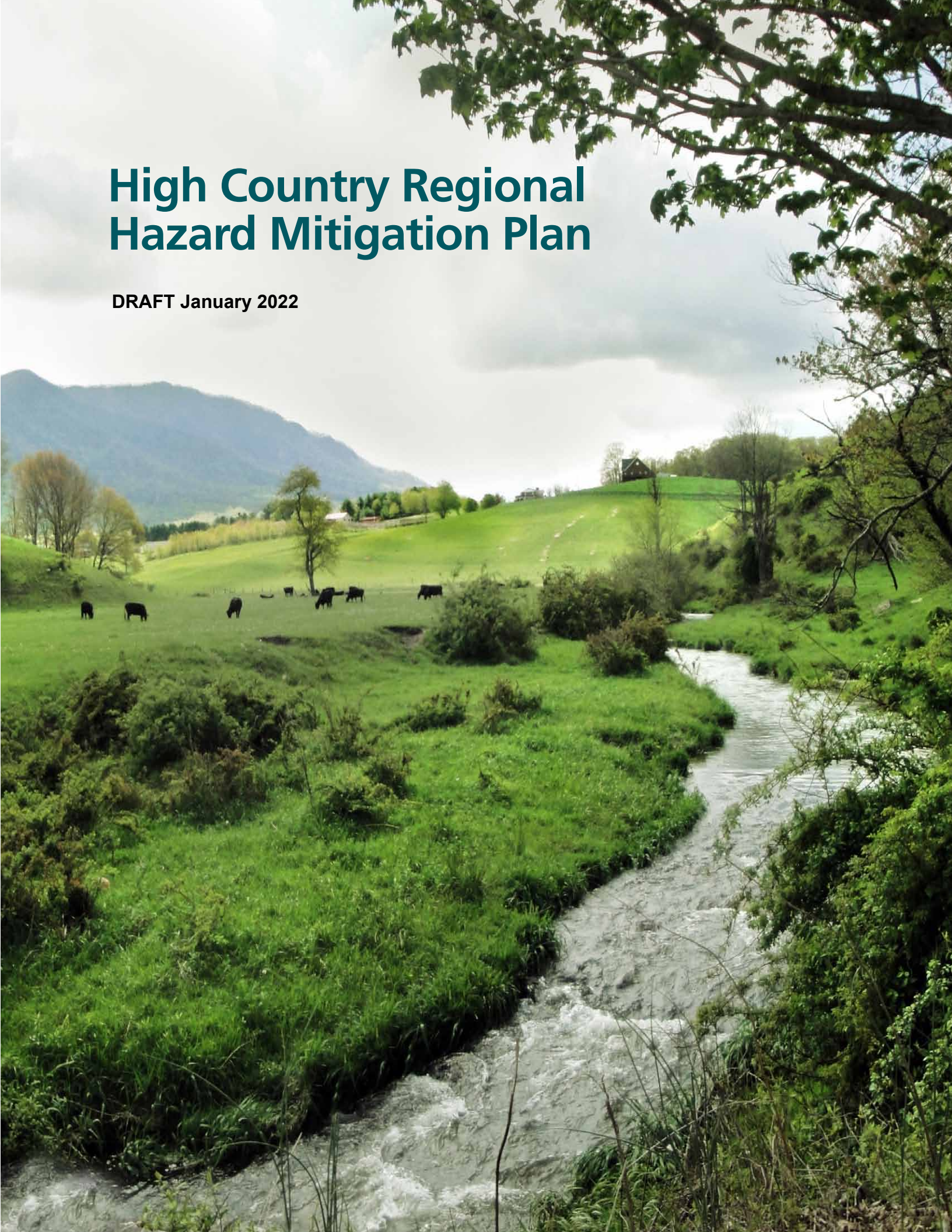
High Country Regional Hazard Mitigation Plan

DRAFT January 2022



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SECTION 1
INTRODUCTION

This section provides a general introduction to the High-Country Regional Hazard Mitigation Plan. It consists of the following five subsections:

- 1.1 Background
- 1.2 Purpose
- 1.3 Scope
- 1.4 Authority
- 1.5 Summary of Plan Contents

1.1 BACKGROUND

Natural hazards, such as hurricanes, floods, and tornadoes, are a part of the world around us. Their occurrence is natural and inevitable, and there is little we can do to control their force and intensity. We must consider these hazards to be legitimate and significant threats to human life, safety, and property.

The High-Country Region is located in the western part of North Carolina and includes the counties of Alleghany, Ashe, Watauga, and Wilkes. This area is vulnerable to a wide range of natural hazards such as floods, landslides, winter storms, severe thunderstorms, and wildfires. It is also vulnerable to human caused hazards, including chemical releases and hazardous material spills. These hazards threaten the life and safety of residents in the High-Country Region and have the potential to damage or destroy both public and private property, disrupt the local economy, and impact the overall quality of life of individuals who live, work, and vacation in the High-Country Region.

While the threat from hazardous events may never be fully eliminated, there is much we can do to lessen their potential impact upon our community and our citizens. By minimizing the impact of hazards upon our built environment, we can prevent such events from resulting in disasters. The concept and practice of reducing risks to people and property from known hazards is generally referred to as *hazard mitigation*.

FEMA Definition of Hazard Mitigation:
"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazard mitigation techniques include both structural measures (such as strengthening or protecting buildings and infrastructure from the destructive forces of potential hazards) and non-structural measures (such as the adoption of sound land use policies and the creation of public awareness programs). It is widely accepted that the most effective mitigation measures are implemented at the local government level, where decisions on the regulation and control of development are ultimately made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the

foreseeable future. Therefore, it is essential that projected patterns of future development are evaluated and considered in terms of how that growth will increase or decrease a community's overall hazard vulnerability.

A key component in the formulation of a comprehensive approach to hazard mitigation is to develop, adopt, and update a local hazard mitigation plan as needed. A hazard mitigation plan establishes the broad community vision and guiding principles for reducing hazard risk, and further proposes specific mitigation actions to eliminate or reduce identified vulnerabilities.

The four counties participating in the development of the High-Country Regional Hazard Mitigation Plan first joined together in 2012 to develop the initial version of this plan. The plan was updated in 2017/2018 and this version serves as the second update of the regional plan. The process followed to update the plan in detailed in Section 2: Planning Process.

This regional plan draws from each of the county plans and documents the region's sustained efforts to incorporate hazard mitigation principles and practices into routine government activities and functions. At its core, the Plan recommends specific actions to minimize hazard vulnerability and protect residents from losses to those hazards that pose the greatest risk. These mitigation actions go beyond simply recommending structural solutions to reduce existing vulnerability, such as elevation, retrofitting, and acquisition projects. Local policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities are examples of other actions considered to reduce the High-Country Region's vulnerability to identified hazards. The Plan remains a living document, with implementation and evaluation procedures established to help achieve meaningful objectives and successful outcomes over time.

1.1.1 The Disaster Mitigation Act and the Flood Insurance Reform Acts

In an effort to reduce the Nation's mounting natural disaster losses, the U.S. Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state and local government entities to closely coordinate on mitigation planning activities and makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for federal mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP), the Building Resilient Infrastructure and Communities (BRIC) program, and the Flood Mitigation Assistance (FMA) program, all of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally-approved hazard mitigation plan thereby become pre-positioned and more apt to receive available mitigation funds before and after the next disaster strikes.

Major federal flood insurance legislation was passed in 2012 under the Biggert-Waters Flood Insurance Reform Act (P.L. 112-141) and the subsequent Homeowner Flood Insurance Affordability Act (HFIAA) in 2014 which revised Biggert-Waters. HFIAA established the requirement that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for any of the FEMA mitigation programs. These acts made several changes to the way the National Flood Insurance Program is to be run, including raises in rates to reflect true flood risk and changes in how Flood Insurance Rate Map (FIRM) updates impact policyholders. These acts further emphasize Congress' focus on mitigating vulnerable structures.

The High-Country Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region

IV and the North Carolina Division of Emergency Management (NCDEM) to ensure that the Plan meets all applicable FEMA and state requirements for hazard mitigation plans. A *Local Mitigation Plan Review Tool*, found in Appendix C, provides a summary of federal and state minimum standards and notes the location where each requirement is met within the Plan.

1.2 PURPOSE

The purpose of the High-Country Regional Hazard Mitigation Plan is to:

- Completely update the existing High Country Regional Hazard Mitigation Plan to demonstrate progress and reflect current conditions;
- Increase public awareness and education;
- Maintain grant eligibility for participating jurisdictions;
- Update plans in accordance with Community Rating System (CRS) requirements; and
- Maintain compliance with state and federal legislative requirements for local hazard mitigation plans.

1.3 SCOPE

The focus of the High-Country Regional Hazard Mitigation Plan is on those hazards determined to be "high" or "moderate" risks to the High-Country Region, as determined through a detailed hazard risk assessment. Other hazards that pose a "low" or "negligible" risk will continue to be evaluated during future updates to the Plan, but they may not be fully addressed until they are determined to be of high or moderate risk. This enables the participating counties to prioritize mitigation actions based on those hazards which are understood to present the greatest risk to lives and property.

The geographic scope (i.e., the planning area) for the Plan includes the counties of Alleghany, Ashe, Watauga, and Wilkes, as well as their incorporated jurisdictions. **Table 1.1** the participating areas.

TABLE 1.1: PARTICIPATING JURISDICTIONS IN THE HIGH COUNTRY REGIONAL HAZARD MITIGATION PLAN

Alleghany County	
Sparta	Unincorporated Alleghany County
Ashe County	
Lansing	West Jefferson
Jefferson	Unincorporated Ashe County
Watauga County	
Beech Mountain	Seven Devils
Blowing Rock	Unincorporated Watauga County
Boone	
Wilkes County	
North Wilkesboro	Wilkesboro
Ronda	Unincorporated Wilkes County

1.4 AUTHORITY

The High-Country Regional Hazard Mitigation Plan has been developed in accordance with current state and federal rules and regulations governing local hazard mitigation plans and has been adopted by each participating county and local jurisdiction in accordance with standard local procedures. Copies of the adoption resolutions for each participating jurisdiction are provided in Appendix A. The Plan shall be routinely monitored and revised to maintain compliance with the following provisions, rules, and legislation:

- Section 322, Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as enacted by Section 104 of the Disaster Mitigation Act of 2000 (P.L. 106-390);
- FEMA's Mitigation Planning Final Rule published in the Federal Register on September 16, 2009, at 44 CFR Part 201; and
- Flood Insurance Reform Act of 2004 (P.L. 108-264) and Biggert-Waters Flood Insurance Reform Act of 2012 (P.L. 112-141) and the Homeowner Flood Insurance Affordability Act of 2014.

1.5 SUMMARY OF PLAN CONTENTS

The contents of this Plan are designed and organized to be as reader-friendly and functional as possible. While significant background information is included on the processes used and studies completed (i.e., risk assessment, capability assessment), this information is separated from the more meaningful planning outcomes or actions (i.e., mitigation strategy, mitigation action plan).

Section 2, ***Planning Process***, provides a complete narrative description of the process used to prepare the Plan. This includes the identification of participants on the planning team and describes how the public and other stakeholders were involved. It also includes a detailed summary for each of the key meetings held, along with any associated outcomes.

The ***Community Profile***, located in Section 3, provides a general overview of the High-Country Region, including prevalent geographic, demographic, and economic characteristics. In addition, building characteristics and land use patterns are discussed. This baseline information provides a snapshot of the planning area and helps local officials recognize those social, environmental, and economic factors that ultimately play a role in determining the region's vulnerability to hazards.

The Risk Assessment is presented in three sections: Section 4, ***Hazard Identification***; Section 5, ***Hazard Profiles***; and Section 6, ***Vulnerability Assessment***. Together, these sections serve to identify, analyze, and assess hazards that pose a threat to the High-Country Region. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of the High-Country Region.

The Risk Assessment begins by identifying hazards that threaten the High-Country Region. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This section culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, NCEM's Risk Management Tool (RMT) is used to evaluate known hazard risks by their relative long-term cost in expected damages. In essence, the information generated through the risk assessment serves a critical function as the High-Country Region seeks to determine the most appropriate mitigation actions to pursue and implement—enabling it to prioritize and focus its efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The ***Capability Assessment***, found in Section 7, provides a comprehensive examination of the High-Country Region's capacity to implement meaningful mitigation strategies and identifies opportunities to increase and enhance that capacity. Specific capabilities addressed in this section include planning and regulatory capability, staff and organizational (administrative) capability, technical capability, fiscal capability, and political capability. Information was obtained through the use of a detailed survey questionnaire and an inventory and analysis of existing plans, ordinances, and relevant documents. The purpose of this assessment is to identify any existing gaps, weaknesses, or conflicts in programs or activities that may hinder mitigation efforts and to identify those activities that should be built upon in establishing a successful and sustainable local hazard mitigation program.

The *Community Profile*, *Risk Assessment*, and *Capability Assessment* collectively serve as a basis for determining the goals for the High-Country Regional Hazard Mitigation Plan, each contributing to the development, adoption, and implementation of a meaningful and manageable *Mitigation Strategy* that is based on accurate background information.

The ***Mitigation Strategy***, found in Section 8, consists of broad goal statements as well as an analysis of hazard mitigation techniques for the High-Country Region to consider in reducing hazard vulnerabilities. The strategy provides the foundation for a detailed ***Mitigation Action Plan***, found in Section 9, which links specific mitigation actions for each county department or agency to locally-assigned implementation mechanisms and target completion dates. Together, these sections are designed to make the Plan both strategic, through the identification of long-term goals, and functional, through the identification of immediate and short-term actions that will guide day-to-day decision-making and project implementation.

In addition to the identification and prioritization of possible mitigation projects, emphasis is placed on the use of program and policy alternatives to help make the High-Country Region less vulnerable to the damaging forces of hazards while improving the economic, social, and environmental health of the community. The concept of multi-objective planning was emphasized throughout the planning process, particularly in identifying ways to link, where possible, hazard mitigation policies and programs with complimentary community goals related to disaster recovery, housing, economic development, recreational opportunities, transportation improvements, environmental quality, land development, and public health and safety.

Plan Maintenance, found in Section 10, includes the measures that the High-Country Region will take to ensure the Plan's continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly evaluated and updated to remain a current and meaningful planning document.

SECTION 2
PLANNING PROCESS

44 CFR Requirement

44 CFR Part 201.6(c)(1): The plan shall include documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process and how the public was involved.

This section describes the planning process undertaken to develop the 2022 update of the High-Country Regional Hazard Mitigation Plan. Information about the planning process used to develop previous versions of this plan can be found in those plans which are available from NCEM's Hazard Mitigation Planning Section and participating County Emergency Management Offices.

This section consists of the following eight subsections:

2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

Local hazard mitigation planning is the process of organizing community resources, identifying and assessing hazard risks, and determining how to best minimize or manage those risks. This process culminates in a hazard mitigation plan that identifies specific mitigation actions, each designed to achieve both short-term planning objectives and a long-term community vision.

To ensure the functionality of a hazard mitigation plan, responsibility is assigned for each proposed mitigation action to a specific individual, department, or agency along with a schedule or target completion date for its implementation (see Section 9: *Mitigation Action Plans*). Plan maintenance procedures are established for the routine monitoring of implementation progress, as well as the evaluation and enhancement of the mitigation plan itself. These plan maintenance procedures ensure that the Plan remains a current, dynamic, and effective planning document over time that becomes integrated into the routine local decision-making process (see Section 10: *Plan Maintenance*).

Communities that participate in hazard mitigation planning have the potential to accomplish many benefits, including:

- saving lives and property,
- saving money,
- speeding up recovery following disasters,
- reducing future vulnerability through wise development and post-disaster recovery and reconstruction,
- expediting the receipt of pre-disaster and post-disaster grant funding, and
- demonstrating a firm commitment to improving community health and safety.

Typically, mitigation planning is described as having the potential to produce long-term and recurring benefits by breaking the repetitive cycle of disaster loss. A core assumption of hazard mitigation is that the investments made before a hazard event will significantly reduce the demand for post-disaster assistance by lessening the need for emergency response, repair, recovery, and reconstruction. Furthermore, mitigation practices will enable local residents, businesses, and industries to re-establish themselves in the wake of a disaster, getting the community economy back on track sooner and with less interruption.

The benefits of mitigation planning go beyond solely reducing hazard vulnerability. Measures such as the acquisition or regulation of land in known hazard areas can help achieve multiple community goals, such as preserving open space, maintaining environmental health, and enhancing recreational opportunities. Thus, it is vitally important that any local mitigation planning process be integrated with other concurrent local planning efforts, and any proposed mitigation strategies must take into account other existing community goals or initiatives that will help complement or hinder their future implementation.

2.2 HISTORY OF HAZARD MITIGATION PLANNING IN THE HIGH-COUNTRY REGION

Prior to the development of the initial *High Country Regional Hazard Mitigation Plan* in 2012, each of the four counties and jurisdictions participating in this Plan has a previously adopted hazard mitigation plan. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each plan, are listed below:

- *Alleghany County Multi-Hazard Mitigation Plan* (July 2011)
  - Town of Sparta
- *Ashe County Hazard Mitigation Plan* (August 2010)
  - Town of Jefferson
  - Town of Lansing
  - Town of West Jefferson
- *Watauga County Hazard Mitigation Action Plan Update* (March 2005)
  - Town of Beech Mountain
  - Town of Blowing Rock
  - Town of Boone
  - Town of Seven Devils
- *Wilkes County Multi-Jurisdictional Hazard Mitigation Plan* (November 2004)
  - Town of North Wilkesboro
  - Town of Ronda
  - Town of Wilkesboro

Each of the existing county-level plans was developed using the multi-jurisdictional planning process recommended by the Federal Emergency Management Agency (FEMA).

For the development of the 2012 plan, all of the aforementioned jurisdictions joined to form a regional plan. No new jurisdictions have joined the process and all of the jurisdictions that participated in previous planning efforts participated in the development of the 2012 regional plan. The regional plan was developed in order to simplify planning efforts for the jurisdictions in the High-Country region and allowed resources to be shared amongst the participating jurisdictions to ease the administrative duties of all of the participants by combining the four existing County-level plans into one multi-jurisdictional plan. The 2012 plan was an important and successful first start for regional hazard mitigation planning efforts and that success has carried over into a subsequent update of this plan in 2018 and for this update in 2022.

2.3 UPDATING THE PLAN IN 2022

FEMA requires that hazard mitigation plans are required to be updated every five years to remain eligible for federal mitigation and public assistance funding. To prepare the 2022 *High-Country Regional Hazard Mitigation Plan*, ESP Associates, Inc. was hired by the North Carolina Emergency Management to provide professional mitigation planning services. Per the contractual scope of work, the consultant team followed the mitigation planning process recommended by FEMA (Publication Series 386 and Local Mitigation Plan Review Guide) and recommendations provided by North Carolina Emergency Management (NCEM) mitigation planning staff[1]. Additionally, for the 2021 update, FEMA Community Rating System (CRS) and Community Wildfire Protection Plan (DWPP) requirements were integrated into the plan update.

Tables 2.1 and 2.2 below provide an overview of how the Community Rating System and Community Wildfire Protection Plan requirements were integrated into this plan update.

TABLE 2.1 FEMA HAZARD MITIGATION PLANNING REQUIREMENTS AND THE CRS 10-STEP PLANNING PROCESS REFERENCE TABLE

FEMA Disaster Mitigation Act Requirement	CRS Activity 510 Planning Requirement
Phase I – Planning Process	
§201.6(c)(1)	Step 1: Organize to Prepare the Plan
§201.6(b)(1)	Step 2: Involve the Public
§201.6(b)(2) & (3)	Step 3: Coordinate
Phase II – Risk Assessment	
§201.6(c)(2)(i)	Step 4: Assess the Hazard
§201.6(c)(2)(ii) & (iii)	Step 5: Assess the Problem
Phase III – Mitigation Strategy	
§201.6(c)(3)(i)	Step 6: Set Goals
§201.6(c)(3)(ii)	Step 7: Review Possible Activities
§201.6(c)(3)(iii)	Step 8: Draft an Action Plan
Phase IV – Plan Maintenance	
§201.6(c)(5)	Step 9: Adopt the Plan

[1] A copy of the negotiated contractual scope of work between NCEM and ESP is available through NCEM upon request.

FEMA Disaster Mitigation Act Requirement	CRS Activity 510 Planning Requirement
§201.6(c)(4)	Step 10: Implement, Evaluate and Revise the Plan

Table 2.2 Community Wildfire Protection Plan Process Integration Reference Table

CWPP Process	Hazard Mitigation Plan Integration Reference
Step 1: Convene Decisionmakers	Section 2: Planning Process
Step 2: Involve Federal Agencies	Section 2: Planning Process
Step 3: Engage Interested Parties	Section 2: Planning Process
Step 4: Establish a Community Base Map	Section 3: Community Profile
Step 5: Develop a Community Risk Assessment	Sections 4, 5 and 6: Hazard Identification, Hazard Profiles and Vulnerability Assessment Section 7: Capability Assessment
Step 6: Establish Community Hazard Reduction Priorities and Recommendations to Reduce Structural Ignitability	Section 8: Mitigation Strategy
Step 7: Develop an Action Plan and Assessment Strategy	Section 9: Mitigation Action Plans Section 10: Plan Maintenance
Step 8: Finalize the CWPP	Appendix A: Plan Adoption

Source: Preparing a Community Wildfire Protection Plan – A Handbook for Wildland-Urban Interface Communities

The Local Mitigation Plan Review Tool, found in Appendix C, provides a detailed summary of FEMA's current minimum standards of acceptability for compliance with DMA 2000 and notes the location where each requirement is met within this plan. These standards are based upon FEMA's Final Rule as published in the Federal Register in Part 201 of the Code of Federal Regulations (CFR). The planning team used FEMA's Local Mitigation Plan Review Guide (October 2011) for reference as they completed the Plan.

For the development of the 2021 plan, all the aforementioned jurisdiction that participated in the development of the 2018 plan participated in this plan's development.

The process used to prepare this Plan included twelve major steps that were completed over the course of approximately nine months beginning in April 2021. Each of these planning steps (illustrated in **Figure 2.1**) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: *Introduction*.

FIGURE 2.1: MITIGATION PLANNING PROCESS FOR THE HIGH-COUNTRY REGION

2.4 THE HIGH-COUNTRY REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

In order to guide the development of this Plan, the High-Country counties (Alleghany, Ashe, Watauga and Wilkes) and representatives from their participating municipal jurisdictions created the High-Country Regional Hazard Mitigation Planning Committee. The Regional Hazard Mitigation Planning Committee represents a community-based planning team made up of representatives from various county departments and municipalities and other key stakeholders identified to serve as critical partners in the planning process.

Beginning in April 2021, the Regional Hazard Mitigation Planning Committee members engaged in regular discussions as well as local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated on all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through an e-mail distribution list.

Specifically, the tasks assigned to the Regional Hazard Mitigation Planning Committee members included:

- participate in Regional Hazard Mitigation Planning Committee meetings and workshops
- provide best available data as required for the risk assessment portion of the Plan

- help review the local Capability Assessment information and provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan
- support the development and update of the Mitigation Strategy, including the design and adoption of regional goal statements
- help design and propose appropriate mitigation actions for their department/agency for incorporation into the Mitigation Action Plan
- review and provide timely comments on all study findings and draft plan deliverables
- support the adoption of the *2022 High Country Regional Hazard Mitigation Plan*

Table 2.3 lists the members of the Regional Hazard Mitigation Planning Committee who were responsible for participating in the development of the Plan.

TABLE 2.3: MEMBERS OF THE 2022 HIGH-COUNTRY REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

NAME	DEPARTMENT / AGENCY	Title
Alleghany County		
Roten, Daniel	Alleghany County	EM Coordinator
Dalton, Travis	Alleghany County	Chief Inspector/County Planner
Ashe County		
Gambill, Patty	Ashe County	EM Coordinator
Wesley, Barker	Ashe County	Director of Planning
Town of Jefferson		
Shatley, Charity	Town of Jefferson	Town Manager
Town of Lansing		
Roten, Sandy	Town of Lansing	Town Clerk
Town of West Jefferson		
Price, Brantley	Town of West Jefferson	Town Administrator
Watauga County		
Holt, Will	Watauga County	Emergency Management Director
Town of Boone		
Ward, John	Town of Boone	Town Manager
Wilkes County		
Hamby, Suzanne B.	Wilkes County	Emergency Management Director
Barnes, Eddie	Wilkes County	Planning Director
Other Stakeholders		
Marrone, Edwardine	FEMA Region 4	
Hamby, Karen	NCEM	Area Coordinator
Baker, Carl	NCEM	Hazard Mitigation Planner
Crew, Chris	NCEM	Mitigation Plans Manager
Greene, Russell	NCEM	Area Coordinator
Mello, John	NCEM	Hazard Mitigation Planner

NAME	DEPARTMENT / AGENCY	Title
Norris, Seth	Deep Gap Fire Department	Fire Chief
Powers, Mac	>>>	>>>
Steelman, John	>>>	>>>

Table 2.4 lists points of contact for several of the jurisdiction who elected to designate their respective county officials to represent their jurisdiction on the planning team, generally because they did not have the time or staff to be able to attend on their own. Although these members designated county officials to represent them at in-person meetings, each was still contacted throughout the planning process and participated by providing suggestions and comments on the Plan, updates to mitigation actions and the Capability Assessment via email and phone conversations. These members are listed below by municipality.

Table 2.4: Members Designating Representatives to the High-Country Regional Hazard Mitigation Planning Committee

NAME	JURISDICTION/TITLE
Alleghany County	
Brinegar, David	Town of Sparta/Mayor
Watauga County	
Kaufman, Barry	Town of Beech Mountain/Mayor
Sellars, Herman	Town of Blowing Rock/Mayor
Fontaine, Larry	Town of Seven Devils/Mayor
Wilkes County	
Hauser, Marc	Town of North Wilkesboro/Mayor
Benge, Rheajean	Town of Ronda/Mayor
Inscore, Michael	Town of Wilkesboro/Mayor

Additional participation and input from other identified stakeholders and the general public was sought by the participating counties during the planning process through phone calls and the distribution of emails, advertisements, and public notices aimed at informing people on the status of the Hazard Mitigation Plan (public and stakeholder involvement is further discussed later in this section).

2.4.1 Multi-Jurisdictional Participation

The High Country Regional Multi-Jurisdictional Hazard Mitigation Plan includes four counties and eleven incorporated municipalities. To satisfy multi-jurisdictional participation requirements, each county and its participating jurisdictions were required to perform the following tasks:

- Participate in mitigation planning workshops;
- Identify completed/new mitigation projects, if applicable and identify any new mitigation actions to be included in the plan, and;
- Develop and adopt (or update) their local Mitigation Action Plan.

Each jurisdiction participated in the planning process and has developed a local Mitigation Action Plan unique to their jurisdiction. Each jurisdiction will adopt their Mitigation Action Plan separately. This provides the means for jurisdictions to monitor and update their Plan on a regular basis.

