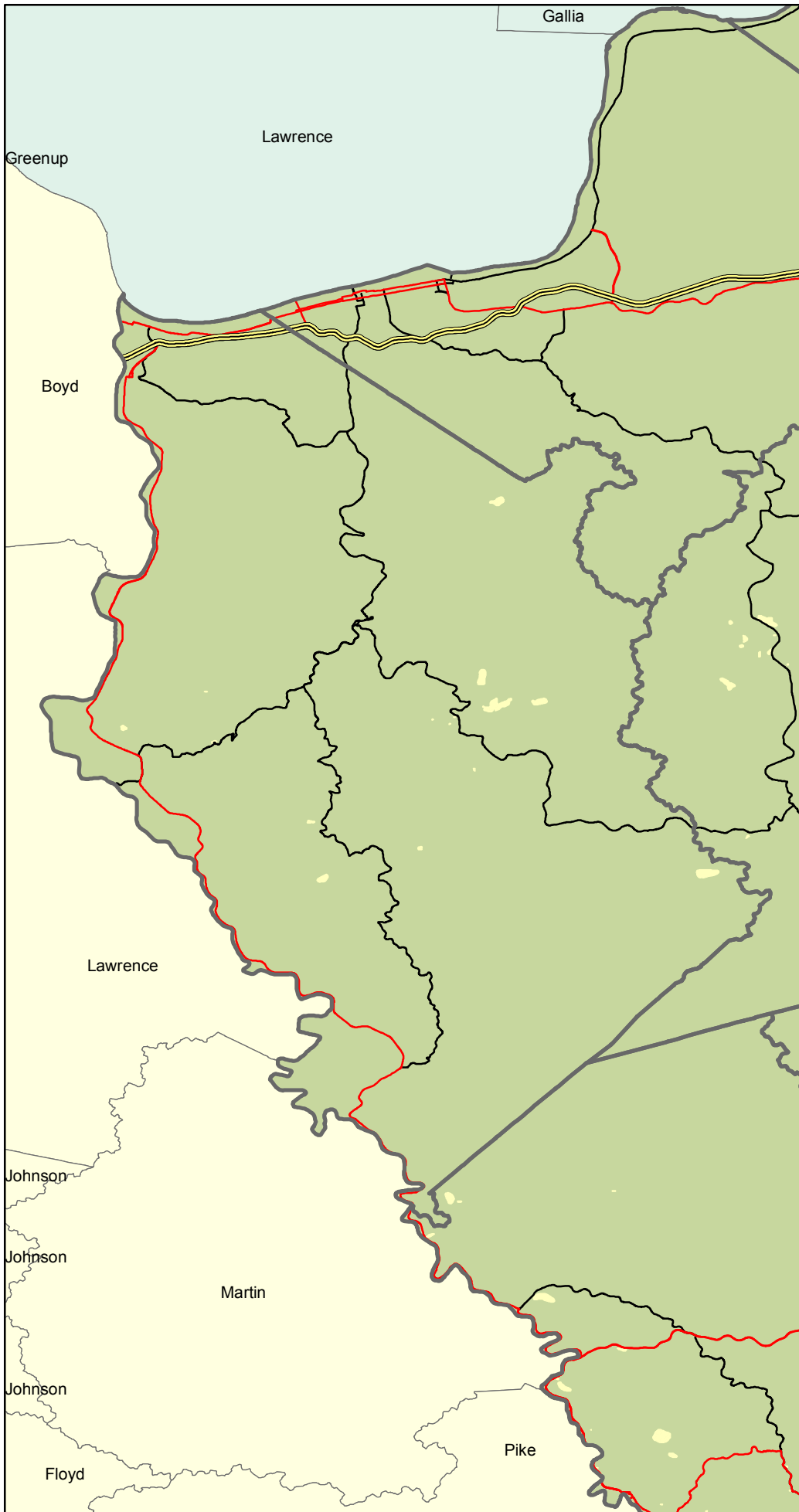
Data Source(s):
WVDEP
US Geological Survey

 Moderate Risk Area
 Low Risk Area

0 1.5 3 6 9 12
 Miles

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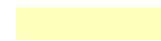





REGION 2 HAZARD MITIGATION PLAN

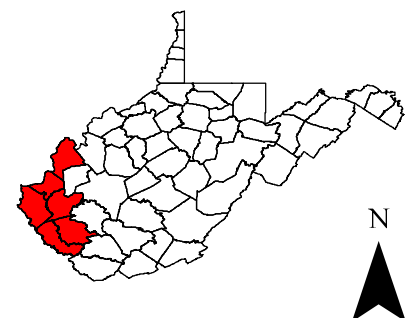
Wayne Risk Map: Land Movements

Data Source(s):
WVDEP
US Geological Survey

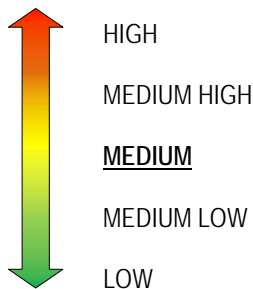
 Moderate Risk Area
 Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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2.2.9 WILDFIRE



"A wildfire is an unplanned, unwanted fire burning in a natural area, such as a forest, grassland, or prairie. As building development expands into these areas, homes and businesses may be situated in or near areas susceptible to wildfires. This is called the wildland urban interface".

- Ready.gov

HAZARD OVERVIEW

In West Virginia, there are two fire seasons: spring and fall. Spring fire season goes from March 1 to May 31 and the fall season is from October 1 to December 31. Wildfires are often thought about as large, out-of-control fires that burn hundreds of acres at a time, injure or kill firefighters, and destroy homes and wildlife. For the purposes of this analysis, the term "wildfire" includes brushfires as well as forest fires. In order for a fire to start there must be oxygen, fuel and heat; if any one of these three components is not present, the fire will not ignite. There are three different types of fires that can be classified (Keller & Devecchio, 2015).

- **Ground:** Creep along slowly just under the ground surface with little flaming and more smoldering combustion.
- **Surface:** Low-intensity surface fires burn grass, shrubs, dead and downed limbs, leaf litter, and other biomass.
- **Crown:** Those in which flaming combustion is carried through the canopies of the trees.

POSSIBLE CAUSES

Nationally, the National Park Service lists several possible causes of wildfires including human-caused and nature-caused. Human-caused fires "result from campfires left unattended, the burning of debris, negligently discarded cigarettes and intentional acts of arson", which account for up to 90% of fires. Lightning or lava causes the remaining 10% of fires (NPS).

This is also true in West Virginia where "in the spring of 2015, 43% of all forest fires were the result of escaped debris fires. Equipment use was the second highest cause of

forest fires in W.Va. causing 29% of all wildfires. Fires set purposely accounted for 13% of forest fires in spring of 2015” (WV Division of Forestry, n.d.).

LOCATION & EXTENT

Areas that are most vulnerable to wildfires include agricultural and forest lands in every county throughout Region 2.

HISTORICAL OCCURRENCES

Since 2008, Wayne County has had the most fires with 412, but Mingo County has had the most burnt acres with 19,986.22. Regionally, on average, there are about 175 fires per year with an average burn rate of 4,660 acres. This data was provided directly by the WV Division of Forestry.

TABLE 2.2.9.A WILDFIRES IN REGION 2 (2008-2017)				
County	Number Fires	Forest Acres	Non Forest Acres	Total Acres
Cabell	206	708.3	52.7	761
Lincoln	269	3,885.14	45.9	3,931.04
Logan	335	10,518.6	564.25	11,082.85
Mason	152	359.7	120.9	480.6
Mingo	373	19,508.52	477.7	19,986.22
Wayne	412	9,498.86	277.75	9,776.61
Totals	1,747	44,479.12	1,539.2	46,018.32

Source: WV Division of Forestry

IMPACT & VULNERABILITY

Aside from the obvious effects on humans such as burns and injuries, the smoke from fires is of great concern. “The smoke produced by wildfires can produce effects ranging from airway and eye irritation to death, especially among individuals with conditions that make them more susceptible to inhalational exposures” (Clements, 2009, p.283). Wildfires cause more than just the direct damage to structures, vegetation or air quality; when a fire removes much or all of the vegetation in a watershed, subsequent rains will have much greater erosive potential, which in turn produces large quantities of sediment and plant debris that affect the water quality of streams and lakes (Keller, Devecchio, 2015, p.459).

However, wildfires can also have benefits to the soil; they “tend to leave an accumulation of carbon on the surface in the form of ash and increase the nutrient content of a soil. Under the right conditions, when erosion does not remove the ash from the environment, a nutrient reservoir may form that is beneficial to local plants” (Keller & Devecchio, 2015, p 159).

LOSS & DAMAGES

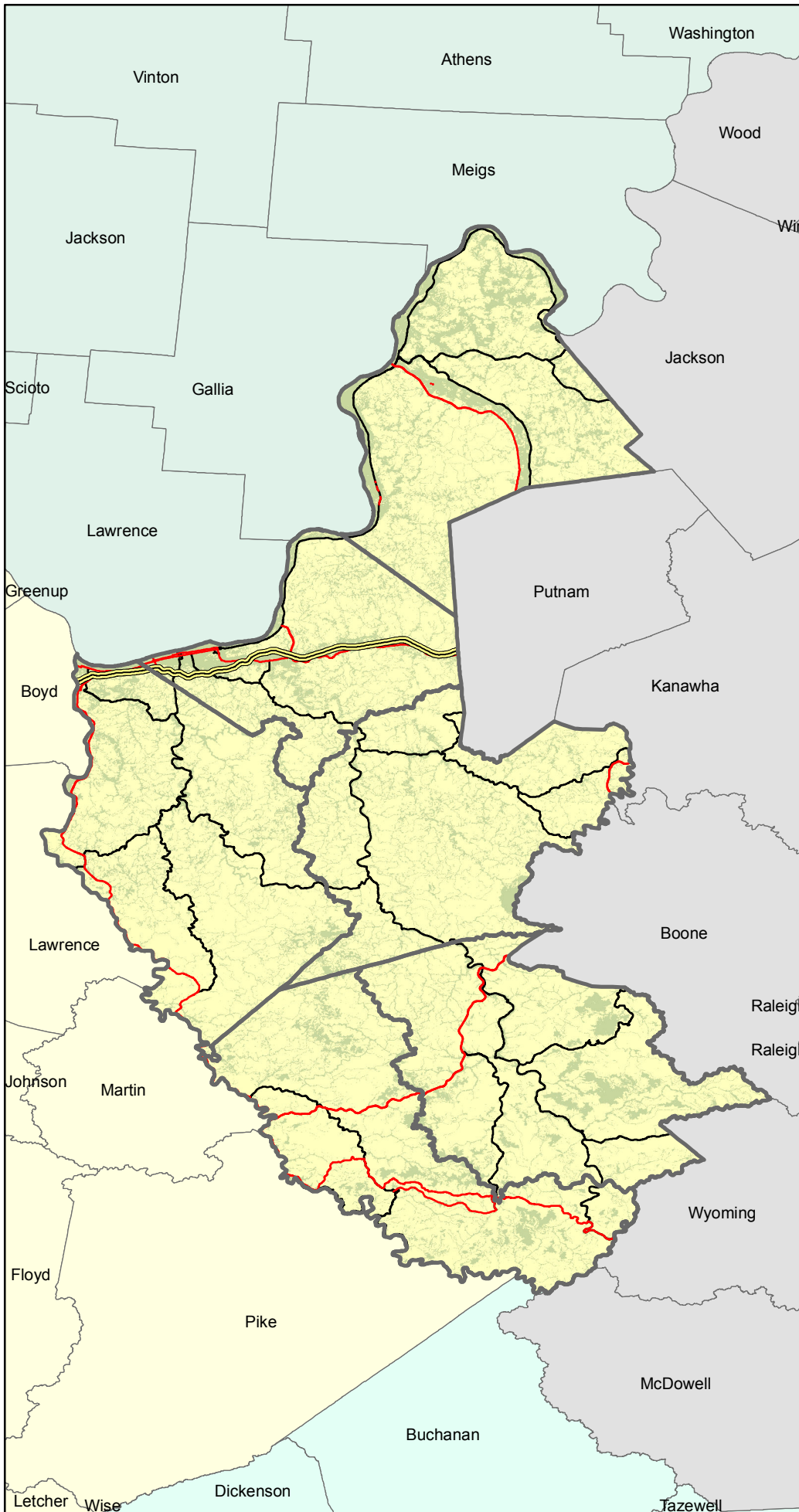
Monetary damage was not provided in the WV Division of Forestry data, but the

amount of federal firefighting costs is available from the National Fire Information Council (NIFC). Although Region 2 and West Virginia have not seen wildfires like typically seen in other parts of the country, mainly due to different types of climate, there still are instances of wildfires. The NFIC estimates that the cost of suppressing fires by the Forest Service and Department of Interior agencies have averaged around \$285 per acre burned from 2010 to 2016.

In Region 2 there have been around 46,018 acres burnt in the last 11 years; if federal cost data is applied, the total average cost in Region 2 would be around \$13,115,130, or on average, about \$7,507 per fire.

RISK CALCULATION



TABLE 2.2.9.B WILDFIRE RISK CALCULATION					
<i>Probability</i>			<i>Severity</i>		<i>Risk</i>
FREQUENT			NEGLIGIBLE		MEDIUM
Events	1,747	+	Although fires can destroy lands and property, typically there is time to mitigate loss of life from this hazard.	=	The risk assessment matrix classifies this hazard as a medium risk to Region 2.
Years	9				
There are on average around 194 wildfires in the entire Region 2 area every year.					



REGION 2 HAZARD MITIGATION PLAN

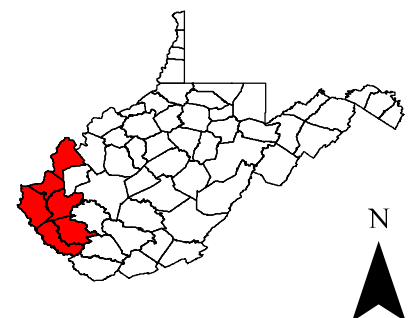
Risk Map: Wildfire

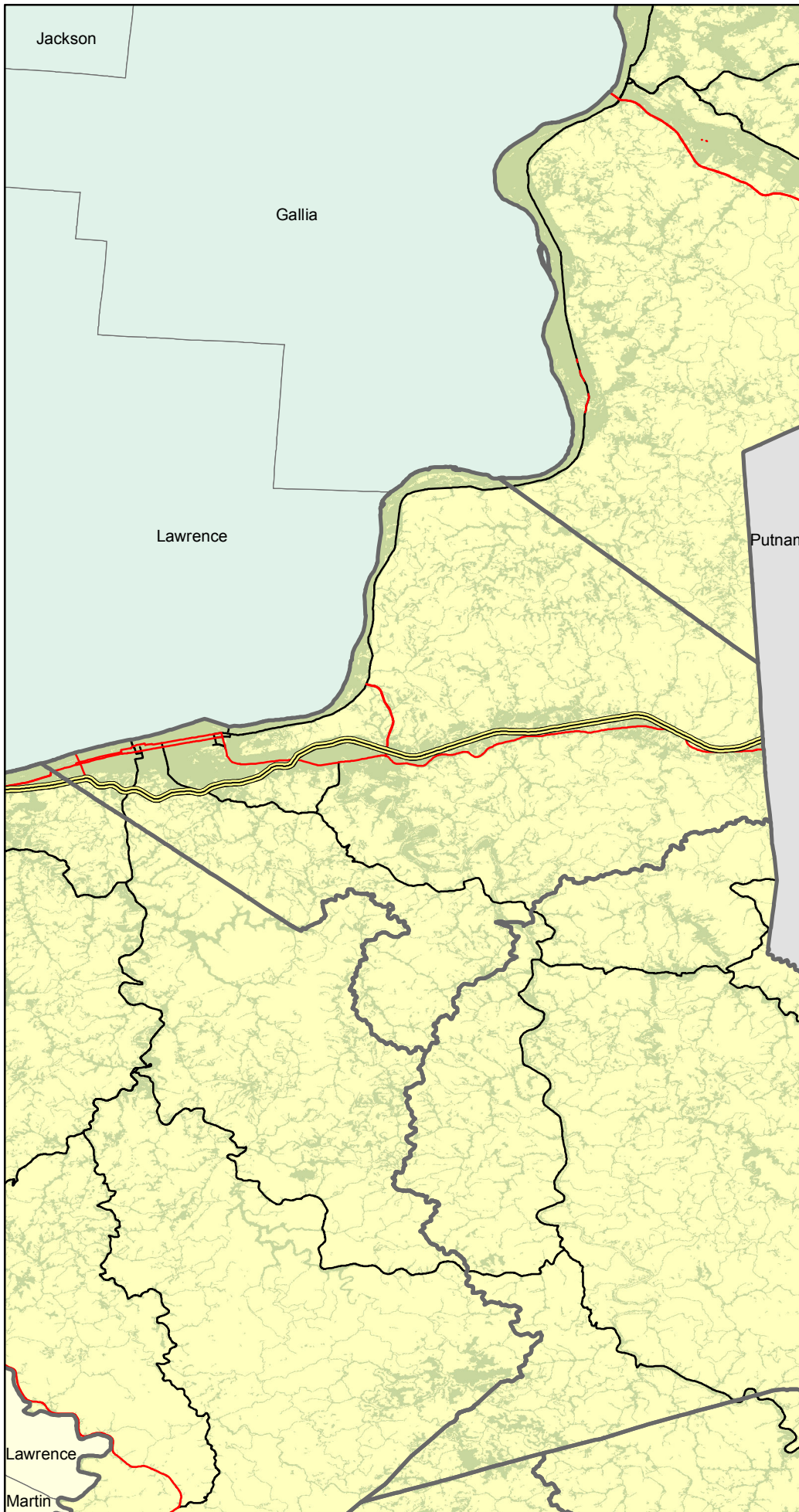
Data Source(s):
US Geological Survey

-  Moderate Risk Area
-  Low Risk Area

0 3 6 12 18 24
Miles

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REGION 2 HAZARD MITIGATION PLAN

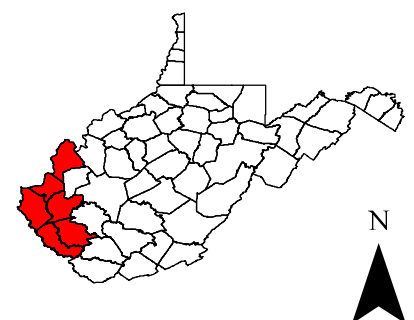
Cabell Risk Map: Wildfire

Data Source(s):
US Geological Survey

-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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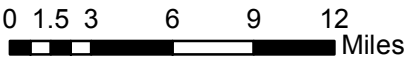


REGION 2 HAZARD MITIGATION PLAN

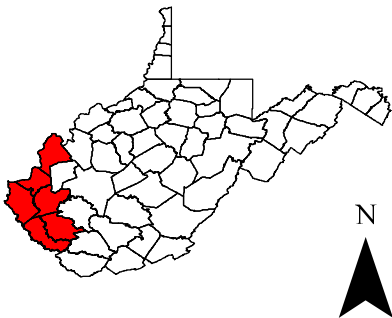
Lincoln Risk Map: Wildfire

Data Source(s):
US Geological Survey

- Moderate Risk Area
- Low Risk Area



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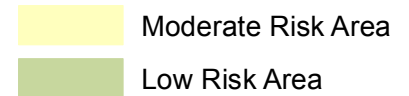




REGION 2 HAZARD MITIGATION PLAN

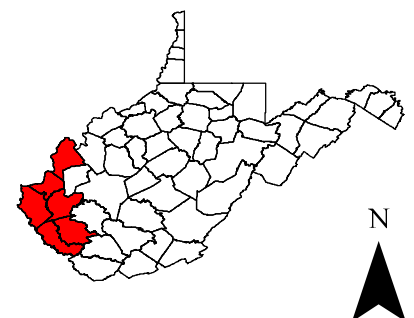
Logan Risk Map: Wildfire

Data Source(s):
US Geological Survey



0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

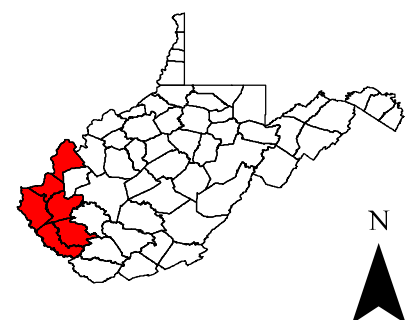
Mason Risk Map: Wildfire

Data Source(s):
US Geological Survey

-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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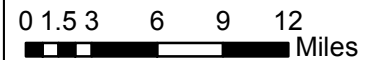
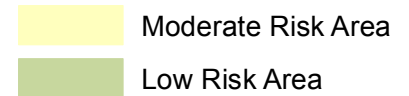




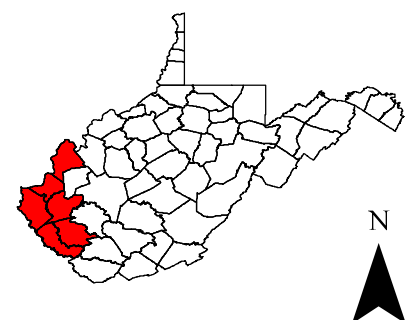
REGION 2 HAZARD MITIGATION PLAN

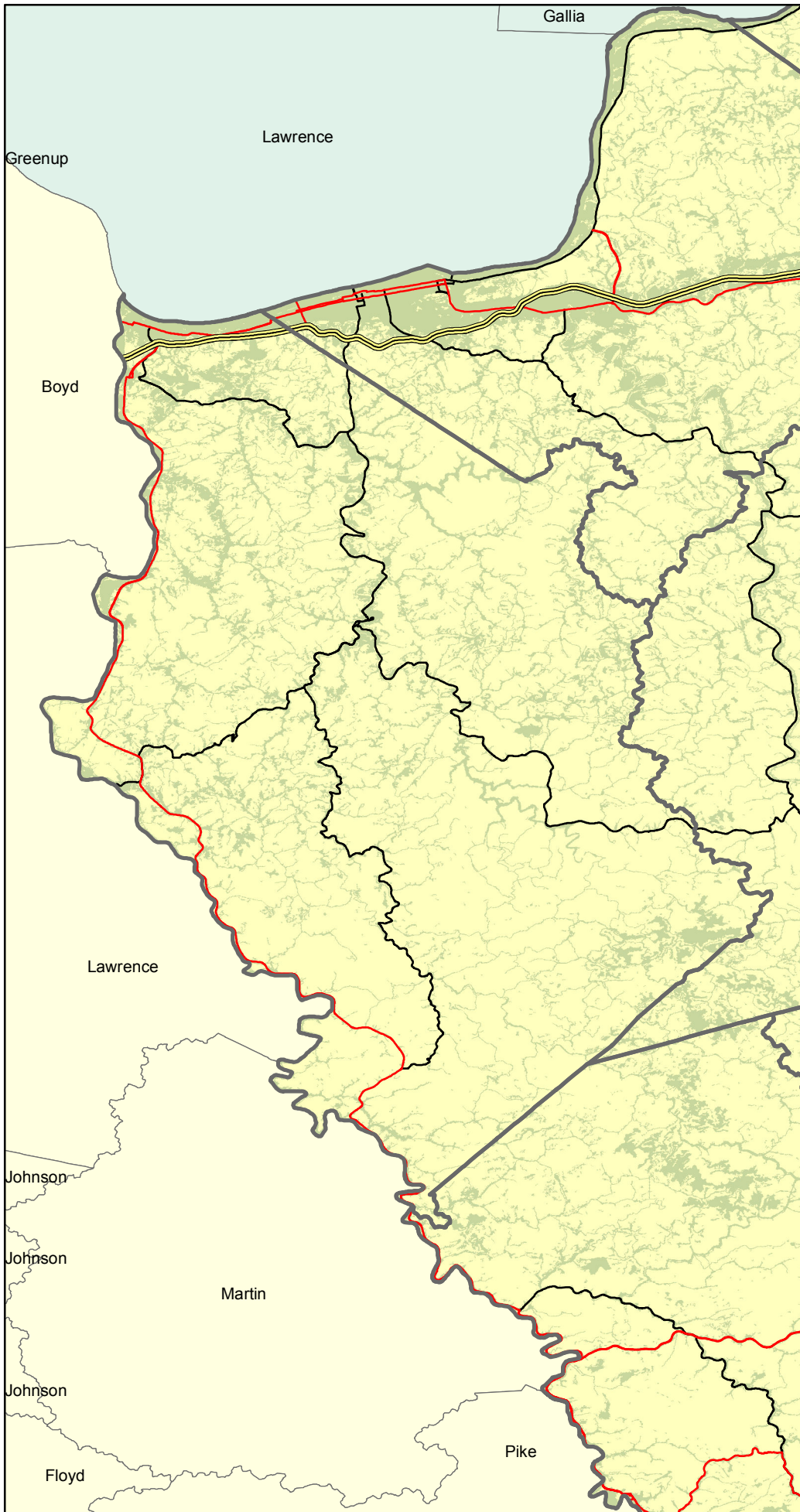
Mingo Risk Map: Wildfire

Data Source(s):
US Geological Survey



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REGION 2 HAZARD MITIGATION PLAN

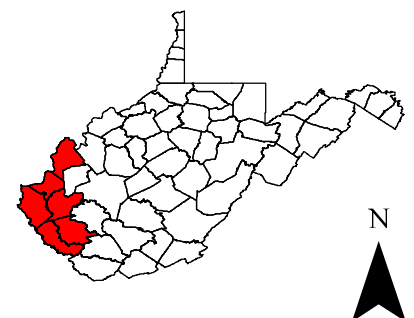
Wayne Risk Map: Wildfire

Data Source(s):
US Geological Survey

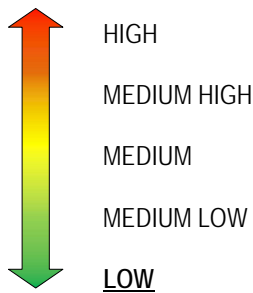
-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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2.2.10 DAM & FLOODWALL FAILURE



Dam: a barrier preventing the flow of water or of loose solid material.

Floodwall: a wall (as a levee) built to prevent inundation by high water.

Levee: an embankment for preventing flooding.

HAZARD OVERVIEW

The West Virginia Department of Environmental Protection (WVDEP) defines a dam as “an artificial barrier or obstruction that impounds, or will impound water and must be 25 feet or more in height and impound 15 or more acre-feet of water volume or six feet or more in height and impound 50 or more acre-feet of water volume” (WVDEP, 2009). The WVDEP is in charge of conducting inspections of existing dams and those under construction, and reviewing design plans to ensure that they are constructed, maintained, and operated or removed in a safe manner, as well as responding to emergencies (WVDEP, 2016).

The WVDEP classifies dams into four categories, including the following:

- **Class 1 (High Hazard):** Dams located where failure may cause loss of human life or major damage to dwellings, commercial or industrial buildings, main railroads, important public utilities, or where a high risk highway may be affected or damaged. All Class 1 - High Hazard dams must have an Emergency Action Plan as required by the West Virginia Department of Environmental Protection (2016).
- **Class 2 (Significant Hazard):** Dams located where failure may cause minor damage to dwellings, commercial or industrial buildings, important public utilities, main railroads, or cause major damage to unoccupied buildings, or where a low risk highway may be affected or damaged. Loss of human life from a failure of a Class 2 dam is unlikely.
- **Class 3 (Low Hazard):** Dams located in rural or agricultural areas where failure may cause minor damage to non-residential and normally unoccupied buildings, or rural or agricultural land. Failure of a Class 3 dam would cause only a loss of the dam itself and a loss of property use, such as use of related roads, with little additional damage to adjacent property.

- **Class 4 (Negligible Hazard):** Dams where failure is expected to have no potential for loss of human life, no potential for property damage, and no potential for significant harm to the environment.

Dams are used for a variety of purposes.

- **Flood Control:** Prevent loss of life and property caused by flooding. They impound floodwaters and either release them under control to the river below or store or divert the water for other uses.
- **Recreation:** Facilities designed for fishing, boating, skiing, camping, picnic areas, and boat launches can all be supported by dams.
- **Navigation:** Provide a stable system of inland river transportation.
- **Mine Tailings:** Allow the mining and processing of coal and other minerals while protecting the environment.

Levees and floodwalls serve the same purpose – to avoid flooding from a body of water in an area. A floodwall is an engineered structure made of reinforced concrete or reinforced concrete block and varies anywhere from 1 foot to over 20 feet in height. A floodwall can surround a structure or, depending on flood depths, site topography, or even cities (USDHS, 2007). There are currently several levees and floodwalls in Region, some built as far back as 1947 in response to the 1937 floods.

TABLE 2.2.10.A LEVEES AND FLOODWALLS IN REGION 2		
<i>Location</i>	<i>River</i>	<i>Type</i>
Huntington	Ohio River	Floodwall
Kenova/Ceredo	Ohio River	Levee & Floodwall
Williamson	Tug Fork River	Floodwall
Point Pleasant	Ohio River	Floodwall
Matewan	Tug Fork River	Floodwall

POSSIBLE CAUSES

Dam failure is often the result of prolonged rainfall or flooding or, during prolonged dry periods, erosion. The primary hazard surrounding dam failure is the swift, unpredictable flooding of those areas immediately downstream. While general inundation areas can be determined, it is often impossible to know exactly how and where water held back by a dam will flow during a rapid failure of the dam.

Generally, there are three types of dam failures: hydraulic, seepage, and structural.

- **Hydraulic Failure (Overtopping):** Hydraulic failures result from the uncontrolled

flow of water over the dam, around and adjacent to the dam, and the erosive action of water on the dam and its foundation. Earthen dams are particularly vulnerable to hydraulic failure since earth erodes at relatively small velocities.

- **Seepage Failure (Piping):** All dams exhibit some seepage that must be controlled in velocity and amount. Seepage occurs both through the dam and the foundation. If uncontrolled, seepage can erode material from the foundation of an earthen dam to form a conduit through which water can pass. This passing of water often leads to a complete failure of the structure, known as piping.
- **Structural Failure:** Structural failures involve the rupture of the dam and/or its foundation. This is particularly a hazard for large dams and for dams built of low strength materials such as silts, slag, fly ash, etc. “When trees and woody plants are allowed to grow on earthen dams, they can hinder safety inspections, can interfere with safe operation, or can even cause dam failure” (USDHS, 2005).

Dam failures generally result from a complex interrelationship of several failure modes. Uncontrolled seepage may weaken the soils and lead to a structural failure. Structural failure may shorten the seepage path and lead to a piping failure. Surface erosion may lead to structural or piping failures.

Reasons that floodwalls and levees fail are generally due to poor maintenance practices (allowing vegetation to grow near or through the wall making the structure weak, or part maintenance) and poor design (not designed for a sufficient flood waters or structurally unsound).

LOCATION & EXTENT

According to the National Inventory of Dams, there are a total of 62 dams in Region 2, distributed by county as follows: Cabell, 6, Lincoln, 2, Logan, 16, Mason, 14 Mingo, 15, and Wayne, 9.

<i>Dam Name</i>	<i>Primary Purpose</i>	<i>Type</i>	<i>River</i>	<i>City</i>	<i>County</i>
Lake of Eden / Harless Fishing Lake	Recreation	Earth	Goose Run	Barboursville	Cabell
Culloden Water Supply Dam	Recreation	Earth	Indian Fork	Milton	Cabell
Trout Lake	Recreation	Earth	Tributary Guyandotte River	Barboursville	Cabell
Melody T Ranch Lake	Recreation	Earth	Tributary Mud River of Guyandotte River	Barboursville	Cabell

TABLE 2.2.10.B LIST OF DAMS IN REGION 2

<i>Dam Name</i>	<i>Primary Purpose</i>	<i>Type</i>	<i>River</i>	<i>City</i>	<i>County</i>
Hartfield Farm Lake	Recreation	Earth	Guyandotte River	Barboursville	Cabell
Lakeview Dam / Hash's Fishing Lake	Recreation	Earth	Tributary Tom Creek	Martha	Cabell
Upper Mud River No 2A	Flood Control	Rockfill, Earth	Mud River	Palermo	Lincoln
Lee's Fishing Lake	Other	Earth	Mahoney Creek	Hamlin	Lincoln
Rockhouse Branch #15	Tailings	Other	N/A	N/A	Logan
Little Oak Branch Dam / Guyan #5 Dam	Tailings	Other	N/A	N/A	Logan
Pine Creek Cr Dam	Tailings	Other	N/A	N/A	Logan
Right Fork of Pine Creek #22	Tailings	Other	N/A	N/A	Logan
Rich Creek Slurry Impoundment	Tailings	Other	N/A	N/A	Logan
Titanic Hollow Dam	Tailings	Other	N/A	N/A	Logan
Big Lick Branch Cr Dam	Tailings	Other	N/A	Omar	Logan
Rock House Branch Slurry Impoundment	Tailings	Other	N/A	Holden	Logan
Holden #22 Slurry Impoundment	Tailings	Other	N/A	N/A	Logan
Little White Oak Slurry Impoundment	Tailings	Other	N/A	Sovereign	Logan
Elk Creek #10 Slurry Impoundment	Tailings	Other	N/A	N/A	Logan
Elk Creek #10 Lower Slurry Impoundment	Tailings	Other	N/A	Emmett	Logan
Elk Creek #10 Upper Slurry Impoundment	Tailings	Other	N/A	Emmett	Logan
Tinsely Branch Slurry Impoundment	Tailings	Other	Tinsely Branch	Dehue	Logan
Moncolo Cr Impoundment Dam	Tailings	Other	N/A	N/A	Logan
Moncolo Slurry Impoundment	Tailings	Other	N/A	Sharples	Logan
Huffman Dam	Recreation	Other	Unnamed Tributary of West Creek	Letart	Mason
McClintic Pond #7B Dam	Fish and Wildlife Pond	Earth	Old Town Creek	York	Mason
Little Broad Run #6 Dam		Other	N/A	N/A	Mason
Robert C Byrd L & D	Navigation	Concrete	Ohio River	Bladen	Mason
McClintic #23 Dam	Recreation	Earth	Old Town Creek	Point Pleasant	Mason
R C Byrd On-Site Fish Hatchery Dam	Fish and Wildlife Pond	Earth	N/A	N/A	Mason
Racine L & D	Navigation	Concrete	Ohio River	Antiquity	Mason
McClintic Pond #7A Dam	Fish and Wildlife Pond	Earth	Old Town Creek	York	Mason
McClintic Pond #11	Recreation	Earth	Old Town Creek	Maggie	Mason
Sporn Unit 5 Flyash Dam	Tailings	Earth	N/A	New Haven	Mason
Sporn Bottom Ash Dam	Tailings	Other	Ohio River	New Haven	Mason
AEP Proj. 1301 Ash Pond	Tailings	Earth	Little Broad Run	New Haven	Mason
Little Broad Run #7 Dam	N/A	Other	N/A	N/A	Mason
McClintic #16 Dam	Recreation	Earth	Mill Creek	Point Pleasant	Mason
Marrowbone F W Dam	Water Supply	Other	N/A	N/A	Mingo
Ragland Slurry Impoundment	Tailings	Other	N/A	Ragland	Mingo
Sprouse Creek Cr Dam	Tailings	Other	N/A	N/A	Mingo
Nile Stone Slurry Impoundment	Other	Earth	Conley Fork	Thacker	Mingo

TABLE 2.2.10.B LIST OF DAMS IN REGION 2					
<i>Dam Name</i>	<i>Primary Purpose</i>	<i>Type</i>	<i>River</i>	<i>City</i>	<i>County</i>
Spring Branch (Holden #25) Dam	Tailings	Other	N/A	N/A	Mingo
Laurel Creek Lake No. 1	Fish and Wildlife Pond	Rockfill, Earth	Laurel Fork	Canterbury	Mingo
Left Fork Slurry Impoundment	Tailings	Other	N/A	Kermit	Mingo
Fresh Water Impoundment	Water Supply	Other	N/A	Wharnccliffe	Mingo
Aldrich Branch Slurry Impoundment	Tailings	Other	N/A	Naugatuck	Mingo
Fresh Water Impoundment	Water Supply	Other	N/A	Naugatuck	Mingo
Left Fork Kermit Coal Co. Cr Impoundment Dam	Tailings	Other	N/A	N/A	Mingo
Ben Creek Slurry Impoundment	Tailings	Other	N/A	Wharnccliffe	Mingo
Twelvepole Refuse Impoundment	Tailings	Other	N/A	Dingless	Mingo
Sprouse Creek Slurry Impoundment	Tailings	Other	N/A	Lobata	Mingo
Delparton Slurry Impoundment	Other	Earth	Pigeon Creek	Ford	Mingo
Right Fork - Camp Creek FW Dam	N/A	Other	N/A	N/A	Wayne
National Steel - Ohio River Site	Tailings	Rockfill	Ohio River	Ceredo	Wayne
Moses Fork Fishing Lake	Recreation	Rockfill, Earth	Right Fork	Dunlow	Wayne
Beech Fork Lake Dam	Flood Control	Earth	Beech Fork of Twelvepole Creek	Lavalette	Wayne
Freshwater Dam	Recreation	Earth	Right Fork of Camp Creek	East Lynn	Wayne
Trace Branch Slurry Impoundment	Tailings	Earth	Right Fork of Camp Creek	East Lynn	Wayne
Maynard Branch Slurry Impoundment	Tailings	Other	N/A	East Lynn	Wayne
Fresh Water Dam	Water Supply	Other	N/A	East Lynn	Wayne
East Lynn Dam	Flood Control	Earth	East Fork of Twelvepole Creek	East Lynn	Wayne

Source: National Inventory of Dams

HISTORICAL OCCURRENCES

In the state as a whole, there has been one notable dam failure and it occurred in Logan County. The Buffalo Creek Dam failed on February 26, 1972 flooding the valley and killing 118 people.