2.5 COMMUNITY MEETINGS AND WORKSHOPS

The preparation of this Plan required a series of meetings and workshops for facilitating discussion, gaining consensus and initiating data collection efforts with local government staff, community officials, and other identified stakeholders. More importantly, the meetings and workshops prompted continuous input and feedback from relevant participants throughout the drafting stages of the Plan.

The following is a summary of the key meetings and community workshops held during the development of the plan update[2]. In many cases, routine discussions and additional meetings were held by local staff to accomplish planning tasks specific to their department or agency, such as the approval of specific mitigation actions for their department or agency to undertake and include in the Mitigation Action Plan.

2.5.1 Meeting Minutes

Meeting Minutes from Kickoff Conference Call/Teams Meeting
April, 29, 2021
Phone Call/Teams Meeting

On April 16, 2021 ESP Associates reached out by email to County Emergency Management and Planning Department leads from Alleghany, Ashe, Watauga, and Wilkes to introduce themselves, explain the plan update process in general and schedule a time to hold an informal internal kickoff conference call/Teams meeting.

On April 29, 2021, Nathan Slaughter, Hazard Mitigation Department Manager from ESP Associates, Inc. and Project Manager for the update of the High-Country Regional Hazard Mitigation Plan conducted a conference call/Teams meeting with the High Country stakeholders. Mr. Slaughter began by having attendees introduce themselves. The 8 attendees included representatives from various departments and local jurisdictions within each of the four counties participating in the plan update. All four counties were represented. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed the agenda and presentation slide handouts. He then defined mitigation and gave a review of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

To continue, Mr. Slaughter provided detailed information about the project. He mentioned that the project is funded by a FEMA HMGP grant, and that NCEM was managing the planning effort and had assigned ESP Associates, Inc. to manage the update, thus ensuring that Mr. Slaughter would remain the Project Manager, as he was for the first two versions of the regional plan. For this update, there was no local funding required.

Mr. Slaughter then explained some of the basic concepts of mitigation. He explained how we should think about mitigation: we want to mitigate hazard impacts of existing development in the community (houses, businesses, critical facilities, etc.), and ensure that future development is conducted in a way

[2] Copies of agendas, sign-in sheets, minutes, and handout materials for all meetings and workshops can be found in Appendix D.

that doesn't increase vulnerability. This can be achieved by having good plans, policies, and procedures in place.

Mr. Slaughter then reviewed the key objectives of the project, which are to:

- Coordinate between the four participating counties to update the regional plan
- Update the plan to demonstrate progress and reflect current conditions
- Complete the update before the existing plan expires on December 28. 2022
- Increase public awareness and education
- Maintain grant eligibility for participating jurisdictions
- Update the plan in accordance with Community Rating System (CRS) requirements where applicable, and
- Maintain compliance with State and Federal requirements

Next, he explained new elements to this update, which include integrating with NCEM's RMT, Activity 510 compliance for CRS communities, Risk MAP, Community Wildfire Protection Plans, the NC Resilience Assessment, and EMAP compliance.

Mr. Slaughter reviewed the list of participating jurisdictions with the group, which all agreed to participate again. He also explained the planning process and specific tasks to be accomplished for the project, which include the planning process, risk assessment, capability assessment, mitigation strategy, mitigation action plan, and plain maintenance procedures. For the risk assessment portion of the process, Mr. Slaughter asked each county to designate a point of contact to coordinate the gathering of GIS data required for the analysis. He also reviewed the list of identified hazards and the committee agreed to maintain the previous list of hazards for the four counties.

The project schedule was presented and Mr. Slaughter noted that the schedule provided ample time to produce a quality plan and meet state and federal deadlines.

Mr. Slaughter discussed what data would need to be collected to complete the project. This includes GIS Data, Capability Assessment Revisions, a Public Participation Survey, and updates to existing Mitigation Actions.

Mr. Slaughter then reviewed the roles and responsibilities of ESP Associates, Inc, the County leads, and the participating jurisdictions. The presentation concluded with a discussion of the next steps to be taken in the project development. He encouraged meeting participants to distribute the Public Participation Survey. The next Regional Hazard Mitigation Planning Committee meeting was scheduled for some time in later in 2021 to discuss the findings of the risk and capability assessments and to begin updating existing mitigation actions and identify new goals.

Meeting Minutes form Mitigation Strategy Meeting
October 28, 2021
Phone Call/Teams Meeting
10:00 am – 11:30 am

Nathan Slaughter, Project Manager from ESP Associates, began the meeting by welcoming the attendees and reviewing the meeting agenda. Mr. Slaughter asked meeting attendees to introduce themselves and gave a refresher on mitigation, why we plan, and the key objectives of the project. He

reviewed the participating jurisdictions, project tasks and project schedule. He stated that a draft of the updated Regional Hazard Mitigation Plan would be presented by the end of December 2021.

Mr. Slaughter then presented the findings of the risk assessment. He shared the list of all hazards that are addressed in the regional plan, and reviewed the list of hazards addressed in the North Carolina State Hazard Mitigation Plan. He discussed a couple of caveats for the risk assessment and indicated that best available data was used. While that information is helpful, events are often under-reported, so it is important to keep the end goal in sight. The purpose of the risk assessment was shared: to compare hazards and determine which should be the focus of the mitigation actions. Finally, he mentioned to the stakeholders that it ultimately is their risk assessment, so their recommendations for adjustment are welcomed and encouraged.

Mr. Slaughter stated that since the last plan was updated, there have been six Presidential disaster declarations that have impacted the region, which helped emphasize the need to continue updating the mitigation plan.

The following Hazard Profiles and summaries of each hazard were then shared:

- DROUGHT: There were 7 regional drought events between 2000 and 2018, and future occurrences are likely.
- HAILSTORM: There have been 321 recorded events since 1962. Future occurrences are likely.
- HURRICANE AND COASTAL STORM: 20 storm tracks have come within 75 miles of the region since 1850. 3 of those were classified as a hurricane or tropical storm. Future occurrences are likely.
- LIGHTNING: Since 1996, there have been 32 reported occurrences, which resulted in one injury and nearly $2.7 million in property damage. Future occurrences are highly likely.
- SEVERE THUNDERSTORMS: 784 severe thunderstorm events have been recorded since 1959. These events resulted in 3 deaths, 7 injuries, and over $5.18 million in property damages. Future occurrences are highly likely.
- TORNADOES: There have been 14 recorded events since 1976, causing 10 injuries and $3.05 million in property damage. Future occurrences are likely.
- SEVERE WINTER WEATHER: 282 winter weather events SINCE 1996 that resulted in over $1.35 million in property damage have been recorded since 1993. Future occurrences are highly likely.
- DAM AND LEVEE FAILURE: Of the 115 dams in the region, 33 are considered high hazard dams. No serious breaches have been reported, and future occurrences are unlikely.
- EROSION: Although little information could be obtained on erosion occurrences in the region, erosion was addressed in the previous plan. Future occurrences are possible.
- FLOOD: 271 flood events have occurred since 1993, resulting in over $26.2 million in property damage. There have also been 266 reported NFIP losses since 1978 and approximately $4.8 million in claims. There are 16 repetitive loss properties, and future occurrences are highly likely.
- EARTHQUAKE: At least 86 earthquakes have occurred in the High-Country region since 1886. Future occurrences are possible.
- LANDSLIDE: Landslide risk in the region is high and there have been previous occurrences of landslides reported in the region according to the North Carolina Geological Survey. Future occurrences are likely.

- HAZARDOUS MATERIALS INCIDENTS: 39 serious HAZMAT events have been reported through the PHMSA. There are 8 TRI Facilities in the region. Future occurrences are possible.
- WILDFIRE: Much of the region is located in a high-risk wildland urban interface area. Future occurrences are likely.
- NUCLEAR EMERGENCY: There are no nuclear facilities within 50 miles of the region. No major historical occurrences were found, and future occurrences are unlikely.

In concluding the review of Hazard Profiles, Mr. Slaughter stated if anyone had additional information for the hazard profiles, or disagreed with any of the data presented, they should call or email him with their concerns.

The results of the hazard identification process were used to generate a Priority Risk Index (PRI), which categorizes and prioritizes potential hazards as high, moderate or low risk based on probability, impact, spatial extent, warning time, and duration. The highest PRI was assigned to Winter Storms and Freeze, followed by Severe Thunderstorm, Flood and Landslides.

Mr. Slaughter then displayed maps that presented each county's social vulnerability, as documented by the Center for Disease Control. The maps present how socially vulnerable areas in each county are as compared to the rest of North Carolina. Many indicators were used to determine the social vulnerability, and the factors were grouped into four themes that were based on census-tract levels.

After a brief break, Mr. Slaughter then presented the Capability Assessment Findings. ESP Associates used a scoring system that was used to rank the participating jurisdictions in terms of capability in four major areas (Planning and Regulatory; Administrative and Technical; Fiscal; Political). Important capability indicators include National Flood Insurance Program (NFIP) participation, Building Code Effective Grading Schedule (BCEGS) score, and Community Rating System (CRS) participation.

Mr. Slaughter reviewed the Relevant Plans and Ordinances, Relevant Staff/Personnel Resources, and Relevant Fiscal Resources. All of these categories were used to rate the overall capability of the participating counties and jurisdictions. Most jurisdictions are in the moderate to high range for Planning and Regulatory Capability and in the low to moderate range for Fiscal Capability. There is variation between the jurisdictions for Administrative and Technical Capability, mainly with respect to availability of planners and grant writers. Based upon the scoring methodology, it was determined that all of the participating jurisdictions have moderate or high capabilities to implement hazard mitigation programs and activities.

Mr. Slaughter then transitioned to the Mitigation Strategy portion of the presentation. Mr. Slaughter gave an overview of the process for updating the Mitigation Strategy and presented the existing mitigation goals for the regional plan. He asked the HCRHMPC to review the goals to determine whether or not they still reflect current vulnerabilities and current mitigation priorities. The committee members agreed that the goals should be modified to mention human-caused hazards but otherwise felt that they were still relevant hazard mitigation goals for the region.

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and jurisdictions' websites. As of the meeting date, 202 responses had been received. Based on the preliminary results, respondents felt that severe thunderstorms/high wind and severe winter storms posed the greatest threats to their neighborhood. Most did not live in a floodplain

or have flood insurance, but 71% of all respondents did not know who to contact regarding reducing their risks to hazards.

Mr. Slaughter then indicated that each participating jurisdiction would need to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by November 30, 2021. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by November 30, 2021. Mr. Slaughter then presented sample mitigation actions for the committee members to consider to include in their plan update.

Finally, Mr. Slaughter discussed the next steps in the planning process. These included returning mitigation action updates and delivery of a draft plan in late December 2021. He thanked the group for taking the time to attend and the meeting was adjourned.

2.6 INVOLVING THE PUBLIC

44 CFR Requirement

44 CFR Part 201.6(b)(1): The planning process shall include an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval

An important component of the mitigation planning process involved public participation. Individual citizen and community-based input provides the entire planning team with a greater understanding of local concerns and increases the likelihood of successfully implementing mitigation actions by developing community "buy-in" from those directly affected by the decisions of public officials. As citizens become more involved in decisions that affect their safety, they are more likely to gain a greater appreciation of the hazards present in their community and take the steps necessary to reduce their impact. Public awareness is a key component of any community's overall mitigation strategy aimed at making a home, neighborhood, school, business or entire city safer from the potential effects of hazards.

Public involvement in the development of the *High-Country Regional Hazard Mitigation Plan* was sought using two methods: (1) public survey instruments were made available; and (2) copies of draft Plan deliverables were made available for public review on county websites and at government offices. The Public was provided two opportunities to be involved in the actual plan development at two distinct periods during the planning process: (1) during the drafting stage of the Plan; and (2) upon completion of a final draft Plan, but prior to official plan approval and adoption. A public participation survey (discussed in greater detail in Section 2.6.1) was made available during the planning process at various locations throughout the High-Country region and on each county's website.

Documentation of the final public meetings will be included in the final plan in this section and in Appendix D.

2.6.1 Public Participation Survey

The High-Country Region was successful in getting citizens to provide input to the mitigation planning process through the use of the *Public Participation Survey*. The *Public Participation Survey* was designed to capture data and information from residents of the High-Country Region that might not be able to attend public meetings or participate through other means in the mitigation planning process. Copies of the *Public Participation Survey* were distributed to the Regional Hazard Mitigation Planning Committee

to be made available for residents to complete at local public offices. A link to an electronic version of the survey was also posted on each county's website. The online version of the survey was provided on the following websites:

- Goblueridge.net
- Appalachian Scene – Appalachian State University
- County Emergency Management websites for Alleghany, Ashe, Watauga and Wilkes Counties.

By the completion of the project, a total of 205 survey responses were received, which provided valuable input for the HCRHMPC to consider in the development of the plan update. Selected survey results are presented below.

- Approximately 38 percent of survey respondents had been impacted by a disaster, mainly flooding, severe winter storms and remnants from hurricanes.
- Respondents ranked Severe Thunderstorms/High Winds as the highest threat to their neighborhood (27.8 percent), followed by Severe Winter Storms (25.9 percent).
- Approximately 58 percent of respondents have taken actions to make their homes more resistant to hazards and 78 percent are interested in making their homes more resistant to hazards.
- 71.2 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Emergency Services, Natural Resource Protection, and Prevention, were ranked as the most important activities for communities to pursue in reducing risks.
- A copy of the survey and a detailed summary of the survey results are provided in Appendix B.

2.7 INVOLVING THE STAKEHOLDERS

44 CFR Requirement

44 CFR Part 201.6(b)(2): The planning process shall include an opportunity for neighboring communities, local and regional agencies involved in mazzard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other non-profit interests to be involved in the planning process.

At the beginning of the planning process for the development of this plan, the project consultant worked with each of the four County Emergency Management leads to initiate outreach to stakeholders to be involved in the planning process. The project consultant sent out a list of recommended stakeholders provided from FEMA Publication 386-1 titled **Getting Started: Building Support for Mitigation Planning**, which demonstrated the wide range of stakeholders that were considered to participate in the development of this plan. Each of the County Emergency Management leads used that list for reference as they invited stakeholders from their counties to participate in the planning process.

The Regional Hazard Mitigation Committee encouraged more open and widespread participation in the mitigation planning process. The region also went above and beyond in its local outreach efforts through the design and distribution of the Public Participation Survey. This opportunity was provided for local officials, residents, businesses, academia, and other private interests in the High Country Region to be involved and offer input throughout the local mitigation planning process.

2.8 DOCUMENTATION OF PLAN PROGRESS

Progress in hazard mitigation planning for the participating jurisdictions in the High-Country Region is documented in this plan update. Since hazard mitigation planning efforts officially began in the participating counties with the development of the initial Hazard Mitigation Plans in the late 1990's/early 2000s, many mitigation actions have been completed and implemented in the participating jurisdictions. These actions will help reduce the overall risk to natural hazards for the people and property in the High-Country Region. The actions that have been completed are documented in Appendix E.

In addition, community capability continues to improve with the implementation of new plans, policies and programs that help to promote hazard mitigation at the local level. The current state of local capabilities for the participating jurisdictions is captured in Section 7: Capability Assessment. The participating jurisdictions continue to demonstrate their commitment to hazard mitigation and hazard mitigation planning and have proven this by reconvening the Hazard Mitigation Planning Team to update the Plan and by continuing to involve the public in the hazard mitigation planning process.

SECTION 3
COMMUNITY PROFILE

This section of the Plan provides a general overview of the High-Country Region. It consists of the following four subsections:

- 3.1 Geography and the Environment
- 3.2 Population and Demographics
- 3.3 Housing, Infrastructure, and Land Use
- 3.4 Employment and Industry

3.1 GEOGRAPHY AND THE ENVIRONMENT

The High-Country Region is located in the northern portion of the Western North Carolina Blue Ridge Mountains. The region was named for the high rising mountain peaks and high elevations of its communities and towns. For the purposes of this plan, the High-Country Region includes the counties of Alleghany, Ashe, Watauga, and Wilkes. An orientation map is provided as **Figure 3.1**.

The region is a popular tourist destination for outdoor activities which include biking, fishing, hiking, golfing, horseback riding, whitewater rafting, and even gem mining. The High Country is also known for offering the most popular ski resorts in Western North Carolina and the area boasts many other attractions, historical sites, and geological formations such as Grandfather Mountain and Blowing Rock. At 5,946 feet, Grandfather Mountain's Calloway Peak is the highest point in the Blue Ridge Mountains.

The total land area of each of the participating counties is presented in **Table 3.1**.

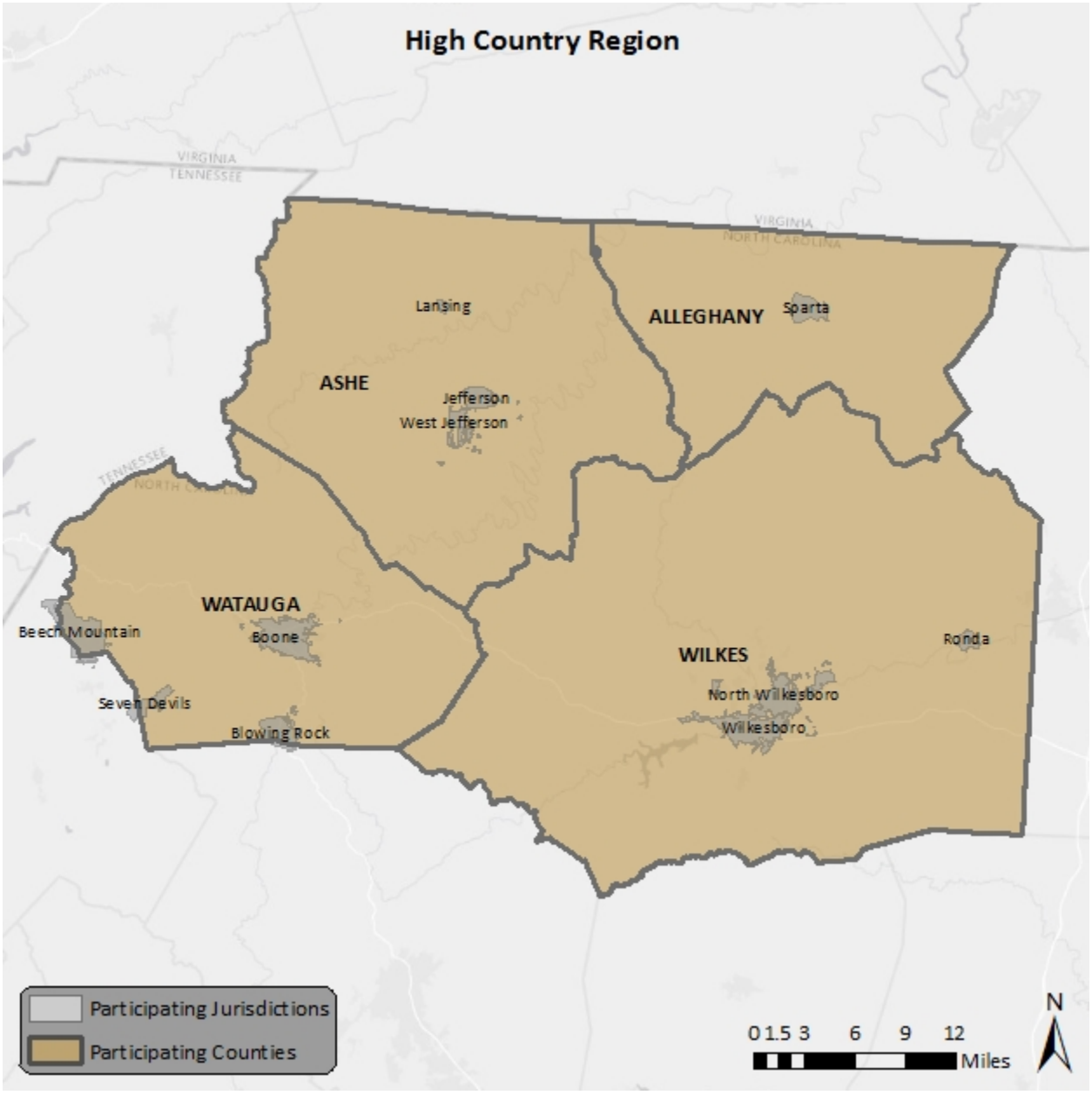
TABLE 3.1: TOTAL AREAS OF PARTICIPATING COUNTIES

County	Total Land Area
Alleghany	235 square miles
Ashe	426 square miles
Watauga	313 square miles
Wilkes	757 square miles

Source: US Census Bureau

The High-Country Region enjoys four distinct seasons but the climate in the region is considerably cooler and more drastic than other parts of North Carolina. Dramatic and unexpected changes in weather, in precipitation in particular, are quite common and late spring and early autumn are often marked by windy conditions, sudden drops in temperature, and freezing rain, sleet, or snow. The climate in the region more closely resembles that of New England or parts of the Upper Midwest rather than the South. This is particularly true in winter when the area gets considerably more snow and wintery precipitation than the rest of the state. In the winter, average high temperatures (˚F) reach the low forties while average low temperatures are in the low twenties. In the summer, average high temperatures are in the high seventies and average low temperatures are in the high fifties.

FIGURE 3.1: HIGH COUNTRY REGION ORIENTATION MAP



3.2 POPULATION AND DEMOGRAPHICS

Wilkes County is the largest participating county by area and it also has the largest population. Between 2010 and 2018, the participating jurisdictions experienced population growth and decline. The Town of Boone, home of Appalachian State University, had the highest rate of growth at 14.2 percent. Population counts from the US Census Bureau for 2000, 2010, and 2018 estimations for each of the participating counties and jurisdictions are presented in **Table 3.2**.

TABLE 3.2: POPULATION COUNTS FOR PARTICIPATING JURISDICTIONS

Jurisdiction	2000 Census Population	2010 Census Population	2018 Census Population	% Change 2010-2018
ALLEGHANY COUNTY	**10,677**	**11,155**	**11,154**	**-0.10%**
Town of Sparta	1,817	1,770	1,759	-0.60%
ASHE COUNTY	**24,384**	**27,281**	**27,240**	**-0.50%**
Town of Jefferson	1,422	1,611	1,541	-4.30%
Town of Lansing	151	158	155	-1.90%
Town of West Jefferson	1,081	1,299	1,313	1.10%
WATAGUA COUNTY	**42,695**	**51,079**	**55,945**	**9.60%**
Town of Beech Mountain	310	320	323	0.90%
Town of Blowing Rock	1,418	1,241	1,307	5.30%
Town of Boone	13,472	17,122	19,562	14.20%
Town of Seven Devils	129	192	215	11.90%
WILKES COUNTY	**65,632**	**69,340**	**68,557**	**-1.10%**
Town of North Wilkesboro	4,116	4,245	4,225	-0.50%
Town of Ronda	460	417	411	-1.40%
Town of Wilkesboro	3,159	3,413	3,498	2.50%

Source: US Census Bureau

Based on the 2018 Census, the median age for residents of the participating counties ranges from 30 to 49 years. The racial characteristics of the participating counties are presented in **Table 3.3**. Generally, whites make up the vast majority of the population in the region, accounting for over 90 percent of each county's population.

TABLE 3.3: DEMOGRAPHICS OF PARTICIPATING COUNTIES

Jurisdiction	White, Percent (2019)	Black or African American, Percent (2019)	American Indian or Alaska Native, Percent (2019)	Asian, Percent (2019)	Native Hawaiian or Other Pacific Islander, Percent (2019)	Persons of Hispanic Origin, Percent (2019)*	Two or More Races, Percent (2019)
Alleghany County	95.24%	1.80%	0.50%	0.80%	0.00%	9.90%	1.40%
Ashe County	96.90%	1.00%	0.40%	0.50%	0.10%	5.10%	1.20%
Watauga County	94.80%	1.90%	0.40%	1.20%	0.00%	4.00%	1.70%
Wilkes County	92.70%	4.70%	0.40%	0.60%	0.10%	6.90%	1.50%

*Hispanics may be of any race, so also are included in applicable race categories
Source: US Census Bureau

3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

3.3.1 Housing

According to the 2018 US Census estimates, there are 93,579 housing units in the High-Country Region, most of which are single family homes. Housing information for the four participating counties is presented in **Table 3.4**. As shown in the table, Wilkes County has a very low percentage of seasonal housing units compared to the other counties.

TABLE 3.4: HOUSING CHARACTERISTICS of Participating Counties

County	Housing Units (2010)	Housing Units (2018)	Seasonal Units, Percent (2018)	Median Home Value (2013-2017)
Alleghany County	8,094	8,127	2.1	$136,000
Ashe County	17,342	17,787	3	$150,300
Watauga County	32,137	34,016	3.5	$240,700
Wilkes County	33,065	33,649	1.6	$123,700

Source: U.S. Census Bureau

3.3.2 Infrastructure

Transportation

There are several major thoroughfares that traverse the High-Country Region. US Highway 221 runs roughly northeast to southwest through Alleghany, Ashe, and Watauga Counties from the Virginia border near Sparta towards Boone. It is intersected by US Highway 421 which traverses across Wilkes and Watauga Counties from east to west, connecting Wilkesboro to Boone. US Highway 21 also runs through Alleghany County from northwest to southeast and along the border of Wilkes County. In addition, the Blue Ridge Parkway runs through Alleghany County, along the border of Ashe and Wilkes Counties, then across Watauga County. The Blue Ridge Parkway is a National Parkway that is highly regarded for its scenic views, hiking trails, picnic areas, camp sites, and exhibits.

There are several small general aviation airports within the High-Country Region, including the Ashe County Airport in Jefferson and the Wilkes County Airport in North Wilkesboro. The major airport nearest to the region is the Piedmont Triad International Airport in Greensboro which offers non-stop commercial flights to destinations across the eastern US and Midwest and is approximately 100 miles from the center of the region. Other nearby major airports include Asheville Regional Airport, Charlotte/Douglas International Airport, and Tri-Cities Regional Airport in Blountville, Tennessee.

Utilities

Electric power in the High-Country Region is provided by several electricity cooperatives. Blue Ridge Electric Membership Corporation serves Alleghany, Ashe, Watauga, and Wilkes Counties. Additionally, Wilkes County is served by Energy United and Surry-Yadkin Electric Membership Corporation.

Water and sewer service are provided by all of the participating towns, but unincorporated areas rely on septic systems and wells in the High-Country Region. Currently, the Town of Lansing is challenged to provide basic water and sewer services because its wells lack sufficient yield and the sewer system needs repairs. Consequently, the water system is under a state moratorium on new connections. However, the town is participating in the NC Small Towns Economic Prosperity (NC STEP) program and is seeking to identify funding sources that will help leverage additional private investments in the Town by

increasing the number of job opportunities and local business activity.

Community Facilities
There are a number of public buildings and community facilities located throughout the High-Country Region. According to the data collected for the vulnerability assessment (Section 6.4.1), there are 118 fire/EMS stations, 23 police stations, 114 medical care facilities, and 42 public schools located within the study area.

Six hospitals are located in the High-Country Region. The largest is the Watauga County Medical Center, a 117-bed regional referral medical complex located in Boone. The Wilkes Regional Medical Center in North Wilkesboro is close behind with 112 beds as is the Blowing Rock Hospital with 100 beds. The two smaller facilities are the Ashe Memorial Hospital in Jefferson, with 85 beds, and the Alleghany Memorial Hospital in Sparta, with 25 beds.

The High-Country Region contains numerous local, state, and national parks and recreation areas, including the Blue Ridge Parkway, Grandfather Mountain, Cherokee National Forest, and Pisgah National Forest. These facilities offer recreational opportunities to area residents and hundreds of thousands of visitors each year.

3.3.2 Land Use and Development Trends

Many areas of the High-Country Region are undeveloped or sparsely developed due to the mountainous terrain and the conservation of land in state and national parks. As shown in **Figure 3.1** above, there are a few small incorporated municipalities located throughout the study area, and these areas are where the region's population is generally concentrated. The incorporated areas are also where many of the businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consist of rural residential development, agricultural uses, recreational areas, and forestland.

3.4 EMPLOYMENT AND INDUSTRY

Like many other parts of North Carolina, the High Country's economy was heavily reliant on the manufacturing and textiles industries during the 20th century. However, the region has since suffered from numerous plant closings during the 1990s and 2000s. As a result, many of the communities are now working to develop place-based economies that will rely on the High Country's cultural traditions and natural resources. Agriculture also continues to play a major role in the local economy and there are cattle, poultry, and other operations located throughout the region. However, over the last ten years, many farmers have converted cattle farms into Christmas tree farms and North Carolina has become second, only to Oregon, in Christmas tree production.

According to the North Carolina Department of Commerce Labor and Economic Analysis (NCDCLEA), in 2018, Alleghany County had a labor force of 4,302 workers. The top 5 employers in Alleghany County were Alleghany County Board of Education, Parkdale Mills, Alleghany County, Living Waters Home Care, and Alleghany Memorial Hospital. The average unemployment rate was 4.7 compared to the State rate of 3.7.

Ashe County had an average annual employment of 12,785 workers. In 2018 the top 5 employers in Ashe County were the Ashe County Board of Education, American Emergency Vehicles, General Electric Company, Ashe Memorial Hospital, and Ashe County. The average unemployment rate was 3.6

compared to the State rate of 3.7.
Watauga County had a labor force of 29,032 workers in 2018. The top 5 employers in Watauga County were Appalachian State University, Appalachian Regional Healthcare System, Watauga County Board of Education, Samaritan's Purse, and Watauga County. The average unemployment rate was 3.1 compared to the State rate of 3.7.

Wilkes County had a labor force of 30,088 workers in 2018. The top 5 employers in Wilkes County were Tyson Farms, Wilkes County Board of Education, Lowes Companies INC, Wake Forest University, and Wilkes County. The average unemployment rate was 3.6 compared to the State rate of 3.7.

SECTION 4
HAZARD IDENTIFICATION

This section describes how the planning team identified the hazards to be included this plan. It consists of the following five subsections:

- 4.1 Overview
- 4.2 Disaster Declarations
- 4.3 Summary of Hazard Impacts Since Previous Plan
- 4.4 Hazard Evaluation
- 4.5 Hazard Identification Results

44 CFR Requirement
44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all-natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

4.1 OVERVIEW

The High-Country Region is vulnerable to a wide range of natural and human-caused hazards that threaten life and property. Current FEMA regulations and guidance under the Disaster Mitigation Act of 2000 (DMA 2000) require, at a minimum, an evaluation of a full range of natural hazards. An evaluation of human-caused hazards (i.e., technological hazards, terrorism, etc.) is encouraged, though not required, for plan approval. The High-Country Region has included a comprehensive assessment of both types of hazards.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating counties in the High-Country Region (Alleghany County, Ashe County, Watauga County, and Wilkes County) have identified a number of hazards that are to be addressed in their Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the High-Country Regional Hazard Mitigation Planning Committee members, research of past disaster declarations in the participating counties[1], and review of the North Carolina State Hazard Mitigation Plan (2018). To maintain consistency, the High-Country Regional Hazard Mitigation Planning Committee voted to assess the same hazards that were identified in the most recent updated of the North Carolina Hazard Mitigation Plan. Therefore, since the development of the previous version of this plan, the hazard identified and included in the plan have changed. A list of all previous hazards covered in the 2018 High Country Regional Hazard Mitigation Plan is viewable in **Table 4.1**, along with a summary of the hazards assessed in this 2022 update. Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

[1] A complete list of disaster declarations for the High-Country Region can be found below in Section 4.2

TABLE 4.1: 2022 HIGH COUNTRY HAZARDS UPDATE

2014 High Country Identified Hazards		2022 High Country Identified Hazards		Sub hazards covered in 2022 Plan and Explanations
Atmospheric Hazards	Drought	Drought	**Natural Hazards**	Agricultural Drought, Hydrological Drought
	Hailstorm			Assessed under "Tornadoes/Thunderstorms"
	Hurricane and Tropical Storm	Hurricane and Coastal Hazards		Storm Surge associated with Hurricanes and Nor'easters, High Wind associated with Hurricanes and Nor'easters, Torrential Rain, Tornadoes Associates with Hurricanes, Severe Winter Weather associated with Nor'easters
	Lightning			Assessed under "Tornadoes/Thunderstorms"
	Tornado	Tornadoes/Thunderstorms		Hailstorm, Torrential Rain associated with Severe Thunderstorms, Thunderstorm Wind, Lightning, Waterspout, High Wind
	Severe Thunderstorm			Assessed under "Tornadoes/Thunderstorms"
	Winter Storm and Freeze	Severe Winter Weather		Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold
Hydrologic Hazards	Dam and Levee Failure	Dam Failures		
	Erosion			Assessed under "Geological"
	Flood	Flooding		
Geologic Hazards	Earthquake	Earthquakes		
	Landslide	Geological		Landslides, Sinkholes, Erosion
Other Hazards	Wildfire	Wildfires	**Other Hazards**	
		Infectious Disease		
Other Hazards	Hazardous Materials Incident	Hazardous Substances	**Technological Hazards**	Hazardous Materials, Hazardous Chemicals, Oil Spill
		Terrorism		Chemical, Biological, Radiological, Nuclear, Explosive
		Cyber		
		Electromagnetic Pulse		

4.2 DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the High-Country Regional planning area. Since 1973, fifteen presidential disaster declarations have been reported in the High-Country Region, which can be seen in **Table 4.2** below. This includes seven storms related to severe storms and flooding, five storms related to hurricane and tropical events, two storms related to winter storms events, two storm events which caused severe mudslides and landslides, and most recently one pandemic disaster declaration.

TABLE 4.2: HIGH COUNTRY REGION DISASTER DECLARATIONS

Year	Disaster Number	Description	Alleghany County	Ashe County	Watauga County	Wilkes County
1973	394	Severe Storms and Flooding		X	X	
1977	542	Severe Storm and Flooding		X	X	X
1989	844	Severe Storms and Flooding	X	X	X	X
1995	1073	Hurricane Hugo		X	X	X
1996	1087	Severe Storms, Flooding, and High Winds	X	X	X	X
1996	1103	Blizzard of 1996			X	X
1998	1200	Winter Storm		X	X	
2004	1546	Severe Storms and Flooding	X	X	X	X
2004	1553	Tropical Storm Frances	X	X	X	X
2010	1871	Hurricane Ivan	X	X	X	
2013	4146	Severe Storms, Flooding, Landslides, and Mudslides	X	X	X	
2013	4153	Severe Storms, Flooding, Landslides, Mudslides		X	X	X
2018	4393	Hurricane Florence	X	X		
2020	4487	COVID-19 Pandemic	X	X	X	X
2020	4543	Severe Storms, Tornadoes, and Flooding		X		

4.3 SUMMARY OF HAZARD IMPACTS SINCE PREVIOUS PLAN

Since the approval date of the previous High-Country Regional Hazard Mitigation Plan (2018), there have been 266 hazard events recorded for the region in the National Centers for Environmental Information Storm Events Database. It is important to take note of those hazard events and consider them in the *Hazard Identification* section to help ensure that the appropriate hazards are being considered in the risk assessment sections and in the Mitigation Strategy. **Table 4.3** documents the hazard events recorded. Details for some of these events are discussed in further detail in the *Hazard Profiles* section.

TABLE 4.3: SUMMARY OF HAZARD EVENTS SINCE PREVIOUS PLAN

Hazard Type*	Number of Reported Events in Alleghany County	Number of Reported Events in Ashe County	Number of Reported Events in Watauga County	Number of Reported Events in Wilkes County
Cold/Wind Chill	0	0	0	0
Flash Flood	4	6	11	6
Flood	3	4	13	9
Hail	7	4	3	8
Heavy Snow	2	2	3	1
High Wind	12	25	25	4
Lightning	3	0	0	2
Strong Wind	2	2	2	3
Thunderstorm Wind	5	6	3	55
Tornado	0	1	0	2
Tropical Storm	0	0	0	0
Winter Storm	6	7	8	7
Winter Weather	0	0	0	0
TOTAL NUMBER OF REPORTED EVENTS	**44**	**57**	**68**	**97**

*The hazard type names that NCEI uses are different than the names of hazards used in this plan; however, one can still get an understanding of the types of hazards that impact the region as the hazard types are similar in name.

Appendix H includes detailed information about all previous historical hazard occurrence events that have occurred in the region as reported to the National Centers for Environmental Information. Some more detailed information about previous historical hazards events can be found in Section 5: Hazard Profiles under each separate hazard profile.

4.4 HAZARD EVALUATION

Table 4.4 documents the evaluation process used for determining which of the initially identified hazards are considered significant enough to warrant further evaluation in the risk assessment. For each hazard considered, the table indicates whether or not the hazard was identified as a significant hazard to be further assessed, how this determination was made, and why this determination was made. The table works to summarize not only those hazards that *were* identified (and why) but also those that *were not* identified (and why not). Hazard events not identified for inclusion at this time may be addressed during future evaluations and updates of the risk assessment if deemed necessary by the High-Country Regional Hazard Mitigation Planning Committee during the plan update process.

TABLE 4.4: DOCUMENTATION OF THE HAZARD EVALUATION PROCESS

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
NATURAL HAZARDS			
Avalanche	**NO**	• Review of US Forest Service National Avalanche site • Review of the NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the previous High-Country Hazard Mitigation Plan	• There is no risk of avalanche events in North Carolina. The United States avalanche hazard is limited to mountainous western states including Alaska, as well as some areas of low risk in New England • Avalanche was not included in the previous High-Country Hazard Mitigation Plan
Drought	**YES**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of the NC State Hazard Mitigation Plan • Review of previous High-Country Hazard Mitigation Plan	• There are reports of drought conditions in 18 of the last 20 years (2000-2020) in the High-Country Region, according to the North Carolina Drought Monitor. • Droughts are discussed in NC State Hazard Mitigation Plan • Drought is included in the previous High-Country Hazard Mitigation Plan
Hailstorm	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous High Country Hazard Mitigation Plan • Review of NOAA NCEI Storm Events	• Hailstorm events are discussed in the state plan as its own hazard • NCEI reports 321 hailstorm events (0.75 to 4.5-inch size hail) for the High-Country Region between 1984 and 2019. For these events there was almost $2 million (2020 dollars) in property damages reported. • Hail was addressed as an individual hazard in the previous

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		Database	High-Country Hazard Mitigation Plan
Excessive Heat	**NO**	• Review of NOAA NCEI Storm Events Database • Review of the North Carolina State Hazard Mitigation Plan • Review of the previous High-Country Hazard Mitigation Plan	• NCEI reported no excessive heat events in the High-Country region • The NC State Hazard Mitigation Plan includes Excessive Heat as an identified Hazard for North Carolina • Excessive heat was not included in the previous hazard mitigation plan
Hurricane and Coastal Hazards	**YES**	• Review of NC State Hazard Mitigation Plan • Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website • Review of NOAA NCEI Storm Events Database • Review of historical presidential disaster declarations • Review of the previous High-Country Hazard Mitigation Plan	• Hurricanes and coastal hazard events are discussed in the NC State Hazard Mitigation Plan • Hurricanes and coastal hazards were addressed as hurricanes and tropical storms in the previous High-Country Hazard Mitigation Plan. • NOAA historical records indicate 20 tropical storms or hurricane events have come within 75 miles of the High-Country Region since 1896. • NCEI did not report any hurricane, tropical storm, or tropical depression events in the High-Country Region
Lightning	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous High-Country Hazard Mitigation Plan • Review of NOAA	• Lightning events are discussed in the NC State Hazard Mitigation Plan as part of the Severe Thunderstorm hazard. • NCEI reports 32 lightning events for the High-Country Region since 1996. These events have resulted in a recorded 1 injury and $2.26 million (2020 dollars) in property damage.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		NCEI Storm Events Database • Review of Vaisala's NLDN Lightning Flash Density Map	• Lightning is addressed as an individual hazard in the previous High-Country Hazard Mitigation Plan. To maintain consistency with the NC State Hazard Mitigation Plan, it will be addressed under the Tornadoes/Thunderstorms section.
Nor'easter	**NO**	• Review of the NC State Hazard Mitigation Plan • Review of the NOAA NCEI Storm Events Database • Review of the previous High-Country Hazard Mitigation plan	• Nor'easters are discussed in the state plan as a part of the Hurricane hazard. • NCEI does not report any Nor'easter activity for the High-Country Region. However, Nor'easter activity may have affected the region as severe winter storms. In this case, the activity would be reported under winter storm events. • This hazard was not addressed in the previous plan.
Tornado/Thunderstorm	**YES**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous High-Country Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	• Tornado events are discussed in the NC State Hazard Mitigation Plan. • Tornado events were addressed in the previous High-Country Hazard Mitigation Plan. • NCEI reports 14 tornado events in High Country Region counties since 1950. These events have resulted in 10 injuries and over $3.05 million (2020 dollars) in property damage with the most severe being an F1.
Severe Thunderstorm	**YES (Assessed under Tornadoes/Thunderstorms)**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment	• Severe thunderstorm events are discussed in the NC State Hazard Mitigation Plan • Severe thunderstorm events

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of NC State Hazard Mitigation Plan • Review of previous High-Country Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database	were addressed as Thunderstorm Wind/High Wind in the previous High-Country hazard mitigation plan • NCEI reports 784 thunderstorm wind and high wind events in the High-Country region since 1959. These events have resulted in 7 injuries, 3 deaths and over $5.18 million (2020 dollars) in property damage.
Severe Winter Weather	**YES**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of historical Presidential disaster declarations. • Review of NOAA NCEI Storm Events Database • Review of the previous High-Country Regional Hazard Mitigation Plan	• Severe winter storms, including snow storms and ice storms, are discussed in the NC State Hazard Mitigation Plan. • Severe Winter Weather events were addressed as Winter Storms and Freezes in the previous High-Country hazard mitigation plan. • NCEI reports that the High-Country counties have been affected by 282 severe winter weather events since 1996. These events resulted in 1 injury and over $1.35 million property damage (2020 dollars). • A blizzard event in 1996 was responsible for two of the fifteen disaster declarations in the High-Country region.
Earthquake	**YES**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous High-Country Hazard Mitigation Plan	• Earthquake events are discussed in the NC State Hazard Mitigation Plan and both of the participating counties in the High-Country Region are in the region with the highest vulnerability to an earthquake event in the state. • Earthquakes have occurred in

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of the National Geophysical Data Center • USGS Earthquake Hazards Program website	and around the State of North Carolina in the past. The state is affected by the Charleston and the New Madrid (near Missouri) Fault lines which have generated a magnitude 8.0 earthquake in the last 200 years. • The previous High-Country hazard mitigation plan addresses earthquakes. • 84 events are known to have occurred in the region according to the National Geophysical Data Center. The greatest MMI reported was a VI (strong). • According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the High-Country Region is approximately 3 to 4%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more.
Expansive Soils	**NO**	• Review of NC State Hazard Mitigation Plan • Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of USDA Soil Conservation Service's Soil Survey • Review of the previous High-Country Regional Hazard Mitigation Plan	• Expansive soils are identified in the NC State Hazard Mitigation Plan but they are not a hazard of concern in the mountains. • The previous High-Country hazard mitigation plan did not identify expansive soils as a potential hazard. • According to FEMA and USDA sources, the High-Country Region is located in an area that has a "little to no" clay swelling potential.
Geological (Landslides,	**YES**	• Review of NC State	• Landslide/debris flow events are

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Sinkholes, Erosion)		Hazard Mitigation Plan • Review of USGS Landslide Incidence and Susceptibility Hazard Map • Review of the North Carolina Geological Survey database of historic landslides • Review of the previous High Country Regional Hazard Mitigation Plan	identified in the state plan as a hazard. • The previous High-Country hazard mitigation plan addressed landslides as an individual hazard. • USGS landslide hazard maps indicate "high landslide incidence" (more than 15% of the area is involved in landslides) is found across the High-Country Region. Both counties also have areas of moderate incidence with high susceptibility. • Data provided by NCGS indicate 491 recorded landslide events in the High-Country Region. • Coastal erosion is discussed in the NC State Hazard Mitigation Plan but only for coastal areas (there is no discussion of riverine erosion). The High-Country Region is not located in a coastal area. • Riverine erosion is discussed in the previous High-Country hazard mitigation plan.
Land Subsidence	**NO**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous High-Country Regional Hazard Mitigation Plan	• The state plan delineates certain areas that are susceptible to land subsidence hazards in North Carolina; however, the High-Country counties have zero vulnerability. • The state plan delineates certain areas that are susceptible to land subsidence hazards in North Carolina; however, none of these areas are located in High Country counties. • The previous High-Country hazard mitigation plan did not

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			identify land subsidence as a potential hazard.
Tsunami	**NO**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous High-Country Regional Hazard Mitigation Plan • Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses).	• No record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States. • Tsunami inundation zone maps are not available for communities located along the U.S. East Coast. • Tsunamis are not addressed in the State Hazard Mitigation Plan. • FEMA mitigation planning guidance suggests that locations along the U.S. East Coast have a relatively low tsunami risk and need not conduct a tsunami risk assessment at this time.
Volcano	**NO**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of USGS Volcano Hazards Program website • Review of the previous High-Country Hazard Mitigation Plan	• There are no active volcanoes in North Carolina. • There has not been a volcanic eruption in North Carolina in over 1 million years • No volcanoes are located near the High-Country Region.
Dam Failure	**YES**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan	• Dam failure is identified as a hazard in the NC State Hazard Mitigation Plan. • The previous High-Country Hazard Mitigation Plan identifies Dam failure hazard as Dam and

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of the previous High-Country Regional Hazard Mitigation Plan • Review of North Carolina Dam Safety Program's NC Dam Inventory as of 11/20/19	Levee Failure. • Per the NC Dam Inventory, there are 115 dams in total in the High-Country region, of those, 33 are high hazard dams in the planning region. (High hazard is defined as "where failure will likely cause loss of life or serious damage to homes, industrial and commercial buildings, important public utilities, primary highways, or major railroads.")
Flooding	**YES**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous High-Country Regional Hazard Mitigation Plan • Review of NOAA NCEI Storm Events Database • Review of historical disaster declarations • Review of FEMA DFIRM data • Review of FEMA's NFIP Community Status Book and Community Rating System (CRS)	• Floods occur in all 50 states and in the U.S. territories. • The flood hazard is thoroughly discussed in the NC State Hazard Mitigation Plan. The High-Country Region was found to have relatively low vulnerability compared to the state. • The previous High-Country hazard mitigation plan addressed flood hazard. NCEI reports that High Country Region counties have been affected by 271 floods events since 1993. These events caused an estimated $26.22 million (2020 dollars) in property damages and over $1 million in crop damages. • Eight of the fifteen Presidential Disaster Declarations were flood-related and an additional two were hurricane or tropical storm-related which caused flooding issues. • 3.5% of the High-Country Region is located in an identified floodplain (100- or 500-year). • All municipalities in the region participate in the NFIP and

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
			Watauga County and Boone participate in the CRS.
OTHER HAZARDS			
Wildfires	**YES**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of NC State Hazard Mitigation Plan • Review of previous High-Country Regional Hazard Mitigation Plan • Review of Southern Wildfire Risk Assessment (SWRA) Data • Review of the NC Division of Forest Resources website	• Wildfires occur in virtually all parts of the United States. Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases. • Wildfires are identified as a hazard in the state plan. • The previous High-Country Hazard Mitigation plan addressed wildfire as a hazard. • A review of SWRA data indicates that there are areas of elevated concern in the High-Country Region. • According to the North Carolina Division of Forest Resources, the High-Country Region experiences an average of 24 fires each year which burn a combined 87 acres.
Hazardous Substances	**YES**	• Review of FEMA's Multi-Hazard Identification and Risk Assessment • Review of previous High-Country Hazard Mitigation Plan • Review of the NC State Hazard Mitigation Plan	• The previous High-Country Hazard Mitigation Plan lists the Hazardous Substances hazard as Hazardous Materials Incidents. • Review of Pipeline and Hazardous Materials Safety Administration data indicates 39 HAZMAT incidents occurred in the High-Country region. • EPA Toxic Release Inventory indicates eight Toxic Release Inventory (TRI) facilities in the High-Country region.

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
Infectious Disease	**YES**	• Review of the previous High-Country Regional Hazard Mitigation Plan • Review of the previous High-Country Hazard Mitigation Plan	• Infectious Disease is identified as a hazard in the state plan • Although the previous hazard mitigation plans for the region did not include infectious diseases as a hazard, it is assessed in this update to maintain consistency with the NC State Hazard Mitigation Plan. • Infectious Disease has caused one of the fifteen disaster declarations in the High-Country Region.
TECHNOLOGICAL HAZARDS			
Terrorism	**Yes**	• Review of the NC State Hazard Mitigation Plan • Review of the previous High-Country Hazard Mitigation Plan • Review of local official knowledge.	• Although the previous hazard mitigation plans for the region did not include terrorism as a hazard, it is assessed in this update to maintain consistency with the NC State Hazard Mitigation Plan • This hazard will assess chemical, biological, nuclear, and explosive terrorism events.
Radiological Emergency – Fixed Nuclear Facilities	**No**	• Review of the previous High-Country Regional Hazard Mitigation Plan • Review of IAEA list of fixed nuclear power stations in the United States • Discussion with local officials about location of nuclear power stations	• Radiological Emergency hazard was not included in the previous High-Country Regional Hazard Mitigation Plan • There are no nuclear stations located within 50 miles of the High-Country Region
Cyber	**YES**		

Natural Hazards Considered	Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No)	How was this determination made?	Why was this determination made?
		• Review of NC State Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of a cyber-attack with the increase in global technology
Electromagnetic Pulse	**YES**	• Review of NC State Hazard Mitigation Plan	• Changing future conditions encourage the assessment of the possibility of an electromagnetic pulse with the increase in global technology

4.5 HAZARD IDENTIFICATION RESULTS

Table 4.5 provides a summary of the hazard identification and evaluation process noting which of the 27 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with a "☑").

TABLE 4.5: SUMMARY RESULTS OF THE HAZARD IDENTIFICATION AND EVALUATION PROCESS

NATURAL HAZARDS		TECHNOLOGICAL HAZARDS	
☐	Avalanche	☑	Radiological Emergency – Fixed Nuclear Facilities
☑	Drought	☑	Terrorism
☑	Hailstorm**	☑	Cyber
☐	Excessive Heat	☑	Electromagnetic Pulse
☑	Hurricane and Coastal Hazards	**OTHER HAZARDS**	
☑	Flooding	☑	Hazardous Substances
☑	Lightning**	☑	Wildfires
☐	Nor'easter	☑	Infectious Disease
☑	Tornadoes/Thunderstorms		
☑	Severe Winter Weather		
☑	Earthquakes		
☑	Dam Failures		
☑	Geological		
☑	Infectious Disease		
☐	Expansive Soils		
☐	Land Subsidence		
☐	Tsunami		
☐	Volcano		
☐	Storm Surge		
☐	Erosion		

☑ = Hazard considered significant enough for further evaluation in the High-Country Region hazard risk assessment.
** = Hazard is assessed as a sub hazard under the Tornadoes/Thunderstorms hazard

Section 5
Hazard Profiles

This section includes detailed hazard profiles for each of the hazards identified in the previous section (*Hazard Identification*) as significant enough for further evaluation in the High-Country Regional Hazard Mitigation Plan. It contains the following subsections:

- 5.1 Overview
- 5.2 Study Area
- 5.3 Drought
- 5.4 Hurricane and Coastal Hazards
- 5.5 Tornadoes/Thunderstorms
- 5.6 Severe Winter Weather
- 5.7 Earthquakes
- 5.8 Geological
- 5.9 Dam Failure
- 5.10 Flooding
- 5.11 Wildfires
- 5.12 Infectious Disease
- 5.13 Hazardous Substances
- 5.14 Terrorism
- 5.15 Cyber
- 5.16 Electromagnetic Pulse
- 5.17 Conclusions on Hazard Risk
- 5.18 Final Determination

44 CFR Requirement

44 CFR Part 201.6(c)(2)(i): The risk assessment shall include a description of the type, location and extent of all-natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazards events and on the probability of future hazard events.

5.1 OVERVIEW

This section includes detailed hazard profiles for each of the hazards identified in the previous section (*Hazard Identification*) as significant enough for further evaluation in the High-Country Region hazard risk assessment by creating a hazard profile. Each hazard profile includes a general description of the hazard, its location and extent, notable historical occurrences and the probability of future occurrences. Each profile also includes specific items noted by members of the Regional Hazard Mitigation Planning Committee as it relates to unique historical or anecdotal hazard information for the counties in the High-Country Region or a participating municipality within them.

The following hazards were identified:

- **Natural Hazards**
  - Drought
  - Hurricane and Coastal Hazards
  - Tornadoes/Thunderstorms (including hailstorms and lightning)
  - Severe Winter Weather
  - Earthquakes
  - Geological (including landslides, sinkholes, and erosion)
  - Dam Failure
  - Flooding
- **Other Hazards**
  - Wildfires
  - Infectious Disease
- **Technological Hazards**
  - Hazardous Substances
  - Terrorism
  - Cyber
  - Electromagnetic Pulse

5.2 STUDY AREA

Table 5.1 provides a summary table of the participating jurisdictions within each of the four counties included in this plan. In addition, **Figure 5.1** provides a base map, for reference, of the High-Country Region.