Coal mining poses many environmental complications and first among them is safe disposal of the byproduct, known as tailings. If the tailings are dumped on hills, they can cause landslides. If placed in valleys, they can block streams and cause flooding. Tailings can be unstable, especially in heavy rain. That day in 1972, three days of rain exacerbated two small dam breaks that had occurred several years earlier. The dam burst, unleashing a 20-foot wall of water that roared into the valley.

About 4,000 people were living in 17 towns and villages in Buffalo Creek Valley at the time. Hundreds of homes and buildings were swept away by the powerful flood. The Buffalo Mining Company, which was responsible for the tailings, was forced to pay \$30

million in damages (History.com, 2009).

COMMITTEE INPUT

During committee and public meetings, committee members expressed concern about specific problems in their areas. The following is a summary of problems and what has been done so far to begin to mitigate the hazard.

- Mason County: FEMA has stated intentions to decertify the Point Pleasant flood wall and levees. This would change the flood map from X to D and flood insurance rates would go up. The issue has been identified and county officials are attempting to work with the Point Pleasant government to address the issue.
- Wayne County: The age of the dams are of concern and are in need of repair. If they fail there would be floods of dams to the Ohio River, in Ceredo, Kenova and areas below. Some planning and education has been conducted to the public who lives below the dam.

IMPACT & VULNERABILITY

Dam failures themselves do not pose a threat to public health; the cascading effects that occur after a failure are more concerning. When a dam fails it causes flooding downstream that can cause death, injury, and illnesses relating to water-borne diseases and standing water. The consequences of flooding from a dam can cause damage to buildings and transportation infrastructure and power outages. As a result of flooding, people might have to evacuate and be displaced from their homes. In a large enough event, this can translate into economic loss for the area due to businesses closing and loss of workforce including the cost of clean-up activities after the event.

Cascading effects from dam failure can include the following.

- Flooding
- Power outages
- Damage to infrastructure and buildings
- Economic loss to businesses and loss of income
- Population displacement as a result of evacuation or damage to homes

LOSS & DAMAGES

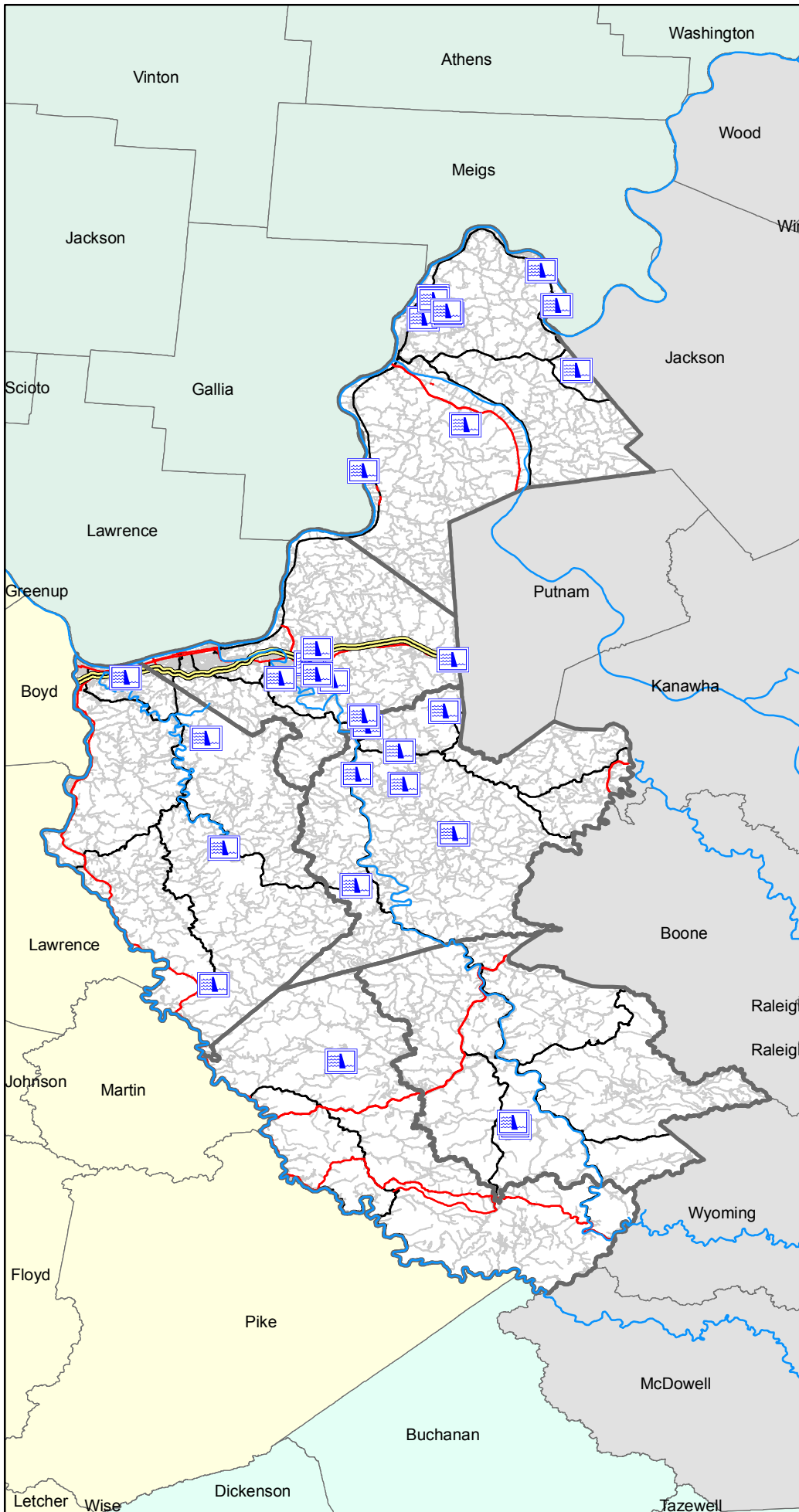
The direct cost of dam failure is the replacement cost, typically determined on the

original construction cost. Under certain conditions, only a part of a dam will fail, such as the spillway, gates, penstock, or power plant. However, there are many indirect costs that arise from the failure of a dam such as labor and capital reduction due to flooding, and water shortages (US DOI, 2009).

Because there has only been one dam failure in the region, it is difficult to estimate the amount of damages that dam failure could have in the region. However, the Army Corps of Engineers has done work on the Robert C. Byrd Lock and Dam with a cost of lock replacement being \$244,550,000; dam rehabilitation \$ 46,700,000, and fish hatchery mitigation \$ 13,800,000 (US Army Corps of Engineers, n.d.). This ends up being a total of around \$292,630,000 for the entire dam. If it were to fail, it could be estimated that the replacement and damages would cost at least this amount. Every dam and floodwall in all six counties will have a different cost of repair, maintenance, and reconstruction due to the nature of their construction, size, and location.

RISK CALCULATION

TABLE 2.2.10.C DAM AND FLOODWALL FAILURE RISK CALCULATION				
<i>Probability</i>		<i>Severity</i>		<i>Risk</i>
IMPROBABLE		CRITICAL		LOW
Although some dams in the area may require maintenance, it is improbable that any one would completely fail – County officials are constantly monitoring the dam conditions.	+	The only dam failure in the region caused many deaths and destruction of 17 towns. However, the maintenance and monitoring efforts of the counties can greatly reduce the impacts of a dam failure.	=	According to the risk assessment matrix, this hazard is considered low.



REGION 2 HAZARD MITIGATION PLAN

Risk Map: Dam & Floodwall Failure

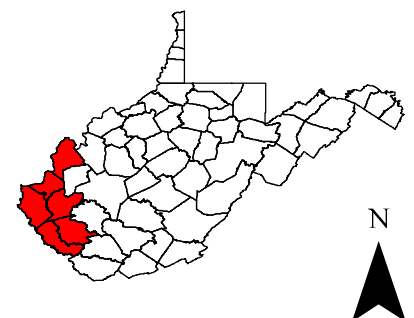
Data Source(s):
National Inventory of Dams

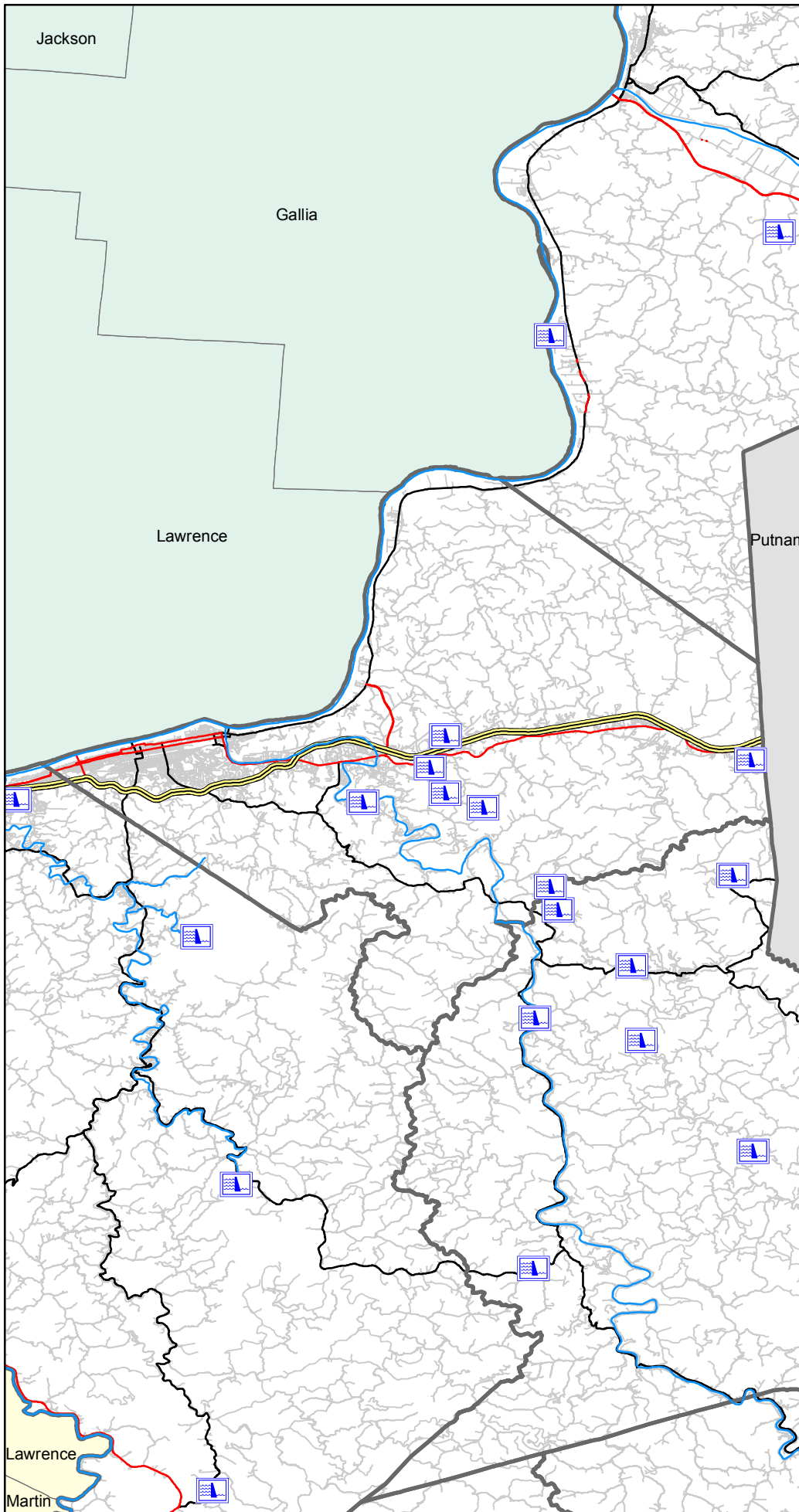


Dam Locations

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.





REGION 2 HAZARD MITIGATION PLAN

Cabell Risk Map: Dam & Floodwall Failure

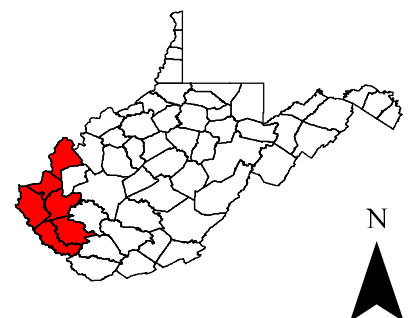
Data Source(s):
National Inventory of Dams

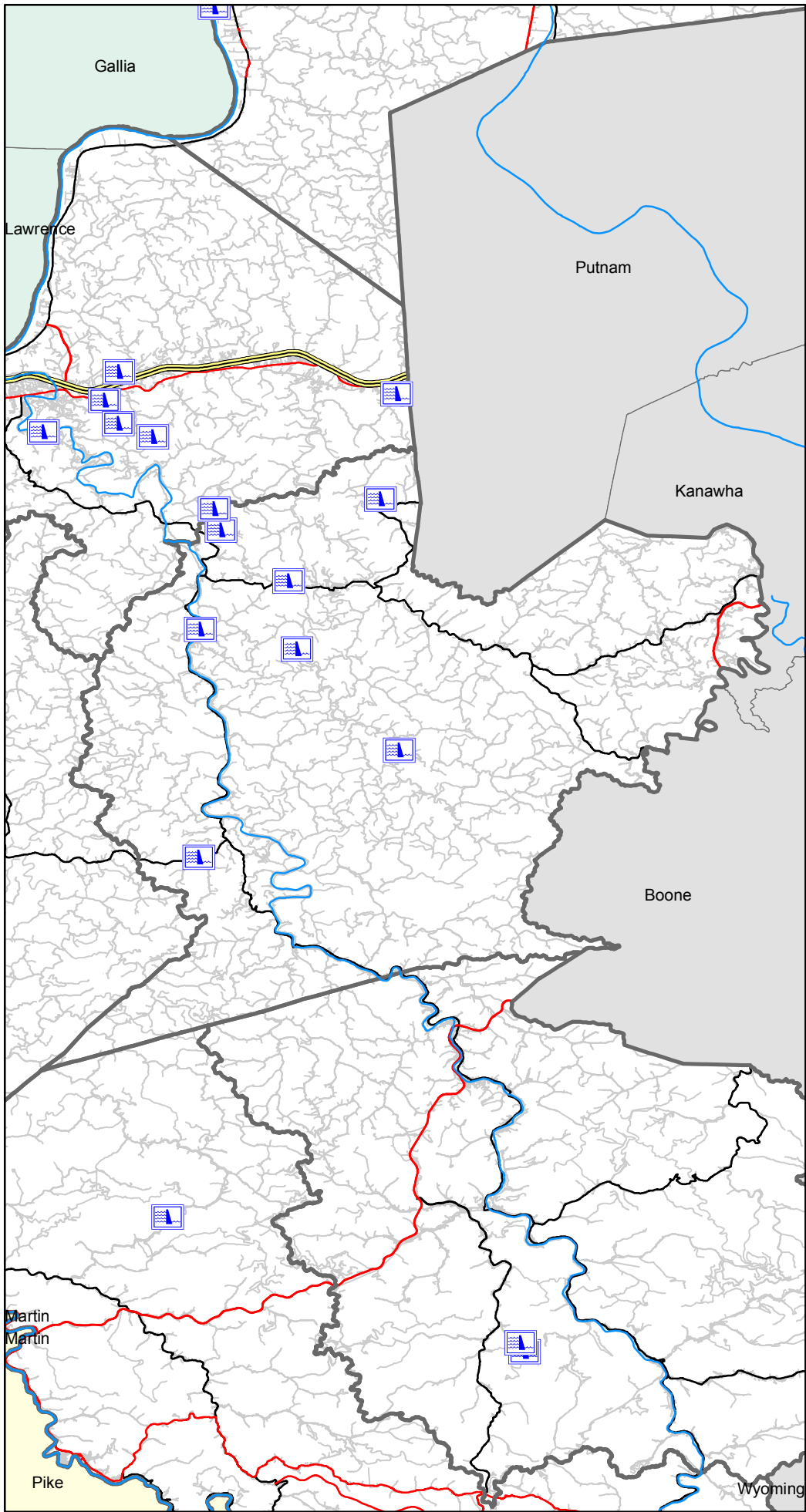


Dam Locations

0 1.25 2.5 5 7.5 10
Miles

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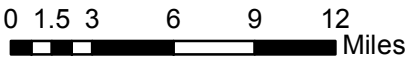
REGION 2 HAZARD MITIGATION PLAN

Lincoln Risk Map: Dam & Floodwall Failure

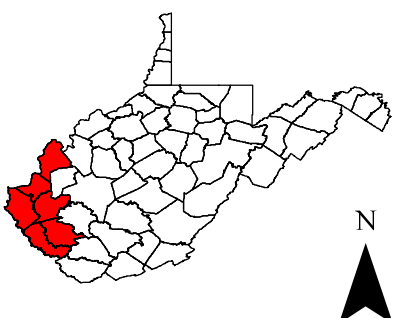
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National Inventory of Dams

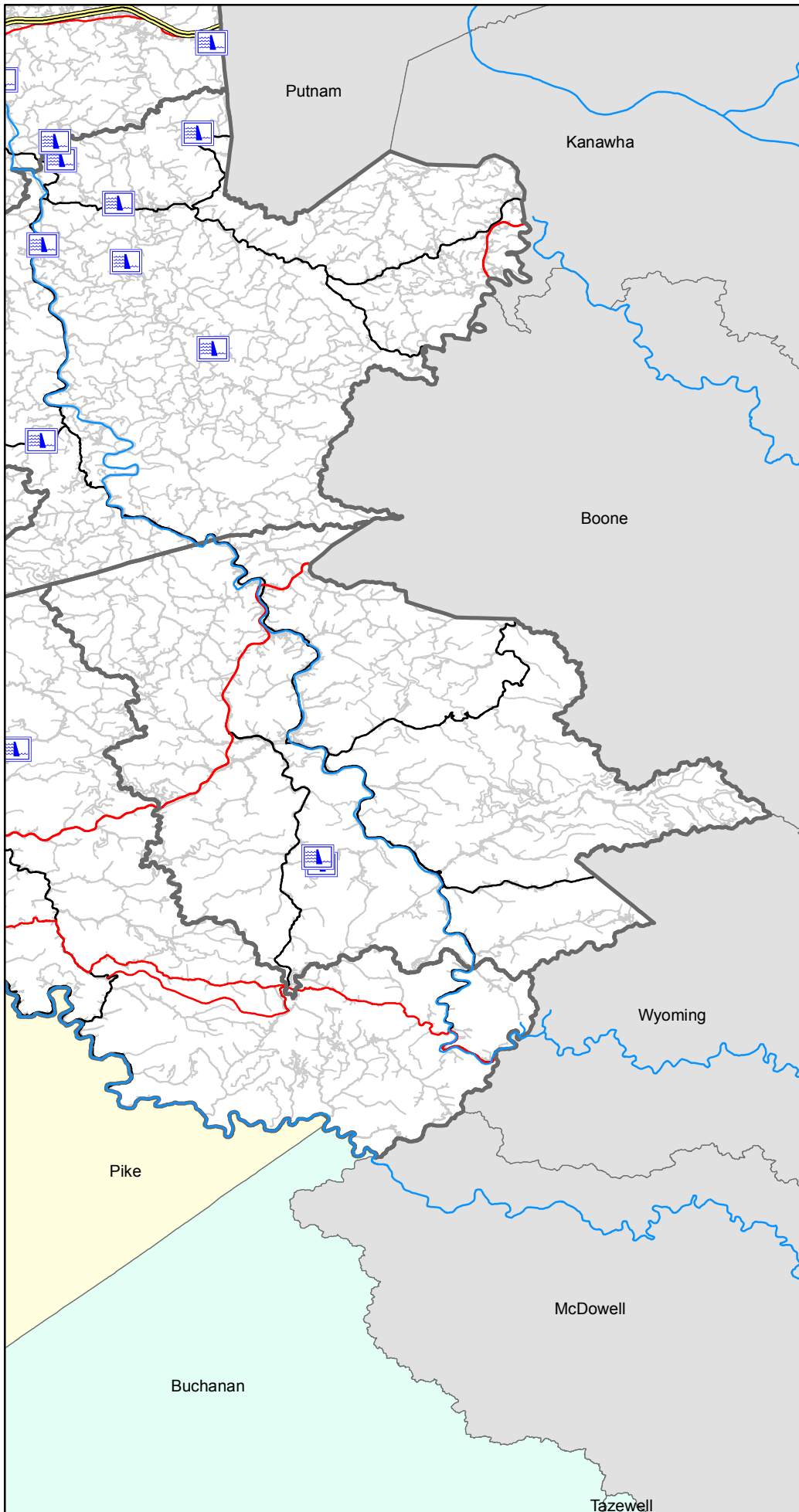


Dam Locations



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REGION 2 HAZARD MITIGATION PLAN

Logan Risk Map: Dam & Floodwall Failure

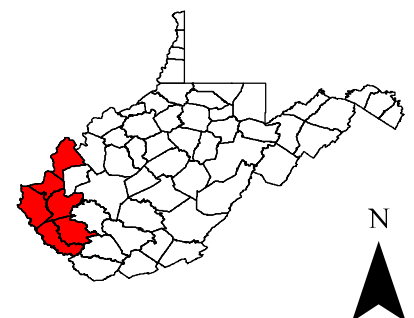
Data Source(s):
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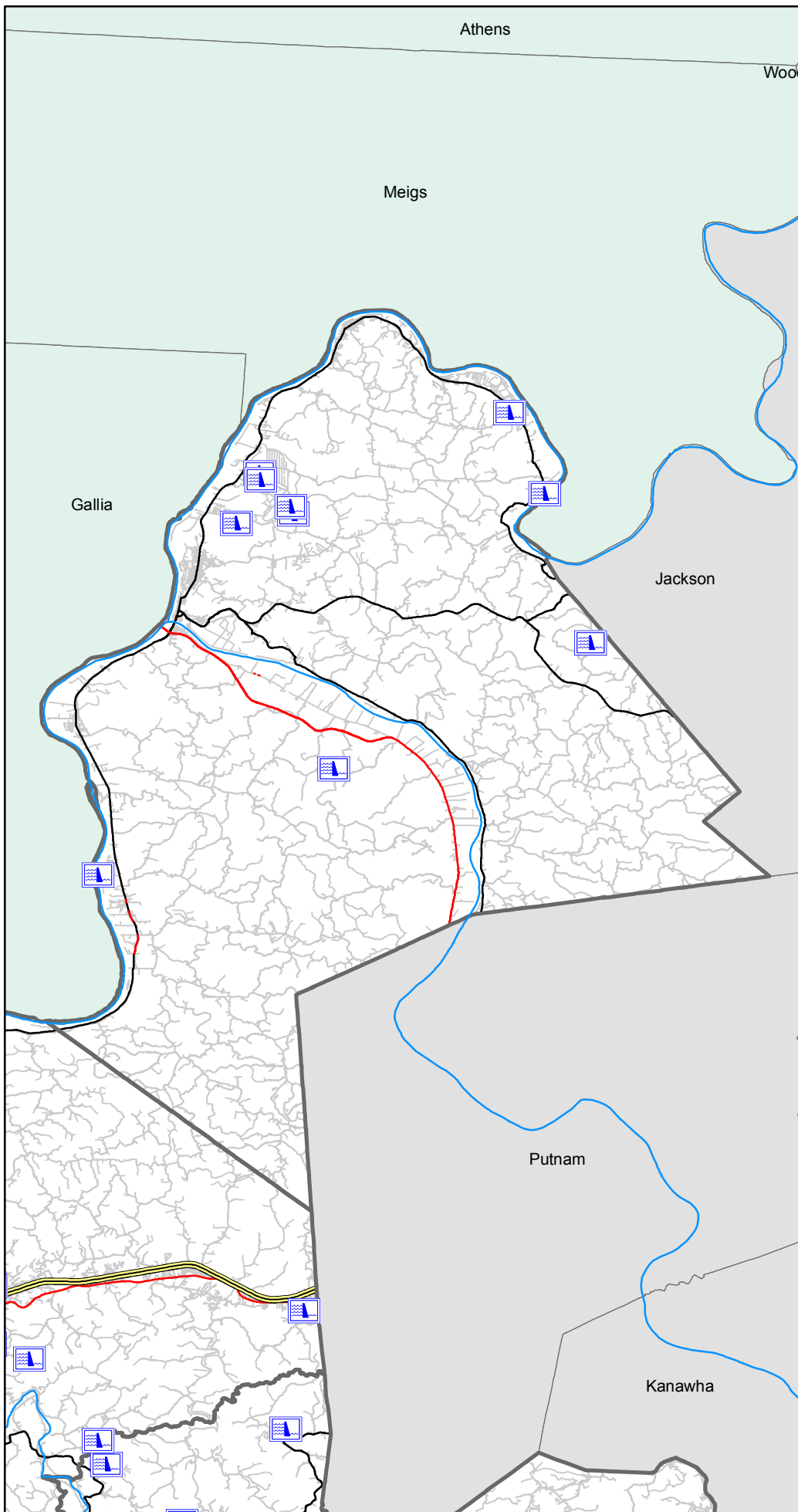


Dam Locations

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

Mason Risk Map: Dam & Floodwall Failure

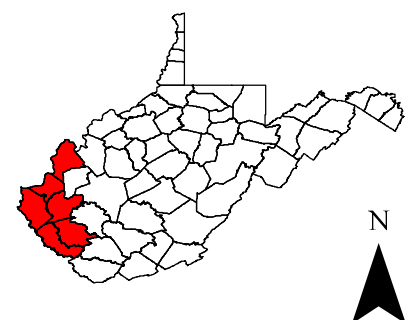
Data Source(s):
National Inventory of Dams

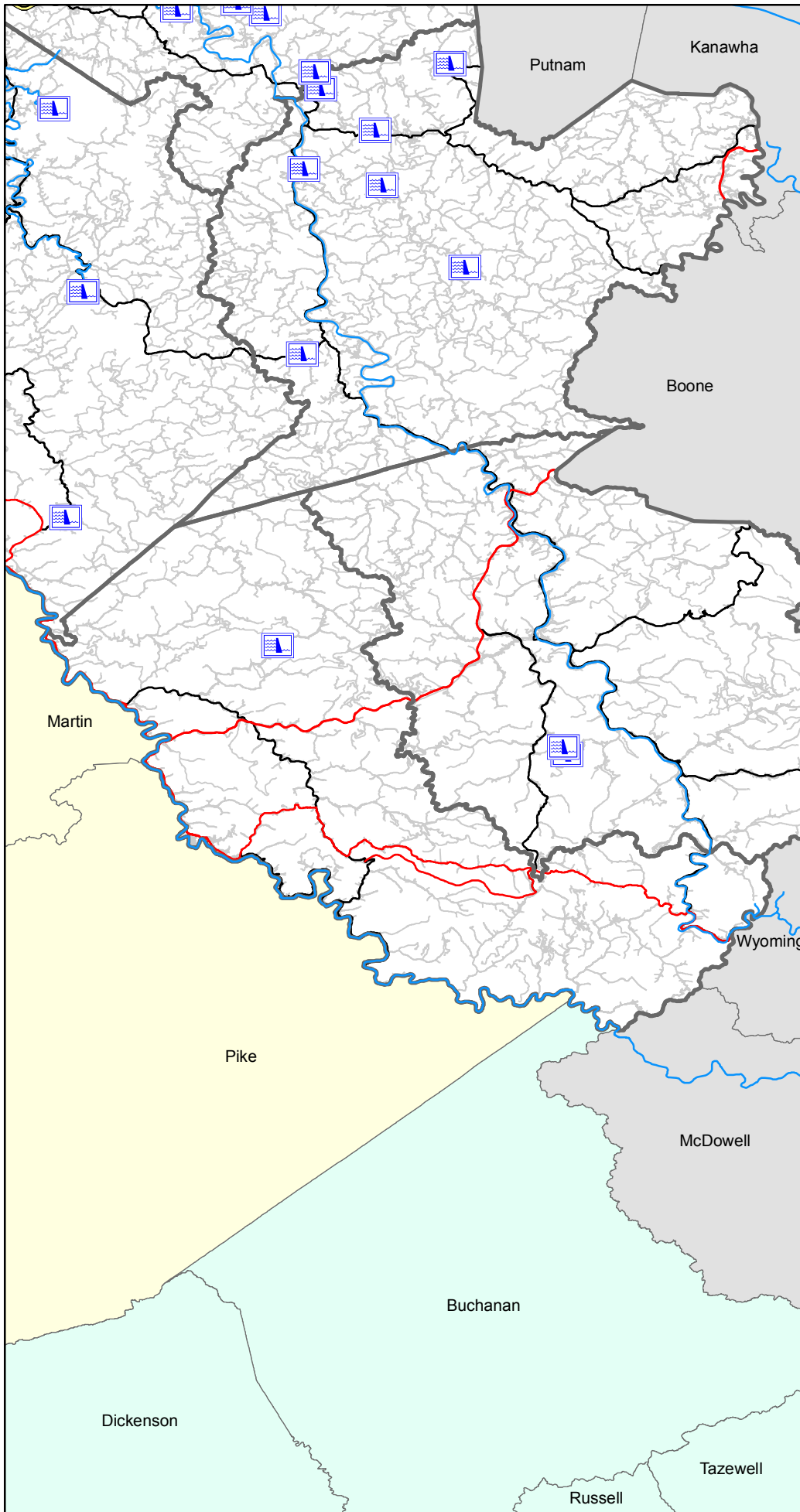


Dam Locations

0 1.25 2.5 5 7.5 10
Miles

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REGION 2 HAZARD MITIGATION PLAN

Mingo Risk Map: Dam & Floodwall Failure

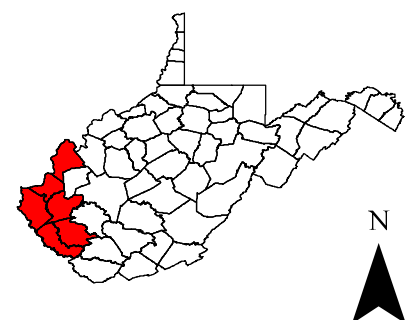
Data Source(s):
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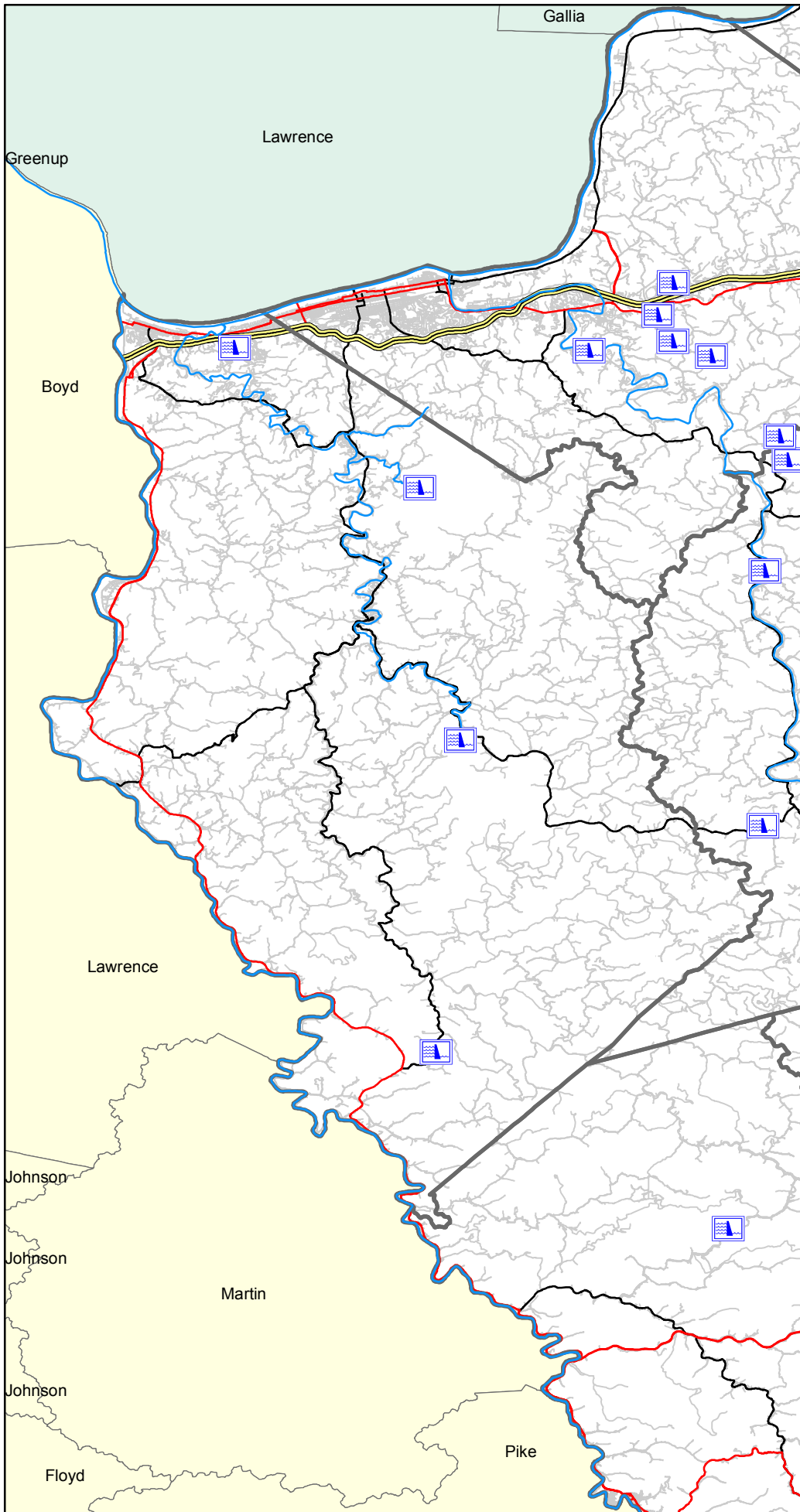


Dam Locations

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

Wayne Risk Map: Dam & Floodwall Failure

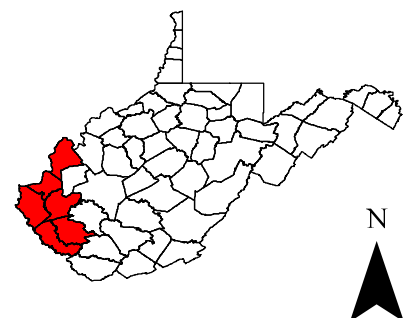
Data Source(s):
National Inventory of Dams



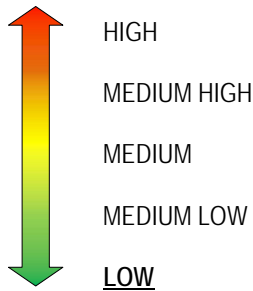
Dam Locations

0 1.25 2.5 5 7.5 10
Miles

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2.2.11 EARTHQUAKE



"Earthquakes may cause household items to become dangerous projectiles; cause buildings to move off foundations or collapse, damage utilities, roads and structures such as bridges and dams, or cause fires and explosions. They may also trigger landslides, avalanches, and tsunamis"

- Ready.gov

HAZARD OVERVIEW

An earthquake's sudden release of stored energy may manifest itself by the shaking or displacement of the ground. According to the U.S. Geological Society, based on historical trends, the frequency of an earthquake occurrence inversely relates to its magnitude. There are an estimated 1.3 million earthquakes every year with a magnitude between 2.0 and 2.9 while there is, on average, one magnitude 8.0 or higher earthquake annually.

Earthquakes move or shake the earth in three different directions depending on the plate movements: convergent, divergent, and transform generating primary and secondary waves. There are a few ways to measure an earthquake:

- Richter scale,
- modified Mercalli Scale, and
- peak ground acceleration (PGA).

Developed in 1935, the Richter scale measures the scale and severity of an earthquake. The magnitude of an earthquake can range between 0 and

Modified Mercalli Scale		Magnitude Scale
I	Felt by few people under especially favorable conditions.	1.5
II	Felt by few persons at rest, especially on upper floors of buildings.	2.0
III	Felt quite noticeably indoors, especially on upper floors of buildings. Many do not recognize it as an earthquake. Standing vehicles may rock slightly. Vibration feels like passing truck.	2.5
IV	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation of a heavy truck striking building; standing vehicles rock noticeably.	3.0
V	Felt by nearly everyone; many awakened. Some dishes and windows broken. Unstable objects overturned.	3.5
VI	Felt by all; many frightened. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.	4.0
VII	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by vehicle drivers.	4.5
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, and walls. Heavy furniture overturned. Disturbs	5.0
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. Underground pipes broken.	5.5
X	Some well-built wooden structures are destroyed; most masonry and frame structures with foundations destroyed; train rails bent.	6.0
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Underground pipelines taken out of service. Train rails bent greatly.	6.5
XII	Damage total. Waves seen on ground surfaces. Lines of sight and level are distorted. Objects thrown into the air.	7.0

10. The image on the previous page shows the Richter scale and what effects each magnitude can have. The effects of an earthquake can extend far beyond the site of its occurrence.

The modified Mercalli scale measures earthquakes based on their intensity on the surface. This scale, shown to the right, uses roman numerals I through XII to denote detection and damage levels associated with an earthquake.