TABLE 5.1: PARTICIPATING JURISDICTIONS IN THE HIGH-COUNTRY REGIONAL HAZARD MITIGATION PLAN

Alleghany County
Sparta
Ashe County
Lansing
Jefferson
West Jefferson
Watauga County
Beech Mountain
Blowing Rock
Boone
Seven Devils
Wilkes County
North Wilkesboro
Ronda
Wilkesboro

FIGURE 5.1: HIGH COUNTRY REGION BASE MAP

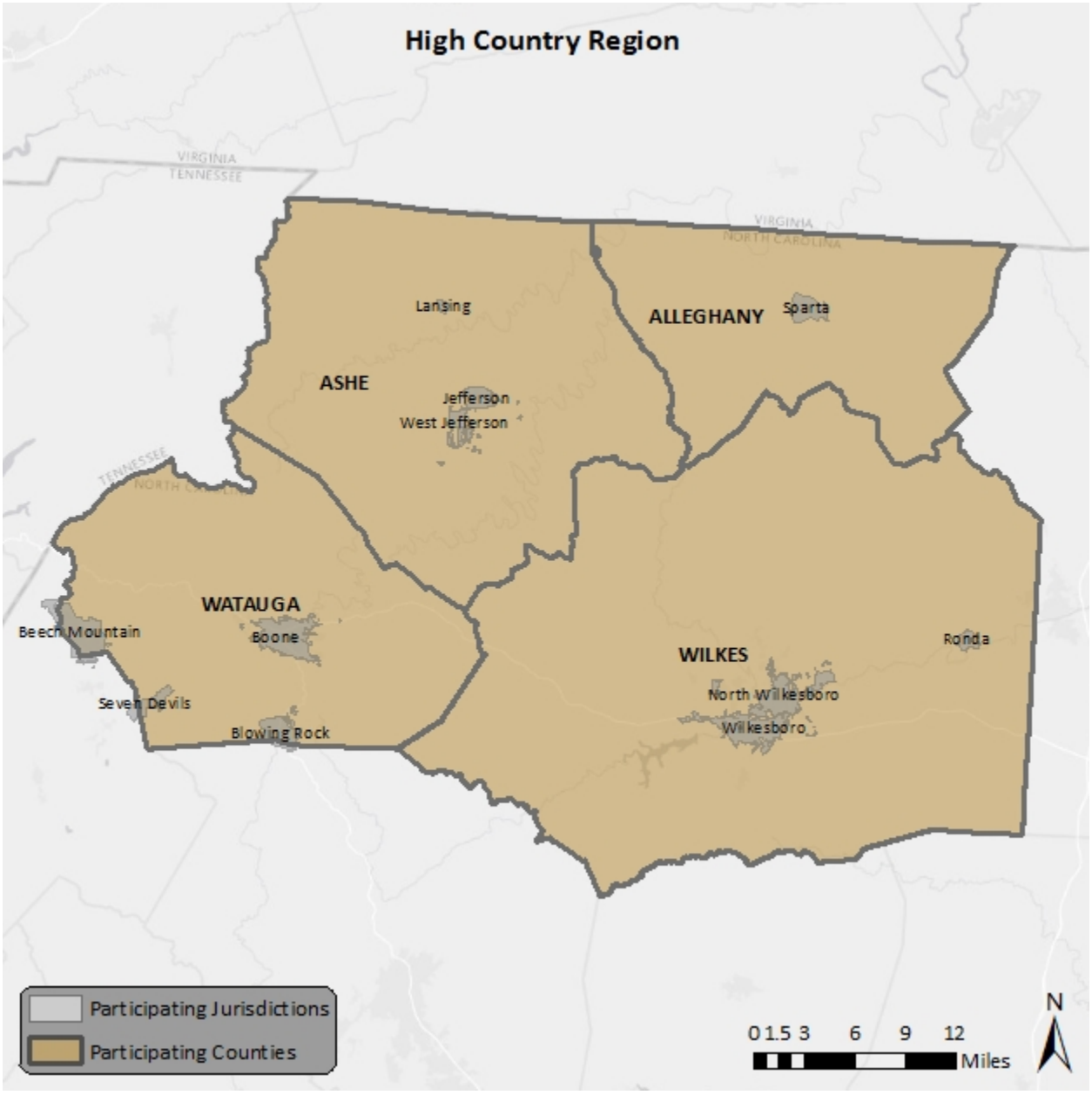


Table 5.2 lists each significant hazard for the High-Country Region and identifies whether or not it has been determined to be a specific hazard of concern for the eleven municipal jurisdictions and each of the four county's unincorporated areas. This is the based on the best available data and information from the High-Country Regional Hazard Mitigation Planning Committee. (● = hazard of concern)

TABLE 5.2: SUMMARY OF IDENTIFIED HAZARD EVENTS IN THE HIGH-COUNTRY REGION

Jurisdiction	Natural								Other		Technological			
	Drought	Hurricane and Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Geological	Dam Failure	Flooding	Wildfires	Infectious Disease	Hazardous Substances	Terrorism	Cyber	Electromagnetic Pulse
Alleghany County														
Sparta	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Unincorporated Area	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Ashe County														
Jefferson	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Lansing	•	•	•	•	•	•	•	•	•	•	•	•	•	•
West Jefferson	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Unincorporated Area	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Watauga County														
Beech Mountain	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Blowing Rock	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Boone	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Seven Devils	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Unincorporated Area	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Wilkes County														
North Wilkesboro	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Ronda	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Wilkesboro	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Unincorporated Area	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Natural Hazards

5.3 DROUGHT

5.3.1 Background and Description

Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. High temperatures, high winds, and low humidity can exacerbate drought conditions. In addition, human actions and demands for water resources can hasten drought-related impacts.

Droughts are typically classified into one of four types: 1) meteorological, 2) hydrologic, 3) agricultural, or 4) socioeconomic. **Table 5.3** presents definitions for these types of drought.

TABLE 5.32: DROUGHT CLASSIFICATION DEFINITIONS

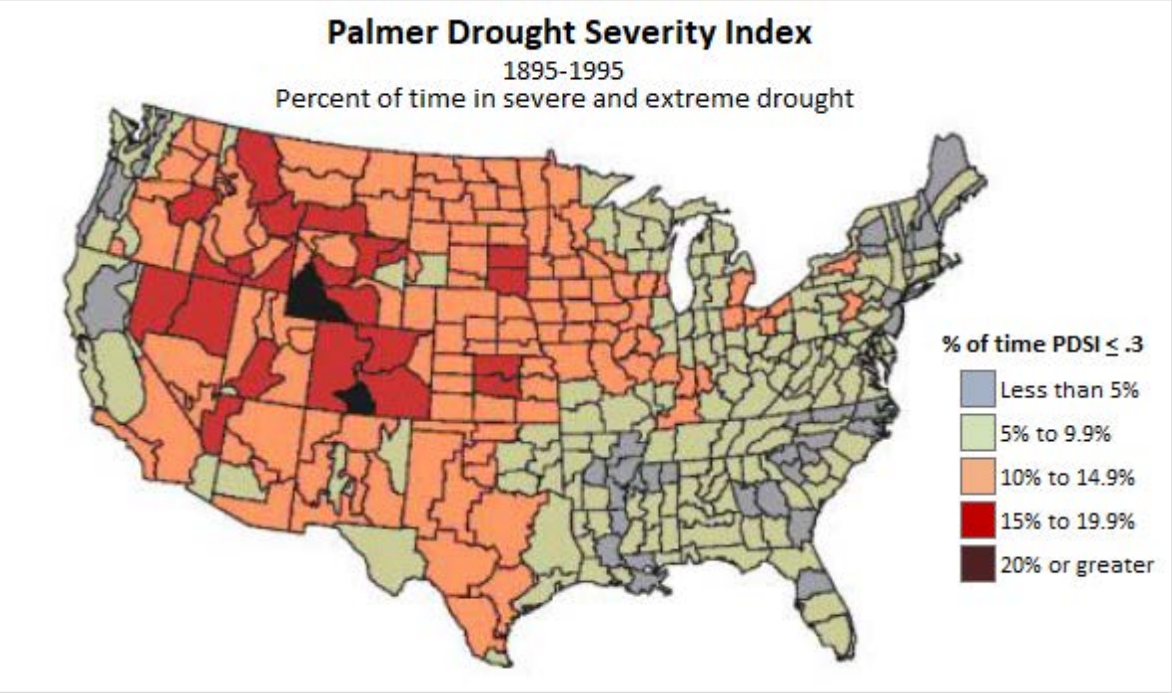
Meteorological Drought	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
Hydrologic Drought	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
Agricultural Drought	Soil moisture deficiencies relative to water demands of plant life, usually crops.
Socioeconomic Drought	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

Droughts are slow-onset hazards, but, over time, can have very damaging affects to crops, municipal water supplies, recreational uses, and wildlife. If drought conditions extend over a number of years, the direct and indirect economic impact can be significant.

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and range from -0.5 (incipient dry spell) to -4.0 (extreme drought). Evident in **Figure 5.2**, the Palmer Drought Severity Index Summary Map for the United Stated, drought affects most areas of the United States, but is less severe in the Eastern United States.

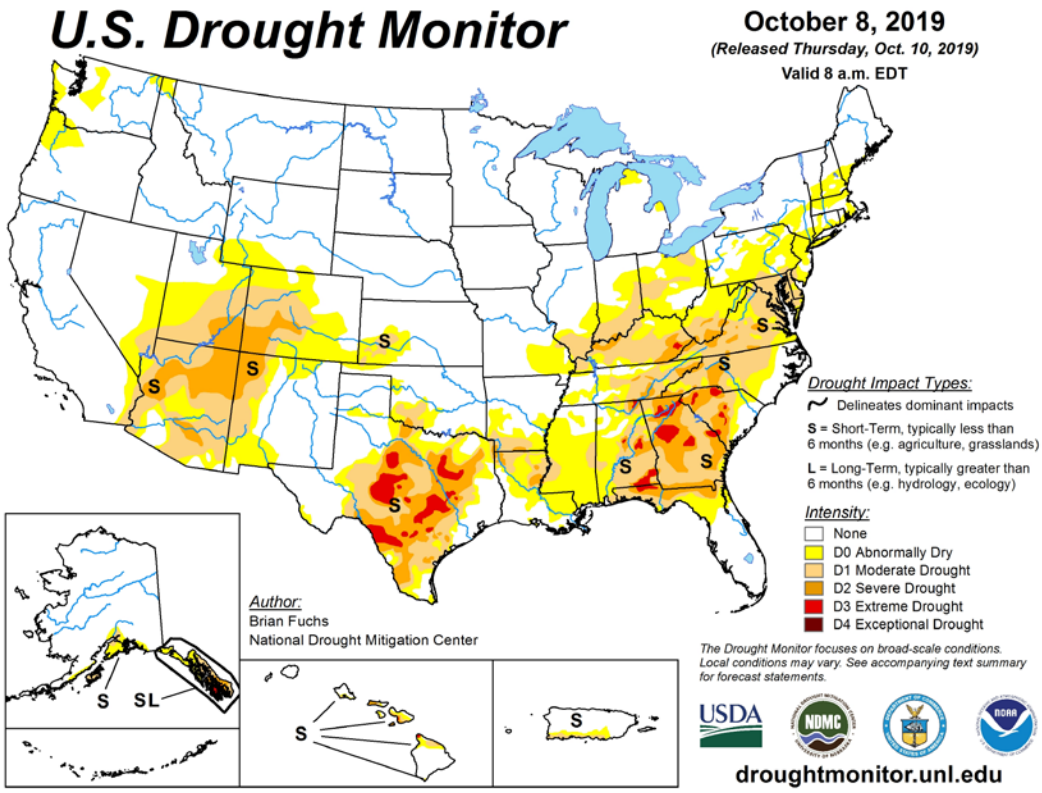
FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP FOR THE UNITED STATES



Source: National Drought Mitigation Center

The figure above is the most updated version of the Palmer Drought Severity Index; however, the US Drought Monitor is updated on a weekly basis. An archived map from Fall of 2019 can be seen below in **Figure 5.3** to reflect more current drought conditions in the US.

FIGURE 5.3: US DROUGHT MONITOR



5.3.2 Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. According to the Palmer Drought Severity Index, Western North Carolina has a relatively low risk for drought hazard. However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map. Furthermore, it is assumed that the High-Country Region would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

5.3.3 Historical Occurrences

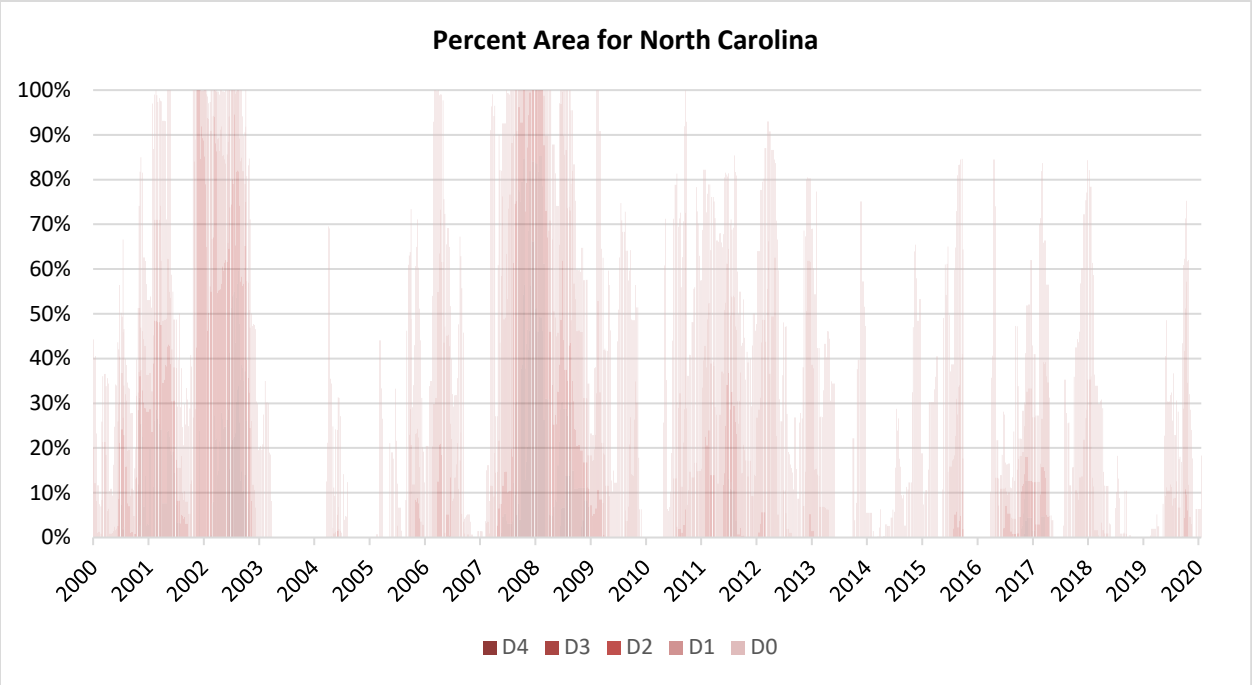
The North Carolina Drought Management Advisory Council also reports data on North Carolina drought conditions from 2000 to 2018 through the North Carolina Drought Monitor. It classifies drought conditions using the scale set by the US Drought Monitor, which classifies conditions on a scale of D0 to D4. Each class is further explained in **Table 5.4**.

TABLE 5.4: USDM DROUGHT CLASSIFICATIONS

Scale	Description	Impacts
D0	Abnormally Dry	- Short-term dryness slowing planting, growth of crops - Some lingering water deficits - Pastures or crops not fully recovered
D1	Moderate Drought	- Some damage to crops, pastures - Some water shortages developing - Voluntary water-use restrictions requested
D2	Severe Drought	- Crop or pasture loss likely - Water shortages common - Water restrictions imposed
D3	Extreme Drought	- Major crop/pasture losses - Widespread water shortages or restrictions
D4	Exceptional Drought	- Exceptional and widespread crop/pasture losses - Shortages of water creating water emergencies

Data from the North Carolina Drought Management Advisory Council and National Centers for Environmental Information (NCEI) were used to ascertain historical drought events in the High-Country Region. Since 2000, the longest duration of drought (D1-D4) in North Carolina lasted 155 weeks beginning on January 4, 2000 and ending on December 17, 2002. The most intense period of drought occurred the week of December 11, 2007 where D4 affected 66.2% of North Carolina land. **Figure 5.4** shows the percent area of North Carolina that has experiencing drought conditions from 2000 to 2018.

FIGURE 5.4: NORTH CAROLINA DROUGHT CONDITIONS (2000 – 2018)



Source: NIDIS, Drought.gov, US Drought Portal

According to the North Carolina Drought Monitor, the region has experienced drought conditions for 18 of the last 20 years (2000 – 2019). In addition, **Table 5.5** shows the most severe drought classification for each year, according to North Carolina Drought Monitor classifications.

TABLE 5.5: SUMMARY OF DROUGHT OCCURRENCES IN THE HIGH-COUNTRY REGION

	Alleghany County	Ashe County	Watauga County	Wilkes County
2000	Extreme Drought	Extreme Drought	Extreme Drought	Extreme Drought
2001	Extreme Drought	Extreme Drought	Extreme Drought	Extreme Drought
2002	Exceptional Drought	Exceptional Drought	Exceptional Drought	Exceptional Drought
2003	None	None	None	None
2004	None	Abnormally Dry	Abnormally Dry	Abnormally Dry
2005	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought
2006	Severe Drought	Severe Drought	Severe Drought	Severe Drought
2007	Extreme Drought	Exceptional Drought	Exceptional Drought	Extreme Drought
2008	Extreme Drought	Exceptional Drought	Exceptional Drought	Exceptional Drought
2009	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought
2010	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought
2011	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought
2012	Moderate Drought	Moderate Drought	Abnormally Dry	Moderate Drought
2013	Moderate Drought	Abnormally Dry	None	Moderate Drought
2014	Abnormally Dry	Abnormally Dry	Abnormally Dry	Abnormally Dry
2015	Abnormally Dry	Abnormally Dry	Moderate Drought	Moderate Drought
2016	Moderate Drought	Severe Drought	Severe Drought	Severe Drought
2017	Moderate Drought	Moderate Drought	Moderate Drought	Severe Drought
2018	Abnormally Dry	Abnormally Dry	Abnormally Dry	Moderate Drought
2019	Moderate Drought	Moderate Drought	Severe Drought	Severe Drought

Source: North Carolina Drought Monitor

Some additional anecdotal information was provided on droughts in the High-Country Region:

- **Alleghany County** – The majority of residents in Alleghany County are connected to an individual groundwater well, or a shared community well. Other residents connect to a spring to provide water for their property. In some cases, property owners have been forced to discontinue the use of their spring with the threat of sediment loading and other surface pollutants. The Town of Sparta water system supplies water to residential, commercial, and industrial properties in and outside of the Town limits. Sixteen groundwater wells supply water for the town with a capacity of 628,000 GPD (gallons per day) with an average daily use of 300,000 GPD.

The following drought occurrences have made the public more aware about the potential for drought to be a hazard of concern for the County.

- **1998-2000**: A two year drought plagued the county. Many residential wells went dry

and people were forced to conserve. The Town of Sparta enacted mandatory water restrictions to conserve and residents tapped into neighboring wells. In addition, the agricultural industry suffered tremendously and was forced to seek federal aid.

- **2007-2008**: This drought caused significant impacts to the farming community and residents of Sparta. Again, mandatory water restrictions were enacted by the town. Farmers were forced to obtain feed from other states in wake of drought-damaged crops.

- **Ashe County** –

  - **2002-2003**: Voluntary water conservation measures utilized

- **Wilkes County** –

  - **2002**: Drought conditions led to a declaration disaster for agriculture drought for Wilkes County. This led to funding becoming available for many farmers in the form of Small Business Administration low interest loans. Numerous crop losses (including previous years) forced some small family farms to cease operation. Dairy farms have had to purchase extra feed from other areas because of poor silage production. This has increased operational costs considerably.

5.3.4 Probability of Future Occurrences

Based on historical occurrence information, it is assumed that all of the High-Country Region has a probability level of likely (10-100 percent annual probability) for future drought events. This hazard may vary slightly but each area has an equal probability of experiencing a drought. While reports indicate that there is a much lower probability for extreme, long-lasting drought conditions, NOAA also predicts that, western North Carolina to have areas of persistent drought and further drought development[1].

[1] *U.S. Seasonal Drought Outlook. National Weather Service Climate Prediction Center. http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php*

5.4 HURRICANE AND COASTAL HAZARDS

5.4.1 Background and Description

Hurricanes and coastal hazards are classified as cyclones and defined as any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the Northern Hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such circulation that develops over tropical waters. Tropical cyclones act as a "safety-valve," limiting the continued build-up of heat and energy in tropical regions by maintaining the atmospheric heat and moisture balance between the tropics and the pole-ward latitudes. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation, and tornadoes.

The key energy source for a tropical cyclone is the release of latent heat from the condensation of warm water. Their formation requires a low-pressure disturbance, warm sea surface temperature, rotational force from the spinning of the earth, and the absence of wind shear in the lowest 50,000 feet of the atmosphere. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in the Atlantic basin is about six.

As an incipient hurricane develops, barometric pressure (measured in millibars or inches) at its center falls and winds increase. If the atmospheric and oceanic conditions are favorable, it can intensify into a tropical depression. When maximum sustained winds reach or exceed 39 miles per hour, the system is designated a tropical storm, given a name, and is closely monitored by the National Hurricane Center in Miami, Florida. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. Hurricane intensity is further classified by the Saffir-Simpson Scale (**Table 5.6**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

TABLE 5.6: SAFFIR-SIMPSON SCALE

Category	Maximum Sustained Wind Speed (MPH)	Minimum Surface Pressure (Millibars)
1	74-95	Greater than 980
2	96-110	979-965
3	111-129	964-945
4	130-156	944-920
5	157 +	Less than 920

Source: National Hurricane Center (2018)

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds and barometric pressure, which are combined to estimate potential damage. Categories 3, 4, and 5 are classified as "major" hurricanes and, while hurricanes within this range comprise only 20 percent of total tropical cyclone landfalls, they account for over 70 percent of the damage in the United States. **Table 5.7** describes the damage that could be expected for each category of hurricane. Damage during hurricanes may also result from spawned tornadoes, storm surge, and inland flooding associated with heavy rainfall that usually accompanies these storms.

TABLE 5.7: HURRICANE DAMAGE CLASSIFICATIONS

Category	Damage Level	Description of Damages	Photo Example
1	MINIMAL	No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal flooding and minor pier damage.	
2	MODERATE	Some roofing material, door, and window damage. Considerable damage to vegetation, mobile homes, etc. Flooding damages piers and small craft in unprotected moorings may break their moorings.	
3	EXTENSIVE	Some structural damage to small residences and utility buildings, with a minor amount of curtainwall failures. Mobile homes are destroyed. Flooding near the coast destroys smaller structures, with larger structures damaged by floating debris. Terrain may be flooded well inland.	
4	EXTREME	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach areas. Terrain may be flooded well inland.	
5	CATASTROPHIC	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Flooding causes major damage to lower floors of all structures near the shoreline. Massive evacuation of residential areas may be required.	

Source: National Hurricane Center; Federal Emergency Management Agency

5.4.2 Location and Spatial Extent

Hurricanes, coastal hazards, and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States. While coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland and they can affect the High-Country Region. All areas in the High-Country Region are equally susceptible to hurricane and coastal hazards.

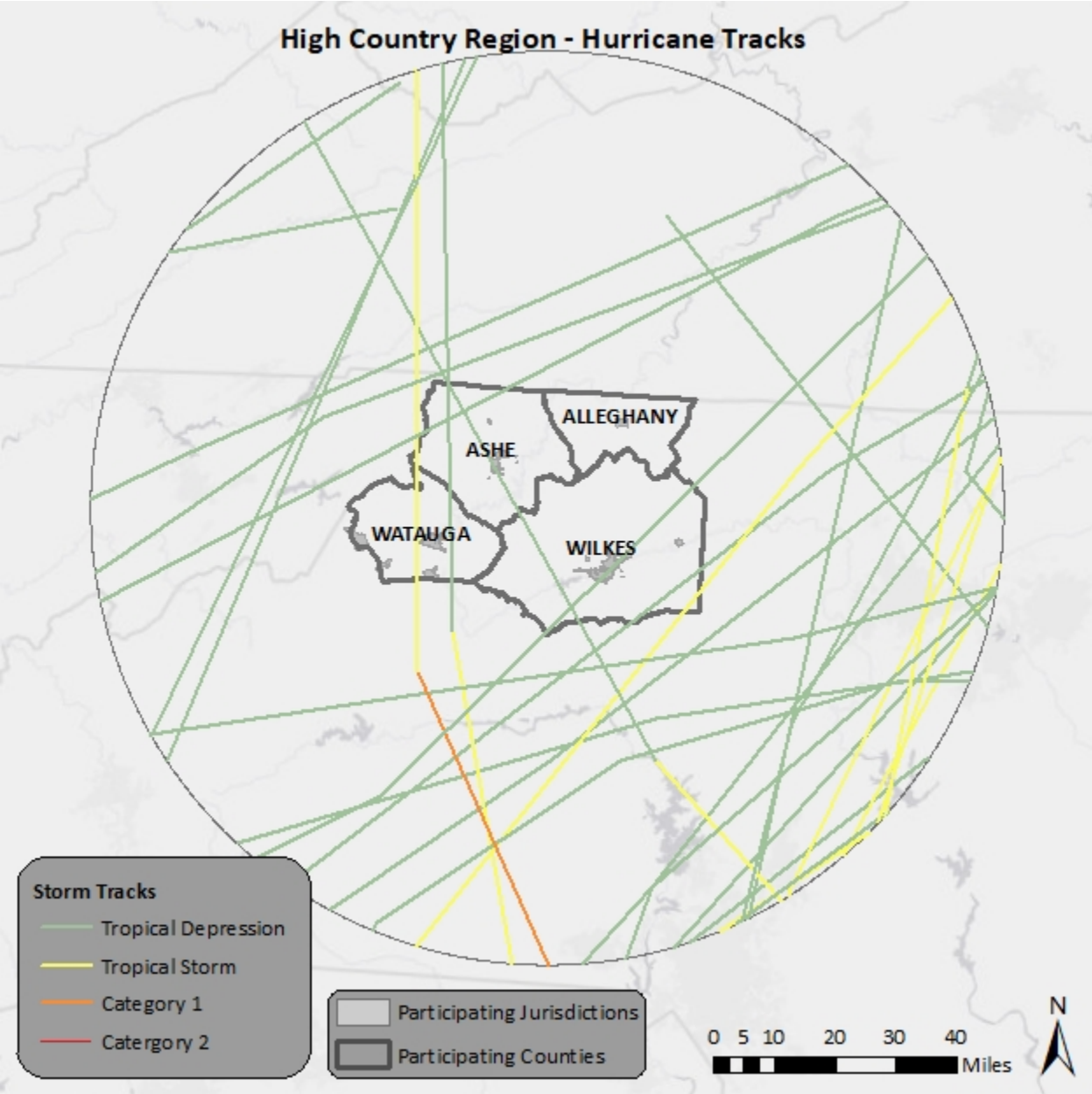
5.4.3 Historical Occurrences

According to the National Hurricane Center's historical storm track records, 20 hurricane or tropical storm tracks have passed within 75 miles of the High-Country Region since 1850[2]. This includes: one Category 2 hurricane, one Category 1 hurricane, and thirteen tropical storms. Hurricane Hugo, which impacted the region in 1989, remained a Category 2 storm until just before entering the High-Country Region in Watauga County as a tropical storm. Another Category One storm track passed several miles east of the region in 1893.

Of the recorded storm events, three tropical storms traversed directly through the High-Country Region as shown in **Figure 5.5. Table 5.8** provides for each event the date of occurrence, name (if applicable), maximum wind speed (as recorded within 75 miles of the High-Country Region) and Category of the storm based on the Saffir-Simpson Scale.

[2] These storm track statistics do not include extra-tropical storms. Though these related hazard events are less severe in intensity, they may cause significant local impact in terms of rainfall and high winds.

FIGURE 5.5: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE HIGH-COUNTRY REGION



Source: National Oceanic and Atmospheric Administration, National Hurricane Center

TABLE 5.8: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE HIGH-COUNTRY REGION (1850-2019)

Date of Occurrence	Storm Name	Maximum Wind Speed (miles per hour)	Storm Category
9/17/1859	Not Named	46	Tropical Storm
9/12/1878	Not Named	69	Tropical Storm
9/11/1882	Not Named	46	Tropical Storm

Date of Occurrence	Storm Name	Maximum Wind Speed (miles per hour)	Storm Category
6/22/1886	Not Named	52	Tropical Storm
9/24/1889	Not Named	52	Tropical Storm
8/28/1893	Not Named	86	Category 1
8/3/1915	Not Named	40	Tropical Storm
9/23/1920	Not Named	40	Tropical Depression
10/3/1927	Not Named	46	Tropical Storm
8/29/1949	Not Named	46	Tropical Storm
8/31/1952	Able	52	Tropical Storm
9/30/1959	Gracie	69	Tropical Storm
9/5/1979	David	52	Tropical Depression
7/25/1985	Bob	52	Tropical Depression
9/22/1989	Hugo	98	Category 2
7/2/2003	Bill	23	Tropical Depression
9/17/2004	Ivan	23	Tropical Depression
7/7/2005	Cindy	23	Tropical Depression
9/17/2018	Florence	23	Tropical Depression
10/11/2018	Michael	51	Tropical Storm

Source: National Oceanic and Atmospheric Administration, National Hurricane Center

The National Centers for Environmental Information did not report any event associated with a hurricane or tropical storm in the High-Country Region between 1950 and 2020. However, federal records indicate that disaster declarations were made in 1995 (Hurricane Hugo), 2004 (Tropical Storm Frances), 2010 (Hurricane Ivan), and 2018 (Hurricane Florence)3. Hurricane and tropical storm events can cause substantial damage in the area due to high winds and flooding.

Flooding is generally the greatest hazard of concern with hurricane and tropical storm events in the High-Country Region. Most events do not carry winds that are above that of the winter storms received by the High-Country counties. Many anecdotes are available for the major storms that have impacted that area as found below:

Hurricane Hugo – September 21, 1989

Hurricane Hugo is the worst hurricane event to impact the High-Country Regional planning area. It caused over $7.1 billion (in the Carolinas) and 89 deaths resulting in $1.3 billion in federal assistance. Unlike most hurricanes, Hugo maintained its strength and intensity hitting Charlotte, NC with wind gusts of over 100 mph. High Country counties experienced tropical storm sustained winds of approximately 60 mph with gusts of 80-90 mph and had several inches of rainfall. Residents were caught off guard with the storm's strength and intensity. High winds uprooted trees causing them to block primary and secondary roads. Power lines and poles were blown down due to the high winds and fallen trees. All of Alleghany County experienced a power outage, making emergency situations even more dangerous. Massive power outages were reported throughout the area. High winds and localized flooding caused severe structural damage to many of the residences. The estimated damage to public facilities, roads, bridges, public buildings, equipment, etc., was 1.9 million in Alleghany and over $8 million in Wilkes.

[3] Not all of the participating counties were declared disaster areas for these storms. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: Hazard Identification.

Homes, businesses, industries, and agriculture suffered estimated losses of $14 million in Alleghany. In addition, shelters were in full operations during Hugo due to power outages. The Town of Lansing was said to be "under water," and the National Guard was called to assist (largely to help milk cows due to lack of electricity.

Tropical Storm Beryl - August 17, 1994

Tropical Storm Beryl was also noted as a significant event in Alleghany County (and thus impacted the other High-Country Region Counties). Beryl brought high winds and torrential rains to an already saturated Alleghany County. The rising waters of Bledsoe Creek forced residents of Ted's Trailer Park (north end of Sparta) to evacuate their homes. The community of Glade Valley experienced some flooding of the Little River and the New River flooded several low-lying campgrounds. Although the winds were not as severe as Hurricane Hugo's, there were some agricultural losses and minor damage to residential and nonresidential properties throughout the county.

Tropical Storm Frances – September 7-8, 2004

Tropical Storm Frances was a slow-moving, relatively large storm that dumped heavy rains over the eastern United States. The remnants of Frances produced a swath of 5 to 15 inches of rain across the North Carolina Mountains with reports of 12 to 15 inches of rain along the higher terrain and isolated reports in excess of 18 inches. Wind gusts reached between 40 and 60 mph along the Appalachian Mountains and numerous trees were downed. Frances caused significant crop damages totaling $55 million statewide. North Carolina residents received almost $20.6 million in federal disaster assistance following the storm and there were 176 applications submitted for Individual Assistance in the High-Country counties.

Tropical Storm Frances – September 16-17, 2004

Just a week and a half following Tropical Storm Frances, the remnants of Hurricane Ivan hit western North Carolina when many streams and rivers were already well above flood stage. Rainfall amounts ranged from 2 to 8 inches across the High-Country Region with isolated reports reaching 8 to 10 inches. The widespread flooding forced many roads to be closed and landslides were common across the mountain region. Wind gusts reached between 40 and 60 mph across the higher elevations of the Appalachian Mountains resulting in numerous downed trees. More than $13.8 million of federal aid was dispersed across North Carolina following Ivan.

Hurricane Ivan—September 17 – 18, 2010

Hurricane Ivan impacted Alabama on September 16th as a Category 3 storm. As it moved across Alabama headed north, the maximum sustained winds dropped to near 35 mph and southern Appalachian started to experience widespread heavy rain. By the time the storm passed through western North Carolina, the storm had been dropped to a tropical depression. Numerous trees were downed and flooding was widespread. Wind gusts reached between 40 and 60 MPH across the higher elevations of the Appalachians Rainfall amounts reached 8 to 12 inches across portions of the higher elevations. As a result of rain, a major debris flow of mud, rocks, trees, and water surged down Peek's Creek near Franklin, North Carolina, sweeping away 15 houses and killing five people.

Hurricane Florence -- September 12 – 15, 2018

Hurricane Florence was a long-lived Cape Verde hurricane and the wettest tropical cyclone on record in the Carolinas. As the storm moved over North Carolina, it caused record breaking storm surge of 9 to 13 feet and rainfall across the state of 20 to 30 inches, which produced catastrophic and life-threatening flooding. North Carolina reported 42 fatalities due to the hurricane and preliminary damage estimates of

$16.7 billion. At the height of the storm on Sunday evening, 3,074 members in the High-Country region were without power. In Ashe County, a few outages were directly impacted by sections of the New River exceeding its banks.

5.4.4 Probability of Future Occurrences

Given the inland location of the region, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. The probability of being impacted is less than coastal areas, but still remains a real threat to the High-Country Region due to induced events like flooding and landslides that are a result of tropical system remnants. Based on historical evidence, the probability level of future occurrence is possible (between 1 and 10 percent annual probability). However, when the region is impacted, the damage could be catastrophic, threatening lives and property throughout the planning area.

5.5 TORNADOES/THUNDERSTORMS

For the purposes of maintaining consistency with the State of North Carolina Hazard Mitigation Plan, this section will assess tornadoes and thunderstorms, which also include high winds, hailstorms, and lightning.

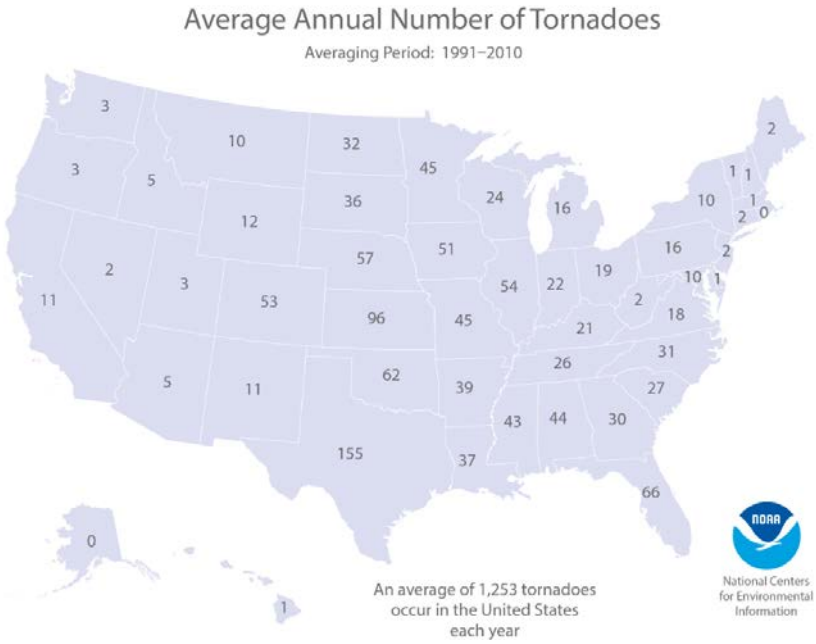
5.5.1 Background and Description

Tornadoes

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 miles per hour to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles. Each year, an average of over 1,200 tornadoes is reported nationwide, resulting in an average of 56 deaths and 1,500 injuries[4]. According to the NOAA Storm Prediction Center (SPC), the highest concentration of tornadoes in the United States has been in Oklahoma, Texas, Kansas, and Florida respectively. Although the Great Plains region of the Central United States does favor the development of the largest and most dangerous tornadoes (earning the designation of “tornado alley”), Florida experiences the greatest number of tornadoes per square mile of all U.S. states (SPC, 2002). **Figure 5.6** shows tornado activity in the United States based on the number of recorded tornadoes per 10,000 square miles.

[4] NOAA, 2013.

FIGURE 5.6: TORNADO ACTIVITY IN THE UNITED STATES



Tornadoes are more likely to occur during the months of March through May and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small short-lived tornadoes can inflict tremendous damage. Highly destructive tornadoes may carve out a path over a mile wide and several miles long.

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). Tornadic magnitude is reported according to the Fujita and Enhanced Fujita Scales. Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (**Table 5.9**). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.10**).

TABLE 5.9: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)

F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.

F3	Severe tornado	158-206 mph	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Source: National Weather Service

TABLE 5.10 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

EF-Scale Number	Intensity Phrase	3 Second Gust (MPH)	Type of Damage Done
0	Gale	65-85	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards.
1	Moderate	86-110	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
2	Significant	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	Severe	136-165	Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted.
4	Devastating	166-200	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
5	Incredible	Over 200	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.

Source: National Weather Service

Thunderstorms

Thunderstorms can produce a variety of accompanying hazards including wind, hailstorms, and lightning[5], which are all discussed here. Although thunderstorms generally affect a small area, they are very dangerous and may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the "engine" of the storm). Third, thunderstorms need lift, which comes in the form of cold or warm fronts, sea breezes, mountains, or the sun's heat. When these conditions occur simultaneously, air masses of varying temperatures meet, and a thunderstorm is formed. These storm events can occur singularly, in lines, or in clusters. Furthermore, they can move through an area very quickly or linger for several hours.

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) hail of three-quarters of an inch, 2) a tornado, or 3) winds of at least 58 miles per hour.

Thunderstorm events have the capability of producing straight-line winds that can cause severe destruction to communities and threaten the safety of a population. Such wind events, sometimes separate from a thunderstorm event, are common throughout the High-Country Region. Therefore, high winds are also reported in this section.

High winds can form due to pressure of the Northeast coast that combines with strong pressure moving through the Ohio Valley. This creates a tight pressure gradient across the region, resulting in high winds which increase with elevation. It is common for gusts of 30 to 60 miles per hour during the winter months.

Downbursts are also possible with thunderstorm events. Such events are an excessive burst of wind in excess of 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by down drafts from the base of a convective thunderstorm cloud. It occurs when rain-cooled air within the cloud becomes heavier than its surroundings. Thus, air rushes towards the ground in a destructive yet isolated manner. There are two types of downbursts. Downbursts less than 2.5 miles wide, duration less than 5 minutes, and winds up to 168 miles per hour are called "microbursts." Larger events greater than 2.5 miles at the surface and longer than 5 minutes with winds up to 130 miles per hour are referred to as "macrobursts."

Hailstorms

Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. **Table 5.11** shows the TORRO

[5] Lightning and hail hazards are discussed as separate hazards in this section.

Hailstorm Intensity Scale which is a way of measuring hail severity.

TABLE 5.11: TORRO HAILSTORM INTENSITY SCALE

	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy, J-m^2	mm to inch conversion (inches)	Typical Damage Impacts
H0	Hard Hail	5	0-20	0 – 0.2	No damage
H1	Potentially Damaging	5-**15**	>20	0.2 – 0.6	Slight general damage to plants, crops
H2	Significant	10-**20**	>100	0.4 – 0.8	Significant damage to fruit, crops, vegetation
H3	Severe	20-**30**	>300	0.8 – 1.2	Severe damage to crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-**40**	>500	1.0 – 1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-**50**	>800	1.2 – 2.0	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-**60**		1.6 – 2.4	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-**75**		2.0 – 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	60-**90**		1.6 – 3.5	(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-**100**		3.0 – 3.9	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100			Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: http://www.torro.org.uk/site/hscale.php

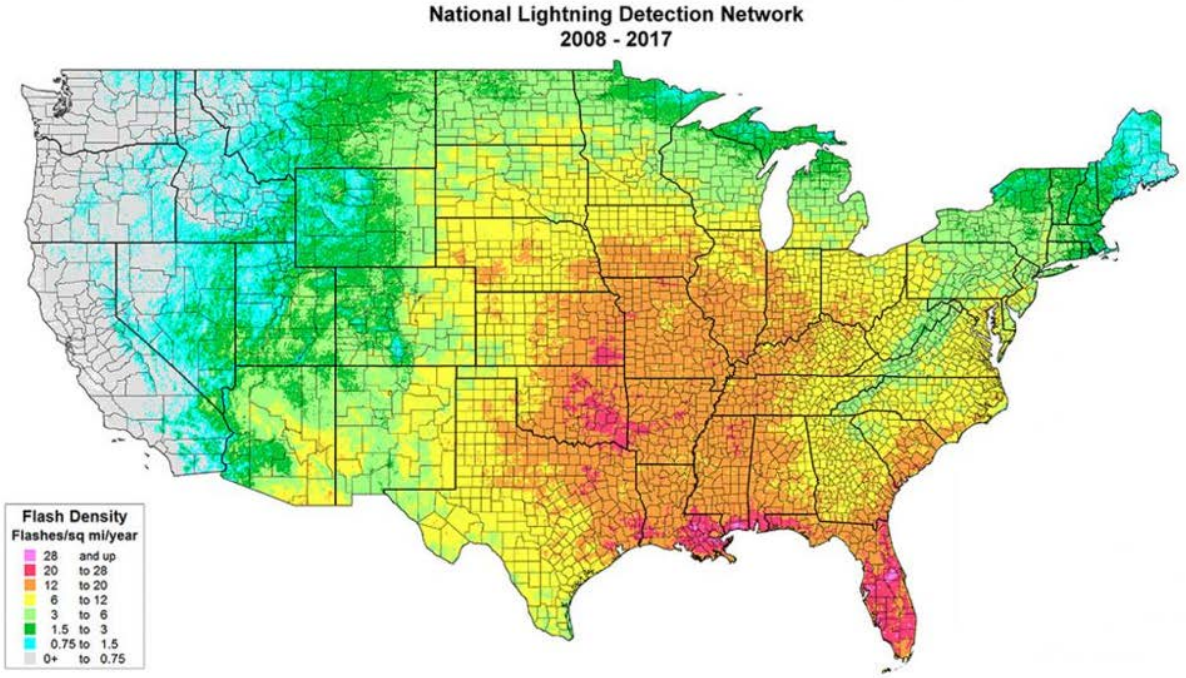
Lightning

Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning can reach temperatures approaching 50,000 degrees Fahrenheit. Lightning rapidly heats the sky as it flashes but the surrounding air cools following the bolt. This rapid heating and cooling of the surrounding air causes the thunder which often accompanies lightning strikes. While most often affiliated with severe thunderstorms, lightning may also strike outside of heavy rain and might occur as far as 10 miles away from any rainfall.

Lightning strikes occur in very small, localized areas. For example, they may strike a building, electrical transformer, or even a person. According to FEMA, lightning injures an average of 300 people and kills 80 people each year in the United States. Direct lightning strikes also have the ability to cause significant damage to buildings, critical facilities, and infrastructure largely by igniting a fire. Lightning is also responsible for igniting wildfires that can result in widespread damages to property.

Figure 5.7 shows a lightning flash density map for the years 2008-2017 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN®).

FIGURE 5.7: LIGHTNING FLASH DENSITY IN THE UNITED STATES



Source: Vaisala U.S. National Lightning Detection Network

5.5.2 Location and Spatial Extent

Tornadoes

Tornadoes occur throughout the entire state of North Carolina, and thus in the High-Country Region. Tornadoes typically impact a relatively small area, but damage may be extensive. Event locations are completely random and it is not possible to predict specific areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that the entire High-Country Region is uniformly exposed to this hazard.

Thunderstorms

A thunderstorm/ wind event is an atmospheric hazard, and thus has no geographic boundaries. It is typically a widespread event that can occur in all regions of the United States. However, thunderstorms are most common in the central and southern states because atmospheric conditions in those regions are favorable for generating these powerful storms. Also, the High-Country Region typically experiences several straight-line wind events each year. These wind events can and have caused significant damage. It is assumed that the High-Country Region has uniform exposure to a thunderstorm/wind event and the spatial extent of an impact could be large.

Hailstorms

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed that the High-Country Region is uniformly exposed to severe thunderstorms; therefore, all areas of the region are equally exposed to hail which may be produced by such storms.

Lightning

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed that all of the High-Country Region is uniformly exposed to lightning.

5.5.3 Historical Occurrences

Tornadoes

Tornadoes have resulted in no disaster declarations in the High-Country Region[6]. According to the National Centers for Environmental Information, there have been a total of 14 recorded tornado events in the High-Country Region since 1950 (**Table 5.12**), resulting in over $3.05 million (2020 dollars) in property damages[7]. Four of the recorded tornado occurrences happened within the last five years. In addition, 10 injuries were reported. No deaths related to tornadoes in the region. The magnitude of these tornados' ranges from F0 to F1 in intensity, although an F5 event is possible. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is possible that a high number of occurrences have gone unreported.

TABLE 5.12: SUMMARY OF TORNADO OCCURRENCES

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**3**	**0**	**7**	**$455,000**
Sparta	0	0	0	$0
Unincorporated Area	3	0	7	$455,000
Ashe County	**1**	**0**	**0**	**$1,000**
Jefferson	0	0	0	$0
Lansing	0	0	0	$0
West Jefferson	0	0	0	$0
Unincorporated Area	1	0	0	$1,000
Watauga County	**2**	**0**	**2**	**$70,000**
Beech Mountain	0	0	0	$0
Blowing Rock	0	0	0	$0
Boone	1	0	2	$50,000
Seven Devils	0	0	0	$0
Unincorporated Area	1	0	0	$20,000
Wilkes County	**8**	**0**	**1**	**$2,527,500**
North Wilkesboro	0	0	0	$0
Ronda	0	0	0	$0
Wilkesboro	1	0	1	$1,000,000
Unincorporated Area	7	0	0	$1,527,500
High County Region Total	**14**	**0**	**10**	**$3,053,500**

Source: National Centers for Environmental Information

Further details or recent tornado events can be seen in **Table 5.13**. This include descriptions of each event from the High-Country Region.

[6] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*

[7] These tornado events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional tornadoes have occurred in the High-Country Region. As additional local data becomes available, this hazard profile will be amended.

TABLE 5.13: HISTORICAL TORNADO IMPACTS IN HIGH COUNTRY REGION

Location	Date	Magnitude	Deaths / Injuries	Property Damage	Details
Alleghany County	5/27/1973	F1	0/1	$250,000	A low-end EF-2 tornado touched down on Osee Road and was intermittently on the ground approximately 5 miles moving east-southeast, finally lifting between Old Barrett Road and Glade Valley Road. A single wide mobile home was destroyed on Osee Road, causing four injuries. Along the track, cement silos were collapsed, 5 other homes were damaged, and several other structures were heavily damaged. Two people received minor injuries when struck by debris after winds blew out windows in their home. Monetary damages are estimates.
Alleghany County	5/8/2009	EF2	0/6	$205,000	There was also a brief touchdown of an EF-1 tornado near Jarvis Road. This tornado tracked around a quarter mile and then lifted near Early Road. Numerous trees were snapped.
Ashe County	10/8/2017	EF0	0/0	$10,000	A tornado touched down as an EF1 near Highway 421 close to Harley in Wilkes County and traveled north about 4.3 miles before moving into Ashe County near the Blue Ridge Parkway and Phillips Gap Road at 5:54PM (LST). The tornado would continue about 2.7 miles further north into Ashe County before lifting at 6:00PM near Idlewilde. The damage through Ashe County was restricted to numerous trees being snapped or knocked over. Average path width was 150 yards or less. EF1 (86-110 MPH) damage was consistent through the lifespan of this tornado. Also, of note, this was the first recorded/documented tornado in Ashe County since records began in 1950.
Boone	4/20/1996	F1	0/2	$50,000	A tornado briefly touched down at 1300 EST approximately 3 miles southeast of Boone at an amusement park. The tornado damaged 16 vehicles and injured two people. The tornado ripped the car door off of one vehicle and then blew a significant amount of small stones into the vehicle. In addition, a man broke a rib after being lifted into the air by the tornado and then dropped. Several vehicles were turned around by the tornado.
Watauga County	6/3/1998	F0	0/0	$20,000	Thunderstorms during the late afternoon and evening on the 3rd produced hail up to 3.00 inches in diameter, damaging wind, and a tornado.
Wilkes County	9/5/2011	EF1	0/0	$850,000	The tornado touched down just south of the intersection of Longbottom Road and Green Street Mountain Resort Road. From here, it tracked north into Stone Mountain State Park where it destroyed 14 outbuildings, damaged three homes, and uprooted a large oak tree. Damage values are estimated.

Location	Date	Magnitude	Deaths / Injuries	Property Damage	Details
Wilkes County	10/8/2017	EF1	0/0	$100,000	A tornado touched down as an EF1 near Highway 421 close to Harley in Wilkes County and traveled north about 4.3 miles before moving into Ashe County near the Blue Ridge Parkway and Phillips Gap Road at 5:54PM (LST). The tornado would continue about 2.7 miles further north into Ashe County before lifting at 6:00PM near Idlewilde. Most of the damage that occurred was to trees being snapped or knocked over with half a dozen structures damaged, mainly along Summit Road, just south of the Blue Ridge Parkway. The widest width of the tornado was 300 yards, but the average width of 150 yards or less. EF1 (86-110 MPH) damage was consistent through the lifespan of this tornado.
Wilkesboro	10/23/2017	EF1	0/1	$1,000,000	A tornado touched down in Wilkesboro at 411 PM EST near the intersection of East Main and Salem Streets. It would move north for over eight miles before lifting at Yellow Banks Road west of Hays at 420 PM EST. Multiple structures in Wilkesboro received significant damage. The following morning, Duke Energy which supplies power to much of the County indicated that over 23,000 customers were still without power. There was one injury, which resulted from a tree falling on a one-story home which caused a resident to be hit in the head by debris. Dozens of trees and power poles were reported down. The tornado max width was 275 yards and maintained EF1 (86-110 MPH) strength through much of its lifespan.

Source: National Centers for Environmental Information

Thunderstorms

Severe storms resulted in seven disaster declarations in the High-Country Region[8]. According to NCEI, there have been 784 reported thunderstorm wind and high wind events since 1959 in the High-Country Region[9]. These events caused over $5.1 million (2020 dollars) in damages. There were reports of 7 injuries and 3 fatalities. **Table 5.14** summarizes this information.

TABLE 5.14: SUMMARY OF THUNDERSTORM / HIGH WIND OCCURRENCES

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**94**	**0**	**0**	**$629,400**
Sparta	11	0	0	$62,900
Unincorporated Area	83	0	0	$566,500
Ashe County	**185**	**2**	**1**	**$962,750**
Jefferson	7	0	0	$11,050
Lansing	3	0	0	$0

[8] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

[9] These thunderstorm events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional thunderstorm events have occurred in the High-Country Region. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
West Jefferson	2	0	0	$1,000
Unincorporated Area	173	2	1	$950,700
Watauga County	**177**	**0**	**3**	**$1,503,900**
Beech Mountain	0	0	0	$0
Blowing Rock	3	0	0	$0
Boone	15	0	0	$78,500
Seven Devils	0	0	0	$0
Unincorporated Area	159	0	3	$1,425,400
Wilkes County	**328**	**1**	**3**	**$2,092,100**
North Wilkesboro	22	0	0	$201,100
Ronda	11	0	0	$8,800
Wilkesboro	32	0	0	$64,900
Unincorporated Area	263	1	3	$1,817,300
High County Region Total	**784**	**3**	**7**	**$5,188,150**

Source: National Centers for Environmental Information

Hailstorms

According to the National Centers for Environmental Information, 321 recorded hailstorm events have affected the High-Country Region since 1962[10]. **Table 5.15** is a summary of the hail events in the High-Country Region. In all, hail occurrences resulted in over $400 thousand (2020 dollars) in property damages, most of which were reported in Watauga County. Hail ranged in diameter from 0.75 inches to 4.5 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment that may not be reported to the National Centers for Environmental Information. Furthermore, high losses in Watauga County indicate that neighboring counties may also be subject to additional, unreported losses. Therefore, it is likely that damages are greater than the reported value. Additionally, a single storm event may have affected multiple counties.

TABLE 5.15: SUMMARY OF HAIL OCCURRENCES

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**51**	**0**	**0**	**$21,000**
Sparta	5	0	0	$20,000
Unincorporated Area	46	0	0	$1,000
Ashe County	**82**	**0**	**0**	**$8,000**
Jefferson	9	0	0	$0
Lansing	8	0	0	$0
West Jefferson	4	0	0	$0
Unincorporated Area	61	0	0	$8,000
Watauga County	**70**	**0**	**0**	**$426,000**

[10] These hail events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional hail events have affected the High-Country Region. In addition to NCEI, the North Carolina Department of Insurance office was contacted for information. As additional local data becomes available, this hazard profile will be amended.

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Beech Mountain	1	0	0	$0
Blowing Rock	13	0	0	$0
Boone	12	0	0	$350,000
Seven Devils	1	0	0	$0
Unincorporated Area	43	0	0	$76,000
Wilkes County	**118**	**0**	**0**	**$4,000**
North Wilkesboro	14	0	0	$0
Ronda	1	0	0	$0
Wilkesboro	13	0	0	$0
Unincorporated Area	90	0	0	$4,000
High County Region Total	**321**	**0**	**0**	**$459,000**

Source: National Centers for Environmental Information

Lightning

According to the National Centers for Environmental Information, there have been a total of 32 recorded lightning events in the High-Country Region since 1996[11] These events resulted in nearly $2.26 million (2020 dollars) in damages, as listed in summary **Table 5.16**. Furthermore, lightning has caused one injury in the High-Country Region.