Peak ground acceleration (PGA) is “the maximum ground acceleration that occurred during earthquake shaking at a location. PGA is equal to the amplitude of the largest absolute acceleration recorded on an accelerogram site during a particular earthquake” (Douglas, 2003).

POSSIBLE CAUSES

The Earth is made up of tectonic plates; the boundary lines where these tectonic plates meet are called faults. Friction along the boundaries or faults causes the rocks to stress and strain. “When the stress of the rocks exceed their strength, that is, their ability to withstand the force, the rock rupture and are permanently displaced along the fault plane” (Keller & Devecchio, 2015) causing earthquakes that reach and affect the infrastructure on the surface.

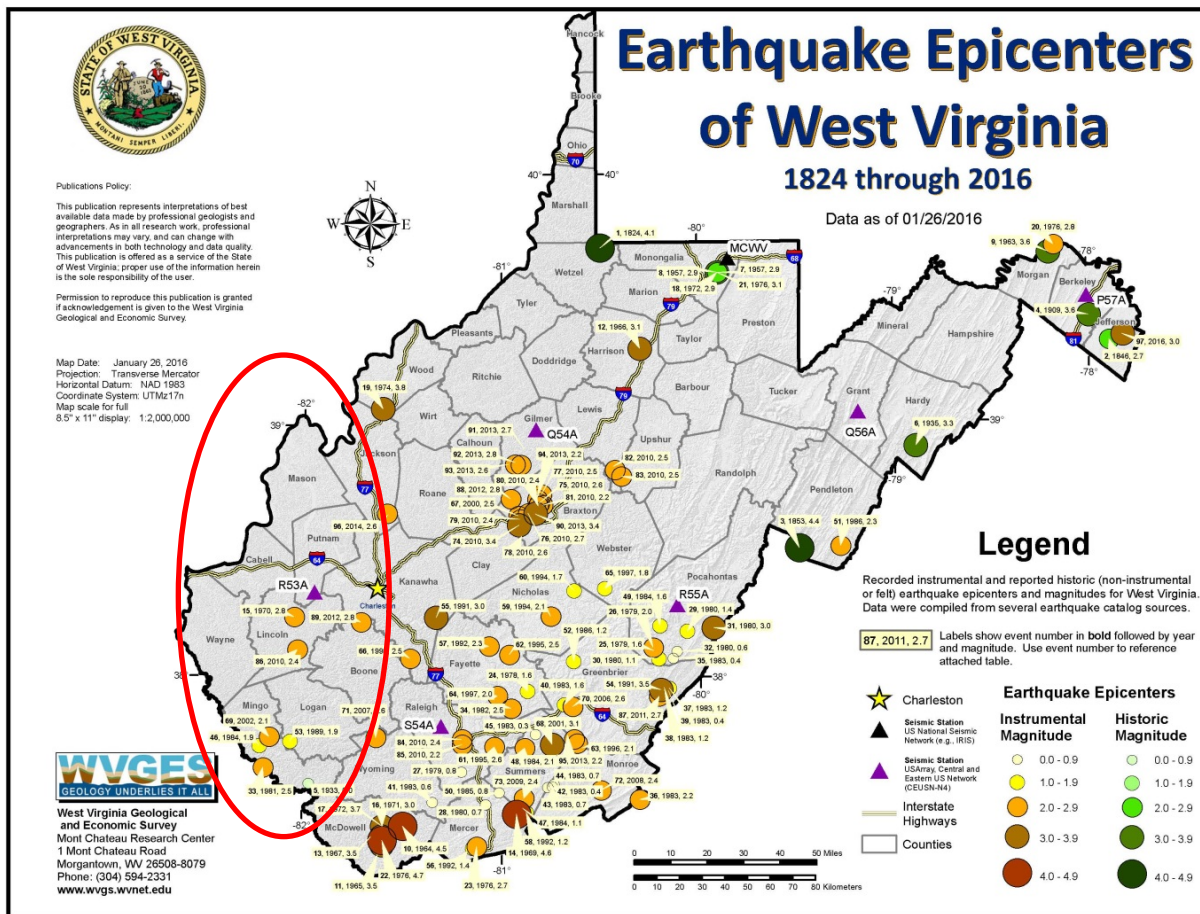
A common misconception is that hydraulic fracturing, or “fracking” is causing all of the induced earthquakes. In reality, fracking “is directly causing a small percentage of the felt-induced earthquakes observed in the United States...Most induced earthquakes in the United States are a result of the deep disposal of fluids (waste water) related to oil and gas production” (Rubinstein and Mahani, 2015).

LOCATION AND EXTENT

The United States has areas that are prone to earthquakes. The coasts of California, Oregon and Washington are more vulnerable to seismic activity due to the presence of the Ballenas, Brothers, and the San Andreas Faults on the west coast. Also of note is the New Madrid Seismic Zone located in Arkansas, Missouri, and Tennessee. On the east coast, there is the Eastern Tennessee Seismic Zone that stretches from Alabama to Virginia.

According to the West Virginia Geological and Economic Survey (WVGES), there have been a few earthquake epicenters in the Region 2 Counties between 1824 and 2016. The WVGES has one seismic station located close to the geographic center of Region 2, just north of Lincoln County between the cities of Huntington and Charleston. Even though

the earthquakes originated in the state of West Virginia have all been minor (under 4.9), there is still possibility of feeling earthquakes and their effects that originate in further regions. An earthquake that originates as far away as Canada, for example, can still have effects on the local region. For this reason, the possible extent of the damage can be determined to be region wide if an earthquake that is large enough reaches the area because the effects of earthquakes are not localized to one region.



HISTORICAL OCCURRENCES

In and around Region 2, there have been 71 occurrences of earthquakes since 2000 ranging from Magnitude 1.7 to M 4.3. The majority of these have occurred just over the state border in Ohio, Kentucky, and Virginia and to the northeast of Region 2.

TABLE 2.2.11.B EARTHQUAKES IN AND AROUND REGION 2 SINCE 2000		
Magnitude	Location	Date
2.4	11km SE of Princeton, West Virginia	October 9, 2017
3.2	16km N of Pearisburg, Virginia	September 13, 2017

TABLE 2.2.11.B EARTHQUAKES IN AND AROUND REGION 2 SINCE 2000

<i>Magnitude</i>	<i>Location</i>	<i>Date</i>
2	7km ENE of Craigsville, West Virginia	August 13, 2017
2.3	12km ESE of Buckingham, Virginia	August 3, 2017
2.7	6km WNW of Montgomery, West Virginia	June 21, 2017
3.4	1km S of McArthur, Ohio	May 24, 2017
2.8	6km SSW of Narrows, Virginia	May 12, 2017
3	15km SW of Woodsfield, Ohio	April 2, 2017
2.4	11km ENE of Buckingham, Virginia	March 22, 2017
2	3km NNW of Lesage, West Virginia	January 23, 2017
1.8	17km SW of Woodsfield, Ohio	December 12, 2016
2.2	16km SW of Woodsfield, Ohio	December 12, 2016
2.5	14km SW of Spencer, West Virginia	December 1, 2016
2.3	9km S of Pikeville, Kentucky	September 22, 2016
2.3	9km WNW of Mount Gay-Shamrock, West Virginia	August 6, 2016
3.7	Mine Collapse 11km NNW of Richlands, Virginia	July 18, 2016
2.6	11km E of Oak Hill, Ohio	March 8, 2016
2.6	11km E of Buckingham, Virginia	November 4, 2015
2.6	13km NNE of Sissonville, West Virginia	June 6, 2014
2.1	West Virginia	April 14, 2014
3.5	2km ESE of Nelsonville, Ohio	November 20, 2013
2.2	2km N of Alderson, West Virginia	October 19, 2013
2.2	10km WNW of Sutton, West Virginia	October 13, 2013
2.6	13km SW of Glenville, West Virginia	August 16, 2013
2.8	12km SSW of Glenville, West Virginia	July 30, 2013
2.7	14km SW of Glenville, West Virginia	July 20, 2013
2.3	West Virginia	May 29, 2013
3.4	11km WSW of Sutton, West Virginia	March 31, 2013
2.5	15km S of Gallipolis, Ohio	March 27, 2013
2.2	6km E of Cumberland, Virginia	March 16, 2012
2.6	West Virginia	March 16, 2012
2.8	19km SW of Sutton, West Virginia	January 10, 2012
2.6	Ohio	September 4, 2011
3.1	Ohio	August 31, 2011
2.8	Ohio	August 31, 2011
2.7	15km NNE of White Sulphur Springs, West Virginia	August 25, 2011
2.8	Ohio	October 24, 2010
2.4	14km N of Chapmanville, West Virginia	September 13, 2010
2.2	2km ESE of Crab Orchard, West Virginia	August 26, 2010
2.4	1km SSE of MacArthur, West Virginia	August 26, 2010
2.5	26km SSW of Buckhannon, West Virginia	August 21, 2010
2.5	24km S of Weston, West Virginia	August 15, 2010
2.2	7km WNW of Sutton, West Virginia	July 25, 2010
2.4	9km W of Sutton, West Virginia	July 24, 2010
2.4	18km WSW of Sutton, West Virginia	May 8, 2010
2.6	18km WSW of Sutton, West Virginia	May 7, 2010
2.5	West Virginia	April 29, 2010

TABLE 2.2.11.B EARTHQUAKES IN AND AROUND REGION 2 SINCE 2000		
<i>Magnitude</i>	<i>Location</i>	<i>Date</i>
2.7	12km W of Sutton, West Virginia	April 29, 2010
2.6	9km WNW of Sutton, West Virginia	April 29, 2010
3.4	19km WSW of Sutton, West Virginia	April 4, 2010
2.2	4km ESE of Buckingham, Virginia	December 16, 2009
2.7	16km E of Amherst, Virginia	November 25, 2009
2.8	3km W of Pearisburg, Virginia	July 4, 2009
3	2km NNE of Cave Spring, Virginia	May 16, 2009
3.3	13km NW of Gallipolis, Ohio	April 24, 2009
2.4	14km NE of Athens, West Virginia	April 11, 2009
2.3	13km SSW of Pearisburg, Virginia	January 12, 2009
2.4	5km SSE of Union, West Virginia	January 29, 2008
2.6	Rock Burst West Virginia	August 30, 2007
4.3	West Virginia	November 2, 2006
2.9	Rock Burst West Virginia	October 31, 2006
2.6	14km SE of Rainelle, West Virginia	July 11, 2006
1.7	16km NE of Bland, Virginia	July 2, 2006
2.2	16km NNE of Blacksburg, Virginia	December 30, 2005
2	9km NNW of Richlands, Virginia	February 15, 2005
2.8	12km NNW of Raven, Virginia	February 15, 2005
2.7	16km NNW of Raven, Virginia	February 8, 2005
2.8	Ohio	May 6, 2002
3.2	Virginia	September 22, 2001
2.5	West Virginia	March 28, 2001
2.7	Virginia	August 18, 2000
Source :USGS		

IMPACTS & VULNERABILITY

Earthquakes can affect people and structures alike, although older structures may be more susceptible to cracks and damage. “With most earthquakes, trauma caused by the collapse of buildings is the cause of most deaths and injuries. However, a surprisingly large number of patients require acute care for non-surgical problems such as acute myocardial infraction, exacerbation of chronic diseases such as diabetes or hypertension, anxiety and other mental health problems, respiratory disease from exposure to dust and asbestos fibers from rubble, and near-drowning because of flooding from broken dams. An earthquake may precipitate a major technologic disaster by damaging or destroying nuclear power stations, hospitals with dangerous biologic products, hydrocarbon storage areas, and hazardous chemical plants. As with most natural disasters, the risk of secondary epidemics is minimal, and only mas vaccination campaigns based on results of epidemiological surveillance are appropriate following earthquakes” (Noji, 1999).

LOSS & DAMAGES

The effects of a potential earthquake striking each county in Region 2 were analyzed using the HAZUS-MH program from the Federal Emergency Management Agency. The scenario depicts a 5.0 earthquake (the lowest possible magnitude to use in the program) located at the county seat of each county.

TABLE: 2.2.11.C CABELL COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)

	<i>None</i>		<i>Slight</i>		<i>Moderate</i>		<i>Extensive</i>		<i>Complete</i>	
	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>
Agriculture	47	0.20	20	0.19	21	0.27	8	0.33	2	0.34
Commercial	781	3.42	430	4.04	572	7.57	283	11.22	88	12.44
Education	29	0.13	15	0.14	21	0.28	10	0.40	3	0.43
Government	30	0.13	15	0.14	22	0.29	11	0.45	4	0.50
Industrial	213	0.93	97	0.91	143	1.89	74	2.95	23	3.25
Other Residential	5,083	22.26	2,201	20.67	1,889	25.03	717	28.43	172	24.39
Religion	99	0.43	51	0.48	49	0.65	22	0.88	6	0.91
Single Family	16,552	72.49	7,815	73.41	4,833	64.02	1,396	55.35	406	57.74
TOTAL	22,835		10,646		7,549		2,522		704	

TABLE: 2.2.11.D CABELL COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)

<i>Category</i>	<i>Area</i>	<i>Single Family</i>	<i>Other Residential</i>	<i>Commercial</i>	<i>Industrial</i>	<i>Others</i>	<i>Total</i>
Income Losses	Wage	0.00	4.39	57.03	1.53	3.44	66.39
	Capital Related	0.00	1.89	38.17	1.44	0.80	42.29
	Rental	11.76	16.14	19.73	0.82	1.72	50.18
	Relocation	43.35	11.00	41.14	4.34	12.47	112.31
	Subtotal	55.11	33.42	156.07	8.13	18.43	271.17
Capital Stock Losses	Structural	67.70	23.22	47.93	13.30	9.63	161.79
	Non Structural	231.42	109.54	134.39	44.11	32.17	551.63
	Content	85.18	30.93	77.39	31.75	18.14	243.38
	Inventory	0.00	0.00	2.19	4.85	0.09	7.13
	Subtotal	384.31	163.69	261.90	94.00	60.02	963.92
TOTAL		439.42	197.12	417.97	102.13	78.45	1,235.09

TABLE: 2.2.11.E LINCOLN COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)

	<i>None</i>		<i>Slight</i>		<i>Moderate</i>		<i>Extensive</i>		<i>Complete</i>	
	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>
Agriculture	14	0.22	5	0.22	4	0.26	1	0.32	0	0.41
Commercial	106	1.60	38	1.71	39	2.48	16	3.58	4	4.82
Education	7	0.10	2	0.09	2	0.14	1	0.20	0	0.28
Government	14	0.22	5	0.23	6	0.36	2	0.51	1	0.67
Industrial	42	0.63	12	0.55	13	0.81	5	1.13	1	1.51
Other Residential	2,206	33.48	859	38.87	850	54.07	261	57.81	45	48.09
Religion	18	0.27	5	0.23	4	0.24	1	0.30	0	0.37
Single Family	4,183	63.48	1,284	58.11	655	41.65	163	36.15	41	43.86
TOTAL	6,589		2,209		1,573		451		93	

TABLE: 2.2.11.F LINCOLN COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)							
Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.00	0.20	1.68	0.03	0.65	2.55
	Capital Related	0.00	0.08	1.21	0.02	0.04	1.35
	Rental	1.36	0.43	0.79	0.01	0.10	2.68
	Relocation	5.02	1.85	1.23	0.06	0.85	9.01
	Subtotal	6.38	2.56	4.91	0.11	1.64	15.60
Capital Stock Losses	Structural	7.24	2.13	1.51	0.17	0.83	11.87
	Non Structural	24.26	6.03	4.21	0.60	2.52	37.62
	Content	8.91	1.22	2.36	0.37	1.49	14.35
	Inventory	0.00	0.00	0.07	0.07	0.01	0.15
	Subtotal	40.40	9.39	8.15	1.22	4.85	64.00
TOTAL		46.78	11.95	13.05	1.33	6.49	79.60

TABLE: 2.2.11.G LOGAN COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)										
	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	8	0.08	5	0.11	4	0.13	2	0.15	0	0.17
Commercial	198	2.07	106	2.45	124	3.83	54	4.98	15	6.19
Education	10	0.10	5	0.11	6	0.18	2	0.22	1	0.27
Government	18	0.19	9	0.21	12	0.37	5	0.49	1	0.61
Industrial	52	0.55	25	0.57	31	0.95	13	1.22	3	1.44
Other Residential	2,813	29.36	1,411	32.47	1,533	47.17	615	56.40	118	49.54
Religion	25	0.26	11	0.26	10	0.31	4	0.37	1	0.44
Single Family	6,457	67.40	2,773	63.82	1,529	47.05	395	36.17	99	41.34
TOTAL	9,581		4,346		3,249		1,091		239	

TABLE: 2.2.11.H LOGAN COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)							
Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.00	2.06	9.44	0.23	1.28	13.01
	Capital Related	0.00	0.86	7.46	0.15	0.17	8.64
	Rental	3.20	2.22	3.89	0.07	0.39	9.77
	Relocation	11.85	4.24	6.37	0.37	2.91	25.74
	Subtotal	15.05	9.38	27.16	0.82	4.76	57.16
Capital Stock Losses	Structural	15.93	5.56	7.54	1.14	2.33	32.49
	Non Structural	53.90	18.48	21.16	3.70	7.51	104.74
	Content	19.90	4.21	11.53	2.54	4.28	42.47
	Inventory	0.00	0.00	0.36	0.57	0.03	0.95
	Subtotal	89.73	28.24	40.59	7.95	14.15	180.66
TOTAL		104.77	37.62	67.74	8.77	18.91	237.82

TABLE: 2.2.11.I MASON COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)

	<i>None</i>		<i>Slight</i>		<i>Moderate</i>		<i>Extensive</i>		<i>Complete</i>	
	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>
Agriculture	39	.048	12	0.43	8	0.45	2	0.55	0	0.53
Commercial	141	1.72	63	2.27	72	4.08	32	7.72	9	10.71
Education	10	0.13	4	0.15	5	0.27	2	0.48	1	0.65
Government	15	0.19	5	0.19	6	0.34	3	0.61	1	0.82
Industrial	41	0.50	13	0.47	14	0.79	6	1.35	2	1.77
Other Residential	2,518	30.75	956	34.37	794	44.98	161	38.40	24	26.50
Religion	26	.032	10	0.36	8	0.47	3	0.78	1	0.98
Single Family	5,396	65.91	1,718	61.74	859	48.61	210	50.10	51	58.04
TOTAL	8,186		2,782		1,766		420		89	

TABLE: 2.2.11.J MASON COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)

<i>Category</i>	<i>Area</i>	<i>Single Family</i>	<i>Other Residential</i>	<i>Commercial</i>	<i>Industrial</i>	<i>Others</i>	<i>Total</i>
Income Losses	Wage	0.00	1.61	5.53	0.06	0.40	7.60
	Capital Related	0.00	0.66	3.79	0.05	0.09	4.59
	Rental	1.78	1.13	1.6	0.03	0.18	4.81
	Relocation	6.58	1.57	3.63	0.16	1.32	13.25
	Subtotal	8.36	4.97	14.64	0.30	1.98	30.25
Capital Stock Losses	Structural	9.82	2.29	3.69	0.44	1.8	18.12
	Non Structural	32.72	8.07	11.49	1.57	4.03	57.88
	Content	11.92	2.02	6.62	1.15	2.43	24.14
	Inventory	0.00	0.00	0.14	0.21	0.13	0.47
	Subtotal	54.46	12.38	21.94	3.37	8.46	100.61
TOTAL		62.82	17.35	36.58	3.68	10.44	130.86

TABLE: 2.2.11.K MINGO COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)

	<i>None</i>		<i>Slight</i>		<i>Moderate</i>		<i>Extensive</i>		<i>Complete</i>	
	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>	<i>Count</i>	<i>%</i>
Agriculture	7	0.08	2	0.08	2	0.10	1	0.13	0	0.15
Commercial	149	1.74	58	2.28	70	3.91	33	6.17	10	8.23
Education	12	0.13	3	0.13	3	0.19	1	0.26	0	.32
Government	17	0.20	5	0.21	7	0.37	3	0.59	1	0.77
Industrial	38	0.45	11	0.45	14	0.80	7	1.27	2	1.67
Other Residential	3,230	37.82	972	38.33	895	50.02	284	52.64	54	43.68
Religion	24	0.28	10	0.38	9	0.48	4	0.69	1	0.85
Single Family	5,063	59.29	1,475	58.15	789	44.11	206	38.25	55	44.33
TOTAL	8,540		2,537		1,789		539		123	

TABLE: 2.2.11.L MINGO COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.00	1.87	4.15	0.09	0.78	6.89
	Capital Related	0.00	0.77	2.89	0.09	0.08	3.84
	Rental	1.66	1.78	1.79	0.06	0.19	5.47
	Relocation	6.13	2.49	3.44	0.31	1.50	13.87
	Subtotal	7.78	6.91	12.27	0.55	2.55	30.07
Capital Stock Losses	Structural	7.16	3.40	3.81	0.82	1.19	16.39
	Non Structural	24.00	12.44	10.77	2.71	3.99	53.92
	Content	8.74	3.05	6.01	1.94	2.36	22.09
	Inventory	0.00	0.00	0.18	0.27	0.01	0.46
	Subtotal	39.90	18.90	20.77	5.75	7.54	92.85
TOTAL		47.68	25.80	33.04	6.29	10.10	122.92

TABLE: 2.2.11.M WAYNE COUNTY EXPECTED BUILDING DAMAGE BY OCCUPANCY (HAZUS)

	None		Slight		Moderate		Extensive		Complete	
	Count	%	Count	%	Count	%	Count	%	Count	%
Agriculture	17	0.13	7	0.18	7	0.25	3	0.29	1	0.35
Commercial	330	2.60	93	2.29	88	3.17	34	3.85	9	4.57
Education	15	0.12	4	0.11	4	0.15	2	0.17	0	0.20
Government	21	0.17	6	0.16	7	0.26	3	0.34	1	0.42
Industrial	77	0.61	24	0.60	28	1.00	12	1.35	3	1.67
Other Residential	2,943	23.22	1,143	28.07	1,219	43.78	485	54.15	97	48.55
Religion	47	0.37	11	0.28	8	0.28	3	0.28	1	0.29
Single Family	9,222	72.77	2,781	68.31	1,423	51.11	354	39.56	87	43.96
TOTAL	12,672		4,071		2,785		895		199	

TABLE: 2.2.11.N WAYNE COUNTY HAZUS BUILDING-RELATED ECONOMIC LOSS ESTIMATES (MILLIONS OF DOLLARS)

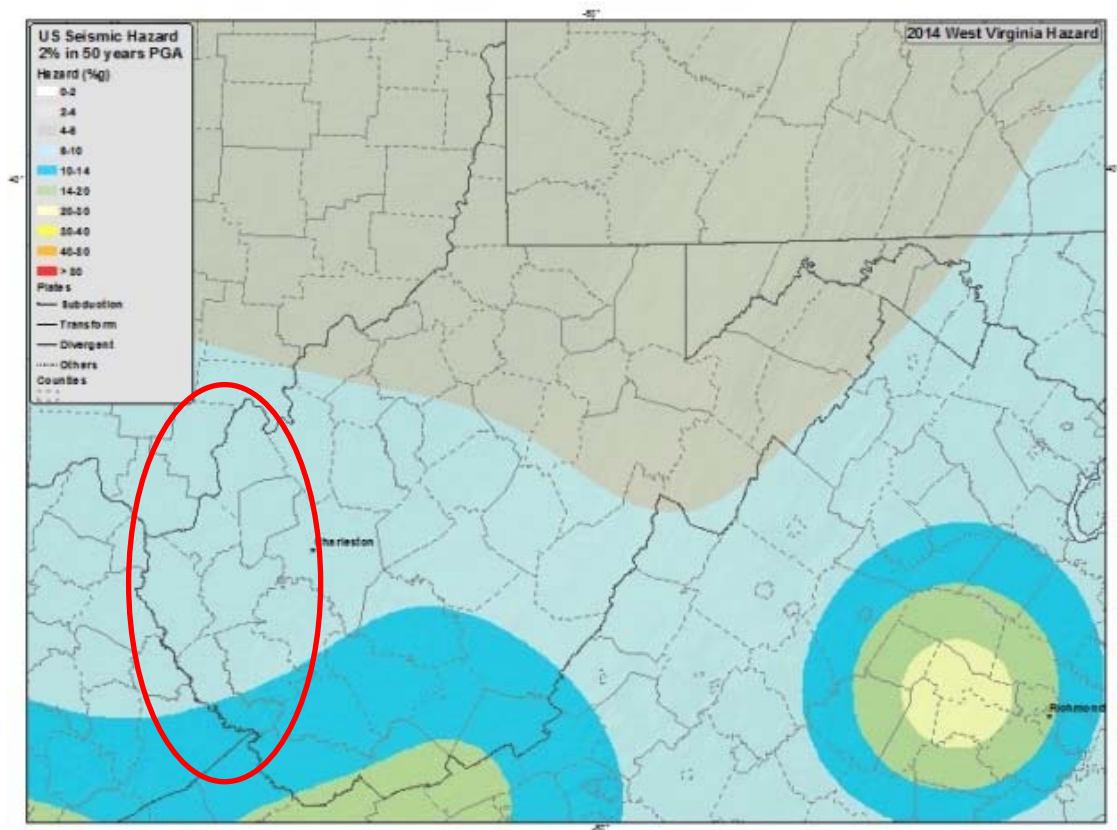
Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.00	0.33	3.92	0.25	0.95	5.45
	Capital Related	0.00	0.13	3.07	0.16	0.08	3.44
	Rental	3.03	0.83	2.02	0.09	0.16	6.14
	Relocation	11.23	3.26	3.12	0.40	1.43	19.44
	Subtotal	14.26	4.55	12.13	0.91	2.62	34.47
Capital Stock Losses	Structural	17.04	3.74	4.57	1.16	1.42	27.92
	Non Structural	56.47	10.97	10.79	3.74	4.19	86.16
	Content	20.41	2.20	5.85	2.64	2.43	33.54
	Inventory	0.00	0.00	0.28	0.64	0.02	0.94
	Subtotal	93.93	16.92	21.49	8.18	8.05	148.57
TOTAL		108.19	21.47	33.62	9.09	10.67	183.04

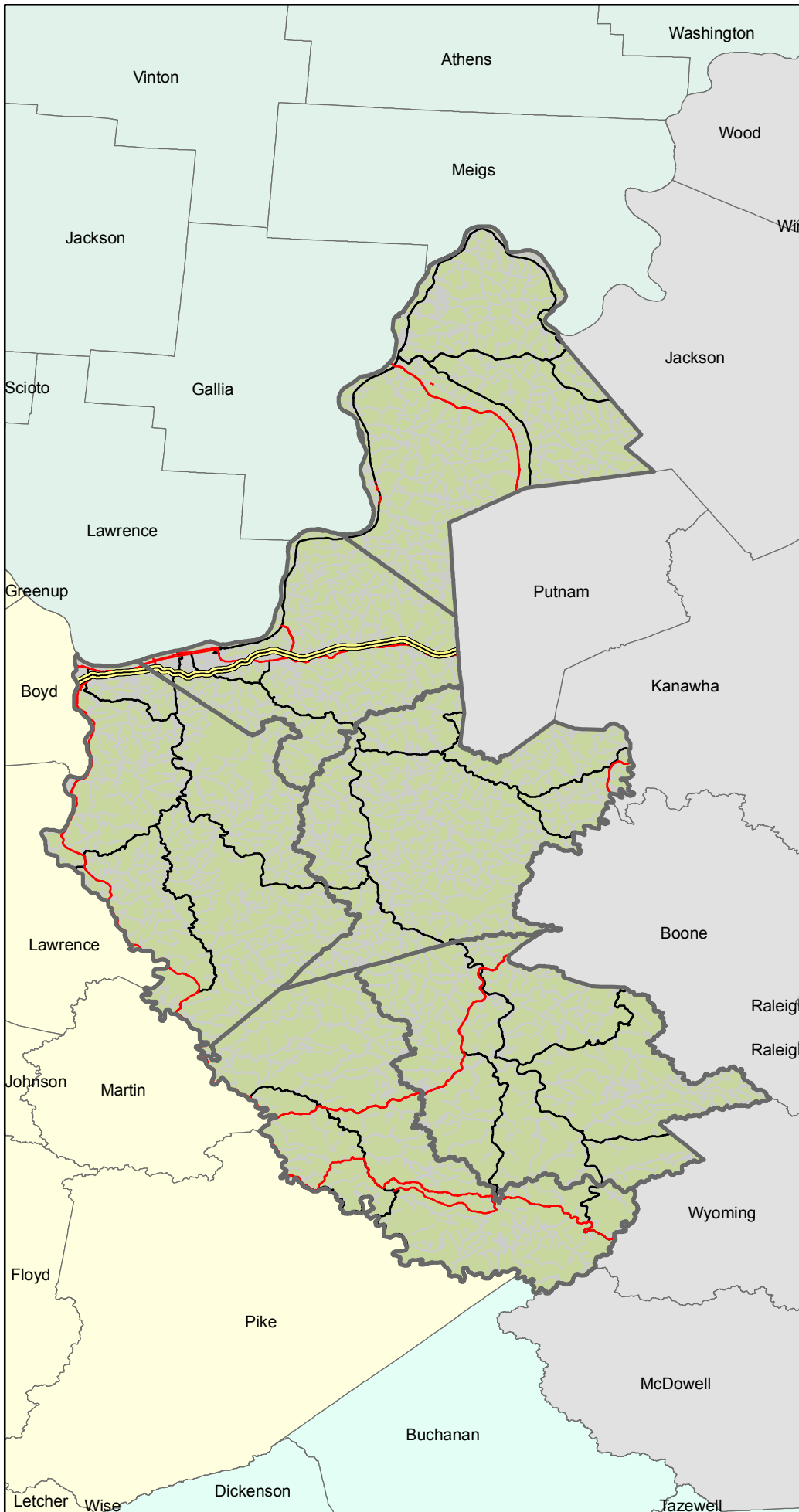
RISK CALCULATION

TABLE 2.2.11.0 EARTHQUAKE RISK CALCULATION				
Probability		Severity		Risk
IMPROBABLE		MARGINAL		LOW
There have been only five earthquake epicenters in Region 2 SINCE 1824, all less than a magnitude 3.0.	+	The largest amount of loss in dollars corresponds to Cabell County, according to the HAZUS program where \$1.2 billion dollars in losses would occur if a 5.0 magnitude earthquake originated in the county seat.	=	The risk assessment matrix puts this hazard at a low risk to Region 2.

RISK MAP

The map below shows the US Seismic Hazard zones in West Virginia; the majority of the counties in Region 2 fall in a low hazard zone. Parts of Mingo and Logan Counties fall under a medium-low hazard area.





REGION 2 HAZARD MITIGATION PLAN

Risk Map: Earthquake

Data Source(s):
US Geological Survey

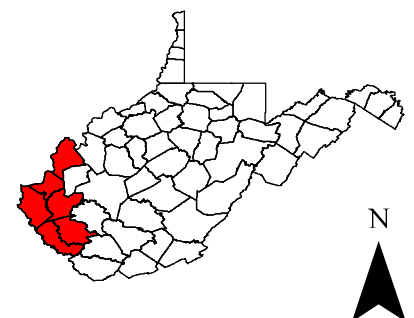
 Low Risk Area

0 3 6 12 18 24
Miles

DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



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REGION 2 HAZARD MITIGATION PLAN

Cabell Risk Map: Earthquake

Data Source(s):
US Geological Survey

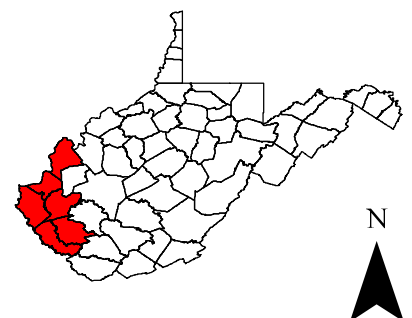
 Low Risk Area

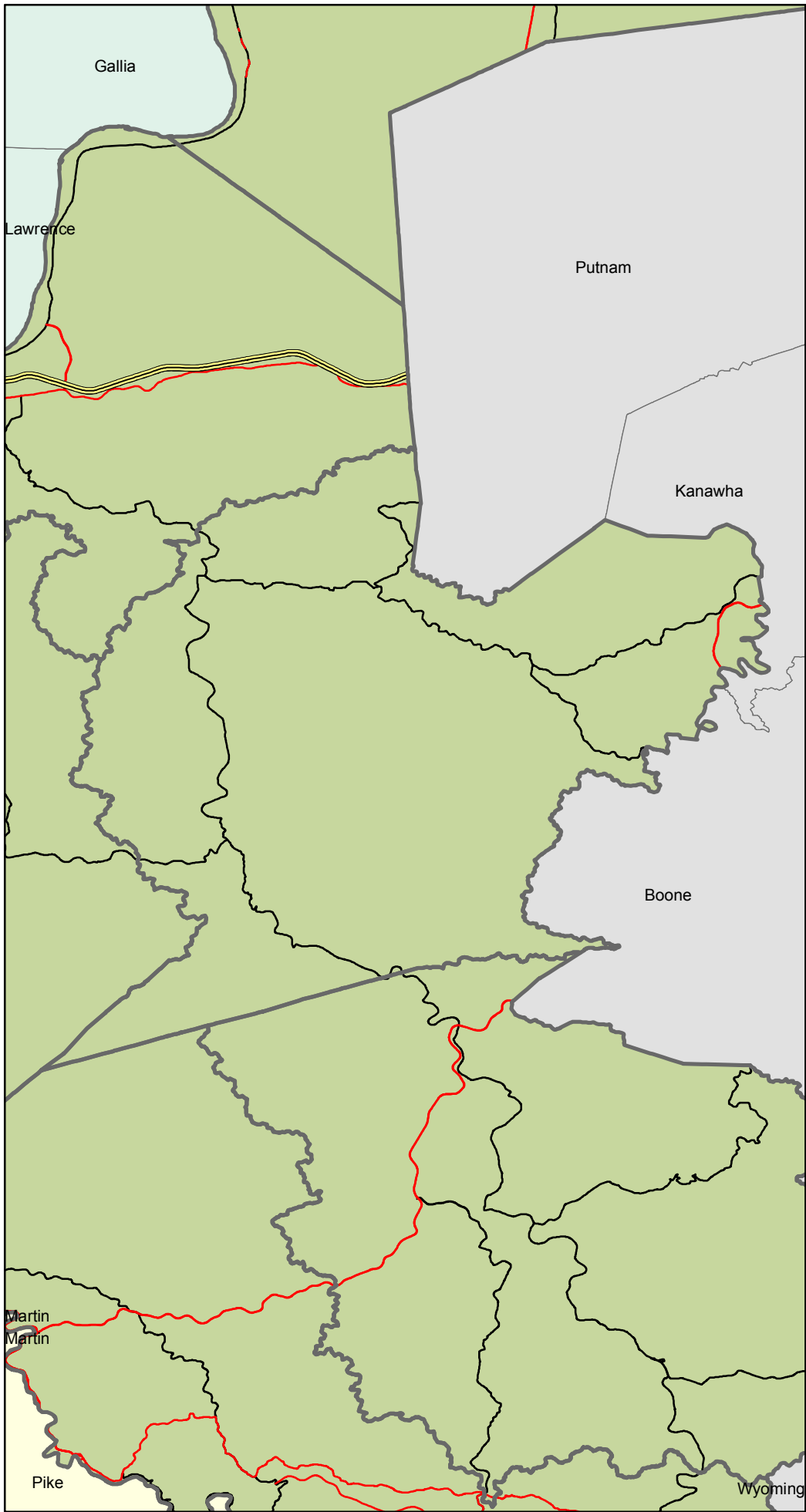
0 1.25 2.5 5 7.5 10
Miles

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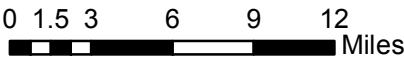


REGION 2 HAZARD MITIGATION PLAN

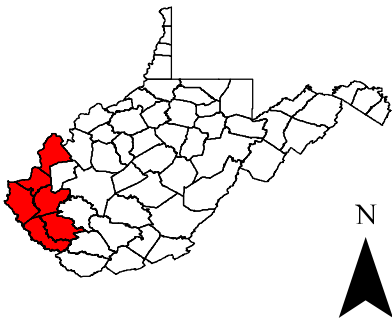
Lincoln Risk Map: Earthquake

Data Source(s):
US Geological Survey

 Low Risk Area



DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.