TABLE 5.16: SUMMARY OF LIGHTNING OCCURRENCES IN THE HIGH-COUNTRY REGION

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**8**	**0**	**0**	**$856,500**
Sparta	1	0	0	$0
Unincorporated Area	7	0	0	$856,500
Ashe County	**3**	**0**	**0**	**$9,500**
Jefferson	0	0	0	$0
Lansing	0	0	0	$0
West Jefferson	0	0	0	$0
Unincorporated Area	3	0	0	$9,500
Watauga County	**7**	**0**	**1**	**$721,500**
Beech Mountain	0	0	0	$0
Blowing Rock	2	0	0	$20,000
Boone	4	0	0	$700,000
Seven Devils	0	0	0	$0
Unincorporated Area	1	0	0	$1,500

[11] These lightning events are only inclusive of those reported by the National Climatic Data Center (NCDC). It is likely that additional lightning events have occurred in the High-Country Region.

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Wilkes County	**14**	**0**	**0**	**$679,500**
North Wilkesboro	0	0	0	$0
Ronda	1	0	0	$8,000
Wilkesboro	3	0	0	$45,500
Unincorporated Area	10	0	0	$626,000
High County Region Total	**32**	**0**	**1**	**$2,267,000**

Source: National Center for Environmental Information

5.5.4 Probability of Future Occurrences

Tornadoes

According to historical information, tornado events are not an annual occurrence for the region. However, given the region's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in terms of size, intensity, and duration, they do pose a significant threat should the High-Country Region experience a direct tornado strike. The probability of future tornado occurrences affecting the High-Country Region is possible (1 to 10 percent annual probability).

Thunderstorms

Given the high number of previous events, it is certain that wind events, including straight-line wind and thunderstorm wind, will occur in the future. This results in a probability level of highly likely (100 percent annual probability) for future wind events for the entire planning area.

Hailstorms

Based on historical occurrence information, it is assumed that the probability of future hail occurrences is likely (10 to 100 percent annual probability). Since hail is an atmospheric hazard (coinciding with thunderstorms), it is assumed that the entire High-Country Region has equal exposure to this hazard. It can be expected that future hail events will continue to cause minor damage to property and vehicles throughout the region.

Lightning

Although there was not a high number of historical lightning events reported throughout the High-Country Region via NCEI data, it is a regular occurrence accompanied by thunderstorms. In fact, lightning events will assuredly happen on an annual basis, though all events will not cause damage. According to Vaisala's U.S. National Lightning Detection Network (NLDN®), the High-Country Region is located in an area of the country that experienced an average of 3 to 6 lightning flashes per square kilometer per year between 2008 and 2017. Therefore, the probability of future events is highly likely (100 percent annual probability). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the region.

5.6 SEVERE WINTER WEATHER

5.6.1 Background and Description

A winter storm can range from a moderate snow over a period of a few hours to blizzard conditions with blinding wind-driven snow that lasts for several days. Events may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Some winter storms might be large enough to affect several states, while others might affect only localized areas. Occasionally, heavy snow might also cause significant property damages, such as roof collapses on older buildings.

All winter storm events have the potential to present dangerous conditions to the affected area. Larger snowfalls pose a greater risk, reducing visibility due to blowing snow and making driving conditions treacherous. A heavy snow event is defined by the National Weather Service as an accumulation of 4 of more inches in 12 hours or less. A blizzard is the most severe form of winter storm. It combines low temperatures, heavy snow, and winds of 35 miles per hour or more, which reduces visibility to a quarter mile or less for at least 3 hours. Winter storms are often accompanied by sleet, freezing rain, or an ice storm. Such freeze events are particularly hazardous as they create treacherous surfaces.

Ice storms are defined as storms with significant amounts of freezing rain and are a result of cold air damming (CAD). CAD is a shallow, surface-based layer of relatively cold, stably-stratified air entrenched against the eastern slopes of the Appalachian Mountains. With warmer air above, falling precipitation in the form of snow melts, then becomes either super-cooled (liquid below the melting point of water) or re-freezes. In the former case, super-cooled droplets can freeze on impact (freezing rain), while in the latter case, the re-frozen water particles are ice pellets (or sleet). Sleet is defined as partially frozen raindrops or refrozen snowflakes that form into small ice pellets before reaching the ground. They typically bounce when they hit the ground and do not stick to the surface. However, it does accumulate like snow, posing similar problems and has the potential to accumulate into a layer of ice on surfaces. Freezing rain, conversely, usually sticks to the ground, creating a sheet of ice on the roadways and other surfaces. All of the winter storm elements – snow, low temperatures, sleet, ice, etcetera – have the potential to cause significant hazard to a community. Even small accumulations can down power lines and trees limbs and create hazardous driving conditions. Furthermore, communication and power may be disrupted for days.

5.6.2 Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather. The High-Country Region is accustomed to severe winter weather conditions and frequently receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire region has uniform exposure to a winter storm.

5.6.3 Historical Occurrences

Winter weather has resulted in two disaster declarations in the High-Country Region[12]. This includes the Blizzard of 1996 and a 1998 winter storm[13]. According to the National Centers for Environmental

[12] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

[13] Not all of the participating counties were declared disaster areas for these events. A complete listing of historical disaster declarations, including the affected counties, can be found in Section 4: Hazard Identification.

Information, there have been a total of 282 recorded winter storm events in the High-Country Region since 1996 (**Table 5.17**)[14]. These events resulted in over $1.3 million (2020 dollars) in damages as well as 1 injury. Those events with reported damages are presented in **Table 5.18**[15].

TABLE 5.17: SUMMARY OF SEVERE WINTER WEATHER EVENTS IN THE HIGH-COUNTRY REGION

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	52	0	1	$50,000
Ashe County	84	0	0	$152,000
Watauga County	99	0	0	$393,000
Wilkes County	47	0	0	$757,800
High County Region Total	**282**	**0**	**1**	**$1,352,800**

Source: National Centers for Environmental Information

TABLE 5.18: HISTORICAL WINTER STORM IMPACTS IN THE HIGH-COUNTRY REGION

Location	Date	Deaths/Injuries	Property Damage	Details
Alleghany County				
Alleghany County (Zone)	2/4/2010	0/0	$50,000	Snow broke out across the county late Thursday evening and continued through the day Friday. It mixed with sleet and freezing rain during the day Friday when warmer air moved in aloft. The precipitation ended as snow showers Friday evening. Total snow accumulations of 7 to 8 inches were common. Ice accumulation of up to 0.20 inches was reported in the Ennice area. The snow and freezing rain combined to bring down numerous trees and power lines across the county. Some structures were also damaged by the falling trees.
Ashe County				
Ashe County (Zone)	1/27/1998	0/0	$150,000	Heavy wet snow developed during the early morning hours on the 27th and continued until around noon on the 28th. Total snowfall amounts were generally from 18 to 36 inches with maximum snow depths from14 to 24 inches.

[14] These ice and winter storm events are only inclusive of those reported by the NCEI. It is likely that additional winter storm conditions have affected the High-Country Region. In addition, the 285 are reported by county, so many of these storms likely affected all of the counties.

[15] The dollar amount provided by NCDC is divided by the number affected counties to reflect a damage estimate for the county.

Location	Date	Deaths/Injuries	Property Damage	Details
Ashe County (Zone)	2/4/2010	0/0	$2,000	Snow broke out across the county late Thursday evening and continued through the day Friday. It mixed with sleet and freezing rain during the day Friday when warmer air moved in aloft. The precipitation ended as snow showers Friday evening. Total snow accumulations of 8 to 10 inches were common. Ice accumulation of up to 0.35 inches was reported in Glendale Springs, with slightly lower amounts around 0.15 inches common across most of the county. Only minor tree and power line damage was reported.
Watauga County				
Watauga County (Zone)	2/1/1996	0/0	$50,000	N/A
Watauga County (Zone)	1/27/1998	0/0	$300,000	Heavy wet snow developed during the early morning hours on the 27th and continued until around noon on the 28th. Total snowfall amounts were generally from 18 to 36 inches with maximum snow depths from 14 to 24 inches.
Watauga County (Zone)	2/3/1998	0/0	$25,000	Rain changed to heavy snow during the evening hours on the 3rd and continued to around midnight. Snowfall amounts were mainly around 4 inches before the precipitation changed back to rain. The heavy wet snow from late January and the weight of the snow and rain from this storm resulted in the collapse of the roof of a Boone business. Hazardous road conditions resulted in several traffic accidents.
Watauga County (Zone)	11/14/2018	0/0	$10,000	Ice accretion across the county ranged from 0.25 inches at a location one mile west of Boone and also a location one mile west-northwest of Aho, 0.30 inches at a location two miles east-northeast of Sands, and 0.50 inches at a location one mile north of Boone. Power outages occurred to downed power lines and impacted at least 1000 customers. Several trees were brought down by the weight of the ice.
Wilkes County				
Wilkes County (Zone)	1/6/1996	0/0	$140,000	Blizzard of 1996
Wilkes County (Zone)	2/1/1996	0/0	$300,000	N/A
Wilkes County (Zone)	12/15/2005	0/0	$8,000	An ice storm produced a 1/4 to 1/2-inch coating of ice across Northern North Carolina starting on the morning of the 15th in the west and continuing into the evening. Downed trees, limbs and power lines created power outages across much of the region. Emergency managers estimated that 12,000 people lost power during the storm. Surry county reported 300 trees downed across the county with 8,000 people losing power in the Dobson, Mount Airy and Westfield areas.

Location	Date	Deaths/Injuries	Property Damage	Details
Wilkes County (Zone)	2/1/2008	0/0	$3,000	One quarter to one third of an inch of glaze occurred during this event. The highest totals occurred closer to the Blue Ridge. The weight of the ice downed trees and power lines in the county.
Wilkes County (Zone)	2/4/2010	0/0	$100,000	Snow broke out across the county late Thursday evening and continued through the day Friday. It mixed with sleet and freezing rain during the day Friday when warmer air moved in aloft. The precipitation ended as snow showers Friday evening. Total snow accumulations of 7 to 9 inches were common. The Brushy Mountain area was hit hard by freezing rain with accumulations up to one inch reported. This caused numerous trees and power lines to fall blocking several roads and knocking out power to thousands. Significant tree damage was reported, with one tree breaking through the roof of a house. At one point almost 4000 customers were without power.
Wilkes County (Zone)	3/2/2010	0/0	$1,800	Three to four inches of snow fell across Wilkes County. An estimated $1,800 in damage occurred when a car slid off a road seven miles west of Wilkesboro. Several roads in Wilkes County were closed due to unsafe road conditions.

There are several notable winter storm events in the region. In extreme occurrences, over sixty inches have fallen (reported in Watauga County). Winter storms may be long-lived with gradual snow or ice accumulation or quick with intense snow fall. Two storms are notorious throughout the High-Country Regional planning area for the consequential disruption in the area.

Blizzard of 1996 (January 6-7, 1996)
In northwest and north-central North Carolina, up to 2 feet of snow on the 6th and the 7th closed schools and businesses for several days, halted mail deliveries, trash pickups, and church services, closed secondary roads in the mountains, and resulted in one injury and two fatalities.

Light snow developed across the mountains during the late evening hours on the 5th and early morning hours on the 6th. Snowfall amounts were mainly from 1 to 3 inches through the late morning on the 6th. The snow became heavy in Watauga, Ashe, and Alleghany counties during the late morning hours on the 6th and spread eastward.

Winter Storm (December 23 – 25, 1998)
An ice storm began during the afternoon of 12/23 and continued through the early morning hours on 12/15. Most of the precipitation fell in the form of freezing rain across central North Carolina causing power outages to approximately 500,000 people sometime during the period. According to the North Carolina Climate Office, $500 thousand in property damage was reported across North Carolina.

Although NCEI does not report any narrative information for the Winter Storm disaster declaration in 1998 for Alleghany or Ashe County. Watauga and Wilkes County reported sleet and freezing rain developed during the morning hours on the 23rd and continued into late afternoon hours on the 24th. There were no property damages, injuries or fatalities reported for this event.

Winter storms throughout the planning area often lead to several negative externalities including

hypothermia, cost of snow and debris cleanup, business and government service interruption, traffic accidents, and power outages. Furthermore, citizens may resort to using inappropriate heating devices that could to fire or an accumulation of toxic fumes.

5.6.4 Probability of Future Occurrences

Winter storm events will remain a regular occurrence in the High-Country Region due to location and elevation. According to historical information, the High-Country Region experiences an average of 13 winter storm events each year. Therefore, the annual probability is highly likely (100 percent).

5.7 EARTHQUAKES

5.7.1 Background and Description

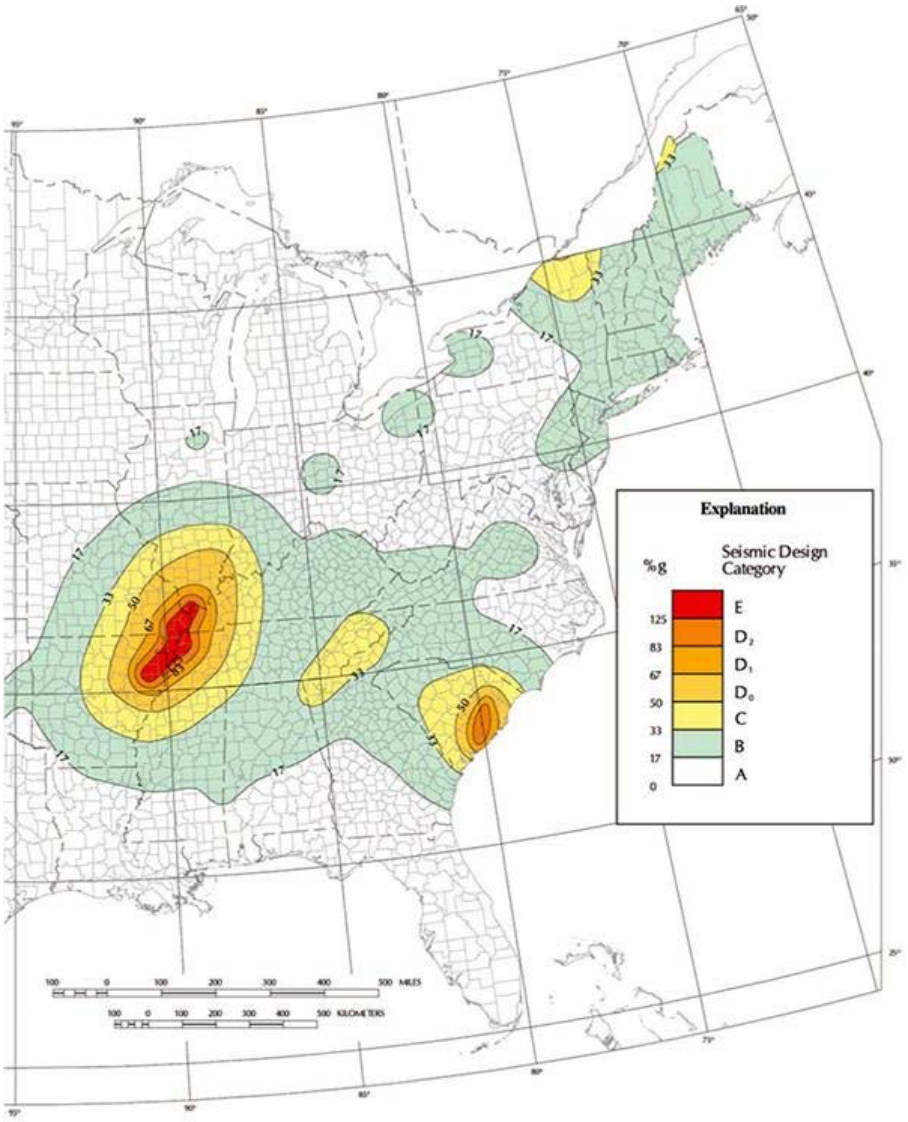
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area.

Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking. The level of damage depends upon the amplitude and duration of the shaking, which are directly related to the earthquake size, distance from the fault, site, and regional geology. Other damaging earthquake effects include landslides, the down-slope movement of soil and rock (mountain regions and along hillsides), and liquefaction, in which ground soil loses the ability to resist shear and flows much like quick sand. In the case of liquefaction, anything relying on the substrata for support can shift, tilt, rupture, or collapse.

Most earthquakes are caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the Earth’s outer crust. These fault planes are typically found along borders of the Earth's 10 tectonic plates. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, generating an earthquake.

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk to less frequent, less intense earthquake events. **Figure 5.8** shows relative seismic risk for the United States.

FIGURE 5.8: EASTERN UNITED STATES EARTHQUAKE HAZARD MAP



Source: Federal Emergency Management Agency

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (**Table 5.19**). Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from "I" corresponding to imperceptible (instrumental) events to "XII" for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in **Table 5.20**.

TABLE 5.19: RICHTER SCALE

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
< 3.5	Generally, not felt, but recorded.
3.5 - 5.4	Often felt, but rarely causes damage.
5.4 - 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1 - 6.9	Can be destructive in areas up to about 100 kilometers across where people live.
7.0 - 7.9	Major earthquake. Can cause serious damage over larger areas.
8 or >	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

Source: Federal Emergency Management Agency

TABLE 5.20: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

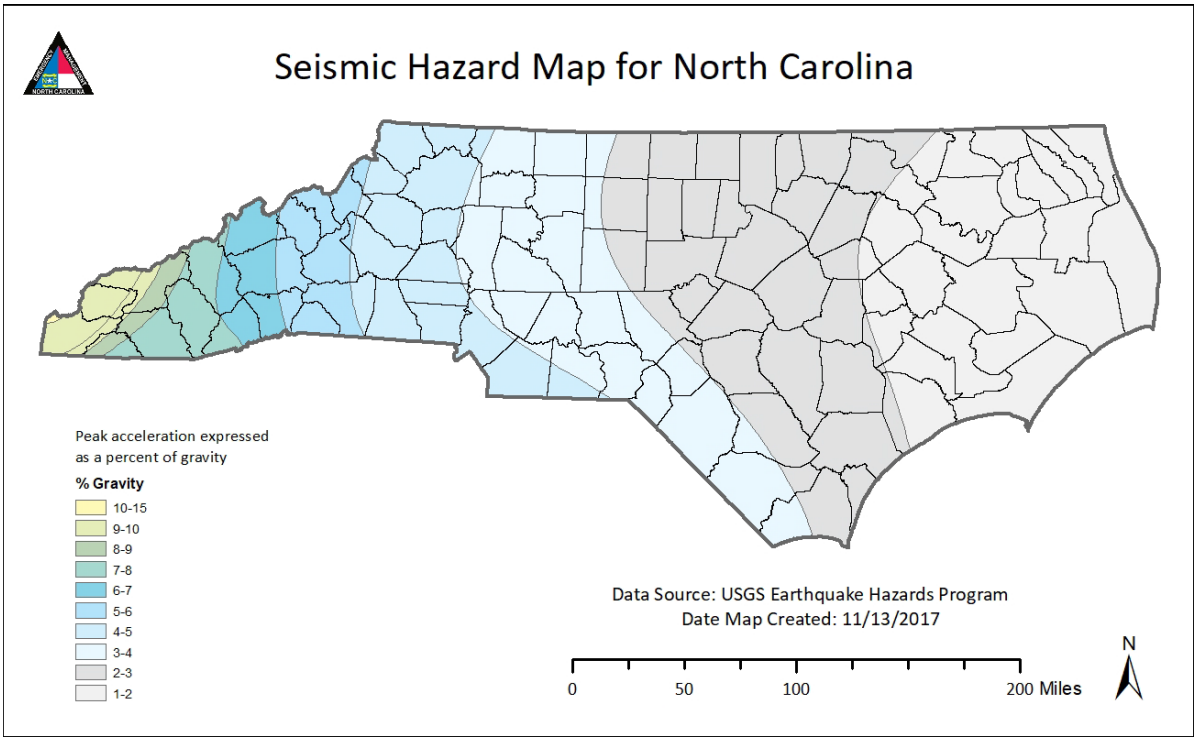
SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	INSTRUMENTAL	Detected only on seismographs.	
II	FEEBLE	Some people feel it.	< 4.2
III	SLIGHT	Felt by people resting; like a truck rumbling by.	
IV	MODERATE	Felt by people walking.	
V	SLIGHTLY STRONG	Sleepers awake; church bells ring.	< 4.8
VI	STRONG	Trees sway; suspended objects swing, objects fall off shelves.	< 5.4
VII	VERY STRONG	Mild alarm; walls crack; plaster falls.	< 6.1
VIII	DESTRUCTIVE	Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged.	
IX	RUINOUS	Some houses collapse; ground cracks; pipes break open.	< 6.9
X	DISASTROUS	Ground cracks profusely; many buildings destroyed; liquefaction and landslides widespread.	< 7.3
XI	VERY DISASTROUS	Most buildings and bridges collapse; roads, railways, pipes and cables destroyed; general triggering of other hazards.	< 8.1
XII	CATASTROPHIC	Total destruction; trees fall; ground rises and falls in waves.	> 8.1

Source: Federal Emergency Management Agency

5.7.2 Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure 5.9** is a map showing geological and seismic information for North Carolina.

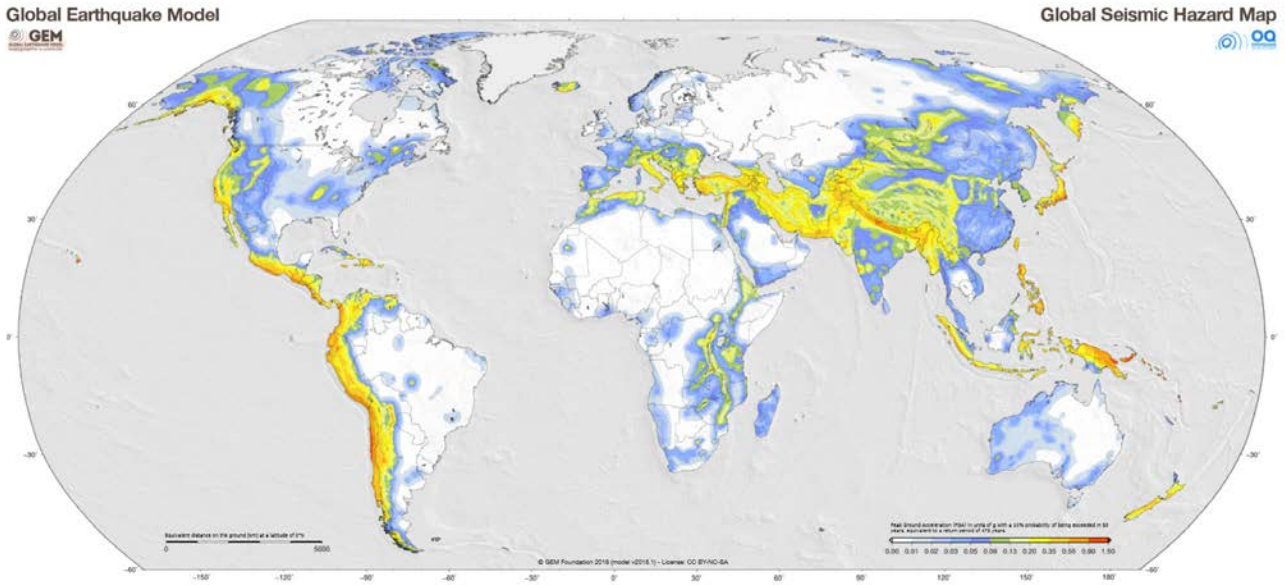
FIGURE 5.9: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA



Source: North Carolina Geological Survey

Figure 5.10 shows the intensity level associated with the High-Country Region, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, all of the High-Country Region lies within an approximate zone of level "3" to "4" ground acceleration. This indicates that the region as a whole exists within an area of moderate seismic risk.

FIGURE 5.10: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS



Source: Global Earthquake Model, 2018

5.7.3 Historical Occurrences

At least 85 earthquakes are known to have affected the High-Country Region since 1885. The strongest of these measured a VI on the Modified Mercalli Intensity (MMI) scale. **Table 5.21** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table 5.22** presents a detailed occurrence of each event including the date, distance for the epicenter, and Modified Mercalli Intensity (if known)[16].

TABLE 5.21: SUMMARY OF SEISMIC ACTIVITY IN THE HIGH-COUNTRY REGION

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Alleghany County	**25**	**VII**	**< 6.1**
Sparta	8	VII	< 6.1
Unincorporated Area	17	VII	< 6.1
Ashe County	**22**	**V**	**< 4.8**
Jefferson	3	IV	< 4.2
Lansing	3	III	< 4.2
West Jefferson	3	IV	< 4.2
Unincorporated Area	13	V	< 4.8

[16] Due to reporting mechanisms, not all earthquakes events were recorded during this time. Furthermore, some are missing data, such as the epicenter location, due to a lack of widely used technology. In these instances, a value of "unknown" is reported.

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Watauga County	**27**	**V**	**< 4.8**
Beech Mountain	0	--	--
Blowing Rock	4	V	< 4.8
Boone	8	V	< 4.8
Seven Devils	0	--	--
Unincorporated Area	15	V	< 4.8
Wilkes County	**11**	**VI**	**< 5.4**
North Wilkesboro	3	V	< 4.8
Ronda	1	IV	< 4.2
Wilkesboro	2	VI	< 5.4
Unincorporated Area	5	IV	< 4.2
HIGH COUNTRY REGION TOTAL	**85**	**VI**	**< 5.4**

Source: National Geophysical Data Center
Note: No further details about these events could be located. Future updates of the plan will attempt to provide more context to previously reported earthquake events.

In addition to those earthquakes specifically affecting the High-Country Region, a list of earthquakes that have caused damage throughout North Carolina is presented below in **Table 5.26.**

TABLE 5.22: EARTHQUAKES WHICH HAVE CAUSED DAMAGE IN NORTH CAROLINA

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
12/16/1811 - 1	NE Arkansas	8.5	XI	VI
12/16/1811 - 2	NE Arkansas	8.0	X	VI
12/18/1811 - 3	NE Arkansas	8.0	X	VI
01/23/1812	New Madrid, MO	8.4	XI	VI
02/071812	New Madrid, MO	8.7	XII	VI
04/29/1852	Wytheville, VA	5.0	VI	VI
08/31/1861*	Wilkesboro, NC	5.1	VII	VII
12/23/1875	Central Virginia	5.0	VII	VI
08/31/1886	Charleston, SC	7.3	X	VII
05/31/1897	Giles County, VA	5.8	VIII	VI
01/01/1913	Union County, SC	4.8	VII	VI
02/21/1916	Asheville, NC	5.5	VII	VII
07/08/1926	Mitchell County, NC	5.2	VII	VII
11/03/1928*	Newport, TN	4.5	VI	VI
05/13/1957	McDowell County, NC	4.1	VI	VI
07/02/1957	Buncombe County, NC	3.7	VI	VI
11/24/1957	Jackson County, NC	4.0	VI	VI
10/27/1959 **	Chesterfield, SC	4.0	VI	VI
07/13/1971	Newry, SC	3.8	VI	VI
11/30/1973*	Alcoa, TN	4.6	VI	VI
11/13/1976	Southwest Virginia	4.1	VI	VI
05/05/1981	Henderson County, NC	3.5	VI	VI

Date	Location	Richter Scale (Magnitude)	MMI (Intensity)	MMI in North Carolina
08/09/2020	Sparta, NC	5.1	VII	VII

*This event is accounted for in the High-Country occurrences.
** Conflicting reports on this event, intensity in North Carolina could have been either V or VI
Source: This information compiled by Dr. Kenneth B. Taylor and provided by Tiawana Ramsey of NCEM. Information was compiled from the National Earthquake Center, Earthquakes of the US by Carl von Hake (1983), and a compilation of newspaper reports in the Eastern Tennessee Seismic Zone compiled by Arch Johnston, CERI, Memphis State University (1983).

Sparta Earthquake – August 9, 2020
As the region was dealing with the COVID-19 pandemic, a 5.1 magnitude earthquake (the second strongest in the recorded history of earthquakes in North Carolina) occurred just southeast of Sparta in Alleghany County.

The earthquake caused widespread damage occurred in Sparta including collapsed ceilings, chimneys, and masonry; damaged water mains; cracked and deformed roads; uprooted headstones; and displaced appliances and other household items. At least 525 structures were damaged, and 60 with major damage, meaning at least 40% of the structure was a total loss. 25 homes were declared uninhabitable. The County received a State disaster declaration for the event.

5.7.4 Probability of Future Occurrences
As evidenced by the Sparta earthquake, the probability of significant, damaging earthquake events affecting the High-Country Region is possible. However, it is more likely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the region. The annual probability level for the region is estimated between 1 and 10 percent (possible).

5.8 GEOLOGICAL
5.8.1 Background and Description
For the purposes of maintaining consistency with the State of North Carolina Hazard Mitigation Plan, this section will assess geological hazards which include landslides, sinkholes, and erosion.

Landslides
A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation, which is driven by gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, volcanic eruptions, and changes in groundwater levels.

There are several types of landslides: rock falls, rock topple, slides, and flows. Rock falls are rapid movements of bedrock, which result in bouncing or rolling. A topple is a section or block of rock that rotates or tilts before falling to the slope below. Slides are movements of soil or rock along a distinct surface of rupture, which separates the slide material from the more stable underlying material. Mudflows, sometimes referred to as mudslides, mudflows, lahars or debris avalanches, are fast-moving rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as heavy rainfall or rapid snowmelt, changing the soil into a flowing river of mud or “slurry.” Slurry can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing in size as it picks up trees, cars, and other materials along the way. As the flows reach flatter ground, the mudflow spreads over a broad area where it can accumulate in thick deposits.

Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly.

Among the most destructive types of debris flows are those that accompany volcanic eruptions. A spectacular example in the United States was a massive debris flow resulting from the 1980 eruptions of Mount St. Helens, Washington. Areas near the bases of many volcanoes in the Cascade Mountain Range of California, Oregon, and Washington are at risk from the same types of flows during future volcanic eruptions.

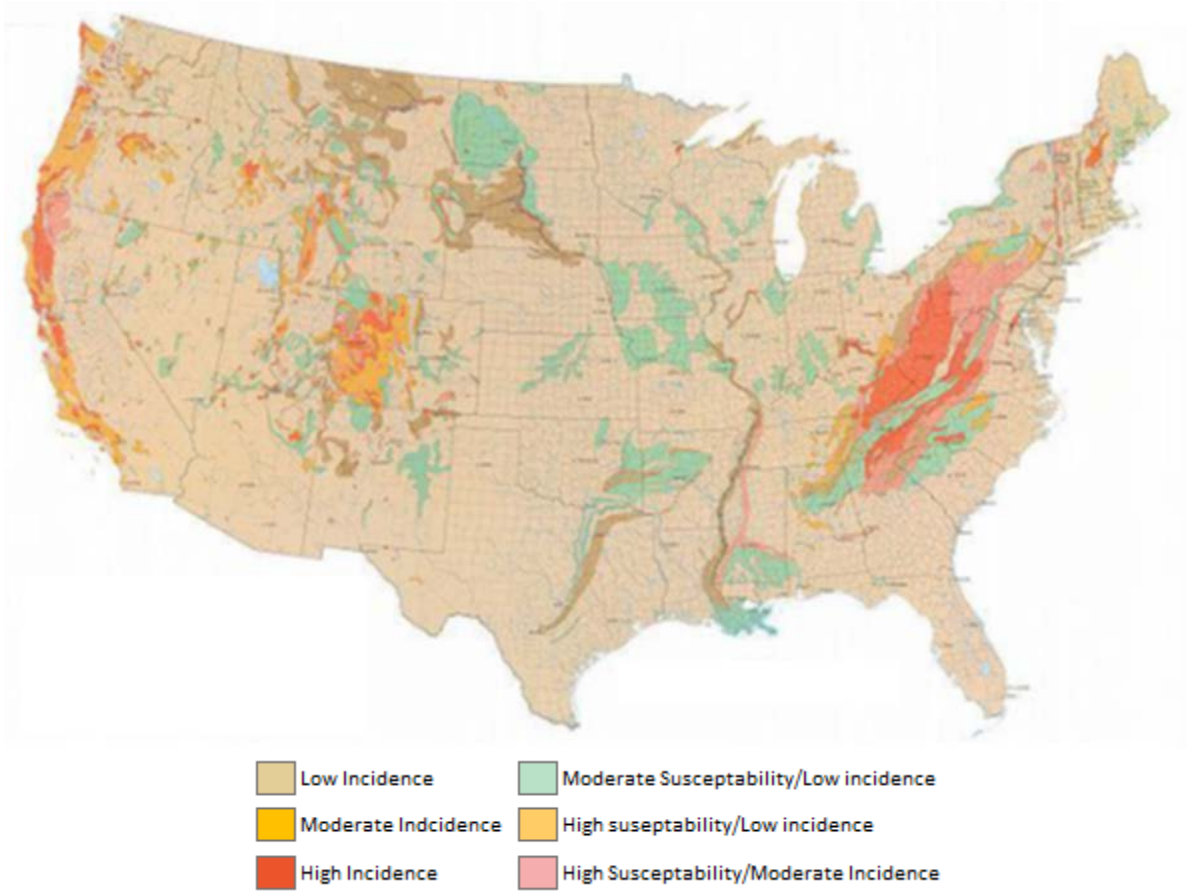
Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved in the past, relatively flat-lying areas away from sudden changes in slope, and areas at the top or along ridges set back from the tops of slopes.

According to the United States Geological Survey, each year landslides cause $5.1 billion (2018 dollars) in damage and between 25 and 50 deaths in the United States[17]. **Figure 5.11** delineates areas where large numbers of landslides have occurred and areas that are susceptible to land sliding in the conterminous United States[18]

[17] United States Geological Survey (USGS). United States Department of the Interior. “Landslide Hazards – A National Threat.” 2005.

[18] This map layer is provided in the U.S. Geological Survey Professional Paper 1183, Landslide Overview Map of the Conterminous United States, available online at: http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html.

FIGURE 5.11: LANDSLIDE OVERVIEW MAP OF THE UNITED STATES[19]



Source: USGS

Sinkholes

According to the United States Geological Survey, a sinkhole is an area of ground that has no natural external surface drainage--when it rains, all of the water stays inside the sinkhole and typically drains into the subsurface. Sinkholes can vary from a few feet to hundreds of acres and from less than 1 to more than 100 feet deep. Some are shaped like shallow bowls or saucers whereas others have vertical walls.

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a while until the underground spaces just get too big. If there is not enough support for the land above the spaces then a sudden collapse of the land surface can occur. These collapses can be small, or, as **Figure 5.12** below shows, they can be huge and can occur where a house or road is on top[20].

[19] Susceptibility not indicated where same or lower than incidence. Susceptibility to landslides was defined as the probable degree of response of [the areal] rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. High, moderate, and low susceptibility are delimited by the same percentages used in classifying the incidence of landslides. Some generalization was necessary at this scale, and several small areas of high incidence and susceptibility were slightly exaggerated.

[20] Sinkholes. United States Geological Survey. Retrieved on December 14, 2017 from: https://water.usgs.gov/edu/sinkholes.html

FIGURE 5.12: SINKHOLE IN NORTH CAROLINA

Source: NCEM

Erosion

Erosion is the gradual breakdown and movement of land due to both physical and chemical processes of water, wind, and general meteorological conditions. Natural, or geologic, erosion has occurred since the Earth's formation and continues at a very slow and uniform rate each year.

There are two types of soil erosion: wind erosion and water erosion. Wind erosion can cause significant soil loss. Winds blowing across sparsely vegetated or disturbed land can pick up soil particles and carry them through the air, thus displacing them. Water erosion can occur over land or in streams and channels. Water erosion that takes place over land may result from raindrops, shallow sheets of water flowing off the land, or shallow surface flow, which becomes concentrated in low spots. Stream channel erosion may occur as the volume and velocity of water flow increases enough to cause movement of the streambed and bank soils. Major storms, such hurricanes in coastal areas, may cause significant erosion by combining high winds with heavy surf and storm surge to significantly impact the shoreline.

An areas potential for erosion is determined by four factors: soil characteristics, vegetative cover, topography climate or rainfall, and topography. Soils composed of a large percentage of silt and fine sand is most susceptible to erosion. As the clay and organic content of these soils increases, the potential for erosion decreases. Well-drained and well-graded gravels and gravel-sand mixtures are the least likely to erode. Coarse gravel soils are highly permeable and have a good capacity for absorption, which can prevent or delay the amount of surface runoff. Vegetative cover can be very helpful in controlling erosion by shielding the soil surface from falling rain, absorbing water from the soil, and slowing the velocity of runoff. Runoff is also affected by the topography of the area including size, shape, and slope. The greater the slope length and gradient, the more potential an area has for erosion.

Climate can affect the amount of runoff, especially the frequency, intensity, and duration of rainfall and storms. When rainstorms are frequent, intense, or of long duration, erosion risks are high. Seasonal changes in temperature and rainfall amounts define the period of highest erosion risk of the year.

During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementation of erosion control measures consistent with sound agricultural and construction operations are needed to minimize the adverse effects associated with harmful chemicals run-off due to wind or water events. The increase in government regulatory programs and public concern has resulted in a wide range of erosion control products, techniques, and analytical methodologies in the United States. The preferred method of erosion control in recent years has been the restoration of vegetation.

5.8.2 Location and Spatial Extent

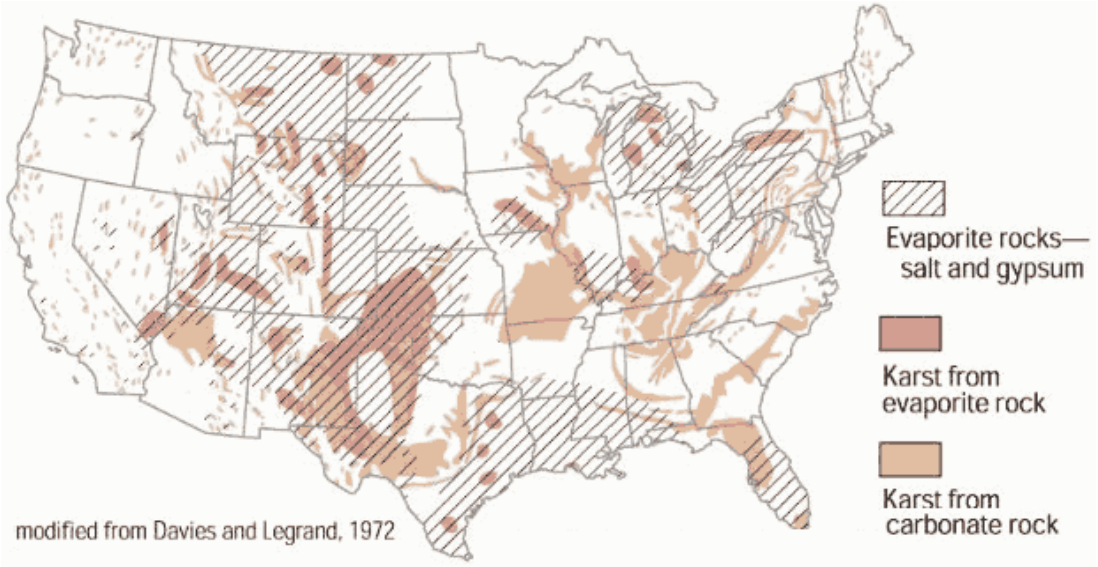
Landslides

Landslides occur along steep slopes when the pull of gravity can no longer be resisted (often due to heavy rain throughout the Appalachian Mountain region). Human development can also exacerbate risk by building on previously undevelopable steep slopes and constructing roads by cutting through mountains. Landslides are possible throughout the High-Country Region.

Sinkholes

Figure 5.13 below shows areas of the United States where certain rock types that are susceptible to dissolution in water occur. In these areas, the formation of underground cavities can form and catastrophic sinkholes can happen. These rock types are evaporites (salt, gypsum, and anhydrite) and carbonates (limestone and dolomite). Evaporite rocks underlie about 35 to 40 percent of the United States, though in many areas they are buried at great depths. In some cases, sinkholes in North Carolina have been measured at up to 20 to 25 feet in depth, with similar widths.

FIGURE 5.13: UNITED STATES GEOLOGICAL SURVEY OF KARST MODIFIED FROM DAVIES AND LEGRAND, 1972



Erosion

Erosion in the High-Country Region is typically caused by flash flooding events. Unlike coastal areas, where the soil is mainly composed of fine-grained particles such as sand, High-Country soils have much greater organic matter content. Furthermore, vegetation also helps to prevent erosion in the area. Erosion occurs in the High-Country Region, particularly along the banks of rivers and streams, but it is not an extreme threat to any of the participating counties and jurisdictions. No areas of concern were reported by the planning committee.

5.8.3 Historical Occurrences

Landslides

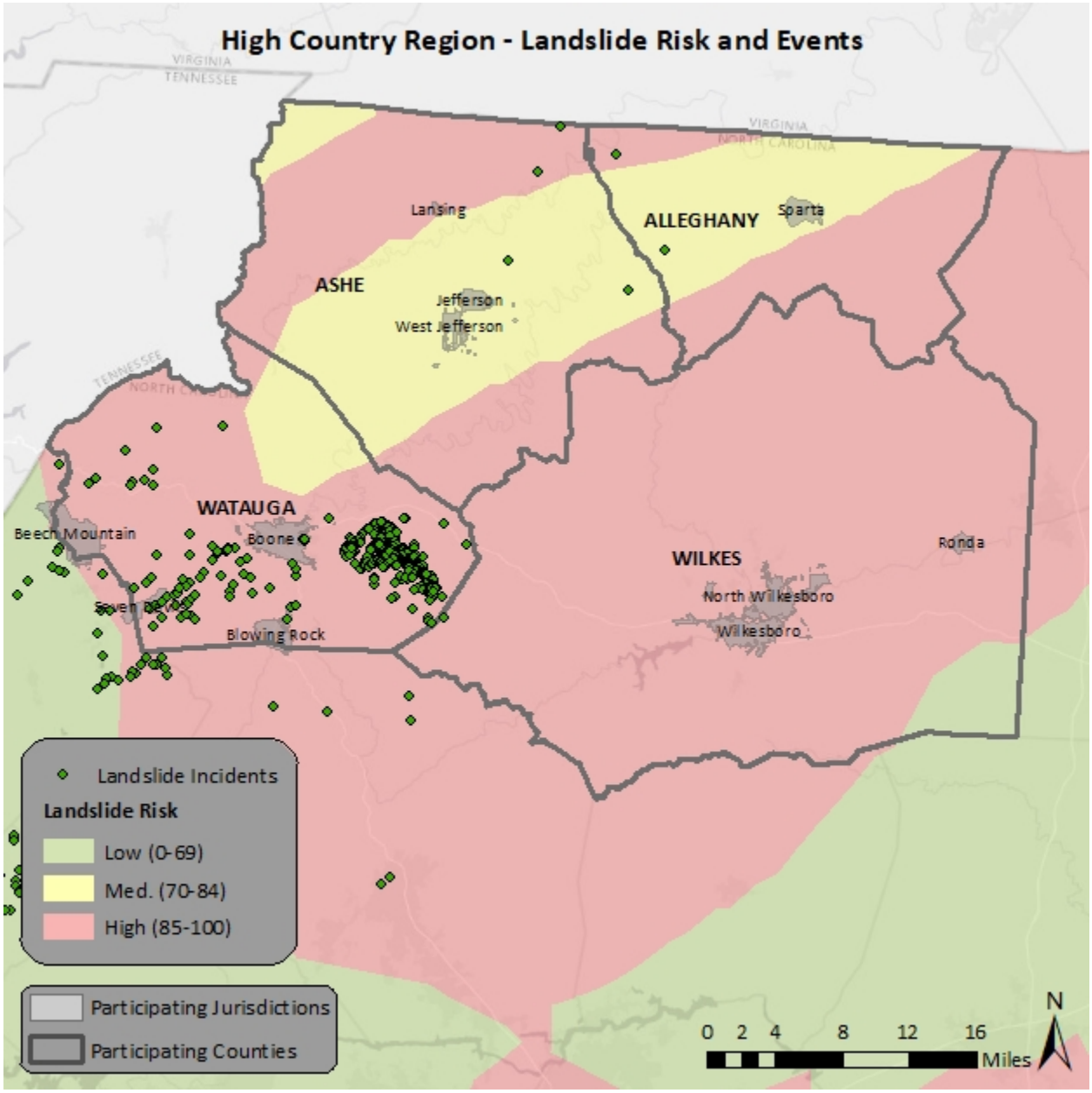
Steep topography throughout the High-Country Region makes the planning area susceptible to landslides. Landslides and mudslides caused by severe storms and flooding have resulted in two disaster declarations in the High-Country region[21]. According to **Figure 5.14** below, the northern central portion of the region, including Alleghany County, Ashe County, and Watauga County, have the greatest landslide activity. The majority of the remaining portion of the region has a moderate incidence occurrence rate. There is high susceptibility throughout the region. Although it is not identified here, local information indicates that Watauga County may have the greatest susceptibility due to substantial development on steep slopes throughout the county. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. **Table 5.23** presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey[22]. According to the North Carolina Geological Survey, there have been a total of 491 landslide, mudslide, or debris movements events in the High-Country region. The locations of the landslide events

[21] A complete listing of historical disaster declarations can be found in Section 4: *Hazard Identification*.

[22] It should be noted that the North Carolina Geological Survey (NCGS) emphasized the dataset provided was incomplete and does not include points identified in the North Carolina Landslide Hazard Mapping Program or, potentially, all landslides in other counties. Therefore, there may be additional historical landslide occurrences. Furthermore, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS

presented in the aforementioned table are presented in **Figure 5.14**. Landslide incidences for the High Country Region are listed in **Table 5.23** below.

FIGURE 5.14: LANDSLIDE SUSCEPTIBILITY MAP OF THE HIGH-COUNTRY REGION



Source: USGS

TABLE 5.23: SUMMARY OF LANDSLIDE ACTIVITY IN THE HIGH-COUNTRY REGION

Location	Number of Occurrences
Alleghany County	**2**
Sparta	0
Unincorporated Area	2
Ashe County	**4**
Jefferson	1
Lansing	0
West Jefferson	0
Unincorporated Area	3
Watauga County	**484**
Beech Mountain	0
Blowing Rock	0
Boone	31
Seven Devils	0
Unincorporated Area	453
Wilkes County	**1***
North Wilkesboro	0
Ronda	0
Wilkesboro	0
Unincorporated Area	1
HIGH COUNTRY REGION TOTAL	**491**

Source: North Carolina Geological Survey

* Landslides event occurrence is list by the North Carolina Geological Survey in Deep Gap, NC; but, data for landslide was assigned to Wilkes County as Deep Gap, NC is bordered on Watauga County and Wilkes County.

In 2008, the North Carolina Geological Survey's Landslide Hazard Mapping Program completed a survey of Watauga County under the auspices of the Hurricane Recovery Act of 2005. The project involved archival aerial photography, existing geologic maps, and a LiDAR (Light Detection and Ranging) digital elevation model for use in a Geographic Information System in order to map landslides and landslide deposits. The study resulted in the creation of four maps, which identified 2,253 landslides, of which 2,099 were the result of the August 13-14, 1940 storm[16]. Debris flows were found to account for 77% of the total landslides. These maps were also able to show where landslides may occur and where they might go once, they begin. Additionally, 20% of the county was considered to be in a high hazard area based on the Stability Index. The magnitude for landslides can be measured by the cubic yards of soil that would be moved by an event. For Watauga County, this magnitude would not likely exceed 20,000 cu/yd of soil moved.

Some information from local officials and existing mitigation plans was also provided on historical occurrences in the High-Country Region:

- **Alleghany County**
  No major landslide events have been reported. However, minor events have temporarily closed roadways such as the Highway 21 closure in 2007. The one-two punch of Fran and Ivan served as a catalyst for that event. The steep topography of the county (which is lesser than

neighboring counties) due make landslides possible in the county.

- **Ashe County**
  A landslide occurred on February 2, 1998 that blocked NC Highway 88 west.

- **Watauga County**
  The 1940 landslide event resulted in 14 fatalities and 32 structures being damaged or destroyed, primarily in the Deep Gap community of the county. Prior to 1940 only 7% of the 2,253 identified landslides occurred on modified slopes. Since 1940, 51% of landslides have occurred on modified slopes thereby identifying the need for regulations regarding modifying or building on slope areas.

Sinkholes
In North Carolina, most sinkholes occur in the southern coastal plain due to the high concentration of limestone; however, they are also common in the western part of the state and in the High-Country region. There are no historical occurrences of sinkholes in the region

Erosion
Several sources were vetted to identify areas of erosion in the High-Country Region. This includes searching local newspapers, interviewing local officials, and reviewing previous hazard mitigation plans. No historical erosion occurrences were found in these sources. Alleghany County, Ashe County, and Watauga County have previous mitigation actions that address erosion including bank stabilization and meeting erosion control requirements. Such actions will continue to be implemented as necessary throughout the region.

5.8.4 Probability of Future Occurrences

Landslides
Based on historical information and the USGS susceptibility index, the probability of future landslide events is likely (10 and 100 percent probability). Local conditions may become more favorable for landslides due to heavy rain, for example. This would increase the likelihood of occurrence. It should also be noted that some areas in the High-Country Region have greater risk than others given factors such as steepness on slope and modification of slopes.

Sinkholes
Sinkholes have also affected parts of North Carolina in recent history, but most of those impacts have been in the southeastern region of the state, not the High-Country region. While many sinkholes have been relatively small, it is still possible (between 1 and 10 percent annual probability) that this region will continue to be affected in the future.

Erosion
Erosion remains a natural, dynamic, and continuous process for the High-Country Region, and it will continue to occur. The annual probability level assigned for erosion is possible (between 1 and 10 percent). However, given the lack of historical events, location, data, and threat to life or property, no further analysis will be done in Section 6: Vulnerability Assessment.

5.9 DAM FAILURE

5.9.1 Background and Description

Worldwide interest in dam and levee safety has risen significantly in recent years. Aging infrastructure, new hydrologic information, and population growth in floodplain areas downstream from dams and near levees have resulted in an increased emphasis on safety, operation, and maintenance.

There are approximately 80,000 dams in the United States today, the majority of which are privately owned. Other owners include state and local authorities, public utilities, and federal agencies. The benefits of dams are numerous: they provide water for drinking, navigation, and agricultural irrigation. Dams also provide hydroelectric power, create lakes for fishing and recreation, and save lives by preventing or reducing floods.

Though dams have many benefits, they also can pose a risk to communities if not designed, operated, and maintained properly. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and great property damage if development exists downstream. If a levee breaks, scores of properties may become submerged in floodwaters and residents may become trapped by rapidly rising water. The failure of dams and levees has the potential to place large numbers of people and great amounts of property in harm's way.

5.9.2 Location and Spatial Extent

The North Carolina Division of Land Resources provides information on dams including a hazard potential classification. There are three hazard classifications—high, intermediate, and low—that correspond to qualitative descriptions and quantitative guidelines. **Table 5.24** explains these classifications.

TABLE 5.24: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS

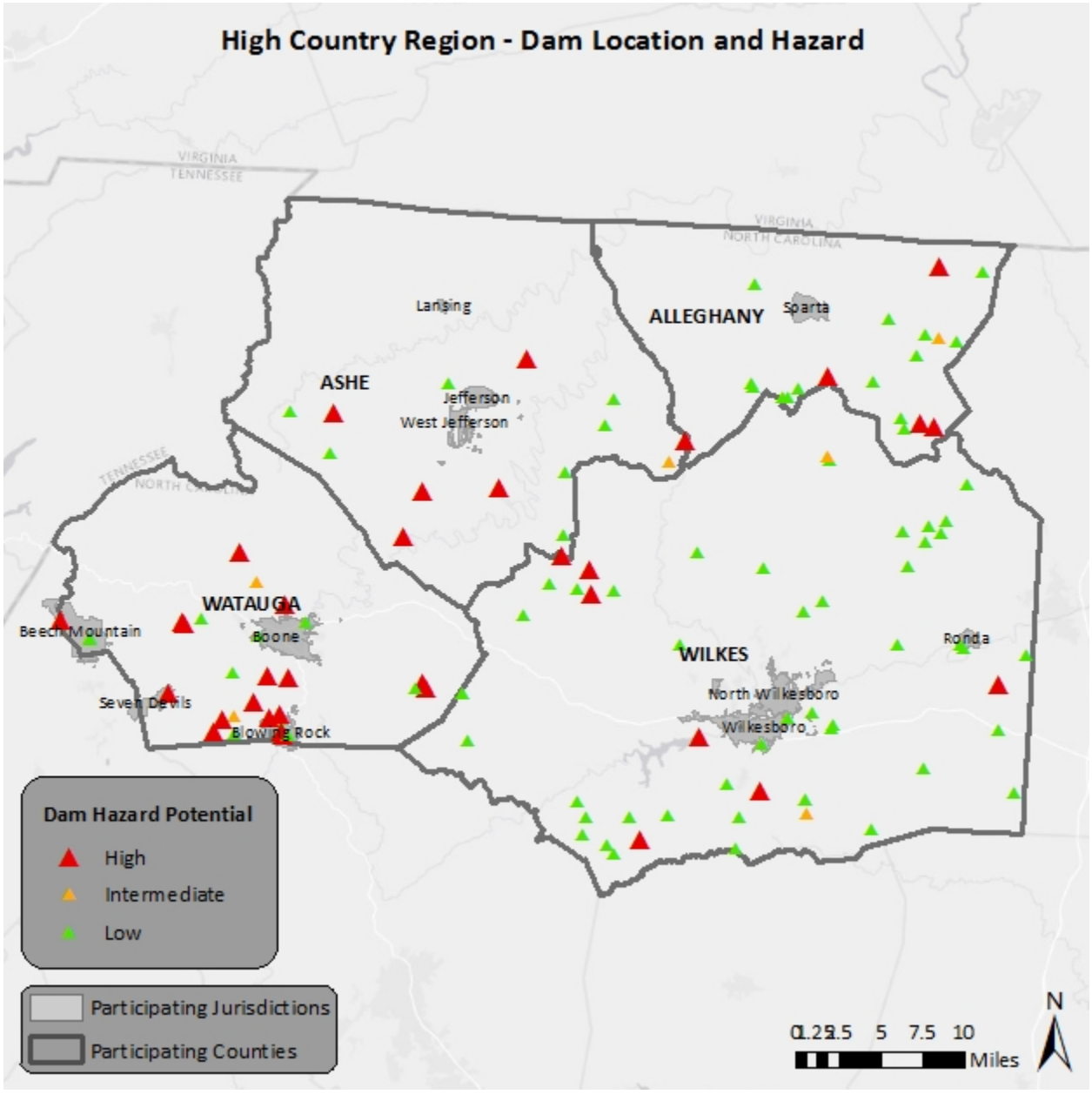
Hazard Classification	Description	Quantitative Guidelines
Low	Interruption of road service, low volume roads Less than 25 vehicles per day	Less than 25 vehicles per day
	Economic Damage	Less than $30,000
Intermediate	Damage to highways, Interruption of service	25 to less than 250 vehicles per day
	Economic Damage	$30,000 to less than $200,000
High	Loss of human life*	Probable loss of 1 or more human lives
	Economic Damage	More than $200,000
	*Probable loss of human life due to breached roadway or bridge on or below the dam	250 or more vehicles per day

Source: North Carolina Division of Energy, Mineral, and Land Resources

According to the North Carolina Division of Energy, Mineral, and Land Resources, there are 115 dams in the High-Country Region[23]. **Figure 5.15** shows the dam location and the corresponding hazard ranking for each. Of these dams, 33 are classified as high hazard potential. These high hazard dams are listed in **Table 5.25**. According to a consensus of local government officials and the Mitigation Advisory Committee, a majority of these dams would not pose a threat in a breach or failure occurrence.