REGION 2 HAZARD MITIGATION PLAN

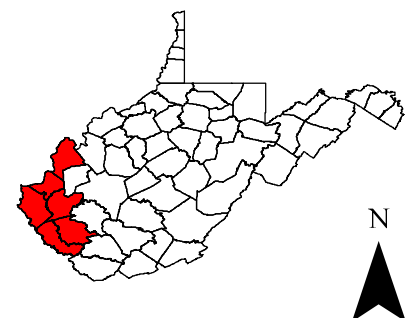
Logan Risk Map: Earthquake

Data Source(s):
US Geological Survey

 Low Risk Area

0 1.5 3 6 9 12
 Miles

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REGION 2 HAZARD MITIGATION PLAN

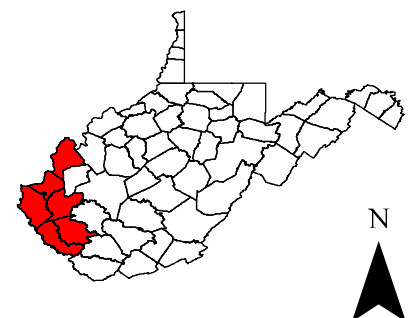
Mason Risk Map: Earthquake

Data Source(s):
US Geological Survey

 Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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REGION 2 HAZARD MITIGATION PLAN

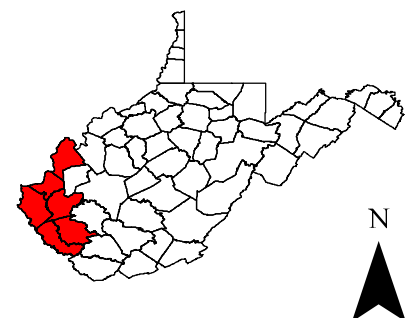
Mingo Risk Map: Earthquake

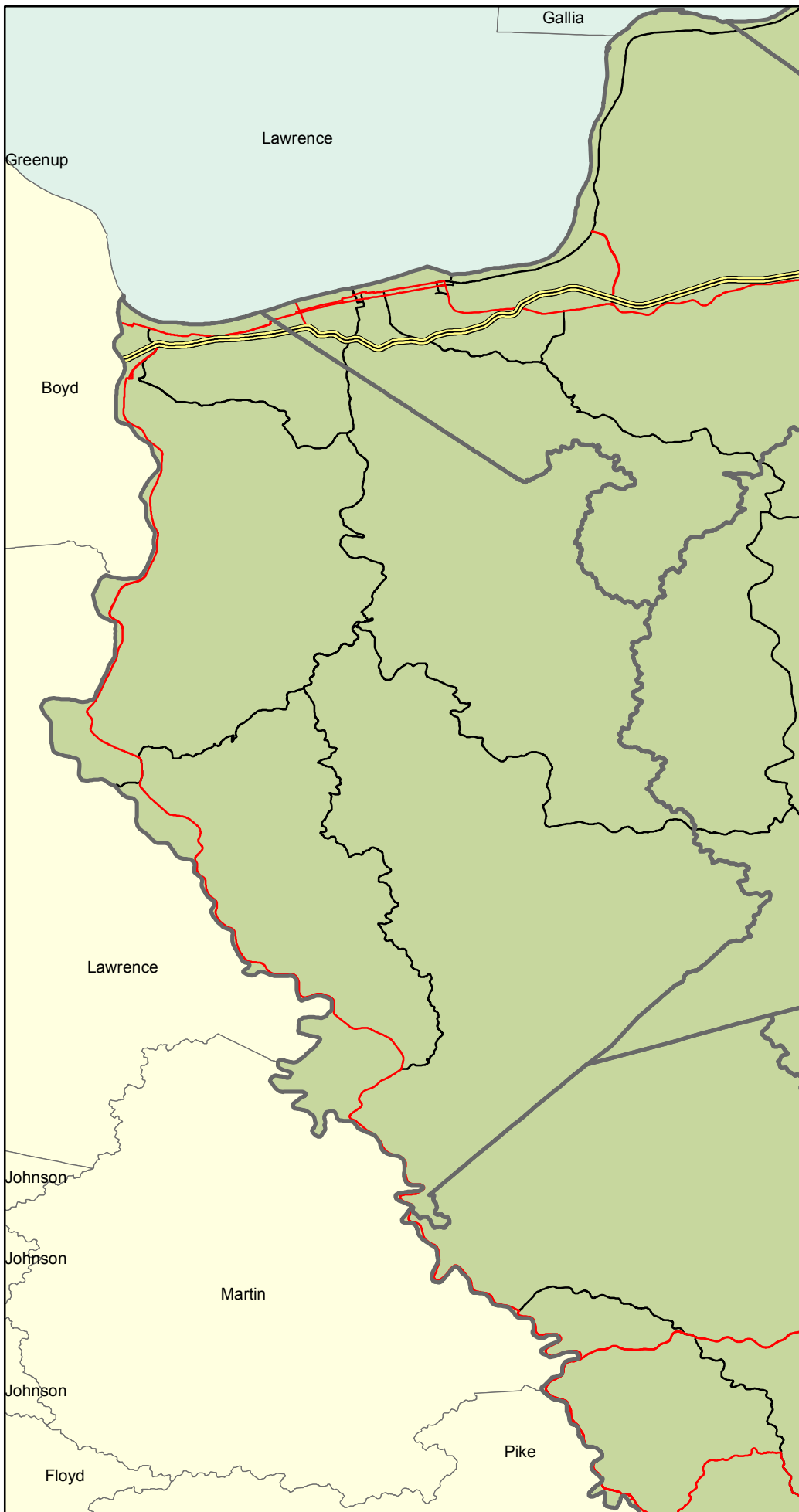
Data Source(s):
US Geological Survey

 Low Risk Area

0 1.5 3 6 9 12
 Miles

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REGION 2 HAZARD MITIGATION PLAN

Wayne Risk Map: Earthquake

Data Source(s):
US Geological Survey

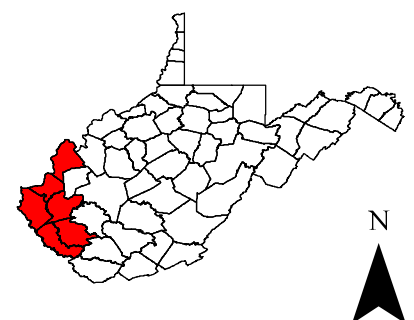
 Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

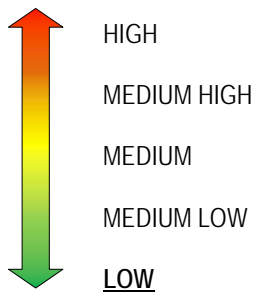
DISCLAIMER: Data is meant for use as reference only. Some sources may be intended to be used at national or regional scales and are thus used beyond their original intent for demonstrative purposes.



H
Consulting, LLC



2.2.12 DROUGHT



"If we plan for drought, then we can enjoy the benefits of normal or rainy years and not get caught unprepared in dry years".

- Ready.gov

HAZARD OVERVIEW

A drought is a deficiency of precipitation over a period of time resulting from a weather pattern that brings no moisture into an area. Droughts may be short term (a few weeks to a month) or long term (several months to several years). A long-term drought may be interrupted by occasional precipitation without breaking the drought cycle. There are four different types of drought, which include the following.

- **Meteorological Drought:** A measure of departure from normal precipitation due to climatic differences. What is considered a drought in one location may not be in another location.
- **Agricultural Drought:** The amount of moisture in the soil no longer meets the needs of a particular crop.
- **Hydrological Drought:** Surface and subsurface water levels are below normal.
- **Socioeconomic Drought:** This occurs when physical water shortage begins to affect people.

TABLE 2.2.12.A. PALMER DROUGHT SEVERITY INDEX

< -4.0	Extreme drought
-3.99 to -3.0	Severe drought
-2.99 to -2.0	Moderate drought
-1.99 to -1.0	Mild drought
-0.99 to -0.5	Incipient drought
-0.49 to 0.49	Near normal
0.50 to 0.99	Incipient moist spell
1.0 to 1.99	Moist spell
2.0 to 2.99	Unusual moist spell
3.0 to 3.99	Very moist spell
> 4.0	Extreme moist spell

The Palmer Drought Severity Index developed by W. C. Palmer in 1965, measures droughts by recording the departure of moisture from the norm. The index provides measurements of moisture conditions so that comparisons can be made between locations and between time periods in the same location. The index is actually a hydrological index rather than a meteorological index since it is based on moisture availability (precipitation, outflow, and storage) over time. Region 2 counties normally receive around 42.5 inches of precipitation per year.

POSSIBLE CAUSES

Precipitation in the form of rain or snow falls in uneven patterns across the country. The amount of precipitation at a particular location varies from year to year, but over a period of years, the average amount is fairly constant. The amount of rain and snow also varies with the seasons. Even if the total amount of rainfall for a year is about average, rainfall shortages can occur during a period when moisture is critically needed for plant growth, such as in the early summer. When little or no rain falls, soils can dry out and plants can die. When rainfall is less than normal for several weeks, months, or years, the flow of streams and rivers declines, water levels in lakes and reservoirs fall, and the depth to water in wells increases. If dry weather persists and water-supply problems develop, the dry period can become a drought (USGS, 2016).

LOCATION & EXTENT

Drought conditions affect all parts of Region 2 PDC equally. All counties are at equal risk from the effects of drought. However, during committee and public meetings, members from Wayne County mentioned that there has been a push to increase agricultural production in the county. Because agriculture is the sector that most suffers the effect of drought, any location with agricultural activities would be exposed to the effects of drought.

HISTORICAL OCCURRENCES

According to data maintained by the U.S. Drought Monitor, since 2000, the county with the most weeks under drought conditions in Region 2 is Mingo County; this is followed in descendant order by Wayne, Logan, Lincoln, Cabell and then Mason Counties. Since the year 2000, there have been no exceptional droughts

County	D0	D1	D2	D3	D4
Cabell	240	85	34	3	0
Lincoln	264	90	31	3	0
Logan	291	101	41	3	0
Mason	227	76	29	2	0
Mingo	287	127	46	4	0
Wayne	278	108	51	5	0

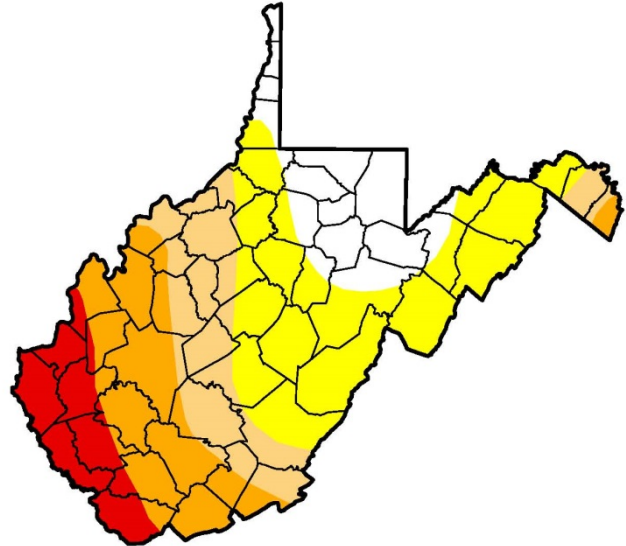
Source: US Drought Monitor

(D4) in Region 2 counties. The table above shows the weeks each county has been in drought conditions. For example, Cabell County has had three weeks in extreme drought conditions (D4), 34 in severe drought (D3), 85 in moderate drought (D2) and 240 in abnormally dry conditions (D0). The higher drought levels include the lower drought level weeks, for example, Cabell County had 240 weeks in abnormally dry conditions (D0), of

which 85 were considered moderate drought (D1), of which 34 were considered severe drought (D2), of which, only three were considered extreme drought (D3); the weeks in higher levels of drought are not in addition to the lower levels, but included.

All the weeks in extreme drought (D3) account for one event in 2007 that lasted from the end of August through the end of October.

The map to the right shows the state of West Virginia in an extreme drought during the last week of October of 2007. The area most affected was the southwestern part, where all the Region 2 counties are located.



IMPACT & VULNERABILITY

Some of the impacts of each type of drought include the following.

D0	Abnormally Dry	<p><u>Going into drought:</u></p> <ul style="list-style-type: none"> • short-term dryness slowing planting, growth of crops or pastures <p><u>Coming out of drought:</u></p> <ul style="list-style-type: none"> • some lingering water deficits • pastures or crops not fully recovered
D1	Moderate Drought	<ul style="list-style-type: none"> • Some damage to crops, pastures streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	<ul style="list-style-type: none"> • Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	<ul style="list-style-type: none"> • Major crop/pasture losses Widespread water shortages or restrictions
D4	Exceptional Drought	<ul style="list-style-type: none"> • Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

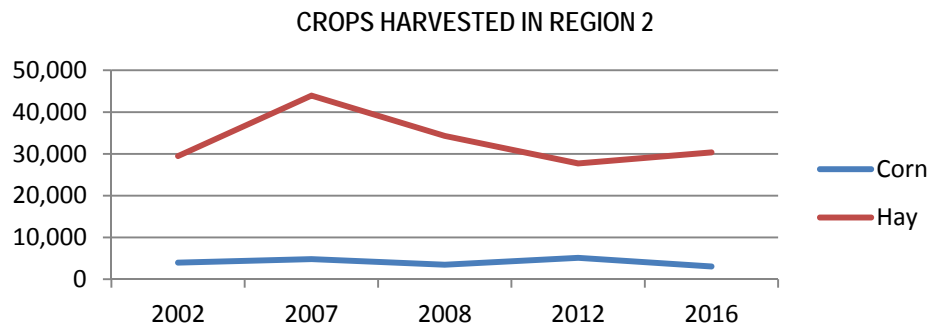
LOSS & DAMAGES

Anywhere between 1 and 20 percent of the population of each county in Region 2 is economically dependent on agriculture, forestry, fishing, hunting, and mining. The table shows the amount of population and the total percentage of population by county that is dedicated to these activities. The effects of droughts could potentially affect these people. However, mining may be greater than agricultural activities within this population. Therefore, this is only for informational purposes since it is difficult to determine the actual amount of people dedicated to agriculture in Region 2 from this data source.

TABLE 2.2.12.C AGRICULTURAL INDUSTRY IN REGION 2*		
County	Total Population	Total Percentage
Cabell	400	1.0%
Lincoln	553	7.6%
Logan	2,018	17.2%
Mason	260	2.9%
Mingo	1,619	20.4%
Wayne	271	1.9%

* Includes forestry, fishing, hunting, and mining.
Source: WVU County Data Profiles (2016)

However, there is another way to calculate potential loss of income and that is by decrease of crops due to drought. The USDA tracks crops production via their census and surveys. 2007 was a census year as well as a drought year for region 2. Data from this census, the 2012 census, and surveys from 2008 and 2016 are shown below. Corn and hay are common commodities that appear on census and survey information.

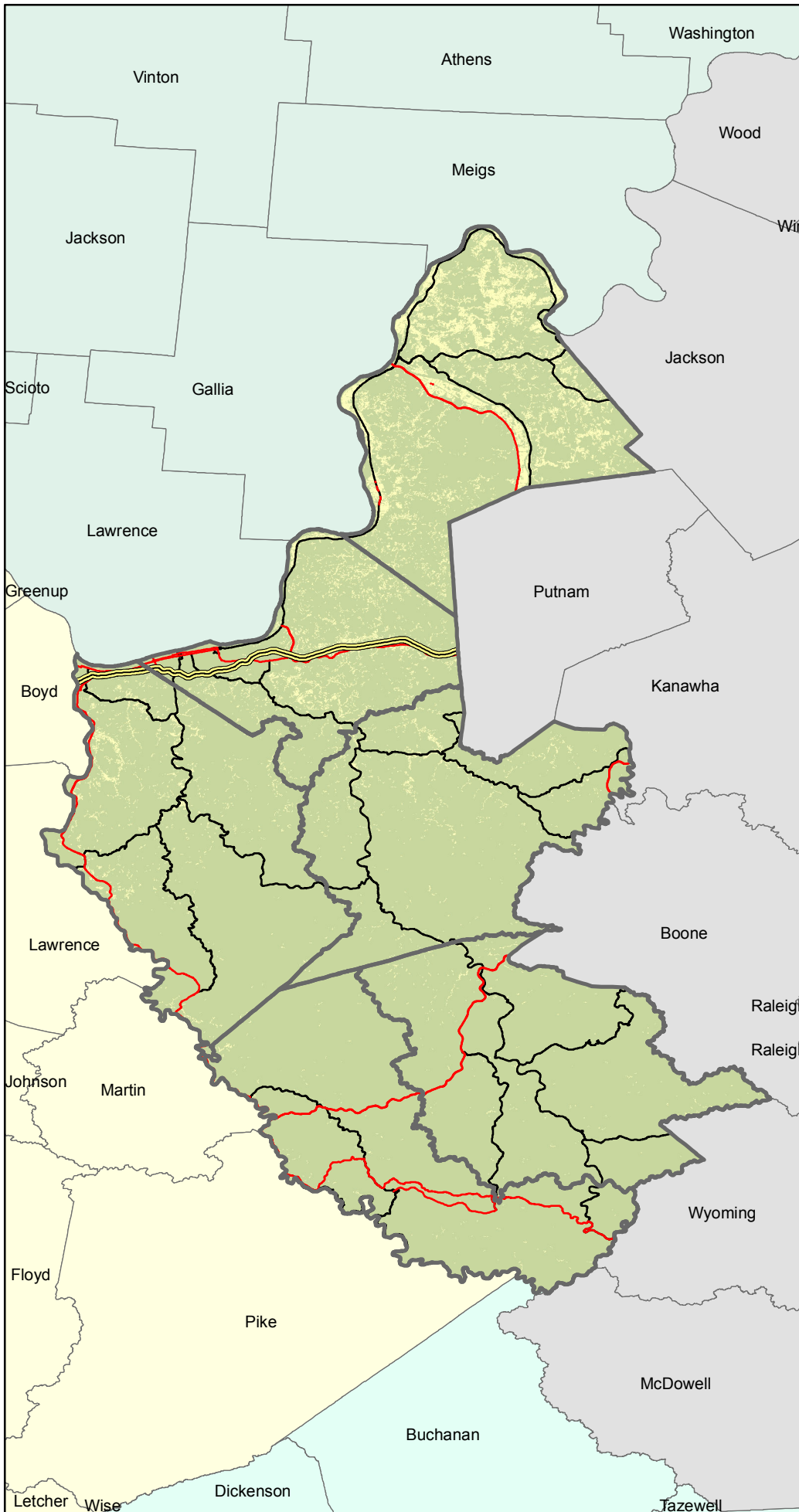


The data does indicate that after the drought of 2007, crop harvest did decline, but it continued to decline throughout the next several years, even when there were not drought conditions. In part, this could be explained by the shift from agricultural economy towards other types of economy such as manufacturing and services.

RISK CALCULATION

TABLE 2.2.12.D DROUGH RISK CALCULATION					
Probability			Severity		Risk
IMPROBABLE			NEGLIGIBLE		LOW
Events	1	=0.05	Drought conditions have not seemed to affect the region's production of crops in any significant way.	=	The risk assessment matrix indicates that with a very low probability and severity, the overall risk is low.
Years	17				
The amount of weeks that Region 2 has been in an extreme drought since 2000 is only 20. This amounts to a total of 1 event.		+			







REGION 2 HAZARD MITIGATION PLAN

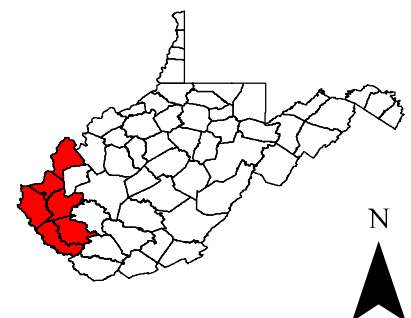
Risk Map: Drought

Data Source(s):
US Geological Survey

-  Moderate Risk Area
-  Low Risk Area

0 3 6 12 18 24
Miles

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REGION 2 HAZARD MITIGATION PLAN

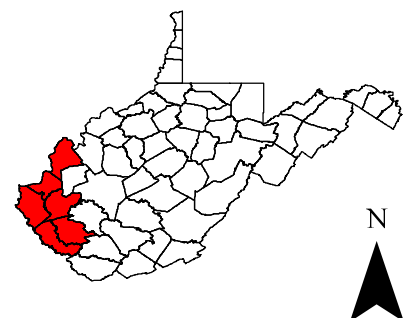
Cabell Risk Map: Drought

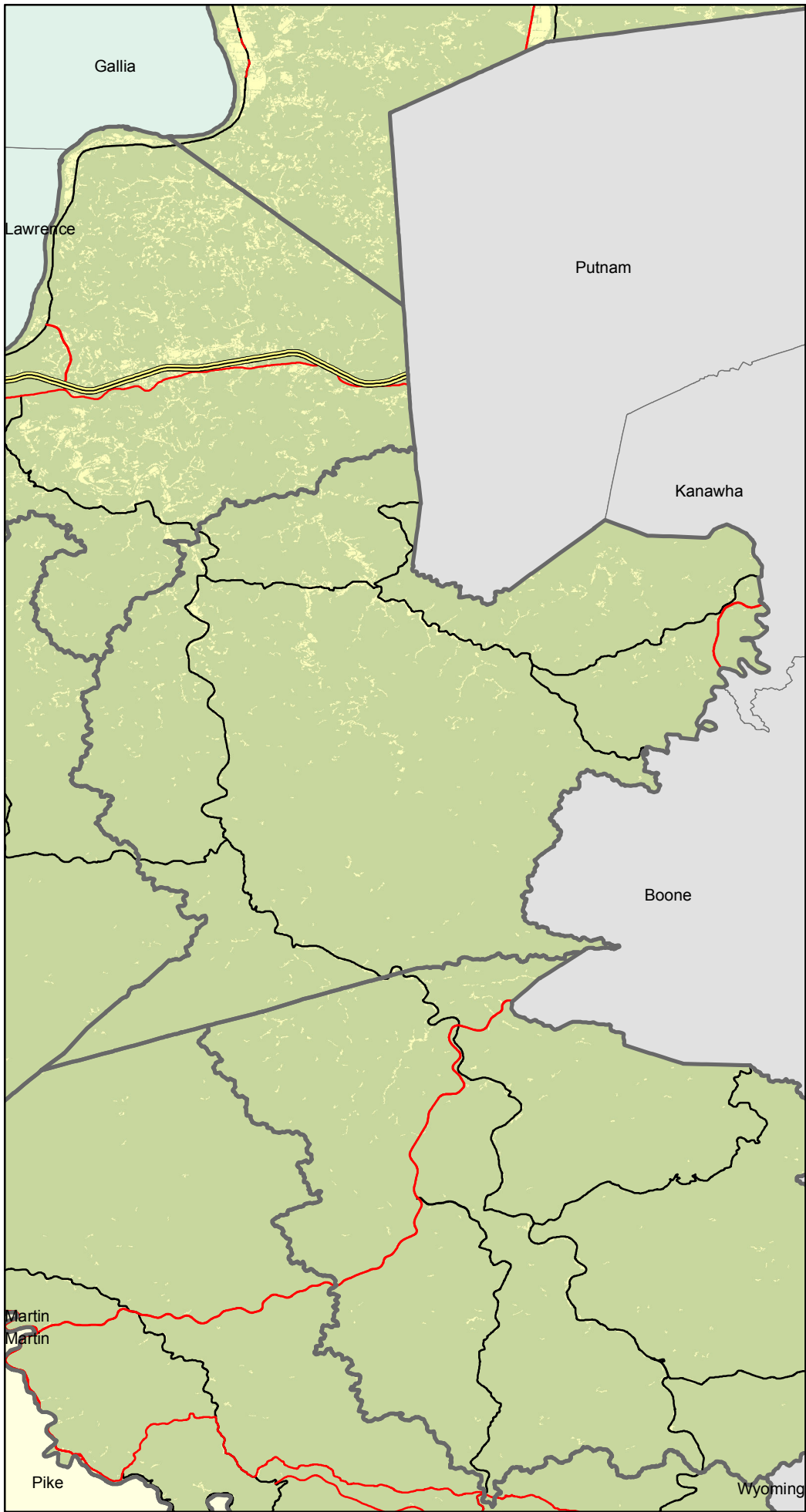
Data Source(s):
US Geological Survey

- Moderate Risk Area
- Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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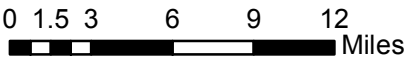


REGION 2 HAZARD MITIGATION PLAN

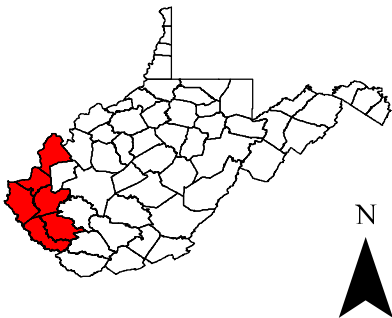
Lincoln Risk Map: Drought

Data Source(s):
US Geological Survey

- Moderate Risk Area
- Low Risk Area



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REGION 2 HAZARD MITIGATION PLAN

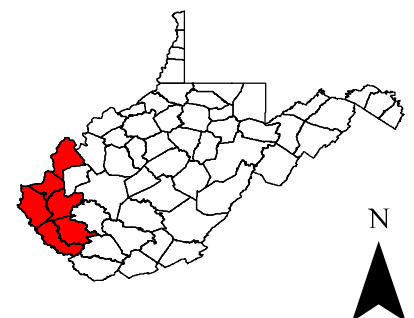
Logan Risk Map: Drought

Data Source(s):
US Geological Survey

-  Moderate Risk Area
-  Low Risk Area

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

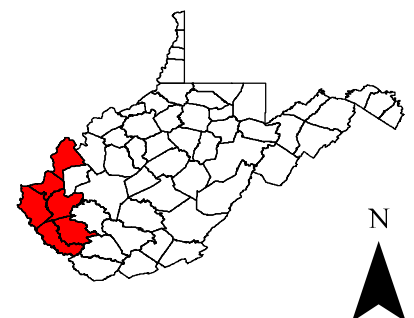
Mason Risk Map: Drought

Data Source(s):
US Geological Survey

-  Moderate Risk Area
-  Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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REGION 2 HAZARD MITIGATION PLAN

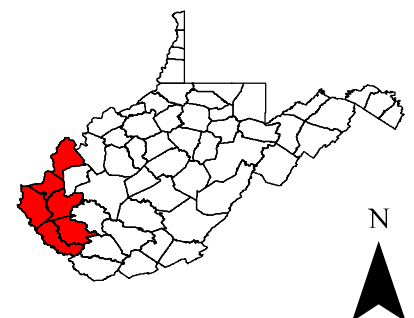
Mingo Risk Map: Drought

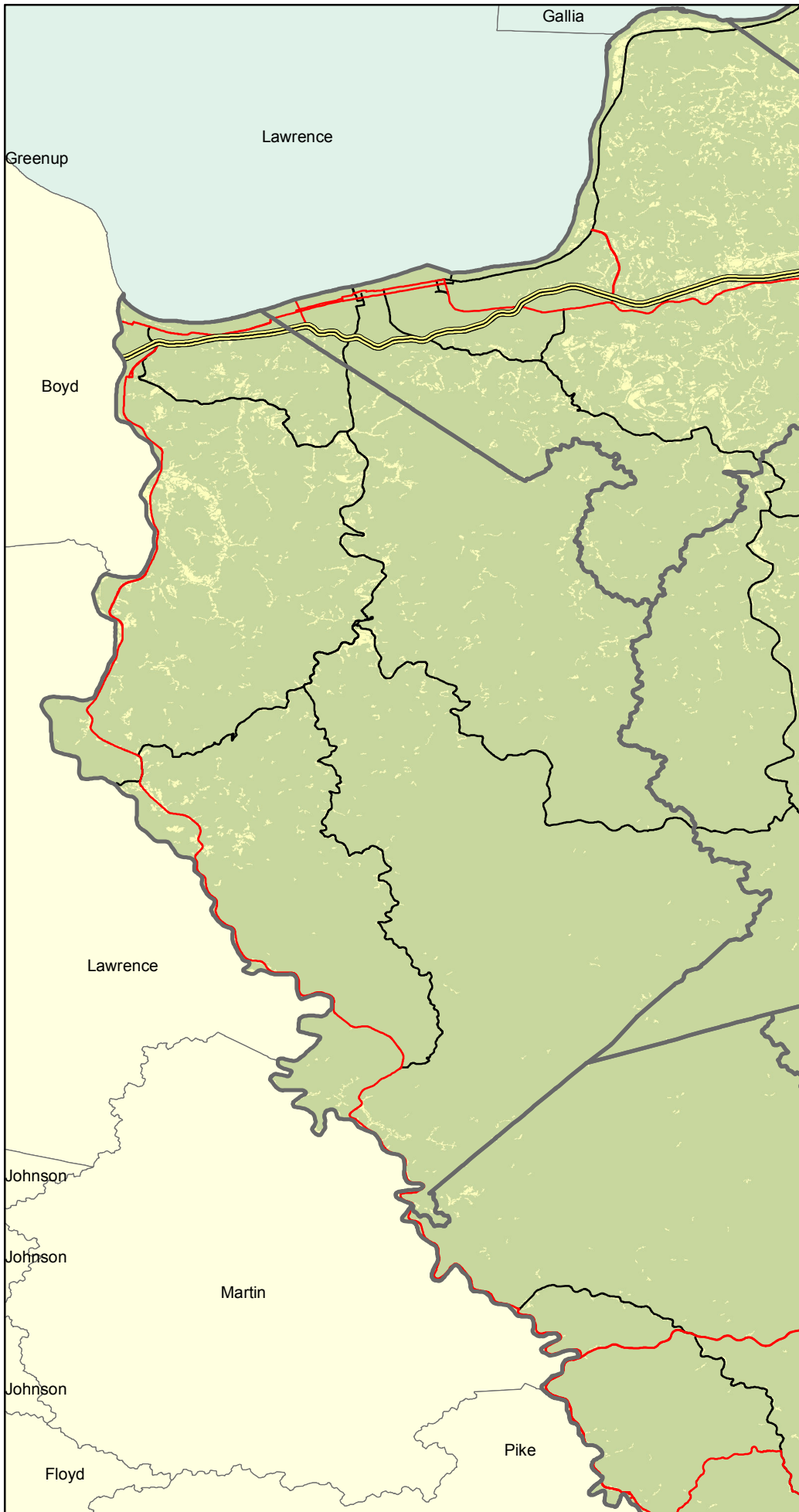
Data Source(s):
US Geological Survey

- Moderate Risk Area
- Low Risk Area

0 1.5 3 6 9 12
Miles

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REGION 2 HAZARD MITIGATION PLAN

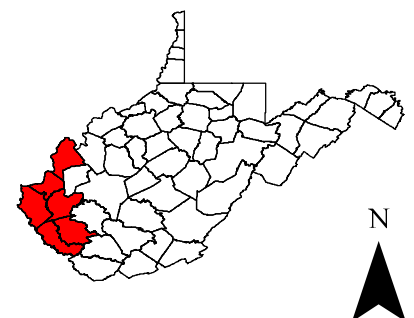
Wayne Risk Map: Drought

Data Source(s):
US Geological Survey

- Moderate Risk Area
- Low Risk Area

0 1.25 2.5 5 7.5 10
Miles

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2.3 COMPLICATING VARIABLES

Direct consequences of disasters can include fatalities, injuries, and damages to humans, animals or property. However, disasters do not end there; there are a number of indirect effects, both tangible and intangible associated with disasters even before a disaster strikes. Some examples of these include loss of livelihood and income, loss of community and population, mental and psychosocial impacts, costs of rebuilding, repair or replacement, loss of inventory, wages and tax revenue, etc. (Coppola, 2015). All of these also have a cost associated with them but it is much more difficult to assign a specific dollar value and quantify accurately.

A variety of situations could occur that would result in a disruption to a number of critical systems throughout Region 2 counties. Some hazards are complicated by a series of loosely-related variables; these are often considered *cascading hazards*. For example, high winds may cause sporadic damage throughout the county, but often do not become a significant countywide concern until a large number of residents are without power.

A single event may not always reach all impacts described herein. However, it is important to understand that the impacts of hazards go beyond what is seen immediately before or after the event or incident. The effects of one event can be years or months in the making and last months or even years, especially where public health, social, economic, environmental and infrastructure impacts are concerned.

2.3.1 Hazards and Climate Change

Many natural hazards are related to climate such as droughts, severe weather, floods and wildfires. There is an important distinction between weather and climate. Weather refers to the atmospheric conditions of a geographical region over a short period of time, such as days or weeks. Climate, in contrast, refers to the atmospheric conditions of a geographical area over long periods of time, such as years, or even decades (Keller, Devecchio, 2015, pp. 406-407).

According to the U.S. Global Change Research Program (2016), there are several weather and climate changes that have already been observed in the United States.

- Since recordkeeping began in 1895, the average U.S. temperature has increased by 1.3°F to 1.9°F with most of the increase happening since 1970. In addition, the first decade of the 2000s has been the warmest on record.
- The average precipitation across the U.S. has increased since 1900 with some areas

experiencing higher than the national average and some lower. Heavy downpours are increasing, especially over the last 30-50 years.

- Drought events have increased in the west. Changes in precipitation and runoff, combined with changes in consumption and withdrawal, have reduced surface and groundwater supplies in many areas.
- Some types of severe weather events have experienced changes; heat waves are more frequent and intense, and cold waves have become less frequent and intense overall.
- The intensity, frequency, and duration of North Atlantic hurricanes have increased since the early 1980s.

Climate change can have a significant impact on human health and the environment. The changes mentioned above can affect the environment by leading to changes in land-use, ecosystems, infrastructure conditions, geography and agricultural production. Extreme heat, poor air quality, reduced food and water supply and quality, changes in infectious agents and population displacement can lead to public health concerns such as heat-related illnesses, cardiopulmonary illnesses, food, water and vector-borne diseases and have consequences on mental health and stress (USGCRP, 2016).

The National Climate Assessment (NCA) defined climate trends for national U.S. regions in 2014. The major trends are seen to be

- wildfires and heat waves on the west coast,
- rising temperatures and increased severity and frequency of winter storms in the middle of the country,
- more rain and flooding in the Midwest and northeastern parts of the country, and
- an increase in sea levels in the mid-Atlantic with an increase of hurricane activity in the southeastern states.

In West Virginia, the trend will be an increase in extreme precipitation which will lead to more events of hazards such as flooding, and possible dam failures or reportable disease epidemics.

2.4 ASSET INVENTORY

§201.6(c)(2)(ii)	[The risk assessment shall include a] description of the jurisdiction's vulnerability of 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.
§201.6(c)(2)(ii)(A)	The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

This risk assessment identifies potentially-vulnerable community assets such as critical facilities, critical infrastructure, historical properties, commercial/industrial facilities, etc. Assets contribute directly to the quality of life in the community as well as ensure its continued operation. As such, government facilities are often listed, as are water/wastewater and transportation infrastructure. Assets can also be irreplaceable items within the community, such as historical structures or even vulnerable populations (including the elderly or youths).

Inventorying assets first involves determining what in the community can be affected by a hazard event. The hazard profiles contained in [Section 2.2](#) above contain generalized loss estimates that, in some cases identify the types of facilities that could be impacted by the hazards considered in this plan. Additionally, the core planning committee used its meetings during the update process to significantly revise the original asset list that was included in this plan. In the following lists, assets are grouped into the following categories.

- **Critical Facilities:** Governmental facilities, water/wastewater facilities, emergency services facilities, medical facilities (hospitals/clinics), and transportation infrastructure.
- **Vulnerable Populations:** Schools, nursing homes, and senior centers.
- **Economic Assets:** Large commercial/industrial facilities or large employers (not covered in other categories).
- **Special Considerations:** Residences, community outreach facilities, post offices, and libraries.
- **Historical Considerations:** Areas/structures listed on the National Register of Historic Places.

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
	X				Commerce	Home Depot	1050 Thundering Herd Dr.	Barboursville	Cabell
X					Healthcare	Village of Riverview	1356 Riverview Dr.	Barboursville	Cabell
				X	School	Barboursville Middle School	1400 Central Ave.	Barboursville	Cabell
	X				Commerce	Walmart	25 Nichols Dr.	Barboursville	Cabell
				X	School	Martha Elementary	3067 Martha Rd.	Barboursville	Cabell
				X	School	Nichols Elementary	3505 Erwin Rd.	Barboursville	Cabell
X					Infrastructure	Package Treatment Plant	N/A	Barboursville	Cabell
X					Government	Post Office	404 Huntington Mall	Barboursville	Cabell
	X				Commerce	Huntington Mall	500 Mall Rd.	Barboursville	Cabell
X					Healthcare	EMS Station 5	5233 Hale Branch Rd.	Barboursville	Cabell
				X	School	Davis Creek Elementary	6330 Davis Creek Rd.	Barboursville	Cabell
X					Government	Post Office	680 Central Ave.	Barboursville	Cabell
	X				Commerce	Lowe's	700 Mall Rd.	Barboursville	Cabell
				X	School	Village of Barboursville Elem.	718 Central Ave.	Barboursville	Cabell
X					Government	Barboursville City Hall	721 Central Ave.	Barboursville	Cabell
			X		Library	Barboursville Public Library	728 Main St.	Barboursville	Cabell
X					Healthcare	Wyngate Senior Living	750 Peyton St.	Barboursville	Cabell
X					Law Enforcement	Barboursville Police Dept.	815 Main St.	Barboursville	Cabell
X					Government	US Coast Guard	95 Peyton St.	Barboursville	Cabell
X					Healthcare	EMS Station 8	Riverview Dr.	Barboursville	Cabell
X					Healthcare	Cabell Health Care Center	1 Hidden Brooke Way	Culloden	Cabell
X					Government	Post Office	2000 US Rt. 60	Culloden	Cabell
				X	School	Culloden Elementary	2100 US Rt. 60	Culloden	Cabell
X					Fire	Culloden VFD	2102 3rd St.	Culloden	Cabell
	X				Commerce	Service Wire	310 Davis Rd.	Culloden	Cabell
X					Government	Post Office	29272 Huntington Rd.	Glenwood	Cabell
				X	Residence	Riverview East	225 Short St.	Guyandotte	Cabell
X					Fire	Station 5 HFD	301 5th Ave	Guyandotte	Cabell
				X	School	Guyandotte Elementary	607 5th Ave.	Guyandotte	Cabell
				X	Nursing Home	Woodlands Retirement Community	1 Bradley Foster Dr.	Huntington	Cabell

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
				X	School	Huntington East Middle School	1 Campbell Dr.	Huntington	Cabell
	X				Commerce	Big Sandy Superstore Arena	1 Center Plaza	Huntington	Cabell
				X	School	Huntington High School	1 Highlander Way	Huntington	Cabell
	X				Commerce	Huntington Steel	100 3rd Ave	Huntington	Cabell
X					Government	Post Office	1000 Virginia Ave.	Huntington	Cabell
				X	Nursing Home	Heritage Center	101 13th St.	Huntington	Cabell
				X	School	Cabell County Career Center	1035 Norway Ave.	Huntington	Cabell
X					Healthcare	EMS Station 3	108 8th Ave. West	Huntington	Cabell
X					Transportation	Tri-State Transit Authority	1120 Virginia Ave.	Huntington	Cabell
				X	Residence	Highlawn Place	1130 3rd Ave.	Huntington	Cabell
X					Healthcare	EMS Station 9	1133 20th St.	Huntington	Cabell
X					Government	Post Office	1200 Veterans Memorial Blvd.	Huntington	Cabell
X					Healthcare	River Park Hospital	1230 6th Ave.	Huntington	Cabell
X					Healthcare	River Park Hospital	1230 6th Ave.	Huntington	Cabell
			X		Community	Salvation Army Shelter	1277 3rd Ave.	Huntington	Cabell
X					Government	Cabell County 911	129 Gallagher St.	Huntington	Cabell
				X	Nursing Home	Madison Manor	1329 Madison Ave.	Huntington	Cabell
X					Healthcare	Cabell/Huntington Hospital	1340 Hal Greer Blvd.	Huntington	Cabell
X					Fire	Station 4 HFD	1431 West 5th Ave.	Huntington	Cabell
X					Healthcare	Mildred Mitchel Bateman Hospital	1530 Norway Ave.	Huntington	Cabell
X					Healthcare	VA Hospital	1540 Spring Valley Dr.	Huntington	Cabell
				X	School	Meadows Elementary	1601 Washington Blvd.	Huntington	Cabell
	X				Commerce	Steel of WV	1700 2nd Ave.	Huntington	Cabell
X					Healthcare	Huntington Health and Rehab	1720 17th St	Huntington	Cabell
	X				Commerce	Dawson/Thompson Oil Co.	1746 Virginia Ave.	Huntington	Cabell
X					Healthcare	EMS Station 6	1766 Washington Ave.	Huntington	Cabell
				X	Residence	Washington Square	17th St. and 8th Ave.	Huntington	Cabell
				X	School	Spring Hill Elementary	1901 Hall Ave.	Huntington	Cabell
				X	Residence	Trowbridge Manor	1st St. and 8th Ave.	Huntington	Cabell
	X				Commerce	State Electric	2010 2nd Ave.	Huntington	Cabell

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Government	Post Office	2016 3rd Ave.	Huntington	Cabell
			X		Library	Guyandotte Public Library	203 Richmond St.	Huntington	Cabell
				X	School	Central City Elementary	2100 Washington Ave.	Huntington	Cabell
				X	Religious	Christ Temple Church Shelter	2400 Johnstown Rd.	Huntington	Cabell
	X				Commerce	Flint Pigment	2401 5th Ave	Huntington	Cabell
	X				Commerce	WV Electric	250 12th St. W	Huntington	Cabell
				X	School	Altizer Elementary School	250 3rd St	Huntington	Cabell
	X				Commerce	Rubberlite	2501 Guyan Ave.	Huntington	Cabell
				X	School	Highlawn Elementary	2549 1st Ave.	Huntington	Cabell
X					Transportation	CSX	2550 6th Ave.	Huntington	Cabell
X					Healthcare	St. Mary's Medical Center	2900 1st Ave.	Huntington	Cabell
				X	School	Explorer Academy	2901 Saltwell Rd.	Huntington	Cabell
X					Fire	Station 10 HFD	3131 Washington Blvd.	Huntington	Cabell
X					Government	Special Metals	3200 Riverside Dr.	Huntington	Cabell
X					Government	Post Office	323 Olive St.	Huntington	Cabell
	X				Commerce	Walmart	3333 US - 60	Huntington	Cabell
X					Healthcare	EMS Station 2	343 Norway Ave	Huntington	Cabell
			X		Library	Gallagher Village Public Library	368 Norway Ave.	Huntington	Cabell
				X	School	Hite Saunders Elementary	3708 Green Valley Rd.	Huntington	Cabell
X					Infrastructure	Earthen Levee	4.55 miles around Huntington	Huntington	Cabell
	X				Commerce	Fletchers	402 High St.	Huntington	Cabell
	X				Commerce	Grief Brothers	409 Buffington St.	Huntington	Cabell
X					Fire	Tri-State Fire Academy	4200 Ohio River Rd.	Huntington	Cabell
				X	Residence	Nelson Apartments	422 9th St West	Huntington	Cabell
			X		Library	Cabell County Public Library	455 9th St.	Huntington	Cabell
X					Government	Corps of Engineers	502 8th St.	Huntington	Cabell
X					Fire	Station 8 HFD	509 Camden Rd.	Huntington	Cabell
X					Fire	Station 2 Huntington Fire Dept.	534 20th St.	Huntington	Cabell
			X		Community	Heistad House	534 7th Ave	Huntington	Cabell
X					Government	Huntington Water Quality Board	555 7th Ave	Huntington	Cabell

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Infrastructure	Concrete Floodwall	6.70 miles around Huntington	Huntington	Cabell
	X				Commerce	Martin Steel	603 16th St. W	Huntington	Cabell
				X	Residence	New Baptist Church Shelter	610 28th St.	Huntington	Cabell
			X		Community	Vanity Fair	621 4th Ave	Huntington	Cabell
			X		Community	Huntington City Mission	624 10th St	Huntington	Cabell
			X	X	Community	Harmony House Day Center	627 4th Ave	Huntington	Cabell
X					Government	VA Huntington Regional Benefit Office	640 4th St. #100	Huntington	Cabell
	X				Commerce	Columbia Paint	641 Jackson Ave.	Huntington	Cabell
X					Law Enforcement	Huntington Police Dept.	675 10th St.	Huntington	Cabell
X					Healthcare	Fairhaven Rest Home	700 Madison Ave.	Huntington	Cabell
X					Healthcare	Cabell Huntington Health Department	703 7th Ave.	Huntington	Cabell
X					Government	Cabell County Courthouse	750 5th Ave.	Huntington	Cabell
X					Government	Huntington City Hall	800 5th Ave.	Huntington	Cabell
X					Healthcare	Grayson's Caring Hands	828 Washington Ave.	Huntington	Cabell
X					Fire	Centennial Fire Station	839 7th Ave.	Huntington	Cabell
X					Government	US Federal Courthouse	845 5th Ave.	Huntington	Cabell
X					Healthcare	Cabell County EMS Headquarters	846 8th Ave.	Huntington	Cabell
				X	Residence	Carter G. Woodson Apartments	8th Ave and Hal Greer Blvd.	Huntington	Cabell
			X		Library	West Huntington Public Library	901 14th St West	Huntington	Cabell
				X	School	Huntington Middle School	925 3rd St.	Huntington	Cabell
				X	School	Southside Elementary	930 2nd St.	Huntington	Cabell
				X	Residence	WK Elliott Apartments	Bridge St. and Buffington St.	Huntington	Cabell
				X	Residence	Marcum Terrace	Olive St.	Huntington	Cabell
X					Healthcare	Huntington Internal Medicine Group	5170 US 60	Huntington	Cabell
				X	School	Mount West Community and Technical College	1 Mount West Dr.	Huntington	Cabell
				X	School	Marshall University	1 John Marshall Dr.	Huntington	Cabell
	X				Commerce	Seaton Taylor	402 7th Ave	Huntington	Cabell
	X				Commerce	Alcon	2 Vision Lane	Lesage	Cabell
				X	School	Cox Landing Elementary	6358 Cox Lane	Lesage	Cabell
			X		Library	Cabell County Public Library	6363 Cox Landing Lane	Lesage	Cabell

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Transportation	Cabell County School Bus Garage	6370 Cox Lane	Lesage	Cabell
X					Fire	Ohio River Road VFD	6521 Ohio River Rd.	Lesage	Cabell
X					Government	Post Office	6596 Ohio River Rd.	Lesage	Cabell
				X	School	Milton Middle School	1 Panther Trail Way	Milton	Cabell
				X	Religious	Milton Baptist Church	1123 Church St.	Milton	Cabell
X					Government	Milton City Hall	1139 Smith St.	Milton	Cabell
X					Law Enforcement	Milton Police Dept.	1139 Smith St.	Milton	Cabell
			X		Library	Milton Public Library	1140 Smith St.	Milton	Cabell
X					Government	Post Office	1177 W Main St.	Milton	Cabell
				X	School	Milton Elementary	1201 Pike St.	Milton	Cabell
X					Healthcare	EMS Station 7	1597 US Route 60	Milton	Cabell
	X				Commerce	Cenergy	1763 US 60	Milton	Cabell
X					Fire	Milton VFD	341 East Main St.	Milton	Cabell
	X				Commerce	Blenko Glass	9 Bill Blenko Dr.	Milton	Cabell
X					Healthcare	Midland Meadows	100 Weatherholt Dr.	Ona	Cabell
				X	School	Cabell Midland High School	2300 Rt. 60 East	Ona	Cabell
X					Government	Post Office	2332 US 60	Ona	Cabell
X					Healthcare	EMS Station 1	2500 Rt. 60 East	Ona	Cabell
				X	School	Ona Elementary	2701 Elementary Dr.	Ona	Cabell
X					Fire	Ona VFD	2900 Howell's Mill Rd.	Ona	Cabell
			X		Community	Salt Rock Senior Center Shelter	5490 WV-10	Salt Rock	Cabell
				X	School	Salt Rock Elementary	5570 Madison Creek Rd.	Salt Rock	Cabell
			X		Library	Salt Rock Public Library	5575 Madison Creek Rd.	Salt Rock	Cabell
X					Government	Post Office	5577 Madison Creek Rd.	Salt Rock	Cabell
X					Fire	Salt Rock VFD	Rt. 10 and Madison Creek Rd.	Salt Rock	Cabell
	X				Commerce	Whittens Feed and Seed	1872 Straight Fork	Alkol	Lincoln
	X				Commerce	Chevron	392 Midway Rd.	Alum Creek	Lincoln
	X				Commerce	Little General	403 Midway Rd.	Alum Creek	Lincoln
	X				Commerce	Family Dollar	4942 McClellan Hwy	Branchland	Lincoln
	X				Commerce	Gino's/Tudors	5772 McClellan Hwy	Branchland	Lincoln

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
	X				Commerce	Speedway	5404 McClellan Hwy	Branchland	Lincoln
X					Healthcare	St. Mary's Physical Therapy	5780 McClellan Hwy	Branchland	Lincoln
	X				Commerce	Dollar General/McDonald's	7305 Lynn Ave.	Hamlin	Lincoln
	X				Commerce	Family Dollar	8333 Court Ave.	Hamlin	Lincoln
	X				Commerce	Gino's/Tudors	8229 Court Ave.	Hamlin	Lincoln
			X		Community	Lincoln County Opportunity Company	360 Main St.	Hamlin	Lincoln
	X				Commerce	Little General/ Burger King	8375 Court Ave,	Hamlin	Lincoln
	X				Commerce	Piggly Wiggly	8337 Court Ave.	Hamlin	Lincoln
	X				Commerce	Seven Eleven	8151 Court Ave.	Hamlin	Lincoln
			X		Community	Harts Senior Center	3 Freedom Ln.	Harts	Lincoln
	X				Commerce	Ranger Fast Check	2908 McClellan Hwy	Ranger	Lincoln
	X				Commerce	Storage Tanks	574 Ely Fork	Sod	Lincoln
X					Healthcare	Dialysis Clinic	11 Lincoln Plaza	West Hamlin	Lincoln
	X				Commerce	Family Dollar	5732 McClellan Hwy	West Hamlin	Lincoln
	X				Commerce	Food Fair	5 Lincoln Plaza	West Hamlin	Lincoln
	X				Commerce	Little General	5742 McClellan Hwy	West Hamlin	Lincoln
X					Healthcare	Prestera Center	25 Lincoln Plaza	West Hamlin	Lincoln
	X				Commerce	Dollar General	4956 Midway rd.	Yawkey	Lincoln
	X				Commerce	Yawkey Quick Mart	4640 Straight Fork	Yawkey	Lincoln
				X	School	Buffalo ES	2367 Buffalo Creek Rd.	Accoville	Logan
X					Fire	Buffalo Creek VFD	70 Garrison Dr.	Amhertdale	Logan
				X	School	Chapmanville East ES	161 Conley St.	Chapmanville	Logan
				X	School	Chapmanville MS	774 Crawley Creek Rd.	Chapmanville	Logan
				X	School	Chapmanville Regional HS	506 Crawley Creek Rd.	Chapmanville	Logan
X					Fire	Chapmanville VFD	128 Tracy Vickers Ave.	Chapmanville	Logan
			X		Community	Chief Logan Lodge	1131 Conference Center Dr.	Chapmanville	Logan
				X	School	West Chapmanville ES	100 W. Tiger Lane	Chapmanville	Logan
X					Law Enforcement	WVSP Logan	8040 Old Logan Rd.	Chapmanville	Logan
				X	School	Omar ES	7061 Jerry West Hwy	Chauncey	Logan
	X				Commerce	Aracoma Coal Inc.	634 Bandmill Holly Rd.	Ethel	Logan

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Infrastructure	Logan County Airport	3236 Bandmill Hollow Rd.	Ethel	Logan
				X	School	Hugh Dingess ES	29 Hugh Dingess School Rd.	Harts	Logan
X					Fire	Main Harts Creek VFD	7984 Harts Creek Rd.	Harts	Logan
X					Fire	Henlawson VFD	3710 Old Logan Rd.	Henlawson	Logan
X					Fire	Cora VFD	28 Old Aldrich Branch Rd.	Holden	Logan
				X	School	Holden ES	1034 Copperas Fork Rd.	Holden	Logan
				X	School	Lake VFD	1343 Hewitt Creek Rd.	Lake	Logan
			X		Recreation	Chafin House	581 Main St.	Logan	Logan
			X		Community	Crooked Creek Resource Center	100 Recovery Rd.	Logan	Logan
				X	School	Justice ES	70 Circle Dr.	Logan	Logan
X					EMS	LEASA	26 1/2 Main Ave.	Logan	Logan
X					Government	Logan County BOE	506 Holly Ave.	Logan	Logan
X					Government	Logan County Courthouse	300 Stratton Street	Logan	Logan
X					Law Enforcement	Logan County S.O	300 Stratton Street	Logan	Logan
X					Government	Logan EOC/911 Center	28 Main Ave.	Logan	Logan
				X	School	Logan ES	18 Wildcat Way	Logan	Logan
X					Fire	Logan FD	219 Dingess Street	Logan	Logan
X					Healthcare	Logan General Hospital	20 Hospital Drive	Logan	Logan
				X	School	Logan HS	1 Wildcat Way	Logan	Logan
				X	School	Logan MS	14 Wildcat Way	Logan	Logan
X					Law Enforcement	Logan PD	219 Dingess Street	Logan	Logan
				X	School	RR Willis Vocational Tech Center	144 Vocational Rd.	Logan	Logan
				X	School	Southern WV Community College	66 District Office Dr.	Logan	Logan
X					Law Enforcement	Town of West Logan PD	515 2nd Ave.	Logan	Logan
	X				Commerce	Wal-Mart Logan	77 Norman Morgan Blvd.	Logan	Logan
X					Government	WV State Office Complex	130 Stratton St.	Logan	Logan
				X	School	Man ES	1 Pioneer Path	Mallory	Logan
				X	School	Logan County #2 VFD	64 Hollinsworth Field Rd.	Man	Logan
				X	School	Man HS	1 Hillbilly Circle	Man	Logan
X					Law Enforcement	Man PD	105 Market St.	Man	Logan

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
				X	School	South Man ES	301 E. McDonald Ave.	Man	Logan
X					Fire	Town of Man VFD	12 Broad St.	Man	Logan
X					Fire	Main Island Creek VFD	8 Firehouse Rd.	Omar	Logan
X					Fire	Sharples VFD	25 Signature Circle	Sharples	Logan
				X	School	Verdunville ES	251 Mustang Hill Rd.	Verdunville	Logan
X					Fire	Verdunville VFD	2270 Mud Fork Road	Verdunville	Logan
	X				Commerce	M&G Polymers	27610 Huntington Road	Apple Grove	Mason
X					EMS	Mason County EMS - Apple Grove	Huntington Road	Apple Grove	Mason
X					Fire	Valley Fire Department	28409 Huntington Road	Apple Grove	Mason
				X	School	Ashton Elementary	997 Ashton Upland Road	Ashton	Mason
				X	School	Hannan High	1 Wild Cat Way	Ashton	Mason
				X	School	Beale Elementary	12897 Huntington Road	Gallipolis Ferry	Mason
X					Infrastructure	R.C. Byrd Locks and Dam	1300 R C Byrd Drive	Gallipolis Ferry	Mason
	X				Commerce	ICL Chemicals	11636 Huntington Road	Gallipolis Ferry	Mason
X					Government	Hartford City Building	133 2nd Street	Hartford	Mason
X					Law Enforcement	Hartford Police Department	133 2nd Street	Hartford	Mason
X					Government	Henderson Town Hall	608 Locust Street	Henderson	Mason
X					Government	Leon City Hall	136 Main Street	Leon	Mason
				X	School	Leon Elementary	1226 Burdette St	Leon	Mason
X					Fire	Leon Fire Department	76 Vine Street	Leon	Mason
X					Infrastructure	AEP - Mountaineer Plant	1347 Graham Station Road	Letart	Mason
X					Infrastructure	Racine Locks and Dam	9909 Graham Station Road	Letart	Mason
X					Government	Mason City Building	656 2nd Street	Mason	Mason
X					EMS	Mason County EMS - Mason	331 Anderson Street	Mason	Mason
X					Fire	Mason Fire Department	1501 2nd Street	Mason	Mason
X					Law Enforcement	Mason Police Department	656 2nd Street	Mason	Mason
				X	School	Wahama High	1 White Falcon Dr	Mason	Mason
				X	School	New Haven Elementary	135 Mill St	New Haven	Mason
X					Fire	New Haven Fire Department	407 5th Street	New Haven	Mason
X					Law Enforcement	New Haven Police Department	218 5th Street	New Haven	Mason

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Government	New Haven Town Hall	218 5th Street	New Haven	Mason
X					Fire	Flatrock Fire Department	14480 Ripley Road	Point Pleasant	Mason
X					Law Enforcement	Mason Count Sheriff's Department	525 Main Street	Point Pleasant	Mason
				X	School	Mason County Career Center	281 Scenic Dr.	Point Pleasant	Mason
X					Government	Mason County Courthouse	200 6th Street	Point Pleasant	Mason
X					Healthcare	Pleasant Valley Hospital	2520 Valley Drive	Point Pleasant	Mason
X					Healthcare	Pleasant Valley Nursing and Rehab	640 Sandhill Road	Point Pleasant	Mason
X					Government	Point Pleasant City Building	400 Viand Street	Point Pleasant	Mason
X					Fire	Point Pleasant Fire Department	2309 Jackson Ave	Point Pleasant	Mason
				X	School	Point Pleasant Intermediate	1 Walden Roush Way	Point Pleasant	Mason
				X	School	Point Pleasant Jr/Sr High	280 Scenic Dr.	Point Pleasant	Mason
X					Law Enforcement	Point Pleasant Police Department	400 Viand Street	Point Pleasant	Mason
				X	School	Point Pleasant Primary	2200 Lincoln Ave	Point Pleasant	Mason
				X	School	Roosevelt Elementary	7953 Ripley Rd	Point Pleasant	Mason
X					EMS	Mason County EMS - Point Pleasant	913 Emergency Drive	Point Pleasant	Mason
X					Infrastructure	AEP - River Division	2226 Tug Drive	West Columbia	Mason
X					Healthcare	Lakin State Hospital	11522 Ohio River Road	West Columbia	Mason
X					Law Enforcement	WV DOC -Lakin Womens Prison	11264 Ohio River Road	West Columbia	Mason
X					Law Enforcement	WV State Police	11344 Ohio River Road	West Columbia	Mason
X					Fire	Baisden VFD	Rte. 13	Baisden	Mingo
				X	School	Dingess Grade School	Main Branch 12 Pole	Chapmanville	Mingo
X					Government	City Hall	1 Riverside Dr.	Delbarton	Mingo
X					Law Enforcement	Delbarton PD	1 Riverside Dr.	Delbarton	Mingo
X					Fire	Delbarton VFD	Co. Hwy 65/12	Delbarton	Mingo
				X	School	Mingo Career & Tech Center	Route 2 Box 52A	Delbarton	Mingo
				X	School	Burch PK-6	177 Bulldog Blvd	Delbarton	Mingo
	X				Commerce	Laurel Creek Co. Inc.	3/3 School House Hollow Rd	Dingess	Mingo
				X	School	Gilbert HS	US 52	Gilbert	Mingo
X					Government	City Hall	292 Main St.	Gilbert	Mingo
				X	School	Gilbert ES	132 US 52	Gilbert	Mingo

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Law Enforcement	Gilbert PD	44 US 52	Gilbert	Mingo
X					Law Enforcement	Gilbert SP	41 Snowflake Lane	Gilbert	Mingo
X					Fire	Gilbert VFD	175 3rd Ave	Gilbert	Mingo
X					EMS	Stafford EMS	4071 Venus St	Gilbert	Mingo
	X				Commerce	Phoenix Coal Mac, Inc.	22 Mine Rd	Holden	Mingo
X					Government	City Hall	US 52	Kermit	Mingo
				X	School	Kermit K-8	25674 US 52	Kermit	Mingo
X					Law Enforcement	Kermit PD	101 Main Street	Kermit	Mingo
X					Fire	Kermit VFD	3 Firehouse Ln	Kermit	Mingo
X					Fire	Kermit Fire & Rescue HQ Station	49 Main St	Kermit	Mingo
	X				Commerce	Rockhouse Creek Dev. Corp.	Rte. 10	Man	Mingo
X					Government	City Hall	306 McCoy Alley	Matewan	Mingo
				X	School	MatewanPK-8	100 Chambers St	Matewan	Mingo
				X	School	Mingo Central High School	1000 King Coal Highway	Matewan	Mingo
X					Fire	Beech Creek VFD	34 Hc 81	Meador	Mingo
	X				Commerce	Mingo Logan Coal Company	1000 Mingo Logan Ave	Wharncliffe	Mingo
X					Fire	Ben Creek VFD	Right Fork Bens Creek Road	Wharncliffe	Mingo
X					Government	City Hall	107 E 4th Ave	Williamson	Mingo
X					Government	Mingo BOE	110 Cinderella Rd	Williamson	Mingo
X					Law Enforcement	Mingo SO	72 E 2nd Ave	Williamson	Mingo
	X				Commerce	Mountaineer Hotel	31 E 2nd Ave	Williamson	Mingo
				X	School	Tug Valley HS	555 Panther Ave	Williamson	Mingo
X					Fire	Williamson FD	104 E 4th Ave	Williamson	Mingo
X					Healthcare	Williamson Memorial Hospital	859 Alderson St	Williamson	Mingo
				X	School	Williamson PK-8	5 Parkway Dr	Williamson	Mingo
X					Law Enforcement	Williamson PD	108 E 4th Ave	Williamson	Mingo
X					Law Enforcement	WV State Police	200 E 3rd Ave	Williamson	Mingo
				X	School	Lenore K-8	Pigeon Creek	Williamson	Mingo
X					EMS	Stat Ambulance Service	Harvey St	Williamson	Mingo
			X		Recreation	Beech fork State Park	5601 Long Branch Road	Barboursville	Wayne

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
	X				Commerce	AEP Ceredo Peaker Station	Walker Br Road	Ceredo	Wayne
	X				Commerce	American National Rubber Co.	626 Main St	Ceredo	Wayne
				X	School	Ceredo ES	700 B Street	Ceredo	Wayne
X					Infrastructure	Ceredo Flood Wall	Main Street & Ohio River	Ceredo	Wayne
				X	School	Ceredo Kenova Middle School	500 High Street	Ceredo	Wayne
X					Transportation	Ceredo Liquid Dock	Main St And River	Ceredo	Wayne
				X	Residence	Ceredo Manor	601 High Street	Ceredo	Wayne
X					Law Enforcement	Ceredo PD	700 B Street	Ceredo	Wayne
X					Government	Ceredo Town Hall	699 B Street	Ceredo	Wayne
X					Healthcare	Ceredo VFD/EMS	700 B Street	Ceredo	Wayne
X					Infrastructure	Ceredo Water	Main Street	Ceredo	Wayne
				X	School	Ceredo-Kenova MS	500 High Street	Ceredo	Wayne
X					Transportation	Coloumbia Gas Ceredo Compressor Station	1664 Walker Br Road	Ceredo	Wayne
X					Transportation	Coloumbia Gas Kenova Compressor Station	70 Big Sandy Road	Ceredo	Wayne
X					Transportation	CSX Rail Yard Ceredo	Ceredo	Ceredo	Wayne
	X				Commerce	Federal Express Depot	1400 Airport Road	Ceredo	Wayne
X					Infrastructure	Huntington TriState Airport	1449 Airport Road	Ceredo	Wayne
X					Transportation	Kanawha River Terminals, Inc.	1 Main St	Ceredo	Wayne
	X				Commerce	Kosmos Cement Cemex	100 Main Street	Ceredo	Wayne
	X				Commerce	Mistras Testing	1200 Airport Road	Ceredo	Wayne
				X	School	Playmates Day Care	111 4Th St	Ceredo	Wayne
			X		Museum	ZD Ramsdell House	1108 B Street	Ceredo	Wayne
				X	School	Crum K-8 School	150 Crum Road	Crum	Wayne
X					Infrastructure	N&W Railroad Tunnels	Crum	Crum	Wayne
X					Infrastructure	Crum PSD	414 Crum Road	Crum	Wayne
			X		Community	CabWaylingo Community Center	1475 L fork Dunlow Bypass Road	Dunlow	Wayne
			X		Recreation	Cabwaylingo state Park	4279 Cabwaylingo Road	Dunlow	Wayne
				X	School	Dunlow Grade School	32800 WV 152	Dunlow	Wayne
X					Fire	Dunlow VFD/EMS	Rte. 1 Box 41	Dunlow	Wayne
	X				Commerce	Argus Energy WV, LLC.	Rural Rte. 1	Dunlow	Wayne



TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Infrastructure	East Lynn Dam	683 Overlook Trail Road	East Lynn	Wayne
				X	School	East Lynn ES	19549 East Lynn Road	East Lynn	Wayne
X					Fire	EastLynn VFD	119123 East Lynn Road	East Lynn	Wayne
	X				Commerce	Rockspring Development, Inc.	1 Camp Creek Road East Lynn	East Lynn	Wayne
X					Transportation	CSX Railroad Bridge Big Sandy	Kenova	Fort Gay	Wayne
				X	School	Fort Gay K-8 School	1 Viking Drive	Fort Gay	Wayne
X					Infrastructure	Fort Gay Sewer Plant	3408 Wayne Street	Fort Gay	Wayne
X					Government	Fort Gay Town Hall	3407 Wayne Street	Fort Gay	Wayne
X					Fire	Fort Gay VFD	Court Street	Fort Gay	Wayne
X					Infrastructure	Fort Gay Water Plant	3407 Wayne Street	Fort Gay	Wayne
X					Transportation	Fortgay Highway Bridge	Fort Gay	Fort Gay	Wayne
	X				Commerce	Wildcat Branch Petroglyphs	Fort Gay	Fort Gay	Wayne
				X	School	Tolsia HS	1 Rebel Drive	Glenhayes	Wayne
				X	School	Buffalo Middle School	298 Buffalo Creek Rd	Huntington	Wayne
				X	School	Buffalo Grade School	331 Buffalo CK Road	Huntington	Wayne
			X		Recreation	Camden Park Recreation Area	5000 Waverley Road	Huntington	Wayne
			X		Recreation	Camp Mad Anthony Wayne	2125 Spring Valley Dr.	Huntington	Wayne
			X		Recreation	Corbin park	810 Vernon St	Huntington	Wayne
			X		Museum	Heritage Farm and Museum	3300 Harvey Road	Huntington	Wayne
X					Infrastructure	Hunting Flood wall	555 7th Ave	Huntington	Wayne
X					Infrastructure	Huntington Sanitary Treatment plant	5010 Sunset Dr.	Huntington	Wayne
				X	School	Kellog ES	4415 Piedmont Rd	Huntington	Wayne
				X	School	Playmates Day Care	3609 Hughes St	Huntington	Wayne
				X	School	Playmates Day Care	33 Buffalo Creek	Huntington	Wayne
				X	School	Playmates Day Care	418 Bridge St	Huntington	Wayne
				X	School	Playmates Day Care	3606 Hughes St	Huntington	Wayne
			X		Recreation	RPA Park	300 Spring Valley Dr.	Huntington	Wayne
				X	School	Spring Valley High School	1 Timberwolf Drive	Huntington	Wayne
X					Infrastructure	Spring Valley PSD Sewer	203 33rd Street	Huntington	Wayne
X					Healthcare	Valley Health	2908 Auburn Road	Huntington	Wayne

TABLE 2.4.A REGION 2 ASSETS

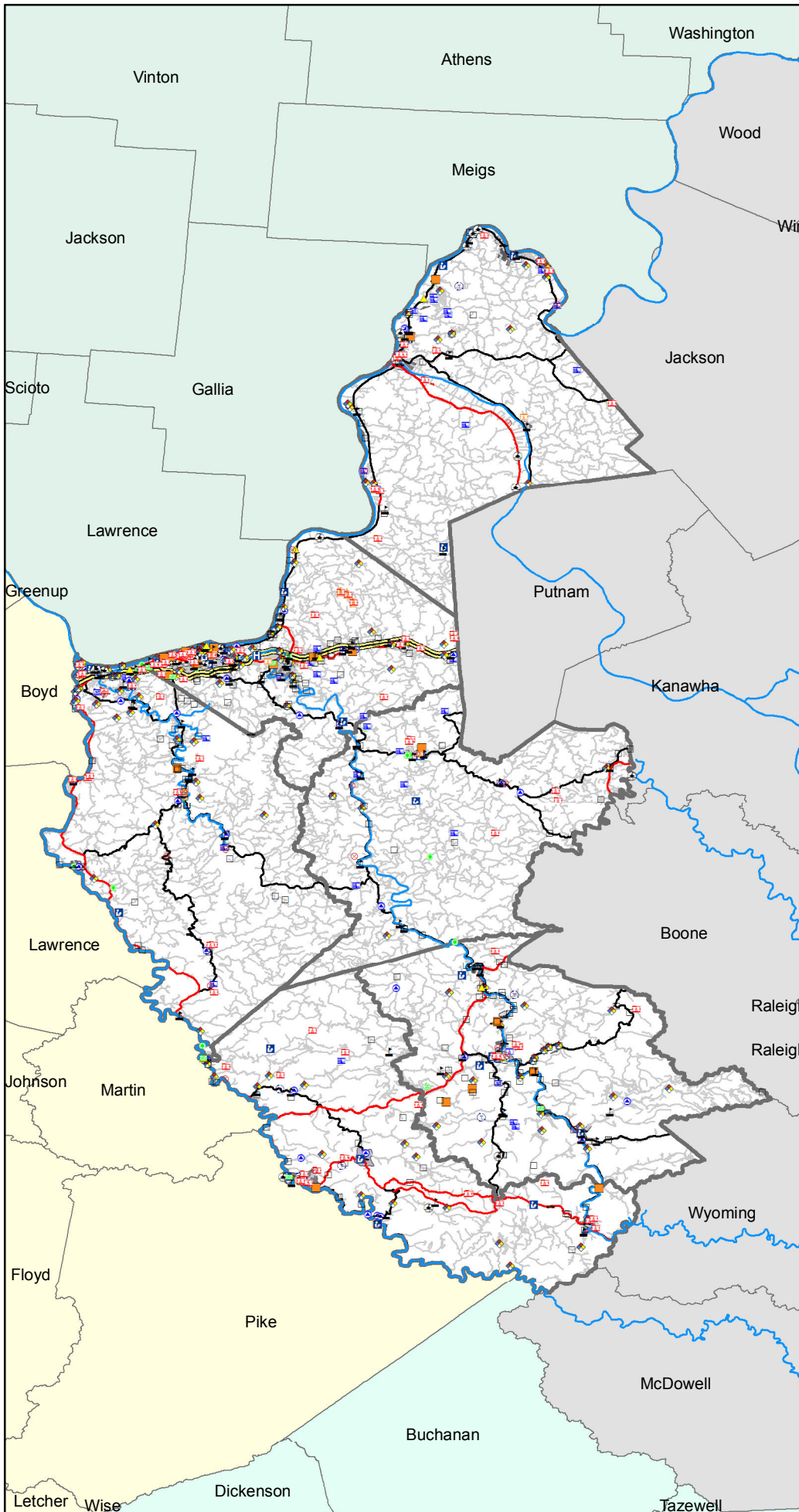
Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Healthcare	Veteran's Admin Hosp.	1340 Spring Valley Dr.	Huntington	Wayne
				X	School	Vinson Middle School	3851 Piedmont Rd	Huntington	Wayne
X					Government	Wayne County Commission Service Org, Inc.	3609 Hughes St	Huntington	Wayne
X					Infrastructure	West Virginia American Water	40002 Ohio River Road	Huntington	Wayne
	X				Commerce	Kevoa /Willart Chemical Co	100 21 St Street	Kenova	Wayne
X					Fire	Kenova FD	1600 Pine Street	Kenova	Wayne
X					Infrastructure	2/19 SFG Tristate Airport	1 Booth Road	Kenova	Wayne
	X				Commerce	Federal Express Depot	700 Walnut St	Kenova	Wayne
X					Transportation	I 64 Highway Bridge Big Sandy River	Kenova	Kenova	Wayne
				X	Residence	Joseph S. Miller House	748 Beech Street	Kenova	Wayne
X					Government	Kenova City Hall	1501 Pine Street	Kenova	Wayne
				X	School	Kenova ES	1600 Pine Street	Kenova	Wayne
X					Infrastructure	Kenova Floodwall	1631 Beech St	Kenova	Wayne
X					Law Enforcement	Kenova PD	1501 Pine Street	Kenova	Wayne
X					Fire	Kenova VFD 2	3985 RT 75	Kenova	Wayne
				X	School	Kenova/Ceredo Elementary	300 9th Street	Kenova	Wayne
	X				Commerce	Marathon Petroleum Kenova Tank Farm	227 23 Street	Kenova	Wayne
	X				Commerce	Marathon Transportation Kenova Ohio River Dock	23 Street and Ohio River	Kenova	Wayne
	X				Commerce	Marathon Tri-State Tank Farm	23 Street And US 60	Kenova	Wayne
X					Transportation	N&S Rail Yard Kenova	Kenova	Kenova	Wayne
X					Transportation	N&W Ohio River Bridge	Kenova	Kenova	Wayne
				X	School	Playmates Day Care	725 Chestnut St	Kenova	Wayne
				X	Nursing Home	Roxanna Booth manor	1315 Chestnut St	Kenova	Wayne
X					Transportation	US RT 60 Highway Bridge	Kenova	Kenova	Wayne
X					Infrastructure	Beech Fork Dam	3900 Beech Fork Road	Lavalette	Wayne
				X	Residence	Lakeview Manor	5100 W US 152	Lavalette	Wayne
X					Infrastructure	Lavalette PSD Water	5308 US 152	Lavalette	Wayne
				X	School	Lavalette ES	1150 Beech fork Road	Lavalette	Wayne
X					Infrastructure	Lavalette PSD	5308 Rte. 152	Lavalette	Wayne
X					Fire	Lavalette VFD	4502 WV 152	Lavalette	Wayne

TABLE 2.4.A REGION 2 ASSETS

Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Infrastructure	North Wayne PSD Sewer	5308 US 152	Lavalette	Wayne
				X	School	Playmates Day Care	5185 Rte. 152	Lavalette	Wayne
	X				Commerce	Aristech Chemical Corp.	200 Big Sandy Road	Neal	Wayne
	X				Commerce	Ashland Chemical	100 Big Sandy Road	Neal	Wayne
	X				Commerce	AXO Nobel Explosives	2625 US 52	Neal	Wayne
	X				Commerce	Kenova Peaker Station	2570 Rte. 52	Neal	Wayne
X					Infrastructure	Kenova Water Plant	US 152	Neal	Wayne
	X				Commerce	Marathon Butane & Propane Cavern	150 Big Sandy River Rod	Neal	Wayne
	X				Commerce	Heartland Intermodal Facility	401 Heartland Road	Prichard	Wayne
X					Government	Prichard DOH Garage	Prichard	Prichard	Wayne
				X	School	Prichard ES	Fire Department Road	Prichard	Wayne
				X	School	Prichard Grade School	519 Prichard Road	Prichard	Wayne
	X				Commerce	Prichard Industrial Park	Industrial Way	Prichard	Wayne
X					Government	Prichard Post Office	295 Prichard Road	Prichard	Wayne
X					Infrastructure	Prichard PSD Sewer	213 Gay Lane	Prichard	Wayne
X					Fire	Prichard VFD/EMS	Fire Department Road	Prichard	Wayne
X					Government	Administrative Annex 2	4 Memorial St	Wayne	Wayne
X					Government	Administrative Annex 1	2 Memorial ST	Wayne	Wayne
X					Transportation	Bus Garage	1302 US Rte. 152	Wayne	Wayne
				X	Residence	Charter House	1607 Mose Aasburry Rd	Wayne	Wayne
X					Government	County Courthouse	707 Hendricks St	Wayne	Wayne
X					Transportation	CSX Main Line Huntington Sub	Wayne	Wayne	Wayne
				X	School	Genoa ES	21269 RT 152	Wayne	Wayne
X					Transportation	Norfolk Southern Pocahontas Division	Wayne	Wayne	Wayne
X					Healthcare	Valley Health	42 McGinnis Drive	Wayne	Wayne
	X				Commerce	Wal-mart Inc.	100 McGuinness Dr.	Wayne	Wayne
X					Government	Wayne 911 Communications Center	1 Hendricks St	Wayne	Wayne
X					Healthcare	Wayne Continuous Care & Rehab	6999 RT 152	Wayne	Wayne
X					Government	Wayne County BOE	212 N Court St	Wayne	Wayne
X					Government	Wayne County Commission	707 Hendricks St	Wayne	Wayne

TABLE 2.4.A REGION 2 ASSETS


























Critical	Economic	Historic	Special	Vulnerable	Description	Asset Name	Address	City/Town	County
X					Healthcare	Wayne County DHHR	26452 East Lynn Road	Wayne	Wayne
				X	School	Wayne County ES	80 Mcginnis Dr.	Wayne	Wayne
X					Healthcare	Wayne County Health Department	217 Kenova Ave	Wayne	Wayne
				X	School	Wayne County HS	100 Pioneer Road	Wayne	Wayne
				X	School	Wayne County MS	200 Pioneer Road	Wayne	Wayne
X					Law Enforcement	Wayne County Sheriff	707 Hendricks ST	Wayne	Wayne
X					Government	Wayne DOH Garage	326 3Rd St Wayne	Wayne	Wayne
				X	School	Wayne Grade School	80 Mcginnis Drive	Wayne	Wayne
				X	School	Wayne High School	1 Pioneer Drive	Wayne	Wayne
X					Law Enforcement	Wayne PD	305 Bluefield St	Wayne	Wayne
X					Infrastructure	Wayne Sewer Plant	308 Bluefield	Wayne	Wayne
X					Fire	Wayne VFD	12345 WV 152 S	Wayne	Wayne
X					Infrastructure	Wayne Water Plant	305 Bluefield St	Wayne	Wayne



REGION 2 HAZARD MITIGATION PLAN

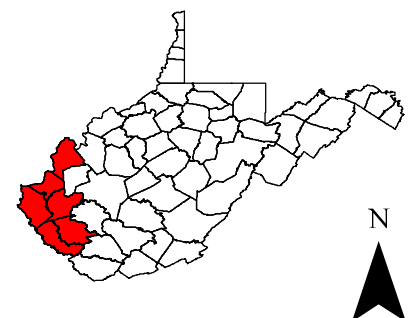
Asset Inventory

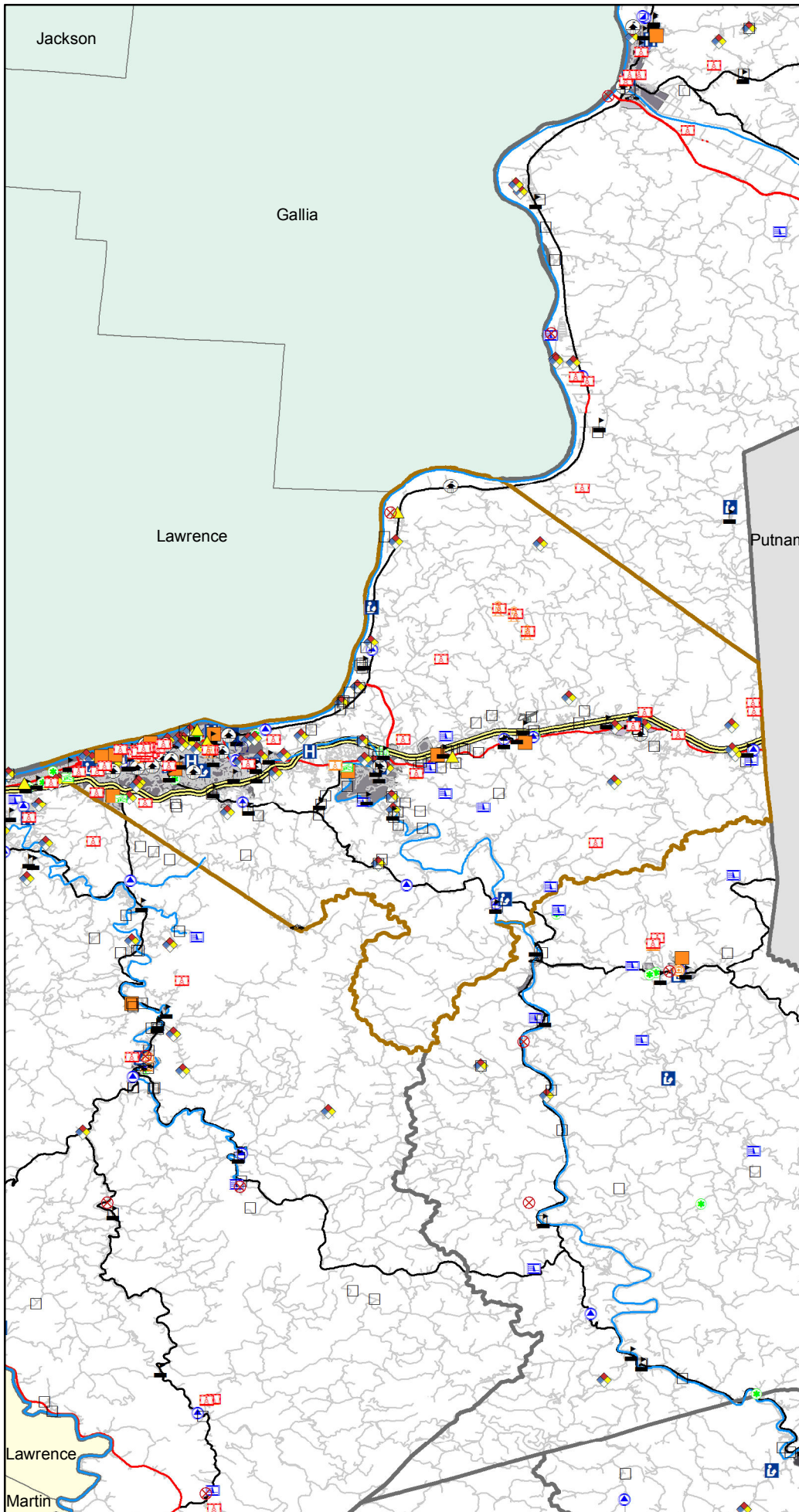
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WV GIS Tech Center

-  Airports
-  Cellular Towers (FCC)
-  Community Health Providers
-  Correctional Institutions
-  Courthouses
-  Dams
-  EMS and Fire
-  EOCs
-  EPA Facilities
-  Hospitals
-  Industrial Buildings
-  Law Enforcement
-  Libraries
-  Microwave Towers (FCC)
-  National Register Sites
-  Nursing Homes
-  Office Buildings
-  Public Health Depts.
-  Schools
-  Solid Waste Facilities
-  TV Towers (FCC)
-  WV Public Broadcasting Towers
-  Weather Stations
-  WVNG Armories
-  WWTPs

0 3 6 12 18 24
Miles

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REGION 2 HAZARD MITIGATION PLAN

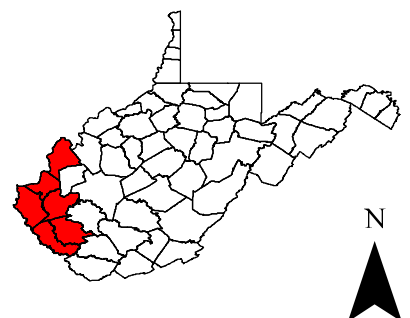
Cabell County Assets

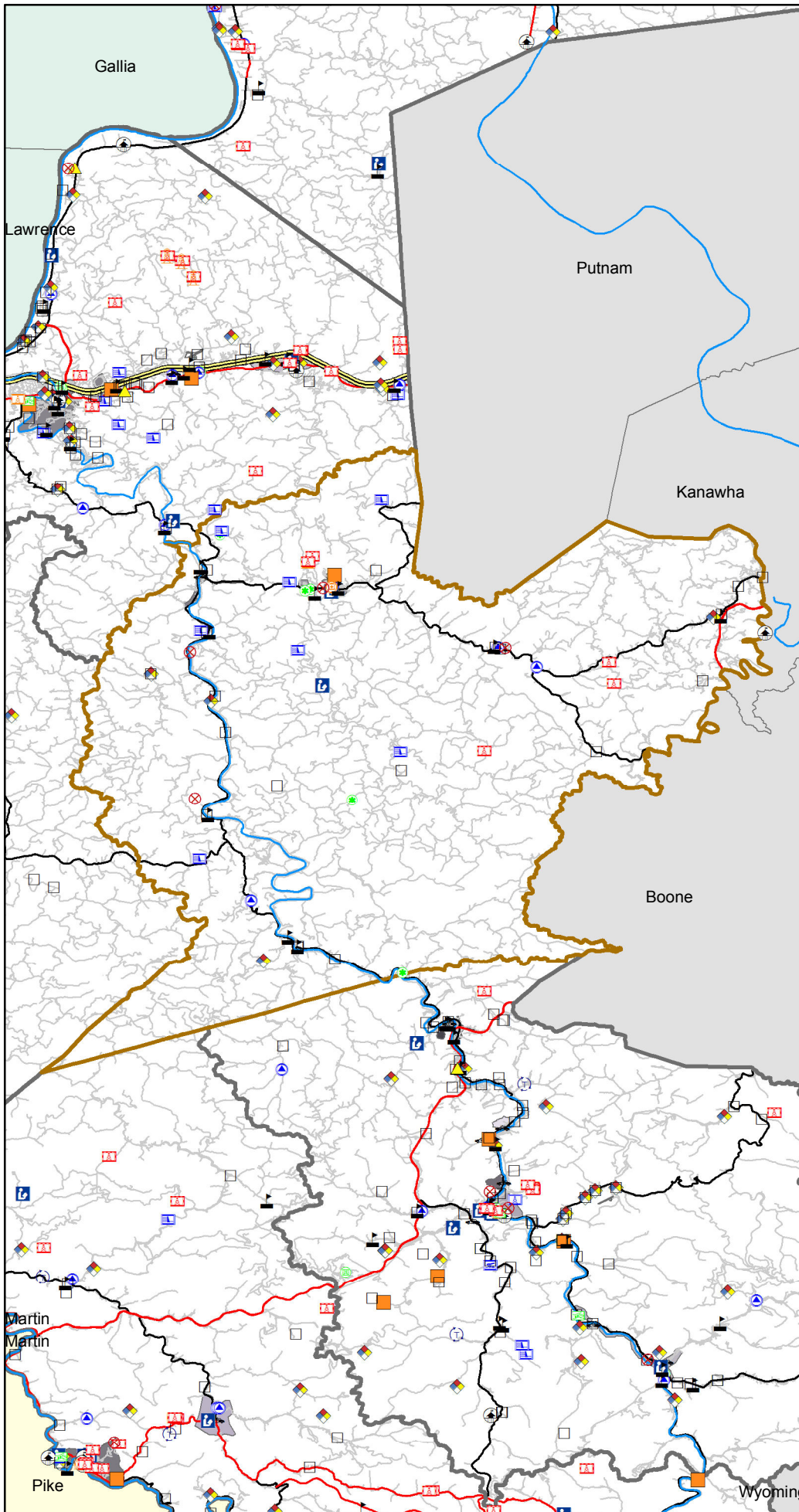
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- Community Health Providers
- Correctional Institutions
- Courthouses
- Dams
- EMS and Fire
- EOCs
- EPA Facilities
- Hospitals
- Industrial Buildings
- Law Enforcement
- Libraries
- Microwave Towers (FCC)
- National Register Sites
- Nursing Homes
- Office Buildings
- Public Health Depts.
- Schools
- Solid Waste Facilities
- TV Towers (FCC)
- WV Public Broadcasting Towers
- Weather Stations
- WWNG Armories
- WWTPs

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Miles

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







REGION 2 HAZARD MITIGATION PLAN

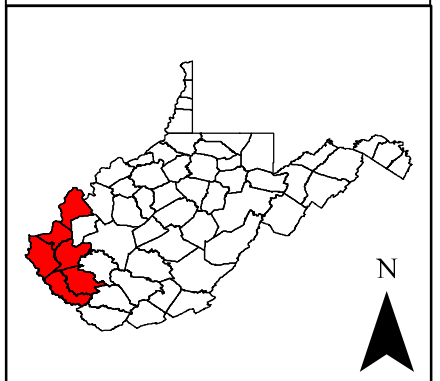
Lincoln County Assets

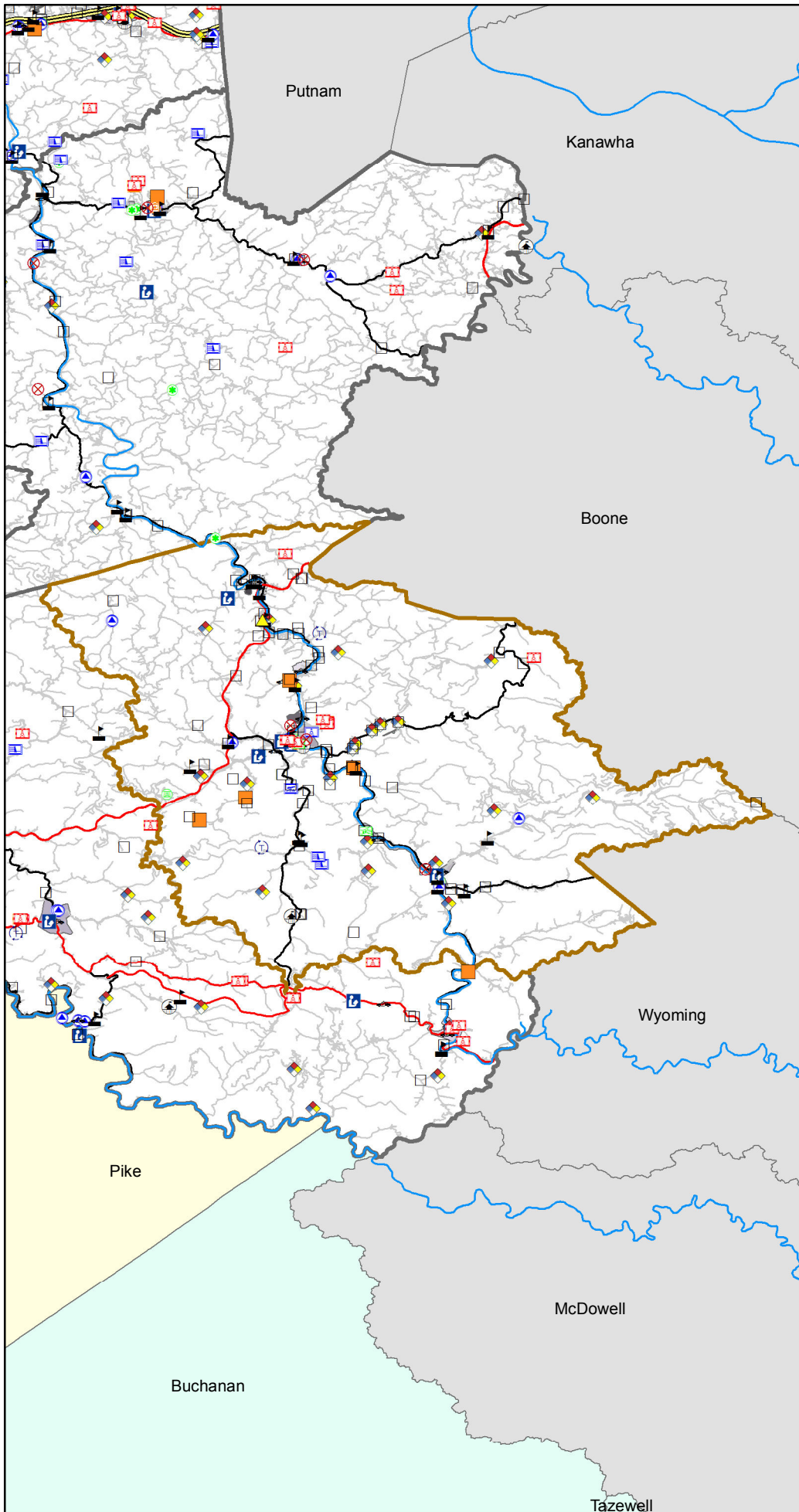
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-  TV Towers (FCC)
-  Microwave Towers (FCC)
-  Cellular Towers (FCC)
-  WV Public Broadcasting Towers
-  Solid Waste Facilities
-  Office Buildings
-  Industrial Buildings
-  WWTPs
-  Schools
-  Public Health Depts.
-  Nursing Homes
-  National Register Sites
-  WVNG Armories
-  Libraries
-  Law Enforcement
-  Hospitals
-  EPA Facilities
-  EOCs
-  EMS and Fire
-  Dams
-  Courthouses
-  Correctional Institutions
-  Community Health Providers
-  Airports

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Miles

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REGION 2 HAZARD MITIGATION PLAN

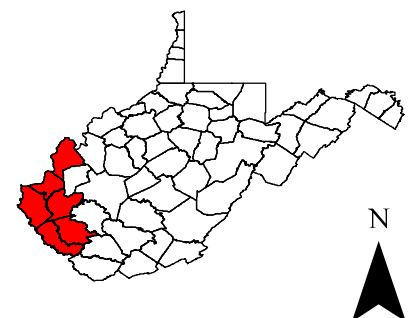
Logan County Assets

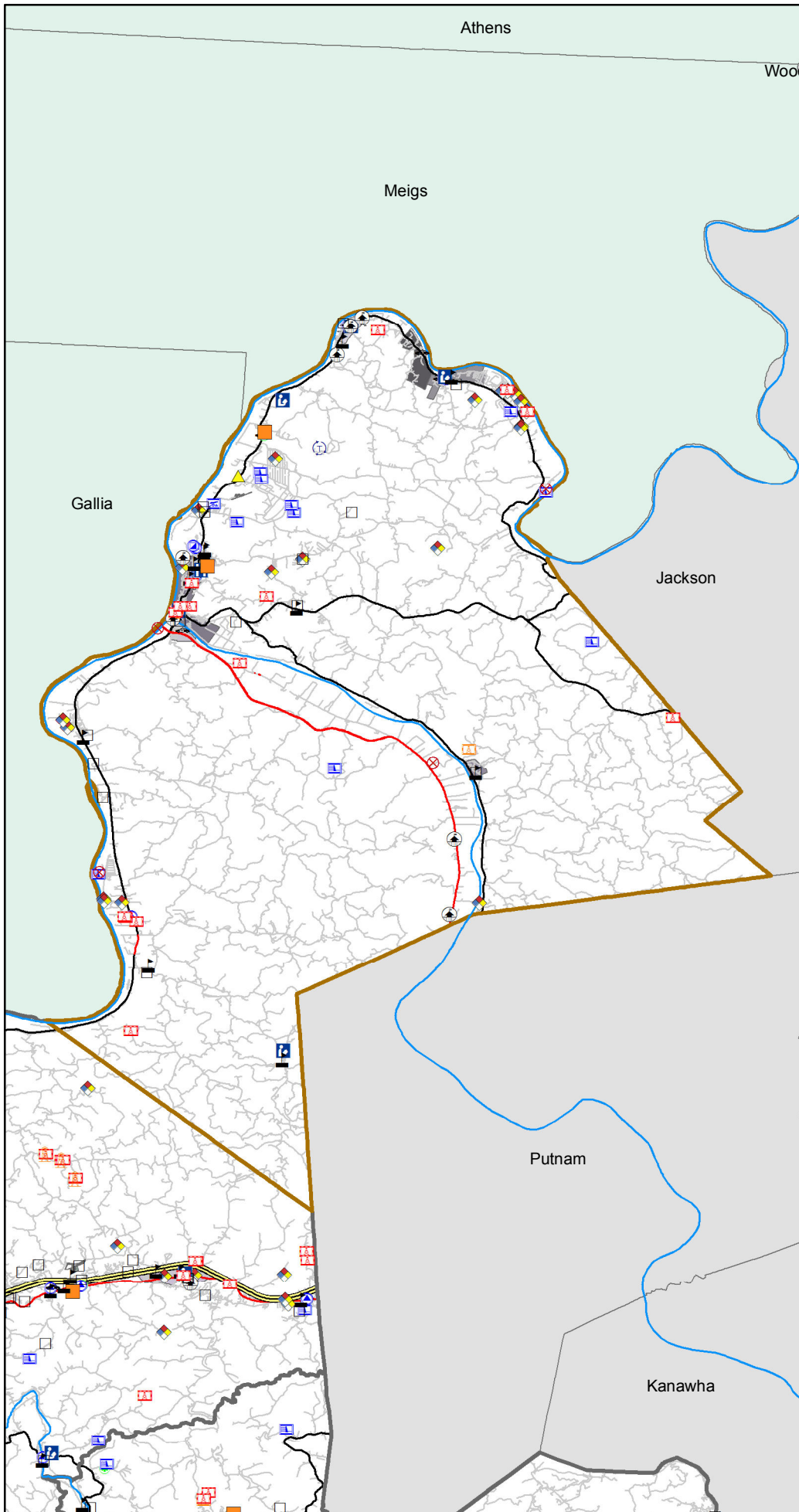
Data Source(s):
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- Microwave Towers (FCC)
- Cellular Towers (FCC)
- WV Public Broadcasting Towers
- Solid Waste Facilities
- Office Buildings
- Industrial Buildings
- WWTPs
- Schools
- Public Health Depts.
- Nursing Homes
- National Register Sites
- WVNG Armories
- Libraries
- Law Enforcement
- Hospitals
- EPA Facilities
- EOCs
- EMS and Fire
- Dams
- Courthouses
- Correctional Institutions
- Community Health Providers
- Airports

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Miles

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REGION 2 HAZARD MITIGATION PLAN

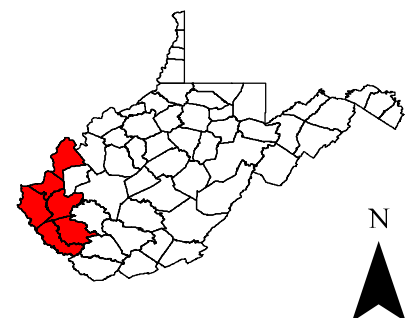
Mason County Assets

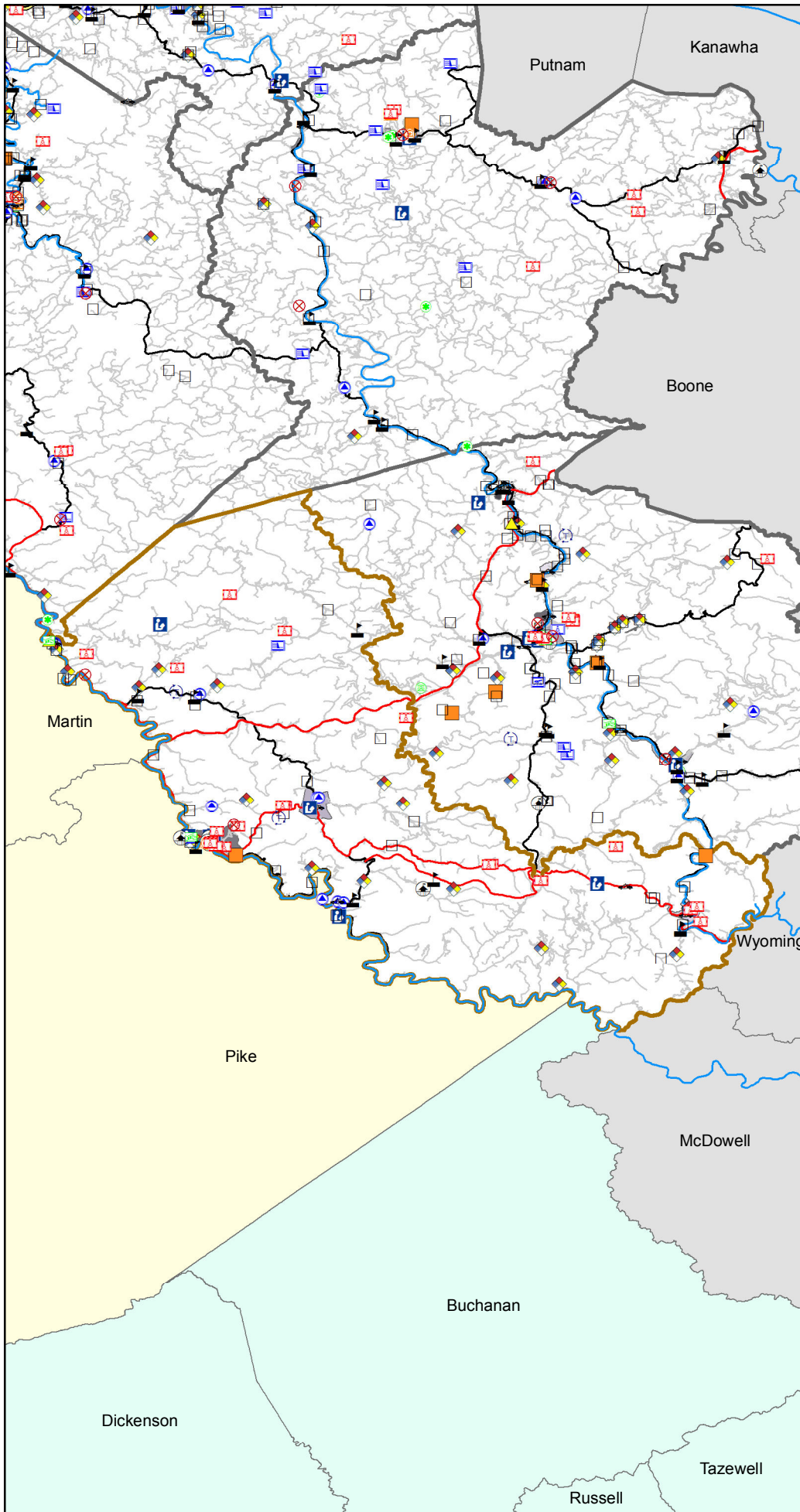
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- Weather Stations
- TV Towers (FCC)
- Microwave Towers (FCC)
- Cellular Towers (FCC)
- WV Public Broadcasting Towers
- Solid Waste Facilities
- Office Buildings
- Industrial Buildings
- WWTPs
- Schools
- Public Health Depts.
- Nursing Homes
- National Register Sites
- WVNG Armories
- Libraries
- Law Enforcement
- Hospitals
- EPA Facilities
- EOCs
- EMS and Fire
- Dams
- Courthouses
- Correctional Institutions
- Community Health Providers
- Airports

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Miles

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REGION 2 HAZARD MITIGATION PLAN

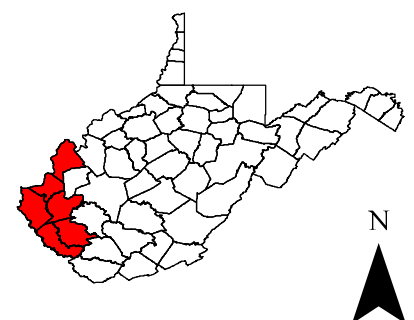
Mingo County Assets

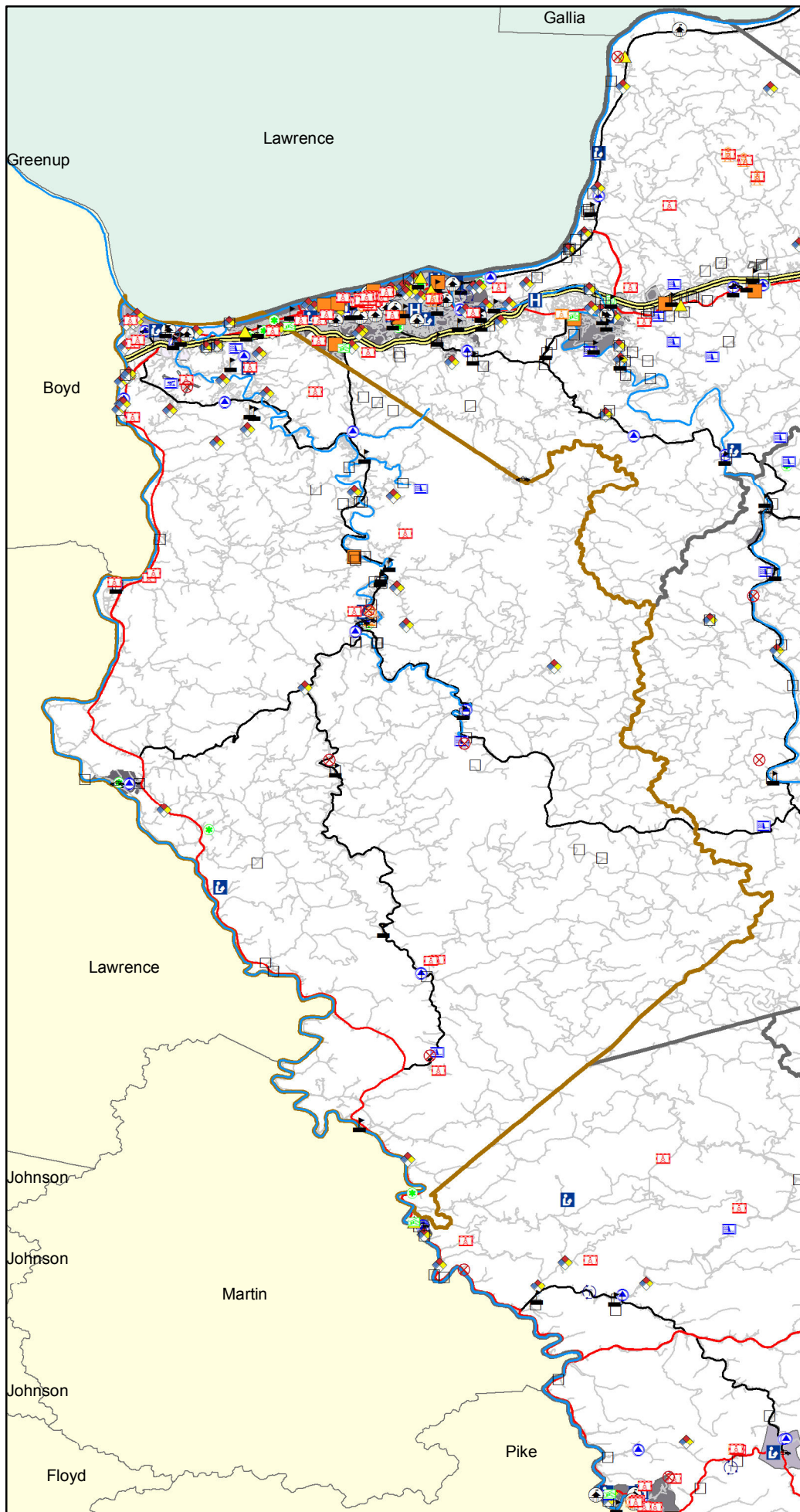
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- TV Towers (FCC)
- Microwave Towers (FCC)
- Cellular Towers (FCC)
- WV Public Broadcasting Towers
- Solid Waste Facilities
- Office Buildings
- Industrial Buildings
- WWTPs
- Schools
- Public Health Depts.
- Nursing Homes
- National Register Sites
- WVNG Armories
- Libraries
- Law Enforcement
- Hospitals
- EPA Facilities
- EOCs
- EMS and Fire
- Dams
- Courthouses
- Correctional Institutions
- Community Health Providers
- Airports

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Miles

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REGION 2 HAZARD MITIGATION PLAN

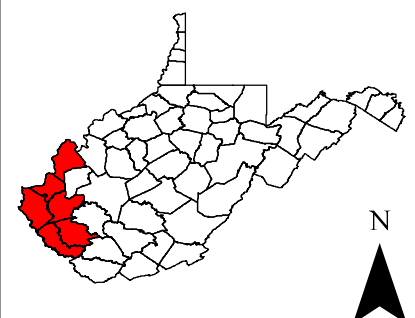
Wayne County Assets

Data Source(s):
WV GIS Tech Center

- Weather Stations
- TV Towers (FCC)
- Microwave Towers (FCC)
- Cellular Towers (FCC)
- WV Public Broadcasting Towers
- Solid Waste Facilities
- Office Buildings
- Industrial Buildings
- WWTPs
- Schools
- Public Health Depts.
- Nursing Homes
- National Register Sites
- WVNG Armories
- Libraries
- Law Enforcement
- Hospitals
- EPA Facilities
- EOCs
- EMS and Fire
- Dams
- Courthouses
- Correctional Institutions
- Community Health Providers
- Airports

0 1.25 2.5 5 7.5 10
Miles

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2.5 DEVELOPMENT TRENDS

§201.6(c)(2)(ii)(C)

[The plan should describe vulnerability in terms of] providing a general discussion of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

When land is developed or redeveloped it can change the general characteristics of a site. For example, if an area was previously forest and in an effort to introduce agriculture it was deforested, the soil would be different and the ecosystem would change and be vulnerable to new hazards. The same goes for buildings and infrastructure; when a site is modified to add new construction, there are many elements developers should consider. In the Region 2 geographic area this is mainly flooding and the effects of severe weather.

There are some challenges to development in the region. According to the Community Economic Development Strategy (CEDS) of 2016, the following is a brief description of those challenges.

- **Outmigration:** Younger generations have and continue to be a major challenge to the advancement and development of the region. The average age of residents continues to stay above 38 years, making its population considerably older on average than similar regions across the country. Loss of labor force, taxes and revenue all are factors that have to be addressed annually and each can be attributed to this phenomena.
- **Increased use of drugs and resulting drug addictions and overdoses:** The local economies are having a difficult time finding applicants to fill positions for jobs due to the inability to pass drug tests. This is occurring at a time when unemployment is well over 13% in the counties located in the southern portion of the region. With the lack of job diversity compiled with the growing drug crisis, the threat to the regional economy is threatened.
- **Infrastructure:** Infrastructure development has been a part of the Region 2 PDC's focus for many years, and advancements have been made throughout each of the six counties. However, though water is plentiful near the rivers, many areas still depend on groundwater from wells to supply residential and commercial needs. In many places, wells regularly run dry or become contaminated from leaking septic tanks or other pollutants. This creates a lack of growth due to water situations. Steps are being taken to create a strong and safe infrastructure for all residents in each of the six counties.

- **Manufacturing:** The region faces an economic threat in terms of a lack of manufacturing locations. Mason County, located along the Ohio River and with rail access, appears to offer great opportunities to attract manufactures to the area. However, even with the efforts of county officials, the development of manufacturing sites has been limited in recent years. Lincoln County, in the latest census data, is shown to have only a few manufacturing sites in the entire county. With the downturn in the coal industry, the labor force will be in need of options. Without growth in the manufacturing sector, the threat of high unemployment and lower wages will continue to be a hindrance to the labor force and the region as whole.

Although there are challenges, there are several organizations and agencies that are working towards overcoming them. One example is the Region 2 Planning and Development Council that has worked with local officials and communities to overcome these challenges. There are over 100 projects in the region that they aim to improve the economy and general wellbeing of the population of the counties. The following is a list of projects that are in some way related to hazard mitigation activities, for example, building facilities that could be potentially used for shelters, improving flooding conditions, creating green infrastructure that can mitigate hazards, etc.

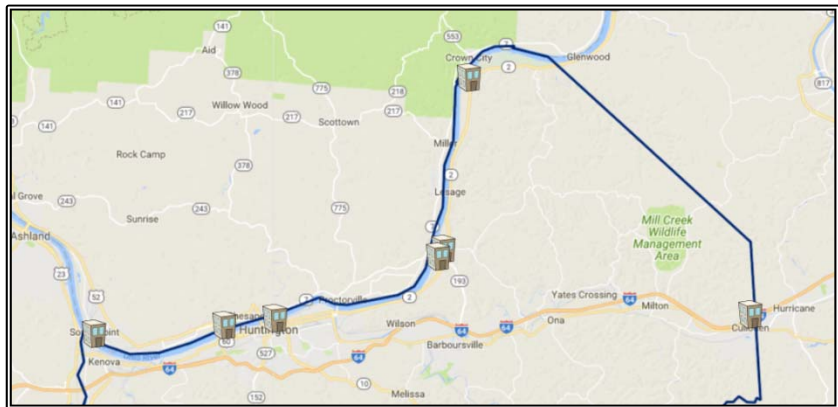
TABLE 2.5.A PROPOSED DEVELOPMENT PROJECTS		
<i>Project</i>	<i>Applicant</i>	<i>Type</i>
Beech Fork State Park Lodge	Wayne County Commission	Building
Rural Substance Abuse Treatment Center	Mingo County Commission	Building
Silver Jackets	Town of Hamlin	Flood Mitigation
Mingo Co. Family Resource Center	Mingo County Commission	Building
Community Health Resource Center	Mingo County Commission	Building
Youth Center Remodeling	Mason County Commission	Building
Lower Mud River Flood Control Project	City of Milton	Flood Control
Floodwall Renovation	City of Huntington	Floodwall
Silver Jackets	Town of New Haven	Flood Mitigation
Town Hall / Multi-Purpose Center	Town of West Hamlin	Building
Neighborhood Revitalization / 11 Areas	Cabell County Commission	Comm. Improv.
Green Infrastructure	City of Huntington	Flood Mitigation
Community Center	Town of Matewan	Building
Landfill	City of Huntington	Landfill
Housing Project	Lincoln County Commission	Housing
Arlington Blvd. Storm and Flood Mitigation	City of Huntington	Mitigation
Combined Sewer / Storm Drainage	City of Point Pleasant	Flood Control

Another entity working to improve conditions in transportation and economy is the

West Virginia Department of Transportation in their port development division; the Cabell/Wayne Port District is being considered for an inland container port. This multimodal facility will be located in Prichard, West Virginia along the Big Sandy River and is currently under study by the West Virginia Department of Transportation, Norfolk Southern Railroad, Nick Rahall Transportation Institute, Marshall University and Clemson University. This inland container port would grant public access to both the international markets of the Virginia Port Authority as well as the Container Port of Columbus, Ohio (WV Department of Transportation, n.d.).

The Huntington Area Development Council (HADCO) maintains listings of available business sites and buildings in the area. HADCO also develops business parks and constructs and manages

available industrial buildings to accommodate business growth. They target manufacturing, metal working, chemicals & polymers, biotechnology, business services and information technology,



healthcare, automotive suppliers, and aerospace sectors. The map above is an illustration of where HADCO has buildings or lots available for development in Cabell County.

Locally, many counties have an Economic Development Authority that list available properties for commercial and industrial use. These include undeveloped land to existing buildings for redevelopment and everything in between, some with and some without utilities.

Lincoln County broadband development has outpaced regional, state, and national speeds. Now, business, government, and economic development leaders in the county are looking to reach out to potential entrepreneurs and corporate interests to make sure they know Lincoln County is at the forefront for data capabilities. At the federal level, West Virginia's two U.S. senators have been vocal on the broadband topic, strongly advocating for improvements, sponsoring legislation, and convening roundtable gatherings (O'Donoghue, n.d.).

3.0 ACTION PLAN

2017 UPDATE

The committee changed the goals and objectives in this plan update after discussions during meetings to present a more unified approach to mitigation in the region. All the projects from the previous plan have been addressed as per their status and some jurisdictions added new projects according to their current mitigation activities or issues or hazards they face in their communities.

SECTION OVERVIEW

The action plan contains information on goals that the steering committee decided upon and projects that the jurisdictions updated or created. This section explains in further detail the process by which goals were established and how existing and new projects were prioritized.

3.1 HAZARD MITIGATION GOALS AND OBJECTIVES

§201.6(c)(3)(i)	[The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.
-----------------	--

Local mitigation goals have changed since the previous hazard mitigation plan update. The steering committee reviewed the list of goals and objectives from the previous plan and noticed that many were repeated or very similar in nature and that the list of goals was long and unmanageable. After some discussion about best practices, the committee determined that they would consider the existing list but create a new one. They set one overall regional goal and few objectives that every jurisdiction's projects would work toward achieving. In essence, all projects from all jurisdictions will work through objectives to achieve the overall regional goal.

The goal and objectives are not specific to any one hazard; rather can apply to all hazards identified in the risk assessment. The committee determined the objectives after discovering project themes from current and past mitigation projects. Generally, the projects aligned into five themes: regulation, infrastructure protection, education, flooding, and preparedness activities.

GOAL: Enhance resiliency by lessening the loss of life and property from the impacts of all hazards in Cabell, Lincoln, Logan, Mason, Mingo, and Wayne Counties and the jurisdictions therein.

OBJECTIVE 1: Create and enforce codes, rules, regulations, ordinances, and programs that reduce the vulnerability of the population and the built environment to the impact of hazards.

OBJECTIVE 2: Protect critical infrastructure from all hazards throughout the region.

OBJECTIVE 3: Educate and train local officials and responders as well as the public on hazards and the different measures they can implement to reduce the impacts.

OBJECTIVE 4: Focus efforts toward mitigating riverine and nuisance flooding in the region.

OBJECTIVE 5: Continue to engage and participate in ongoing preparedness activities, partnerships and programs that could reduce loss of or damage to life and property.

The mitigation goals from the 2012 plan are outlined below. In general, they aim to reduce the negative effects from hazards to the region, which is now the overall regional goal.

1. Lessen flood related losses throughout region.
2. Reduce the negative effects of severe winter storms throughout the region.
3. Reduce the negative effects of severe thunderstorms throughout the region
4. Reduce damage from severe wind and tornadoes throughout the region.
5. Lessen the effects of landslides throughout the region.
6. Lessen hail damage throughout the region.
7. Reduce the negative effects of drought throughout the region.
8. Protect the population and forests from wildfire throughout the region.
9. Reduce the negative effects of land subsidence.
10. Reduce the negative effects of landslides throughout the region.
11. Reduce the negative effects of utility failures throughout the region.
12. Protect the general public from the risk of a bomb threat throughout the region.
13. Reduce the negative effects of a communication failure throughout the region.
14. Protect the general public from hazardous material incidents throughout the region.
15. Protect the general public from dam failures throughout the region.
16. Education.

3.2 PROJECT IMPLEMENTATION

§201.6(c)(3)(ii) [The mitigation strategy shall include 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.

§201.6(c)(3)(iii) [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) 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.

This portion of the plan builds on the goal and objectives presented in [Section 3.1](#). It actualizes the “action plan” portions of the hazard mitigation planning requirement. The following tables will provide specific mitigation projects for the jurisdictions participating in this update. Significantly and in accordance with one of the PDC and steering committee’s 2017 planning priorities, several other government agencies/departments, community groups, private sector organizations, etc. may also under mitigation actions. These efforts may not be included in the mitigation plan because their organizers were not aware of the planning process or otherwise did not participate in the effort. The 2017 update identified these efforts and included extensions of them in the project list below. Future updates should continue to identify these types of projects and their organizers.

TABLE 3.2.A PREVIOUS MITIGATION EFFORTS CONTRIBUTING TO REGIONAL RESILIENCY, BUT UNAFFILIATED WITH THE 2012 VERSION OF THIS PLAN	
<i>Mitigation Effort</i>	<i>Hazard of Concern</i>
Formation and regular meetings of the Cabell-Wayne Homeland Security Committee	Acts of Violence
Ceredo floodwall	Dam/Floodwall Failure Flood
Huntington floodwall	Dam/Floodwall Failure Flood
Matewan floodwall	Dam/Floodwall Failure Flood
Point Pleasant floodwall	Dam/Floodwall Failure Flood
Williamson floodwall	Dam/Floodwall Failure Flood
KYOVA mobility study regarding stormwater flow through Huntington and backup in underpasses under the rail line	Flood
Integrating green infrastructure into hazard mitigation planning, Huntington case study (partnership with U.S. EPA)	Flood
Fourpole Creek Watershed Association stream cleaning projects	Flood

TABLE 3.2.A PREVIOUS MITIGATION EFFORTS CONTRIBUTING TO REGIONAL RESILIENCY, BUT UNAFFILIATED WITH THE 2012 VERSION OF THIS PLAN	
<i>Mitigation Effort</i>	<i>Hazard of Concern</i>
Fourpole Creek Watershed Association tree plantings	Flood
Fourpole Creek Watershed Association rain barrel workshops	Flood
Tug Fork Watershed Association 319 non-point source pollution projects	Flood
Guyandotte River water trail	Flood
Lincoln County private water crossings mitigation through VOAD	Flood
Williamson FD partnership with AEP to identify problem streetlights and service connections throughout the city	Severe Summer Weather Severe Winter Weather
Amp Gymnastic bioretention cell at Kinetic Park, Huntington	Flood
Bioretention cell at residential apartment complex on 10 th Street, Huntington	Flood
Cabell-Huntington Hospital parking lot bioretention cells (13 th Avenue & Cypress Street, 15 th Street, and 16 th Street)	Flood
CVS Pharmacy bioretention cell on Fifth Avenue, Huntington	Flood
Dollar General bioretention cell on Monroe Avenue, Huntington	Flood
Family Dollar bioretention cell on Waverly Road, Huntington	Flood
RMS Pro Finishes bioretention cell on Third Avenue, Huntington	Flood
Sheetz bioretention cell on Fifth Avenue, Huntington	Flood
Belton bioretention cell on 6 th Avenue, Huntington	Flood
Bioretention cell at residential apartments on 6 th Avenue, Huntington	Flood
Taco Bell bioretention cell at Kinetic Park, Huntington	Flood
Atomic Distribution bioretention cell on 7 th Avenue, Huntington	Flood
Bimbo Bakery parking lot bioretention cell at 14 th Street West & Adams, Huntington	Flood
St. Mary's Hospital bioretention cell on 1 st Avenue, Huntington	Flood
Texas Roadhouse bioretention cell on US Route 60, Huntington	Flood
Uptowner Inn impoundment lot bioretention cell at Madison Avenue & 16 th Street West, Huntington	Flood
Huntington Gardens infiltration system on Doultan Avenue, Huntington	Flood
Sheetz infiltration system on 6 th Avenue, Huntington	Flood
River Park Hospital Gym porous pavement installation on 6 th Avenue, Huntington	Flood
Sheetz porous pavement installation at 6 th Avenue & 8 th Street, Huntington	Flood
Porous pavement installation at residential apartments on 6 th Avenue, Huntington	Flood
Buffalo Crossing Development porous pavement installation on Third Avenue, Huntington	Flood
Porous pavement installation at a parking lot on First Street, Huntington	Flood
Cookout Restaurant porous pavement installation on 25 th Street, Huntington	Flood
Taco Bell stormwater planters at Kinetic Park, Huntington	Flood
Milton Middle School porous pavement installation	Flood
WV Silver Jackets Lincoln County mapping initiative	Flood
WV Silver Jackets New Haven stormwater management planning	Flood
Guyandotte River watershed mapping initiative	Flood

Jurisdictional projects below are listed with a timeframe, primary coordinator, support agencies, potential funding source (and cost estimate), and its current status. It is important to note that the cost estimates are tentative and meant as a starting point for research on project feasibility. More specifically, these cost estimates are only ranges of probable project costs; all figures are approximations. At the time the implementation of any strategy is

considered, a full cost estimate should be sought prior to securing funding. Possible funding sources identified include:

- Community Development Block Grant (CDBG)
- Flood Mitigation Assistance Grant
- Hazard Mitigation Grant Program (HMGP)
- Increased Cost of Compliance
- In-Kind Work (Work or Labor)
- Local Funds
- Pre-Disaster Mitigation Grant (PDM)
- Repetitive Flood Claims Program
- Severe Repetitive Loss Grant
- State Funds
- Other (includes N/A)

The benefit-cost review was emphasized in the prioritization process. Mitigation actions were evaluated by their pros and cons, which are represented as costs and benefits.

Project prioritization criteria were established during the third committee meeting utilizing the project prioritization matrix. Committee members were asked to rate each project on six criteria using a one to five scale where five is best. The criteria used are:

- **Ease of Implementation:** Do local policies and capabilities currently allow for the implementation of the project? Are programs available to assist in funding the implementation of the project?
- **Cost Effectiveness:** Is sufficient funding available to implement the project at a cost manageable by the local government? If not, is funding available? Will the costs of implementing the project be significantly less than the cumulative future costs potentially incurred by an un-corrected situation?
- **Social Impacts:** Will the public perceive the project as positively lessening hazard-related losses? Will implementing the project adversely affect any segment of the population?
- **Political Impacts:** Will implementing the project create negative political issues?
- **Economic Impacts:** Is the cost/benefit ratio of implementing the project acceptable? Will implementing the project adversely affect the local economy?

- **Overall Positive Impact;** Do local leaders generally agree that implementing the project will be beneficial to the community?

For example, if a jurisdiction has five mitigation projects, the project number will be identified in the top row. Then each project will be given between 1 and 5 (5 being the best) points for each criterion. The points are tallied and the project with the most points will be the first priority. If two or more projects score the same amount of points, they are considered a tie and given the same priority. The table to the right is filled out as an example. In this example, project number 4 was ranked the highest so therefore it is the number one priority for the jurisdiction, followed by project 2, then a tie between projects 1 and 3 and finally, project number 5.

TABLE 3.2.B PROJECT PRIORITIZATION MATRIX EXAMPLE					
PROJECT → CRITERIA ↓	1	2	3	4	5
<i>Ease of Implementation</i>	5	2	3	4	2
<i>Cost Effectiveness</i>	1	3	3	2	4
<i>Social Impact</i>	3	2	2	5	2
<i>Political Impact</i>	5	4	3	3	1
<i>Economic Impact</i>	1	3	5	4	2
<i>Overall Positive Impact</i>	3	5	2	3	3
TOTAL	18	19	18	21	14
PRIORITY	3	2	3	1	5

TABLE 3.2.C REGION 2 HAZARD MITIGATION PLAN PROJECTS													
<i>Jurisdiction</i>	<i>County</i>	<i>Project Identification</i>	<i>Hazard of Concern</i>	<i>Priority</i>	<i>Project</i>	Status	2017 Status Active/Inactive	Corresponding Objective	Timeframe	Lead Agency	Support Agency(ies)	Cost Estimate	Funding Source
All Jurisdictions	Regional	Regional 1	All Hazards	1	Implement public awareness campaigns regarding all hazards via social media sites (Revised 2012 Project 8.1.1)	New	Active	3, 5	On-going	All County Commissions All County EM Agencies	All County Commissions All County EM Agencies	Minimal	Local funds In-kind funds
All Jurisdictions	Regional	Regional 2	All Hazards	3	Update and maintain mutual aid agreements amongst each county in Region 2 regarding resources that could be required for response to all hazards.	New	Active	3, 5	On-going	All County Commissions All County EM Agencies	All County Commissions All County EM Agencies	Minimal	Local funds In-kind funds
All Jurisdictions	Regional	Regional 3	All Hazards	2	Build partnerships with media providers to ensure the dissemination of early warning information and support municipalities in becoming storm ready through the NWS (Revised 2012 Project 5.1.1)	New	Active	3, 5	On-going	Region 2 PDC	All County Commissions All County EM Agencies Regional media outlets National Weather Service	Minimal	Local funds In-kind funds
All Jurisdictions	Regional	Regional 4	All Hazards	4	Support jurisdictional efforts to identify critical infrastructure; seek funding opportunities to equip said facilities with auxiliary power (i.e., generators).	New	Active	2	On-going	Region 2 PDC	All County EM Agencies	Up to \$50,000, depending on generator & facility needs	PDM HMGP
All Jurisdictions	Regional	Regional 5	All Hazards	5	Offer education and training to PDC and jurisdictional leaders about opportunities for integrating mitigation into other planning efforts.	New	Active	5	5 years	Region 2 PDC	FEMA	N/A	N/A
Barboursville	Cabell County	Barboursville 1	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	Village Council FEMA	\$114,000 per purchased home	HMGP
Barboursville	Cabell County	Barboursville 2	All Hazards	1	Conduct a study of Mud River flooding in the new Tanyard Station development area due to new construction causing runoff.	New	Active	5	3 years	Village Council	Cabell County OES Floodplain Manager	Up to \$75,000, contingent on professional services fees	PDM State funds
Cabell County	Cabell County	Cabell County 1	Opioid Crisis	5	Endeavor to open more drug rehabilitation centers to address the growing opioid crisis.	New	Active	1, 3	5 years	Cabell County Commission	Cabell County Health Department Local Hospitals and Clinics	Up to \$5,000,000 for in-patient facility; up to \$30,000 per 30-day treatment program	N/A
Cabell County	Cabell County	Cabell County 10	Flood	11	Provide a community-wide service to anchor mobile homes for qualifying citizens and encourage private individuals to anchor their own mobile homes. (2012 Project - No ID).	Ongoing. Identify areas for pre mitigation.	Active	1, 3, 4	5 years	Cabell County Commission	County Planning Departments Floodplain Managers	Minimal	Local funds
Cabell County	Cabell County	Cabell County 11	Flood	11	Familiarize the community with the risk of "convergence zone" type flooding. A Convergence Zone is caused when low atmospheric pressure combines with severe weather causing overflow and watershed backup. (2012 Project - No ID)	Ongoing. Seek community and media involvement.	Active	3,4	2 years	Cabell County Public Works Department	Floodplain Manager City/County Planning Offices	Minimal (if added into existing outreach efforts)	Local funds
Cabell County	Cabell County	Cabell County 12	Flood	12	Encourage businesses and citizens in historic flood areas to elevate their structures and valuables out of harms way. (2012 Project - No ID).	Ongoing. Seek community involvement.	Active	2, 3, 4	2 years	Floodplain Coordinator	Cabell County OES	Minimal (if added into existing outreach efforts)	Local funds
Cabell County	Cabell County	Cabell County 13	Land Subsidence	12	Identify and implement community-wide erosion control measures. Utilize public access television to include programming on how to define the problem and how to mitigate and live with the effects of erosion. (2012 Project - No ID).	Ongoing. Continue Implementation.	Active	3	5 years	Cabell County OES	CCERC-911 City/County Planning Departments Public Works Departments Department of Natural Resources WV DOH Army Corps of Engineers USDA Soil Conservation Office	Minimal (utilizing public access programming should minimize costs)	Local funds
Cabell County	Cabell County	Cabell County 14	All Hazards	11	Expand real estate disclosure to include all hazards. (2012 Project - No ID).	Ongoing. Expand disclosures to include all hazards.	Active	1, 3	4 years	Public Works Department	City/County Planning Departments Local Real Estate Agents	Minimal	Local funds
Cabell County	Cabell County	Cabell County 15	All Hazards	4	Examine the feasibility of implementing building codes requiring underground utilities for new development where possible. (2012 Project - No ID).	Ongoing. Continue to seek software for permits.	Active	1, 4	2 years	Cabell County Commission	City/County Planning Departments Floodplain Managers Local Utilities	Minimal	Local funds

<i>Jurisdiction</i>	<i>County</i>	<i>Project Identification</i>	<i>Hazard of Concern</i>	<i>Priority</i>	<i>Project</i>	<i>Status</i>	<i>2017 Status Active/Inactive</i>	<i>Corresponding Objective</i>	<i>Timeframe</i>	<i>Lead Agency</i>	<i>Support Agency(ies)</i>	<i>Cost Estimate</i>	<i>Funding Source</i>
Cabell County	Cabell County	Cabell County 16	All Hazards	18	Pursue recovery recommendations from FEMA to allow the Federal Highway Authority to administer both the on and off road system disaster repair recovery program. (2012 Project - No ID)	Ongoing. Continue to pursue.	Active	2, 5	4 years	Public Works Department	WVDOH FEMA FHA	N/A	N/A
Cabell County	Cabell County	Cabell County 17	Flood* †	1	Acquisition	Ongoing.	Active	4	1 year	Cabell County OES	WVDHSEM FEMA	\$96,678.38	HMGP
Cabell County	Cabell County	Cabell County 18	Flood	1	Create a watershed plan per 319 non-point source pollution efforts.	New	Active	4	3 years	Four Pole Creek Watershed Association	County Planning Department Floodplain Managers Region 2 PDC	N/A	State funds
Cabell County	Cabell County	Cabell County 2	Hazmat	3	Apply for grants for training and necessary equipment to increase hazmat response capabilities.	New	Active	5	2 years	Cabell County LEPC	Local Fire Departments	\$5,000 per project	HMEP
Cabell County	Cabell County	Cabell County 3	Flood*	11	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects and turn the area into a green space.	New	Active	4	5 years with periodic reviews of status	Cabell County OES	FEMA Floodplain Manager	\$114,000 per purchased home	HMGP
Cabell County	Cabell County	Cabell County 4	Acts of Violence	18	Consider mandating rehabilitation and/or longer jail time for crimes relating to drug abuse.	New	Active	1	2 years	Cabell County Commission	Cabell County Commission Cabell County Sheriff Local Law Enforcement	N/A	N/A
Cabell County	Cabell County	Cabell County 5	Flood	5	Distribute National Flood Insurance Program (NFIP) information in utility bills on an annual basis prior to flood season. The program lead for this strategy would require the NFIP to coordinate with the local utility companies to provide and distribute the information. The local floodplain administrators would serve as the points of contact and coordination with the NFIP. (2012 Project - No ID).	Ongoing. Seek funding for implementation	Active	4	1 year	Floodplain Coordinator	Local Utilities	N/A	Local funds
Cabell County	Cabell County	Cabell County 6	Flood	5	Distribute NFIP information through the Assessor's Office with the tax statements each year. This would require coordination with the Assessor's Office, Data Processing and the local floodplain administrators. (2012 Project - No ID)	Ongoing. Continue to apply for funding	Active	4	1 year	Floodplain Coordinator	Cabell County Assessor's Office Local Floodplain Coordinators	N/A	Local funds
Cabell County	Cabell County	Cabell County 7	All Hazards	8	Develop a plan to maintain an available supply of safety and emergency preparedness supplies. (2012 Project - No ID).	Ongoing. Continue to help with coordination.	Active	5	6 months	Cabell County OES	CCERC-911 American Red Cross Public Works Departments Floodplain Manager	N/A	Local funds
Cabell County	Cabell County	Cabell County 8	Flood	10	Streamline environmental compliance requirements for pre-flood prevention activities. (2012 Project - No ID).	Ongoing. Update countywide permit process.	Active	1, 4	3 years	Cabell County OES	CCERC-911 Public Works Departments Development Offices Army Corps of Engineers USDA Soil Conservation Office	N/A	N/A
Cabell County	Cabell County	Cabell County 9	Flood	9	Pursue FEMA Disaster Mitigation Grants which include mitigation measures for the private sector for multi-hazard risks. (2012 Project - No ID).	Ongoing. Some completed, some pending.	Active	4	3 years	Cabell County OES	CCERC-911 Floodplain Manager Public Works Departments Planning Offices	Varies	PDM HMGP
Ceredo	Wayne County	Ceredo 1	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	FEMA Town Council	\$85,000 per purchased home	HMGP
Ceredo	Wayne County	Ceredo 2	All Hazards	1	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flooding from stormwater backup) to develop future mitigation strategies.	New	Active	5	1 year	Town Council	Wayne County OES Floodplain Manager	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Chapmanville	Logan County	Chapmanville 1	Flood	4	Periodically clean culverts and prioritize culvert replacements (2012 Project 4.2.1).	Ongoing	Active	4	5 years ongoing	Town Council	WV DOH	N/A	State funds
Chapmanville	Logan County	Chapmanville 2	Flood	1	Develop a regular stream cleaning schedule (2012 Project 4.3.2)	Ongoing	Active	4	6 months	Town Council	Army Corps of Engineers USDA Natural Resource Center	N/A	N/A

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Chapmanville	Logan County	Chapmanville 3	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects. (Revised 2012 Project 4.4.1)	Ongoing	Active	4	5 years with periodic reviews of status	Town Council	FEMA Floodplain Managers	\$85,600 per purchased home	HMGP
Chapmanville	Logan County	Chapmanville 4	Severe Summer Weather	3	Promote new construction and/or roof remodeling projects to withstand 90 mph wind loads per the building permit process (2012 Project 12.2.1)	Ongoing	Active	1, 5	2 years	Town Council	Municipal Code Enforcement	Minimal (through existing permitting processes)	Local funds
Delbarton	Mingo County	Delbarton 1	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$70,600 per purchased home	HMGP
Delbarton	Mingo County	Delbarton 2	All Hazards	1	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flooding from stormwater backup) to develop future mitigation strategies.	New	Active	5	1 year	Town Council	Mingo County EM Floodplain Manager	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Fort Gay	Wayne County	Fort Gay 1	Flood	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects. (Revised 2012 Project 1.5.1)	Ongoing	Active	4	5 years with periodic reviews of status	Floodplain Manager	FEMA Town Council	Up to \$85,000 per purchased home	HMGP
Fort Gay	Wayne County	Fort Gay 2	All Hazards	1	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flooding from stormwater backup) to develop future mitigation strategies.	New	Active	5	1 year	Town Council	Wayne County OES Floodplain Manager	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Gilbert	Mingo County	Gilbert 1	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects. (Revised 2012 Project 1.5.1)	Ongoing	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$70,600 per purchased home	HMGP
Gilbert	Mingo County	Gilbert 2	All Hazards	1	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flooding from stormwater backup) to develop future mitigation strategies.	New	Active	5	1 year	Town Council	Mingo County EM Floodplain Manager	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Hamlin	Lincoln County	Hamlin 1	Flood	2	Update the plan to monitor and clean storm water drainage systems within municipalities (2012 Project 1.1.1)	Ongoing	Active	1,4	3 years	Floodplain Manager	Floodplain Manager Town Council FEMA	N/A	N/A
Hamlin	Lincoln County	Hamlin 2	Flood*	1	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Lincoln County EMA	Floodplain Manager Town Council FEMA	\$82,400 per purchased home	HMGP
Hartford	Mason County	Hartford 1	Flood	1	Identify areas in which storm water backs up – primarily in municipalities – and determine the costs of corrective actions (2012 Project 4.1.1).	Ongoing	Active	4	1 year	Floodplain Manager	Local PSDs	Minimal	Local funds
Hartford	Mason County	Hartford 2	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$76,900 per purchased home	HMGP
Henderson	Mason County	Henderson 1	Flood	1	Identify areas in which storm water backs up – primarily in municipalities – and determine the costs of corrective actions (2012 Project 4.1.1).	Ongoing	Active	4	1 year	Floodplain Manager	Local PSDs	Minimal	Local funds
Henderson	Mason County	Henderson 2	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 4.3.4)	Ongoing	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$76,900 per purchased home	HMGP
Huntington	Cabell County	Huntington 1	Flood	4	Provide for an engineering study to propose and prepare plans to remove the flooding threat of Fourpole Creek.	New	Active	2, 4	2 years	Huntington Storm Water Utility	City of Huntington Public Works City of Huntington Planning & Development WV Silver Jackets	N/A (per pursuit of partnerships)	N/A
Huntington	Cabell County	Huntington 2	Flood	3	Upgrade, refurbish and rehabilitate 17 floodwall pumping stations and all gate openings to current technology and standards.	New	Active	2, 4	5 years	Huntington Storm Water Utility	Army Corps of Engineers Floodplain Manager City Council	Up to \$175,000 per pump	USACE State funds Local funds

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Huntington	Cabell County	Huntington 3	Flood*	5	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	City Council FEMA	\$114,000 per purchased home	HMGP
Huntington	Cabell County	Huntington 4	All Hazards †	1	11th Street Pump Station	Ongoing	Active	5	1 year	Huntington Storm Water Utility	WVDHSEM FEMA	\$1,063,810	HMGP
Huntington	Cabell County	Huntington 5	All Hazards †	1	Automatic Pumps	Ongoing	Active	5	1 year	Huntington Storm Water Utility	WVDHSEM FEMA	\$1,116,965	HMGP
Kenova	Wayne County	Kenova 1	Flood	1	Continue coordinating with the WVDOH to conduct culvert inspections/cleaning throughout the county. Protect bridges and roadways from flooding hazards (2012 Project 1.2.1).	Ongoing	Active	2, 4	5 years with periodic reviews of status	Public Works	WVDOH	Minimal (coordination should require little additional funding)	Local funds
Kenova	Wayne County	Kenova 2	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	FEMA Town Council	\$85,000 per purchased home	HMGP
Kermit	Mingo County	Kermit 1	Flood	1	Continue coordinating with the WVDOH to conduct culvert inspections/cleaning throughout the county. Protect bridges and roadways from flooding hazards (2012 Project 1.2.1).	Ongoing	Active	2, 4	5 years with periodic reviews of status	Public Works	WVDOH Floodplain Manager	Minimal (coordination should require little additional funding)	Local funds
Kermit	Mingo County	Kermit 2	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$70,600 per purchased home	HMGP
Leon	Mason County	Leon 1	Flood	1	Identify areas in which storm water backs up – primarily in municipalities – and determine the costs of corrective actions (2012 Project 4.1.1).	Ongoing	Active	4	1 year	Floodplain Manager	Local PSDs	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Leon	Mason County	Leon 2	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$76,900 per purchased home	HMGP
Lincoln County	Lincoln County	Lincoln County 1	Flood	17	Educate the public in non-compliant development areas about permitting in flood zones.	New	Active	1, 3, 4	On-going	Lincoln County EMA	Lincoln County Code Enforcement Floodplain Managers	Up to \$2,500 per campaign	Local funds
Lincoln County	Lincoln County	Lincoln County 10	Flood* †	1	Acquisition 1	Ongoing	Active	4	1 year	Lincoln County EMA	WVDHSEM FEMA	\$622,810	HMGP
Lincoln County	Lincoln County	Lincoln County 11	Flood* †	1	Acquisition 2	Ongoing	Active	4	1 year	Lincoln County EMA	WVDHSEM FEMA	\$323,352	HMGP
Lincoln County	Lincoln County	Lincoln County 12	Flood* †	1	Acquisition 3	Ongoing	Active	4	1 year	Lincoln County EMA	WVDHSEM FEMA	\$608,310	HMGP
Lincoln County	Lincoln County	Lincoln County 13	Flood* †	1	Acquisition 4	Ongoing	Active	4	1 year	Lincoln County EMA	WVDHSEM FEMA	\$638,628	HMGP
Lincoln County	Lincoln County	Lincoln County 14	Flood* †	1	Acquisition 5	Ongoing	Active	4	1 year	Lincoln County EMA	WVDHSEM FEMA	\$744,468	HMGP
Lincoln County	Lincoln County	Lincoln County 15	Flood* †	1	Acquisition 6	Ongoing	Active	4	1 year	Lincoln County EMA	WVDHSEM FEMA	\$522,240	HMGP
Lincoln County	Lincoln County	Lincoln County 16	Flood* †	1	Acquisition 7	Ongoing	Active	4	1 year	Lincoln County EMA	WVDHSEM FEMA	\$1,062,900	HMGP
Lincoln County	Lincoln County	Lincoln County 17	Flood	8	Continue to identify and replace private stream crossings.	New and ongoing	Active	4, 5	5 years	Lincoln County Floodplain Manager	WV VOAD	Varies	PDM HMGP
Lincoln County	Lincoln County	Lincoln County 2	Flood	9	Partner with government agencies on the need for permitting for buildings relating to flooding.	New	Active	1, 4	On-going	Lincoln County Commission	Floodplain Manager	Minimal (coordination should require little additional funding)	Local funds
Lincoln County	Lincoln County	Lincoln County 3	Opioid Crisis	10	Continue current opioid response activities and search for new answers for the opioid crisis.	New	Active	1, 3, 5	5 years with periodic reviews of status	Lincoln County Commission	Lincoln County Health Department Lincoln County Sheriff Local Law Enforcement	Minimal (research & coordination should require little additional funding)	N/A

<i>Jurisdiction</i>	<i>County</i>	<i>Project Identification</i>	<i>Hazard of Concern</i>	<i>Priority</i>	<i>Project</i>	Status	2017 Status Active/Inactive	Corresponding Objective	Timeframe	Lead Agency	Support Agency(ies)	Cost Estimate	Funding Source
Lincoln County	Lincoln County	Lincoln County 4	Flood	17	Update the countywide permitting process which requires residents and/or developers to file a permit with the county before beginning any new construction as a means of regulating floodplain development (2012 Project 1.3.1)	Ongoing. This has been enforced.	Active	1, 4	5 years	Lincoln County Commission	Local developers Floodplain Manager	Minimal	Local funds
Lincoln County	Lincoln County	Lincoln County 5	Flood*	13	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 1.3.3).	Ongoing. This was not done but acquisition/demolition mitigation is continuing.	Active	4	5 years with periodic reviews of status	Lincoln County EMA	Floodplain Manager County Commission FEMA	\$82,400 per purchased home	HMGP
Lincoln County	Lincoln County	Lincoln County 6	Flood	10	Coordinate to promote buying flood insurance (2012 Project 1.3.5).	Ongoing. People are reminded each time that an event occurs. Most people who desperately need it, cannot afford it.	Active	4, 5	On-going	Lincoln County Commission	Lincoln County EMA Floodplain Managers Town Councils	Minimal (included in existing NFIP compliance budgets)	Local funds
Lincoln County	Lincoln County	Lincoln County 7	Acts of Violence	13	Continue to train emergency responders on how to handle bomb threats (2012 Project 11.2.1).	Ongoing. No activity.	Active	3, 5	5 years with periodic reviews of status	Lincoln County EM	Local Fire Departments Local Law Enforcement	Up to \$500 per student	HMEP (if hazmat, transportation included) Local funds
Lincoln County	Lincoln County	Lincoln County 8	Hazmat	13	Continue to train first responders in dealing with Hazmat events (2012 Project 12.1.2).	Ongoing. Fire departments have limited ability to deal with hazmat events.	Active	3	5 years with periodic reviews of status	Lincoln County EM	Local Fire Departments	Up to \$495 per student (per 40-hr HAZWOPER)	HMEP Local funds
Lincoln County	Lincoln County	Lincoln County 9	Dam Failure	10	Develop a partnership with appropriate parties that are stakeholders in the monitoring and general condition of dams throughout Lincoln County. Provide technical and manpower support to evaluate the status of these dams and report to the Core Planning Team on a yearly basis. Better Early Warning System needed for potential Dam Failures. Special monitoring program for the R.D. Bailey Dam and the Upper Mud River # 2A Dam near Palermo (2012 Project 13.1.1).	Ongoing. The county reviews and signs off on plans as needed.	Active	5	5 years	Lincoln County EM	Army Corps of Engineers	Minimal (inspection & monitoring are included in various agency budgets; coordination and information sharing should require little additional funding)	N/A
Logan	Logan County	Logan 1	Dam Failure	2	Monitor dam facilities in the area and share information with appropriate officials (2012 Project 1.1.1).	Ongoing	Active	5	On-going	City Council	Army Corps of Engineers USDA Natural Resource Center	Minimal (inspection & monitoring are included in various agency budgets)	Local funds
Logan	Logan County	Logan 2	Flood	3	Periodically clean culverts and prioritize culvert replacements (2012 Project 4.2.1).	Ongoing	Active	4	On-going	City Council	WV DOH	Minimal	Local funds
Logan	Logan County	Logan 3	Flood	1	Develop a regular stream cleaning schedule (2012 Project 4.3.2)	Ongoing	Active	4	On-going	City Council	Army Corps of Engineers USDA Natural Resource Center	Minimal	Local funds
Logan	Logan County	Logan 4	Flood*	4	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects. (Revised 2012 Project 4.4.1)	Ongoing	Active	4	5 years with periodic reviews of status	City Council	FEMA Floodplain Managers	\$85,600 per purchased home	HMGP
Logan County	Logan County	Logan County 1	Hazmat	20	Continue to apply for grants to supplement and upgrade the equipment capabilities of local fire departments (2012 Project 10.1.1).	Ongoing	Active	3, 5	5 years with periodic reviews of status	Logan County OEM	Local Fire Departments	Contingent on equipment needed	AFGP Local funds
Logan County	Logan County	Logan County 10	Flood	18	Support the design of roadways at a minimum of the 100-year base flood elevation. (2012 Project 4.4.3)	Ongoing	Active	4	On-going	Logan County OEM	WV DOH Engineering Consultants	Minimal (offering support should require little additional funding)	Local funds
Logan County	Logan County	Logan County 11	Hazmat	13	Work with local contacts at facilities that use/store hazardous materials (and file Tier II reports with the LEPC) to develop plans to address any gaps that may exist between facility response plans and the county EOP. (2012 Project 6.1.1)	Ongoing. Nine applications have been filed as of 2017	Active	5	On-going	Logan County OEM	Facilities Representatives LEPC	Minimal	Local funds

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Logan County	Logan County	Logan County 12	All Hazards	27	Enforce countywide building codes and other general planning regulations (including land use planning), which will regulate the number of buildings and the materials used in buildings that are constructed in slide-prone areas (2012 Project 7.1.1).	Ongoing	Active	1	On-going	Logan County Commission	Logan County Code Enforcement Floodplain Managers	Minimal	Local funds
Logan County	Logan County	Logan County 13	All Hazards	23	Support local jurisdiction or agency's projects to supplement equipment and other capabilities through grant programs (2012 Project 8.1.2).	Ongoing	Active	5	On-going	Logan County Commission	Logan County OEM	Minimal	Local funds
Logan County	Logan County	Logan County 14	All Hazards	22	Ensure gas and power service can be maintained at critical facilities and at-risk residents (2012 Project 14.2.2)	Ongoing	Active	2	On-going	Logan County OEM	Mountaineer Gas American Electric Power	Minimal (supporting company efforts & providing them with information should require little additional funding)	Local funds
Logan County	Logan County	Logan County 15	All Hazards	15	Ensure backup communications capabilities during emergencies with HAM radios (2012 Project 14.2.3)	Ongoing	Active	5	On-going	Logan County OEM	HAM radio operators	Minimal (planning with local individual should require little additional funding)	Local funds
Logan County	Logan County	Logan County 16	Flood* †	1	Elevation	Ongoing	Active	4	1 year	Logan County OEM	WVDHSEM FEMA	\$73,880	HMGP
Logan County	Logan County	Logan County 17	Flood* †	1	Acquisition 1	Ongoing	Active	4	1 year	Logan County OEM	WVDHSEM FEMA	\$348,845	HMGP
Logan County	Logan County	Logan County 18	Flood* †	1	Reconstruction 1	Ongoing	Active	4	1 year	Logan County OEM	WVDHSEM FEMA	\$945,675	HMGP
Logan County	Logan County	Logan County 19	Flood* †	1	Reconstruction 2	Ongoing	Active	4	1 year	Logan County OEM	WVDHSEM FEMA	\$483,845	HMGP
Logan County	Logan County	Logan County 2	All Hazards	12	Periodically update the county asset inventory list, complete with information such as replacement values, contents values, and annual operating budgets. This information can be used to calculate loss estimates (2012 Project 14.1.1, 14.1.2)	Ongoing	Active	5	1 year	Logan County OEM	N/A	Minimal	Local funds
Logan County	Logan County	Logan County 20	Flood* †	1	Acquisition 2	Ongoing	Active	4	1 year	Logan County OEM	WVDHSEM FEMA	\$153,812	HMGP
Logan County	Logan County	Logan County 21	Flood* †	1	Mapping	Ongoing	Active	4	1 year	Logan County OEM	WVDHSEM FEMA	\$382,927	HMGP
Logan County	Logan County	Logan County 22	All Hazards †	1	Waste Water 1	Ongoing	Active	5	1 year	Logan County OEM	WVDHSEM FEMA	\$5,625,000	HMGP
Logan County	Logan County	Logan County 23	All Hazards †	1	Waste Water 2	Ongoing	Active	5	1 year	Logan County OEM	WVDHSEM FEMA	\$8,163,000	HMGP
Logan County	Logan County	Logan County 24	All Hazards †	1	Generator 1	Ongoing	Active	5	1 year	Logan County OEM	WVDHSEM FEMA	\$84,170	HMGP
Logan County	Logan County	Logan County 25	All Hazards †	1	Generator 2	Ongoing	Active	5	1 year	Logan County OEM	WVDHSEM FEMA	\$74, 170	HMGP
Logan County	Logan County	Logan County 26	All Hazards †	1	Generator 3	Ongoing	Active	5	1 year	Logan County OEM	WVDHSEM FEMA	\$215, 670	HMGP
Logan County	Logan County	Logan County 27	Flood	12	Identify private water crossings in the county that could exacerbate flood problems should they fail and seek to replace them.	New	Active	4,5	5 years	Logan County Floodplain Manager	Logan County OEM WV VOAD	Varies	PDM HMGP
Logan County	Logan County	Logan County 3	All Hazards	20	Maintain a database of residents with health problems (e.g. oxygen requirements) that require electricity (Project 14.2.1)	In progress	Active	5	On-going	Logan County OEM	Local Hospitals and Clinics Logan County Health Department	Minimal	Local funds
Logan County	Logan County	Logan County 4	All Hazards	18	Ensure a sheltering capability in the county (2012 Project 14.3.1. Revised)	Ongoing	Active	5	On-going	Logan County OEM	American Red Cross	Minimal (coordination should require little additional funding)	Local funds
Logan County	Logan County	Logan County 5	Dam Failure	25	Monitor dam facilities in Logan County and share information with appropriate public officials (2012 Project 1.1.1).	Ongoing	Active	5	On-going	Logan County OEM	Local Jurisdictions Army Corps of Engineers	Minimal (inspection is included in various agency existing budgets)	Local funds

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Logan County	Logan County	Logan County 6	All Hazards	12	Continue efforts to extend public water service into rural areas (2012 Project 2.1.1)	Ongoing	Active	5	5 years with periodic reviews of status	Logan County OEM	Department of Public Works Public Service Departments	Up to \$2,000,000 per project	CDBG IJC State funds Local funds
Logan County	Logan County	Logan County 7	Flood	15	Develop a regular stream cleaning schedule (2012 Project 4.3.2)	In progress	Active	4	On-going	Logan County OEM	Army Corps of Engineers USDA Natural Resource Center	Minimal	Local funds
Logan County	Logan County	Logan County 8	Flood*	23	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 4.4.1)	Ongoing. Nine applications have been filed as of 2017	Active	4	5 years with periodic reviews of status	Logan County OEM	FEMA Floodplain Managers	\$85,600 per purchased home	HMGP
Logan County	Logan County	Logan County 9	Flood	26	Complete re-mapping of the Cherry Tree project. (Revised 2012 Project 4.4.2)	Ongoing	Active	4, 5	5 years	Logan County Commission	Logan County Code Enforcement	Minimal	Local funds
Man	Logan County	Man 1	Dam Failure	5	Monitor dam facilities in the area and share information with appropriate officials (2012 Project 1.1.1).	Ongoing	Active	5	On-going	Town Council	Army Corps of Engineers USDA Natural Resource Center	Minimal (inspection is included in various agency existing budgets)	Local funds
Man	Logan County	Man 2	Flood	1	Identify storm water backup areas and determine costs to correct those problems (2012 Project 4.1.1).	Ongoing	Active	4	5 years	Town Council	WV DOH Local PSDs	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Man	Logan County	Man 3	Flood	4	Periodically clean culverts and prioritize culvert replacements (2012 Project 4.2.1).	Ongoing	Active	4	On-going	Town Council	WV DOH	Minimal	Local funds
Man	Logan County	Man 4	Flood	2	Develop a regular stream cleaning schedule (2012 Project 4.3.2)	Ongoing	Active	4	On-going	Town Council	Army Corps of Engineers USDA Natural Resource Center	Minimal	Local funds
Man	Logan County	Man 5	Flood*	6	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 4.4.1)	Ongoing	Active	4	5 years with periodic reviews of status	Town Council	FEMA Floodplain Managers	\$85,600 per purchased home	HMGP
Man	Logan County	Man 6	Severe Summer Weather	3	Promote new construction and/or roof remodeling projects to withstand 90 mph wind loads per the building permit process (2012 Project 12.2.1)	Ongoing	Active	1, 5	On-going	Town Council	Municipal Code Enforcement	Minimal	Local funds
Mason	Mason County	Mason 1	Flood	1	Identify areas in which storm water backs up – primarily in municipalities – and determine the costs of corrective actions (2012 Project 4.1.1).	Ongoing	Active	4	5 years	Floodplain Manager	Local PSDs	Minimal (coordination w/ local officials to determine lists should require minimal additional funding)	Local funds
Mason	Mason County	Mason 2	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$76,900 per purchased home	HMGP
Mason County	Mason County	Mason County 1	Dam Failure	18	Work with the US Army Corps of Engineers to ensure that dams along the Ohio River are inspected periodically and facilitate information sharing so that local responders are prepared to assist in an incident involving one of the lock/dam facilities (2012 Project 1.1.1)	Ongoing	Active	2, 3, 4	On-going	Mason County OES	Army Corps of Engineers	Minimal	Local funds
Mason County	Mason County	Mason County 10	Severe Winter Weather	19	Inventory snow removal capabilities in local resource lists, to include coordinating with the WVDOH regarding snow removal contracts (2012 Project 13.1.1)	Ongoing	Active	5	On-going	Mason County OES	WVDOH Mason County Cities and Towns	Minimal	Local funds
Mason County	Mason County	Mason County 11	All Hazards	4	Coordinate with AEP to maintain rights of way to protect power lines from downed tree limbs (2012 14.1.1).	Ongoing	Active	5	On-going	Mason County OES	AEP WVDOH	Minimal	Local funds
Mason County	Mason County	Mason County 12	All Hazards	11	Develop a database of at-risk citizens with health problems (e.g. oxygen requirements, etc.) that need electricity. Coordinate with AEP to ensure that power is restored to them as quickly as possible (2012 Project 14.2.1).	Ongoing	Active	5	On-going	Mason County OES	AEP Mason County Health Department Local hospitals, clinics, and nursing homes Mason County Cities and Towns	Minimal	Local funds

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Mason County	Mason County	Mason County 13	All Hazards	3	Coordinate with the local chapter of the American Red Cross to maintain updated lists of potential shelters in Mason County (2012 Project 14.3.1).	Ongoing	Active	5	On-going	Mason County OES	American Red Cross Mason County Cities and Towns	Minimal	Local funds
Mason County	Mason County	Mason County 14	All Hazards	5	Continue to develop partnerships with local amateur radio operators to create a backup communications capability for local response operations. (2012 Project 14.3.2).	Ongoing	Active	5	5 years with periodic reviews of status	Mason County OES	Local HAM Radio operators Mason County Cities and Towns	Minimal	Local funds
Mason County	Mason County	Mason County 15	All Hazards	20	Work with the Mason County Board of Education to place caller ID on all phones in school facilities. (2012 Project 14.3.3).	Ongoing	Active	5	3 years	Mason County OES	Mason County Board of Education Mason County Commission	Minimal	Local funds
Mason County	Mason County	Mason County 16	All Hazards	11	Encourage the WVDOH to install signage throughout the county to denote hazard-prone areas (e.g. fog areas, busy intersections, etc.) (2012 Project 14.3.4).	Ongoing	Active	5	On-going	Mason County OES	WVDOH	Up to \$3,250 per sign	State funds
Mason County	Mason County	Mason County 17	Dam Failure Flood	5	Work with the Army Corps of Engineers, FEMA, and the City of Point Pleasant to bring the flood wall into compliance.	New	Active	4	On-going	Mason County OES	Army Corps of Engineers FEMA City of Point Pleasant	N/A	CDBG PDM Local funds
Mason County	Mason County	Mason County 19	All Hazards	1	Support the efforts of local water providers to extend service into areas not currently served by a public water distribution system (2012 Project 2.1.1).	Ongoing	Active	2, 5	On-going	Floodplain Manager	Local PSDs Mason County Cities and Towns	Up to \$2,000,000 per project	CDBG IJDC State funds Local funds
Mason County	Mason County	Mason County 2	Flood	5	Support local government efforts to maintain compliance with the NFIP (2012 Project 4.2.2).	Ongoing	Active	1, 4	On-going	Mason County Floodplain Manager	Mason County Cities and Towns Floodplain Managers	Minimal	Local funds
Mason County	Mason County	Mason County 20	Flood*	11	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 4.3.4).	Ongoing	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$76,900 per purchased home	HMGP
Mason County	Mason County	Mason County 21	Land Subsidence	1	Coordinate with the WV Division of Forestry to promote re-seeding after lumber extraction projects (2012 Project 7.1.1).	Ongoing	Active	5	On-going	Public Works Department	WV Division of Forestry	Minimal	Local funds
Mason County	Mason County	Mason County 3	Flood	11	Coordinate with the WVDOH to clear culverts that are causing flash flooding problems (2012 Project 4.3.1).	Ongoing	Active	4, 5	On-going	Mason County Floodplain Manager	WVDOH Mason County Cities and Towns	Minimal	Local funds
Mason County	Mason County	Mason County 5	Flood	17	Partner with appropriate agencies to support the 100-year based flood elevation design of critical roadways (2012 Project 4.3.5).	Ongoing	Active	4, 5	On-going	WVDOH	Floodplain Managers Mason County Cities and Towns	Minimal	Local funds
Mason County	Mason County	Mason County 6	Hazmat	15	Compile a rail and river commodity flow study to determine what materials are flowing through Mason County (Revised 2012 Project 6.1.1).	Ongoing	Active	2, 5	5 years	Mason County LEPC	Railways River Ports	\$5,000	HMEP
Mason County	Mason County	Mason County 7	Hazmat	15	Coordinate with organizations filing Tier II reports to ensure information sharing and collaborative efforts to strengthen capabilities to respond to hazmat incidents. Ensure access to the reports. (Revised 2012 Project 6.1.2).	Ongoing	Active	2, 3, 5	On-going	Mason County LEPC	WVDHSEM	Minimal	Local funds
Mason County	Mason County	Mason County 8	Acts of Violence	9	Identify areas and/or facilities that could be the target of domestic (or international) terrorism. Keep these lists secure (2012 Project 8.1.1).	Ongoing	Active	5	On-going	Mason County OES	Mason County Cities and Towns	N/A	N/A
Mason County	Mason County	Mason County 9	All Hazards	5	Encourage fire departments to apply for grants to add to equipment inventories and other capabilities (2012 Project 10.1.1).	Ongoing	Active	5	On-going	Mason County Commission	Local Fire Departments Mason County Cities and Towns	Minimal	Local funds
Mason County	Mason County	Mason County 18	Hazmat	10	Provide hazmat training of first responders to build in-county capabilities.	New	Active	3, 5	On-going	Mason County OES	Local Fire Departments	Up to \$495 per student (per 40-hr HAZWOPER)	Local funds
Matewan	Mingo County	Matewan 1	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$70,600 per purchased home	HMGP

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Matewan	Mingo County	Matewan 2	All Hazards	1	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flooding from stormwater backup) to develop future mitigation strategies.	New	Active	5	2 Years	Town Council	Mingo County EM Floodplain Manager	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Milton	Cabell County	Milton 1	Flood*	3	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	City Council FEMA	\$114,000 per purchased home	HMGP
Milton	Cabell County	Milton 2	All Hazards	1	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flooding from stormwater backup) to develop future mitigation strategies.	New	Active	5	2 Years	City Council	Cabell County OES Floodplain Manager	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Milton	Cabell County	Milton 3	Hazmat	2	Conduct a Commodity Flow Study for I-64 and the railroads that surround the city.	New	Active	5	5 Years	City Council	Cabell County OES	Up to \$10,000 per study	HMEP
Mingo County	Mingo County	Mingo County 1	Flood	10	Conduct streambank restoration.	New	Active	4	5 years	Mingo County Commission	WV DOH WV DEP WV Conservation Agency	Up to \$200,000 per river mile	N/A
Mingo County	Mingo County	Mingo County 12	All Hazards	10	Continue expansion of Public Service Districts water supplied areas (2012 Project 7.1.1).	Ongoing	Active	2, 5	5 years with periodic reviews of status	Local PSDs	Mingo County Commission City and Town Councils	Up to \$2,000,000 per project	CDBG IJD State funds Local funds
Mingo County	Mingo County	Mingo County 13	All Hazards	13	Implement plans to address identified areas in Mingo County that need improvement and protection if possible (2012 Project 9.1.1).	Ongoing	Active	2	On-going	Mingo County EM	Mingo County Commission	N/A	N/A
Mingo County	Mingo County	Mingo County 14	All Hazards	10	Work with Pocahontas Land Management to clean up affected areas (2012 Project 9.1.2).	Ongoing	Active	5	On-going	Mingo County EM	Pocahontas Land Management	Minimal	Local funds
Mingo County	Mingo County	Mingo County 16	All Hazards	15	Continue to train HAM operators for emergency operations. Continue development of communication infrastructure. (i.e. Cellular towers and digital radio network) (2012 Project 11.1.1)	Ongoing	Active	5	5 years with periodic reviews of status	Mingo County EM	Local HAM Radio Operators	Minimal	Local funds
Mingo County	Mingo County	Mingo County 17	Dam Failure	7	Continue to coordinate the monitoring and testing of dams in Mingo County with the Core Planning Team, so the local governments and the county commission can be informed as to the safety status of these dams (2012 Project 14.1.1).	Ongoing	Active	2, 4	5 years with periodic reviews of status	Mingo County EM	Local dam owners Mingo County Commission City and Towns Army Corps of Engineers	Minimal (monitoring and inspection of dams is currently done; additional information sharing should require minimal additional funding)	Local funds
Mingo County	Mingo County	Mingo County 18	Flood	17	Develop a plan to monitor and clean storm water drainage systems within municipalities (2012 Project 1.1.1).	Ongoing	Active	4	On-going	Local PSDs	N/A	Minimal	Local funds
Mingo County	Mingo County	Mingo County 2	Flood	5	Repair damaged roads from the floods.	New	Active	4, 5	On-going	Mingo County Commission	WV DOH	N/A	State funds Federal highway funds
Mingo County	Mingo County	Mingo County 20	Severe Winter Weather	7	Identify possible funding source for purchase of county snow clearing/removal equipment (2012 Project 2.2.2).	Ongoing	Active	5	On-going	Mingo County EM	N/A	Minimal	Local funds
Mingo County	Mingo County	Mingo County 21	Flood	13	Identify worst areas within municipalities and develop plans for structural enhancements or property buyouts (2012 Project 5.1.2).	Ongoing	Active	4	2 Years	Public Works	Mingo County EM WVDOH Floodplain Manager	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Mingo County	Mingo County	Mingo County 22	Flood*	16	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$70,600 per purchased home	HMGP
Mingo County	Mingo County	Mingo County 3	Severe Summer Weather Severe Winter Weather	4	Cut tree branches away from power lines to prevent them from falling on the lines and causing power outages.	New	Active	2, 5	On-going	Mingo County Commission	WV DOH Local utilities	Minimal (coordination w/ power companies should require minimal additional funding)	Local funds

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Mingo County	Mingo County	Mingo County 4	Acts of Violence	3	Conduct outreach to faith-based organizations to promote classes to prepare members for shootings at churches.	New	Active	3, 5	3 years	Mingo County EM	Local Churches	Minimal (outreach requires little additional funding)	Local funds
Mingo County	Mingo County	Mingo County 5	Flood	5	Continue to utilize and enforce local Floodplain Management Ordinances and building code permits for the development of new and existing construction. (Revised 2012 Projects 1.3.4, 1.3.5, 4.2.1, 5.1.5, 9.1.3, 1.3.2)	Ongoing	Active	1, 4	5 years with periodic reviews of status	Mingo County Commission	Floodplain Manager	Minimal (NFIP enforcement already included in existing budgets)	Local funds
Mingo County	Mingo County	Mingo County 7	All Hazards	7	Work with the WVDOH to design road construction to elevate at risk roadways (2012 Project 1.6.1).	Ongoing	Active	5	On-going	Floodplain Manager	WVDOH	Minimal (coordination requires minimal additional funding)	Local funds
Mingo County	Mingo County	Mingo County 8	All Hazards	1	Continue monitoring and maintenance of the "Early Warning System" (2012 Project 3.1.2).	Ongoing	Active	5	5 years with periodic reviews of status	Mingo County EM	N/A	N/A	N/A
Mingo County	Mingo County	Mingo County 9	All Hazards	1	Use the WENS to alert residents of hazardous conditions (Revised 2012 Project 4.1.1).	Ongoing	Active	5	On-going	Mingo County EM	N/A	Minimal (costs built into existing agreements for service)	Local funds
Mitchell Heights	Logan County	Mitchell Heights 1	Flood	1	Identify storm water backup areas and determine costs to correct those problems (2012 Project 4.1.1).	Ongoing	Active	4	5 years	Town Council	WV DOH Local PSDs	Minimal	Local funds
Mitchell Heights	Logan County	Mitchell Heights 2	Flood	3	Periodically clean culverts and prioritize culvert replacements (2012 Project 4.2.1).	Ongoing	Active	4	On-going	Town Council	WV DOH	Minimal	Local funds
Mitchell Heights	Logan County	Mitchell Heights 3	All Hazards	2	Promote new construction and/or roof remodeling projects to withstand 90 mph wind loads per the building permit process (2012 Project 12.2.1)	Ongoing. No activity.	Active	1, 5	On-going	Town Council	Municipal Code Enforcement	Minimal	Local funds
Mitchell Heights	Logan County	Mitchell Heights 4	Flood*	4	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$85,600 per purchased home	HMGP
New Haven	Mason County	New Haven 1	Flood	1	Identify areas in which storm water backs up – primarily in municipalities – and determine the costs of corrective actions (2012 Project 4.1.1).	Ongoing	Active	4	5 years	Floodplain Manager	Local PSDs WV Silver Jackets	Minimal	Local funds
New Haven	Mason County	New Haven 2	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 4.3.4)	Ongoing	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$76,900 per purchased home	HMGP
Point Pleasant	Mason County	Point Pleasant 1	Flood	1	Identify areas in which stormwater backs up –primarily in municipalities – and determine the costs of corrective actions (2012 Project 4.1.1).	Ongoing	Active	4	2 Years	Floodplain Manager	Local PSDs	N/A	N/A
Point Pleasant	Mason County	Point Pleasant 2	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 4.3.4).	Ongoing	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$76,900 per purchased home	HMGP
Wayne	Wayne County	Wayne 1	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	FEMA Town Council	\$85,000 per purchased home	HMGP
Wayne	Wayne County	Wayne 2	All Hazards	1	Identify specific areas within the jurisdiction that are susceptible to the impacts of any hazards (e.g., site-specific flooding from stormwater backup) to develop future mitigation strategies.	New	Active	5	2 Years	Town Council	Wayne County OES Floodplain Manager	Minimal (identification of areas & coordination should require minimal additional funding)	Local funds
Wayne County	Wayne County	Wayne County 1	Flood	5	Develop a plan to monitor and clean storm water drainage systems within municipalities (2012 Project 1.1.1).	Ongoing	Active	4, 5	On-going	Public Works	Local PSDs	Minimal	Local funds
Wayne County	Wayne County	Wayne County 11	All Hazards	8	Work with the WVDOH to design road construction to elevate at risk roadways (2012 Project 1.6.1).	Ongoing	Active	2, 5	On-going	Public Works	WVDOH	Minimal (coordination requires minimal funding)	Local funds
Wayne County	Wayne County	Wayne County 12	All Hazards	2	Continue monitoring and maintenance of the "Early Warning System" (2012 Project 3.1.2).	Ongoing	Active	5	5 years with periodic reviews of status	Wayne County OES	N/A	N/A	N/A

<i>Jurisdiction</i>	<i>County</i>	<i>Project Identification</i>	<i>Hazard of Concern</i>	<i>Priority</i>	<i>Project</i>	<i>Status</i>	<i>2017 Status Active/Inactive</i>	<i>Corresponding Objective</i>	<i>Timeframe</i>	<i>Lead Agency</i>	<i>Support Agency(ies)</i>	<i>Cost Estimate</i>	<i>Funding Source</i>
Wayne County	Wayne County	Wayne County 13	All Hazards	1	Use the WENS to alert residents of hazardous conditions (Revised 2012 Project 4.1.1, 6.1.1).	Ongoing	Active	5	On-going	Wayne County OES	N/A	Minimal (currently worked into contracts for existing resources)	Local funds
Wayne County	Wayne County	Wayne County 16	All Hazards	6	Continue expansion of Public Service Districts water supplied areas (2012 Project 7.1.1).	Ongoing	Active	5	5 years with periodic reviews of status	Local PSDs	Wayne County Commission	Up to \$2,000,000 per project	CDBG IJDC State funds Local funds
Wayne County	Wayne County	Wayne County 17	All Hazards	8	Implement plans to address identified areas in Wayne County that need improvement and protection if possible (2012 Project 9.1.1).	Ongoing	Active	2, 5	On-going	Wayne County OES	Public Works WVDOH	Minimal	Local funds
Wayne County	Wayne County	Wayne County 18	All Hazards	13	Continue to train HAM operators for emergency operations. Continue development of communication infrastructure. (i.e. Cellular towers and digital radio network) (2012 Project 11.1.1)	Ongoing	Active	5	5 years with periodic reviews of status	Wayne County OES	Local HAM Radio operators	Minimal	Local funds
Wayne County	Wayne County	Wayne County 19	Dam Failure	6	Continue to develop a partnership with appropriate parties that are stakeholders in the monitoring and general condition of dams throughout Wayne County. Provide technical and manpower support to evaluate the status of these dams and report to the Core Planning Team on a yearly basis. Better Early Warning System needed for potential Dam Failures. Special monitoring program for the Beech Fork Dam and the East Lynn Dam (2012 Project 14.1.1).	Ongoing	Active	2, 4	5 years with periodic reviews of status	Wayne County OES	Public Works Floodplain Manager Wayne County Commission Army Corps of Engineers	Minimal	Local funds
Wayne County	Wayne County	Wayne County 2	All Hazards	8	Continue to maintain, improve, and enforce the building permit process and Floodplain Management Ordinates to restrict development in floodplain areas and educate the public (Revised 2012 Projects 1.3.2, 1.3.4, 1.3.5, 4.2.1, 5.1.1, 5.1.2)	Ongoing	Active	1, 3, 4	5 years with periodic reviews of status	Wayne County Commission	Local developers	Minimal (included in existing NFIP compliance budgets)	Local funds
Wayne County	Wayne County	Wayne County 20	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 2.2.2)	Ongoing	Active	4	5 years with periodic reviews of status	Floodplain Manager	FEMA Wayne County Commission	\$85,000 per purchased home	HMGP
Wayne County	Wayne County	Wayne County 6	Hazmat	4	Conduct additional appropriate training for hazmat response.	New	Active	3	On-going	Wayne County OES	Local Fire Departments	Up to \$495 per student (per 40-hr HAZWOPER)	Local funds
Wayne County	Wayne County	Wayne County 7	Hazmat	8	Purchase necessary equipment to respond to hazardous materials incidents	New	Active	5	On-going	Wayne County Commission	Local Fire Departments	Contingent on equipment needed	N/A
Wayne County	Wayne County	Wayne County 8	Dam Failure	8	Implement operation maintenance of dam structures and floodways.	New	Active	4, 5	On-going	Wayne County Commission	Floodplain Managers Army Corps of Engineers	N/A	N/A
West Hamlin	Lincoln County	West Hamlin 1	Flood	2	Flood-proof West Hamlin Water and Waste Water plants to reduce repetitive losses (2012 Project 1.1.2)	Ongoing	Active	4	5 years	Local PSD	Town Council Floodplain Manager Public Works Department	Unknown until engineering study can be completed	N/A
West Hamlin	Lincoln County	West Hamlin 2	Flood*	1	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Lincoln County EMA	Floodplain Manager Town Council FEMA	\$82,400 per purchased home	HMGP
West Logan	Logan County	West Logan 1	Dam Failure	4	Monitor dam facilities in the area and share information with appropriate officials (2012 Project 1.1.1).	Ongoing	Active	5	On-going	Floodplain Manager	Army Corps of Engineers USDA Natural Resource Center	Minimal	Local funds
West Logan	Logan County	West Logan 2	Flood	1	Identify storm water backup areas and determine costs to correct those problems (2012 Project 4.1.1).	Ongoing	Active	4	5 years	Department of Public Works	WV DOH Local PSDs Town Council	Minimal	Local funds
West Logan	Logan County	West Logan 3	Flood	3	Periodically clean culverts and prioritize culvert replacements (2012 Project 4.2.1).	Ongoing	Active	4	On-going	Town Council	WV DOH	Minimal	Local funds
West Logan	Logan County	West Logan 4	Flood	2	Develop a regular stream cleaning schedule (2012 Project 4.3.2)	Ongoing	Active	4	On-going	Town Council	Army Corps of Engineers USDA Natural Resource Center	Minimal	Local funds

<i>Jurisdiction</i>	<i>County</i>	<i>Project Identification</i>	<i>Hazard of Concern</i>	<i>Priority</i>	<i>Project</i>	Status	2017 Status Active/Inactive	Corresponding Objective	Timeframe	Lead Agency	Support Agency(ies)	Cost Estimate	Funding Source
West Logan	Logan County	West Logan 5	Flood*	5	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects (Revised 2012 Project 4.4.1)	Ongoing	Active	4	5 years with periodic reviews of status	Floodplain Manager	FEMA Town Council	\$85,600 per purchased home	HMGP
Williamson	Mingo County	Williamson 1	All Hazards	3	Implement road and walkway improvement plans for areas at higher risk of collapse (2012 Project 1.6.2).	Ongoing	Active	2	5 years	Williamson Council	WVDOH	Up to \$250,000 per area	State funds Local funds
Williamson	Mingo County	Williamson 2	All Hazards	1	Prioritize replacement/reinforcement of at risk structures such as retaining walls within the county (2012 Project 1.7.1).	Ongoing	Active	2, 4	1 year	Williamson Council	Army Corps of Engineers Mingo County EM	Prioritization requires minimal funding	Local funds
Williamson	Mingo County	Williamson 3	Flood*	2	Continue to participate in acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.	New	Active	4	5 years with periodic reviews of status	Floodplain Manager	WVDHSEM FEMA	\$70,600 per purchased home	HMGP

* Acquisition/demolition, relocation, mitigation reconstruction, and elevation projects.

† Projects awaiting funding pending the approval of this plan.

4.0 PLAN MAINTENANCE

§201.6(c)(4)(i)	[The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.
§201.6(c)(4)(ii)	[The plan shall include 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.
§201.6(c)(4)(iii)	[The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.

2017 UPDATE

The main change for this plan update is that the Region 2 PDC has established a solid schedule for the maintenance of this plan to which they and the committee members will adhere. This section also includes an updated description of how this plan will be implemented and incorporated into other plans and programs.

4.1 Monitoring, Evaluating, and Updating the Plan

Per regulation, and good practice, this plan must be maintained. Maintenance of a plan comes in a variety of forms; in this case, the custodial agency responsible for the maintenance and update of this hazard mitigation plan is the Region 2 Planning and Development Council. The Region 2 PDC has contracted JH Consulting, LLC not only to update the plan for 2017 but also to facilitate the periodic review and maintenance of this plan.

The Region 2 PDC and the committee decided to hold an in-person annual meeting for the next four years. These meetings will be held in the second or third quarter of the year and will be preceded by a short online survey sent out to the public and to the committee members one to two months in advance of each meeting. These surveys will serve two purposes: to keep the public involved in the plan implementation and to keep the jurisdictions and officials accountable for implementing mitigation projects.

TABLE 4.1.A COMMITTEE MAINTENANCE TASKS		
<i>Before the Meeting</i>	<i>During the Meeting</i>	<i>After the Meeting</i>
<ul style="list-style-type: none"> • Begin to implement mitigation projects • Complete online committee survey • Distribute online public survey via websites and social media pages • Maintain records of changes in the jurisdiction that may affect the plan • Keep updated records of assets 	<ul style="list-style-type: none"> • Update hazard information • Update jurisdictional project status • Share ideas and challenges of project implementation • Share economic, environmental, social, legal, or political impacts projects have had • Review public and committee survey results • Keep meeting minutes 	<ul style="list-style-type: none"> • Continue to implement mitigation projects • Maintain records of changes in the jurisdiction that may affect the plan • Keep updated records of assets

4.2 Implementation through Existing Programs

The jurisdictions participating in this planning process have used a variety of funding to complete mitigation projects in the past, including the Hazard Mitigation Grant Program, Homeland Security Grant Program, Emergency Management Performance Grant, Community Development Block Grant, and local funding. Local government policies and programs have supported the use of this funding and, thus, the implementation of mitigation projects. Further, all participating government jurisdictions have demonstrated a capability to successfully implement and administer mitigation projects.

The Region 2 PDC serves as a clearinghouse for various development projects in the region. See [Table 2.5.A](#) for a listing of projects that are active on the PDC's master list that are related to mitigation. The table thus includes specific opportunities for integrating mitigation into existing efforts. The PDC creates and maintains a regional economic development strategy with its member governments (i.e., the Community Economic Development Strategy, or "CEDS" document). This effort recurs annually, and offers an opportunity for local officials to consider this risk assessment ([Section 2.0](#)) and the hazard areas it identifies as decisions regarding regional economic development are made.

Region 2 is unique within the context of West Virginia in that it has a high number of jurisdictions with floodwalls: Ceredo, Huntington, Matewan, Point Pleasant, and Williamson. These structures were mitigation projects long before mitigation planning became a requirement. Floodwalls represent massive infrastructure projects. They require near constant maintenance to remain effective, which can be costly. Jurisdictions throughout the region have maintained their structures in a variety of ways, ranging from partnerships with organizations such as the U.S. Army Corps of Engineers to the creation of a separate entity of city government dedicated to managing the structure (e.g., the Huntington Stormwater Utility). These jurisdictions undertake strategic planning initiatives to ensure maintenance of

their floodwalls; these strategic efforts offer opportunities for plan integration.

In support of the PDC and steering committee's priorities for the 2017 update, the following table lists general opportunities for hazard mitigation plan integration with a variety of other plan types. This table can be used as an educational tool for local officials.



TABLE 4.2.A GENERAL PLAN INTEGRATION CONSIDERATIONS

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Emergency Operations Planning	Local Emergency Managers Local Emergency Planning Committees Cabell-Wayne Homeland Security Committee	Emergency operations plans Hazard/vulnerability analyses Commodity flow studies	Ensure consistency between updated hazard analyses and the risk assessment portion of the plan Consider mitigation projects as part of the overall cycle of emergency management	
			PLAN ELEMENTS/POLICIES Establish and maintain effective response program	ASSOC. MITIGATION OBJECTIVE 3: Educate and train local officials and responders as well as the public on hazards and the different measures they can implement to reduce the impacts.
			Support continuity of critical infrastructure and key resources	2: Protect critical infrastructure from all hazards throughout the region.
Transportation Planning	KYOVA Interstate Planning Commission	KYOVA 2040 Integrated Metropolitan Transportation Plan KYOVA Biennial Report: Transportation Improvement Program, Fiscal Years 2018-2021	Ensure hazards are acknowledged in long-range transportation planning Consider response elements to the hazards identified in the mitigation plan, as appropriate, with respect to transportation (e.g., evacuation) Ensure planned transportation projects do not add to vulnerabilities (e.g., ensure projects utilize proper drainage, are properly elevated, etc.) Consider the incorporation of green infrastructure/low-impact development as transportation projects are undertaken (e.g., permeable pavements, green streets and alleys, etc.)	
			PLAN ELEMENTS/POLICIES Provide for emergency access to all parts of the region and safe evacuation routes Consider upgrades to transportation infrastructures to prevent, to the extent possible, long-term infrastructure decay	ASSOC. MITIGATION OBJECTIVE 3: Educate and train local officials and responders as well as the public on hazards and the different measures they can implement to reduce the impacts. 5: Continue to engage and participate in ongoing preparedness activities, partnerships and programs that could reduce loss of or damage to life and property.



TABLE 4.2.A GENERAL PLAN INTEGRATION CONSIDERATIONS

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Floodplain Management	Jurisdictional floodplain managers	Floodplain ordinances (county and municipal levels)	Continue to enforce floodplain development ordinances Consider participation in the Community Rating System, as appropriate for the jurisdiction Continue public outreach to ensure awareness of flood risk and mitigation options	
			PLAN ELEMENTS/POLICIES Support resiliency by ensuring new development stays clear of known hazard areas or is built in such a way as to withstand the effects of known hazards Protect green spaces in special flood hazard areas	ASSOC. MITIGATION OBJECTIVE 1: Create and enforce codes, rules, regulations, ordinances, and programs that reduce the vulnerability of the population and the built environment to the impact of hazards. 4: Focus efforts toward mitigating riverine and nuisance flooding in the region. 5: Continue to engage and participate in ongoing preparedness activities, partnerships and programs that could reduce loss of or damage to life and property.
Infrastructure (i.e., Water, Sewer) Development	Utility providers Region 2 PDC	Jurisdictional and/or utility-specific capital improvement plans Jurisdictional source water protection plans Watershed-level non-point source pollution plans Region 2 CEDS	Ensure protection of environmental features as infrastructure projects are undertaken Support resiliency by extending or improving public utility service to residents	
			PLAN ELEMENTS/POLICIES Support infrastructure development as a means of attracting economic development	ASSOC. MITIGATION OBJECTIVE 2: Protect critical infrastructure from all hazards throughout the region.



TABLE 4.2.A GENERAL PLAN INTEGRATION CONSIDERATIONS

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Commercial/Economic Development	Jurisdictional code enforcement officers Planning commissions for counties and municipalities Region 2 PDC Economic Development Authorities for counties	Zoning ordinances Building codes Subdivision and land development ordinances Comprehensive plans	Ensure adherence to floodplain, zoning, building, subdivision, and other relevant ordinances Consider the implementation of storm water management projects Consider incorporating green infrastructure/low-impact development into site-specific projects (e.g., use of porous pavement, tree planting initiatives, planter boxes, bio swales, etc.)	
			PLAN ELEMENTS/POLICIES Encourage responsible land use	ASSOC. MITIGATION OBJECTIVE 1: Create and enforce codes, rules, regulations, ordinances, and programs that reduce the vulnerability of the population and the built environment to the impact of hazards.
			Identify areas suitable for residential development (or redevelopment)	5: Continue to engage and participate in ongoing preparedness activities, partnerships and programs that could reduce loss of or damage to life and property.
			Identify areas suitable for commercial development (or redevelopment)	5: Continue to engage and participate in ongoing preparedness activities, partnerships and programs that could reduce loss of or damage to life and property.
			Identify areas suitable for industrial development (or redevelopment)	5: Continue to engage and participate in ongoing preparedness activities, partnerships and programs that could reduce loss of or damage to life and property.

TABLE 4.2.A GENERAL PLAN INTEGRATION CONSIDERATIONS

<i>Existing Program</i>	<i>Responsible Agency(ies)</i>	<i>Applicable Plan (i.e., Document)</i>	<i>Mitigation Action Comparison</i>	
Stormwater Management	Utility providers Jurisdictional floodplain managers Huntington Stormwater Utility	Jurisdictional MS4 permitting processes (where applicable)	Identification of site-specific flooding concerns and other water quality issues Provides a means for consideration of low-impact development options for flood mitigation	
			PLAN ELEMENTS/POLICIES Encourage onsite management of runoff	ASSOC. MITIGATION OBJECTIVE 1: Create and enforce codes, rules, regulations, ordinances, and programs that reduce the vulnerability of the population and the built environment to the impact of hazards. 5: Continue to engage and participate in ongoing preparedness activities, partnerships and programs that could reduce loss of or damage to life and property.