[23] The list of high hazard dams obtained from the North Carolina Division of Land Resources was reviewed and amended by local officials to the best of their knowledge.

FIGURE 5.15: HIGH COUNTRY REGION DAM LOCATION AND HAZARD RANKING



Source: North Carolina Division of Energy, Mineral, and Land Resources

TABLE 5.25: HIGH COUNTRY REGION HIGH HAZARD DAMS

Dam Name	Hazard Potential	Surface Area (acres)	Max Capacity (Ac-ft)	State Regulated?
Alleghany County				
Temple Lake Dam	High	7.0	114	Y
High Meadows Lake Dam	High	6.0	103	Y
Mountain Lake Dam	High	34.1	746	N
Ashe County				
Gimlin Dam	High	2.2	15	N
Long Hope Club Dam	High	6.4	67	Y
Flat Rock Pond Dam	High	2.0	13	N
Indian Lake Dam	High	2.0	15	N
Ashe Lake Dam	High	30.6	362	N
Fleetwood Falls Lake Dam	High	1.7	22	N
Charles Harris Dam	High	1.4	12	Y
Watauga County				
Bass Lake	High	25.0	306	Y
Town Of Boone Water Supply Dam	High	11.0	226	Y
Trout Lake	High	14.0	216	Y
Price Lake	High	50.0	428	Y
Bright Penny Dam	High	3.0	45	Y
Trout Lake	High	3.0	60	N
Devils Lake Dam	High	4.0	74	Y
Potato Hill Lake	High	9.0	52	N
Old Blowing Rock Water Supply	High	5.7	76	Y
Appalachian Ski Mountain Lake	High	1.4	24	Y
Asu/Norris Branch Dam	High	22.0	762	Y
Rosasco Dam Lower	High	0.7	11	Y
Rosasco Lake Dam Upper	High	2.0	24	Y
Blowing Rock Cntry Club Dam	High	1.3	10	Y
New River Lake Dam	High	3.5	35	Y
Sweetgrass Dam	High	20.0	439	Y
Beech Mountain Water Supply Dam	High	6.5	200	Y
Wilkes County				
Oliver Dam	High	3.4	25	Y
Miller Dam	High	4.5	41	N
Al Beshears Dam	High	2.0	24	N
KOA Campground Dam	High	11.0	324	Y
W. Kerr Scott	High	2.0	153,000	N
Big Warrior Creek Dam	High	135.0	400	Y

Source: North Carolina Division of Energy, Mineral, and Land Resources

5.9.3 Historical Occurrences

A total of 3 dams have been breached in the High-Country Region. Two dam breaches occurred in Alleghany County. There are no reports of death, injury, or property damage with either of these events. The third breach occurred in 2002. The Sharpe Electric Dam in Ashe County was manually released without notification to the proper authorities or landowners downstream. Ashe Country was suffering from a drought at the time and fortunately no damage or injuries occurred.

5.9.4 Probability of Future Occurrence

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1 percent annual probability) in the future. However, as has been demonstrated in the past, regular monitoring is necessary to prevent these events. No further analysis will be completed in Section 6: Vulnerability Assessment as more sophisticated dam breach plans (typically completed by the U.S. Army Corp of Engineers) have been completed for dams of concern in the region.

Inventories of statewide dam inundation data is an area that NCEM-RM is currently working hard to improve. At this time, there is geospatial data in final quality control review for 19 dams in North Carolina and that number is expected to increase significantly over the next several years. Additionally, NCEM is currently working with the USACE to acquire inundation data for 9 dams under the Corps' management. As this data becomes available, detailed assessments can be run to better determine vulnerability to dam failures. The 2025 update of this plan may include a much more robust analysis of dam failure vulnerability at the County level.

5.10 FLOODING

5.10.1 Background and Description

Flooding is the most frequent and costly natural hazard in the United States and is a hazard that has caused more than 10,000 deaths since 1900. Nearly 90 percent of presidential disaster declarations result from natural events where flooding was a major component.

Floods generally result from excessive precipitation and can be classified under two categories: general floods, precipitation over a given river basin for a long period of time along with storm-induced wave action, and flash floods, the product of heavy localized precipitation in a short time period over a given location. The severity of a flooding event is typically determined by a combination of several major factors, including stream and river basin topography and physiography, precipitation and weather patterns, recent soil moisture conditions, and the degree of vegetative clearing and impervious surface.

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal, and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding is typically a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, and other large coastal storms. Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

Most flash flooding is caused by slow-moving thunderstorms in a local area or by heavy rains associated with hurricanes and tropical storms. However, flash flooding events may also occur from a dam or levee failure within minutes or hours of heavy amounts of rainfall or from a sudden release of water held by a retention basin or other stormwater control facility. Although flash flooding occurs most often along mountain streams, it is also common in urbanized areas where much of the ground is covered by impervious surfaces.

The periodic flooding of lands adjacent to rivers, streams, and shorelines (land known as a floodplain) is a natural and inevitable occurrence that can be expected to take place based upon established recurrence intervals. The recurrence interval of a flood is defined as the average time interval, in years, expected between a flood event of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Floodplains are designated by the frequency of the flood that is large enough to cover them. For example, the 10-year floodplain will be covered by the 10-year flood and the 100-year floodplain by the 100-year flood. Flood frequencies, such as the 100-year flood, are determined by plotting a graph of the size of all known floods for an area and determining how often floods of a particular size occur. Another way of expressing the flood frequency is the chance of occurrence in a given year, which is the percentage of the probability of flooding each year. For example, the 100-year flood has a 1 percent chance of occurring in any given year and the 500-year flood has a 0.2 percent chance of occurring in any given year.

5.10.2 Location and Spatial Extent

There are areas in the High-Country Region that are susceptible to flood events. Special flood areas in the High-Country Region were mapped using Geographic Information System (GIS) and FEMA Digital

Flood Insurance Rate Maps (DFIRM)[24]. This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 1,735 square miles that make up the High-Country Region (including the area of Alleghany County, Ashe County, Watauga County, and Wilkes County), there are 55.19 square miles of land in zones A and AE (1-percent annual chance floodplain/100-year floodplain) and 5.02 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The county totals are presented below in **Table 5.26**.

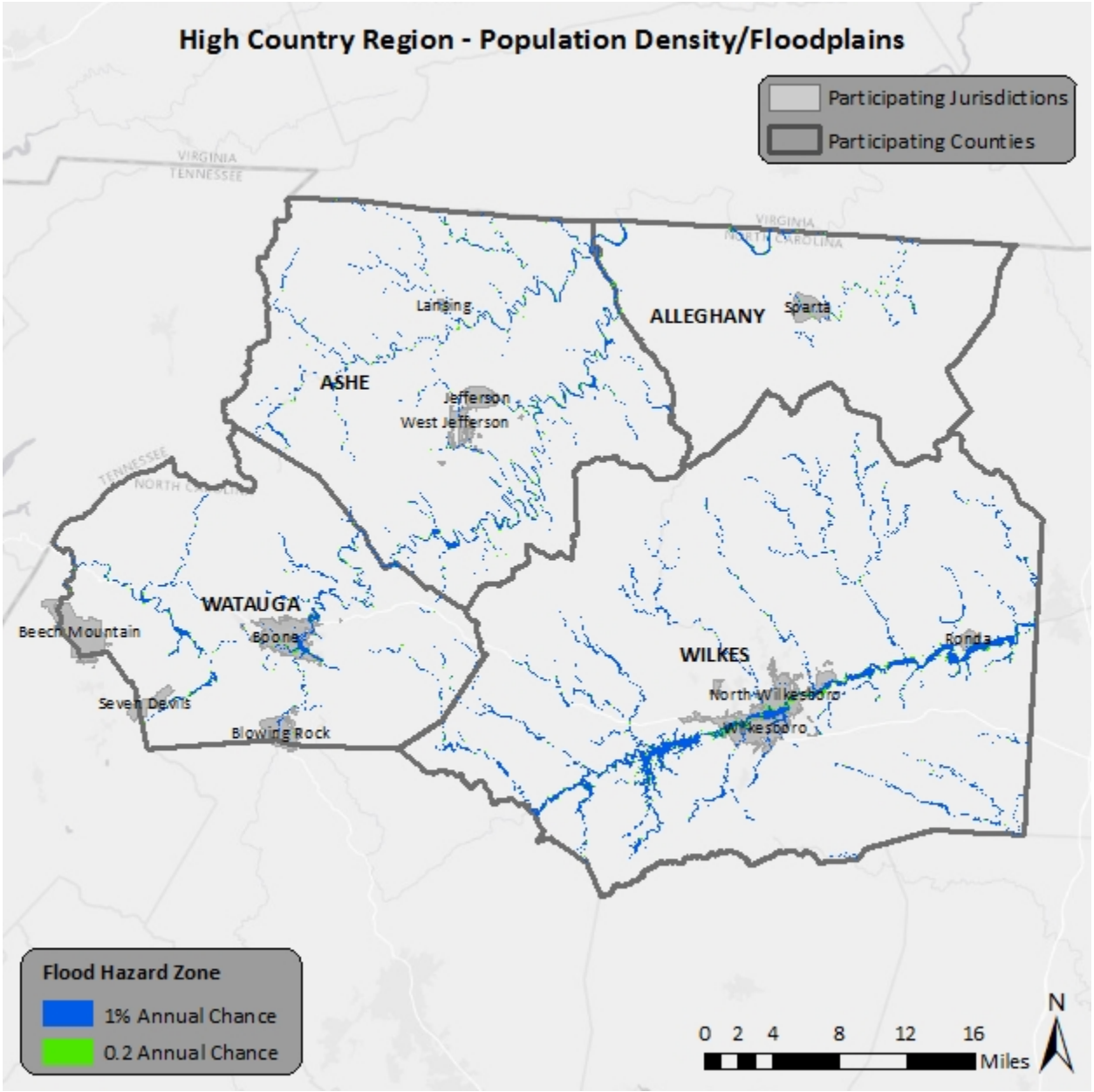
TABLE 5.26: SUMMARY OF FLOODPLAIN AREAS IN THE HIGH-COUNTRY REGION

Location	100-year area (square miles)	500-year area (square miles)
Alleghany County	2.78	0.31
Ashe County	13.93	1.55
Watauga County	7.71	0.86
Wilkes County	30.77	2.3
HIGH COUNTRY REGION TOTAL	**55.19**	**5.02**

These flood zone values account for 3.5 percent of the total land area in the High-Country Region. It is important to note that while FEMA digital flood data is recognized as best available data for planning purposes, it does not always reflect the most accurate and up-to-date flood risk. Flooding and flood-related losses often do occur outside of delineated special flood hazard areas. **Figure 5.16** illustrates the location and extent of currently mapped special flood hazard areas for the High-Country Region based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.

[24] The county-level DFIRM data used for the High-Country Region were updated in 2009 for each of the counties.

FIGURE 5.16: SPECIAL FLOOD HAZARD AREAS IN THE HIGH-COUNTRY REGION



Source: Federal Emergency Management Agency

5.10.3 Historical Occurrences

Information from the National Centers for Environmental Information was used to ascertain historical flood events. The National Centers for Environmental Information reported a total of 271 events throughout the High-Country Region since 1993.[21] A summary of these events is presented in **Table 5.27**. These events accounted for $26.2 million (2020 dollars) in property damage due to flood events throughout the region.[22] Specific information on flood events for each county, including date, type of flooding, and deaths and injuries, can be found in **Appendix H**.

[21] These events are only inclusive of those reported by NCDC. It is likely that additional occurrences have occurred and have

gone unreported.
[22] The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

TABLE 5.27: SUMMARY OF FLOOD OCCURRENCES IN THE HIGH-COUNTRY REGION

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**27**	**0**	**0**	**$636,300**
Sparta	5	0	0	$500,000
Unincorporated Area	22	0	0	$136,300
Ashe County	**71**	**0**	**0**	**$1,311,250**
Jefferson	7	0	0	$52,000
Lansing	4	0	0	$5,000
West Jefferson	6	0	0	$4,000
Unincorporated Area	54	0	0	$1,250,250
Watauga County	**113**	**0**	**0**	**$20,581,000**
Beech Mountain	0	0	0	$0
Blowing Rock	4	0	0	$0
Boone	23	0	0	$2,465,000
Seven Devils	0	0	0	$0
Unincorporated Area	86	0	0	$18,116,000
Wilkes County	**60**	**0**	**0**	**$3,693,000**
North Wilkesboro	1	0	0	$20,000
Ronda	0	0	0	$0
Wilkesboro	2	0	0	$0
Unincorporated Area	57	0	0	$3,673,000
High Country Region Total	**271**	**0**	**0**	**$26,221,550**

Source: National Centers for Environmental Information

5.10.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of August 2019, there have been 367 flood losses reported in the High-Country Region through the National Flood Insurance Program (NFIP) since 1970, totaling over $4.08 million in claims payments. A summary of these figures for each county in the High-Country region is provided in **Table 5.28**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that many additional instances of flood loss in the High-Country Region were either uninsured, denied claims payment, or not reported.

TABLE 5.28: SUMMARY OF INSURED FLOOD LOSSES IN THE HIGH-COUNTRY REGION

Location	Flood Losses	Claims Payments
Alleghany County	**7**	**$52,685**
Sparta	1	$1,255
Unincorporated Area	6	$51,460

Location	Flood Losses	Claims Payments
Ashe County	**92**	**$651,016**
Jefferson	4	$8,618
Lansing	1	$24,194
West Jefferson	14	$198,579
Unincorporated Area	73	$419,625
Watauga County	**252**	**$2,937,385**
Beech Mountain	4	$0
Blowing Rock	11	$198,087
Boone	79	$1,368,894
Seven Devils	0	$0
Unincorporated Area	158	$1,370,404
Wilkes County	**16**	**$444,739**
North Wilkesboro	0	$0
Ronda	0	$0
Wilkesboro	12	$440,550
Unincorporated Area	4	$4,189
HIGH COUNTRY REGION TOTAL	**367**	**$4,085,825**

5.10.5 Repetitive Loss Properties

FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP. Currently there are over 122,000 repetitive loss properties nationwide.

Currently, there are 16 non-mitigated repetitive loss properties located in the High-Country Region, which accounted for 44 losses and more than $978,000 in claims payments under the NFIP. The average claim amount for these properties is $22,245. Eight of the sixteen properties are commercial. Without mitigation, these properties will likely continue to experience flood losses. **Table 5.29** presents detailed information on repetitive loss properties and NFIP claims and policies for the High-Country Region.

TABLE 5.29: SUMMARY OF REPETITIVE LOSS PROPERTIES IN THE HIGH-COUNTRY REGION

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Alleghany County	**1**		**2**	**$42,168**	**$9,292**	**$51,460**	**$25,729**
Sparta	0	--	0	$0	$0	$0	$0
Unincorporated Area	1	residential	2	$42,168	$9,292	$51,460	$25,729
Ashe County	**5**		**10**	**$31,276**	**$45,276**	**$76,552**	**$7,655**
Jefferson	0	--	0	$0	$0	$0	$0
Lansing	0	--	0	$0	$0	$0	$0
West Jefferson	0	--	0	$0	$0	$0	$0
Unincorporated Area	5	4 commercial, 1 residential	10	$31,276	$45,276	$76,552	$7,655
Watauga County	**9**		**27**	**$510,487**	**$267,048**	**$777,535**	**$28,798**
Beech Mountain	0	--	0	$0	$0	$0	$0

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Blowing Rock	0	--	0	$0	$0	$0	$0
Boone	4	commercial	11	$348,914	$109,455	$458,369	$41,670
Seven Devils	0	--	0	$0	$0	$0	$0
Unincorporated Area	5	1 school, 1 church, 1 commercial, 1 multi-family, 1 single family	16	$161,573	$157,593	$319,166	$19,948
Wilkes County	**1**		**5**	**$37,378**	**$36,061**	**$73,440**	**$14,688**
North Wilkesboro	0		0	$0	$0	$0	$0
Ronda	0		0	$0	$0	$0	$0
Wilkesboro	0		0	$0	$0	$0	$0
Unincorporated Area	1	residential	5	$37,378	$36,061	$73,440	$14,688
HIGH COUNTRY REGION TOTAL	**16**		**44**	**$621,309**	**$357,677**	**$978,786**	**$22,245**

Source: National Flood Insurance Program

5.10.6 Probability of Future Occurrences

Flood events will remain a threat in the High-Country Region, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in the figures above, which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2 percent annual chance flood (500-year floodplain).

Other Hazards

5.11 WILDFIRES

5.11.1 Background and Description

A wildfire is any outdoor fire (i.e., grassland, forest, brush land) that is not under control, supervised, or prescribed[25]. Wildfires are part of the natural management of forest ecosystems, but may also be caused by human factors.

Nationally, over 80 percent of forest fires are started by negligent human behavior such as smoking in wooded areas or improperly extinguishing campfires. The second most common use for wildfire is lightning. In North Carolina, a majority of fires are caused by debris burning.

There are three classes of wildland fires: surface fire, ground fire, and crown fire. A surface fire is the most common of these three classes and burns along the floor of a forest, moving slowly and killing or

[25] Prescription burning, or "controlled burn," undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

damaging trees. A ground fire (muck fire) is usually started by lightning or human carelessness and burns on or below the forest floor. Crown fires spread rapidly by wind and move quickly by jumping along the tops of trees. Wildfires are usually signaled by dense smoke that fills the area for miles around.

Wildfire probability depends on local weather conditions, outdoor activities such as camping, debris burning, and construction, and the degree of public cooperation with fire prevention measures. Drought conditions and other natural hazards (such as tornadoes, hurricanes, etc.) increase the probability of wildfires by producing fuel in both urban and rural settings. Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses, and industries are located within high wildfire hazard areas. Furthermore, the increasing demand for outdoor recreation places more people in wildlands during holidays, weekends, and vacation periods. Unfortunately, wildland residents and visitors are rarely educated or prepared for wildfire events that can sweep through the brush and timber and destroy property within minutes.

Wildfires can result in severe economic losses as well. Businesses that depend on timber, such as paper mills and lumber companies, experience losses that are often passed along to consumers through higher prices and sometimes jobs are lost. The high cost of responding to and recovering from wildfires can deplete state resources and increase insurance rates. The economic impact of wildfires can also be felt in the tourism industry if roads and tourist attractions are closed due to health and safety concerns.

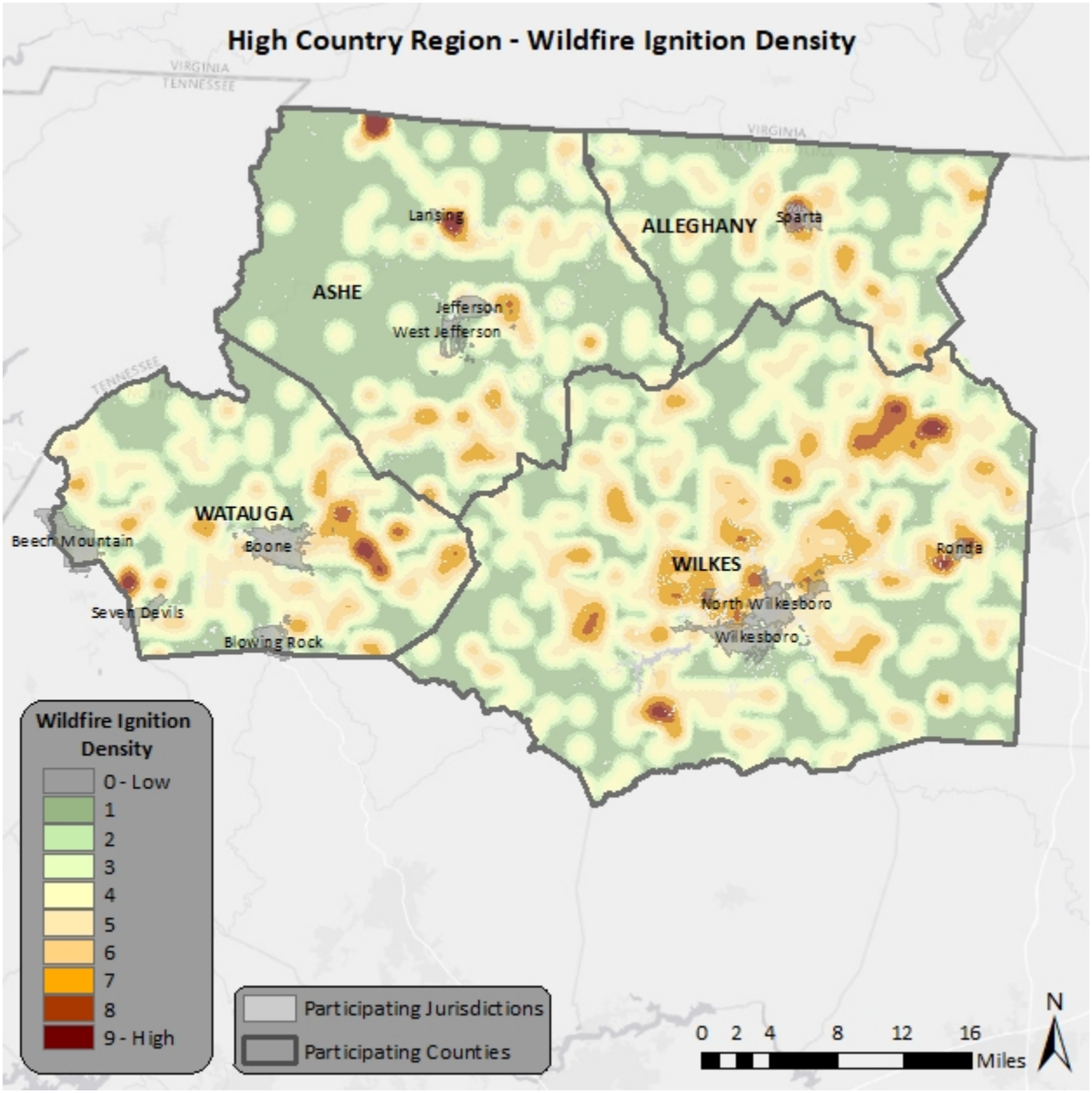
State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks, and fuel management can be designed as part of an overall fire defense system to aid in fire control. Fuel management, prescribed burning, and cooperative land management planning can also be encouraged to reduce fire hazards.

5.11.2 Location and Spatial Extent

The entire region is at risk to a wildfire occurrence. However, several factors such as drought conditions or high levels of fuel on the forest floor, may make a wildfire more likely. Furthermore, areas in the urban-wildland interface is particularly susceptible to fire hazard as populations border formerly undeveloped areas.

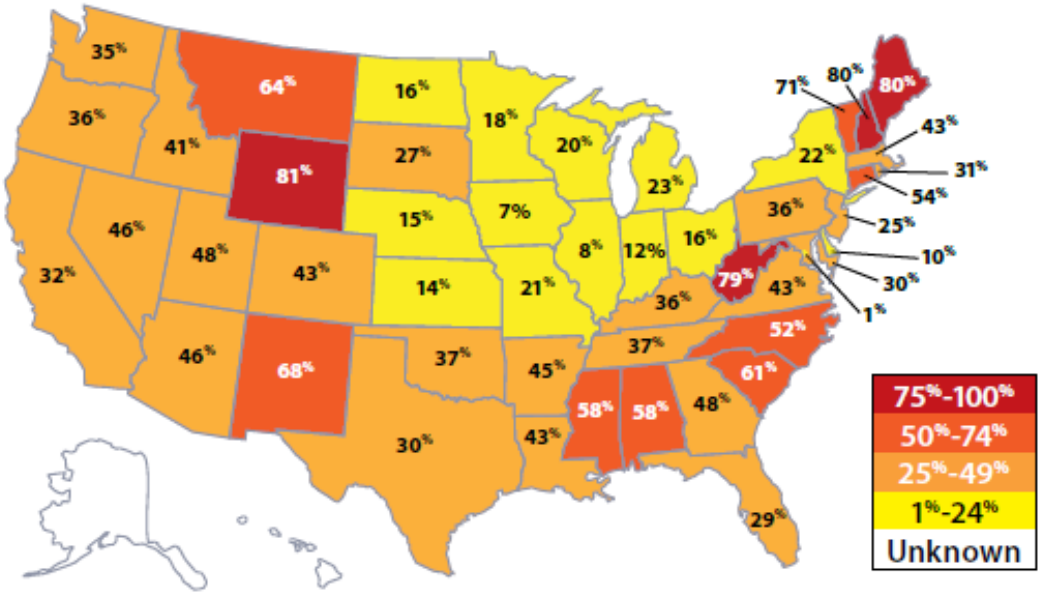
Figures 5.17 shows the Wildfire Ignition Density for each county in the High-Country Region based on data from the Southern Wildfire Risk Assessment. This data represents the likelihood of wildfire igniting in the area, which is derived from historical wildfire occurrences to create an average ignition rate map.

FIGURE 5.17: WILDFIRE IGNITION DENSITY IN THE HIGH COUNTRY REGION



Every state also has a Wildland Urban Interface (WUI), which is the rating of potential impact of wildfires on people and their homes. The WUI is not a fixed geographical location, but rather a combination of human development and vegetation where wildfires have the greatest potential to result in negative impacts. Nationally, one-third of all homes lie in the WUI, which is a growing danger. Below, **Figure 5.18** shows a map of each state's WUI. Based on the data from the US Department of Agriculture, 52% of homes in North Carolina lie within the WUI.

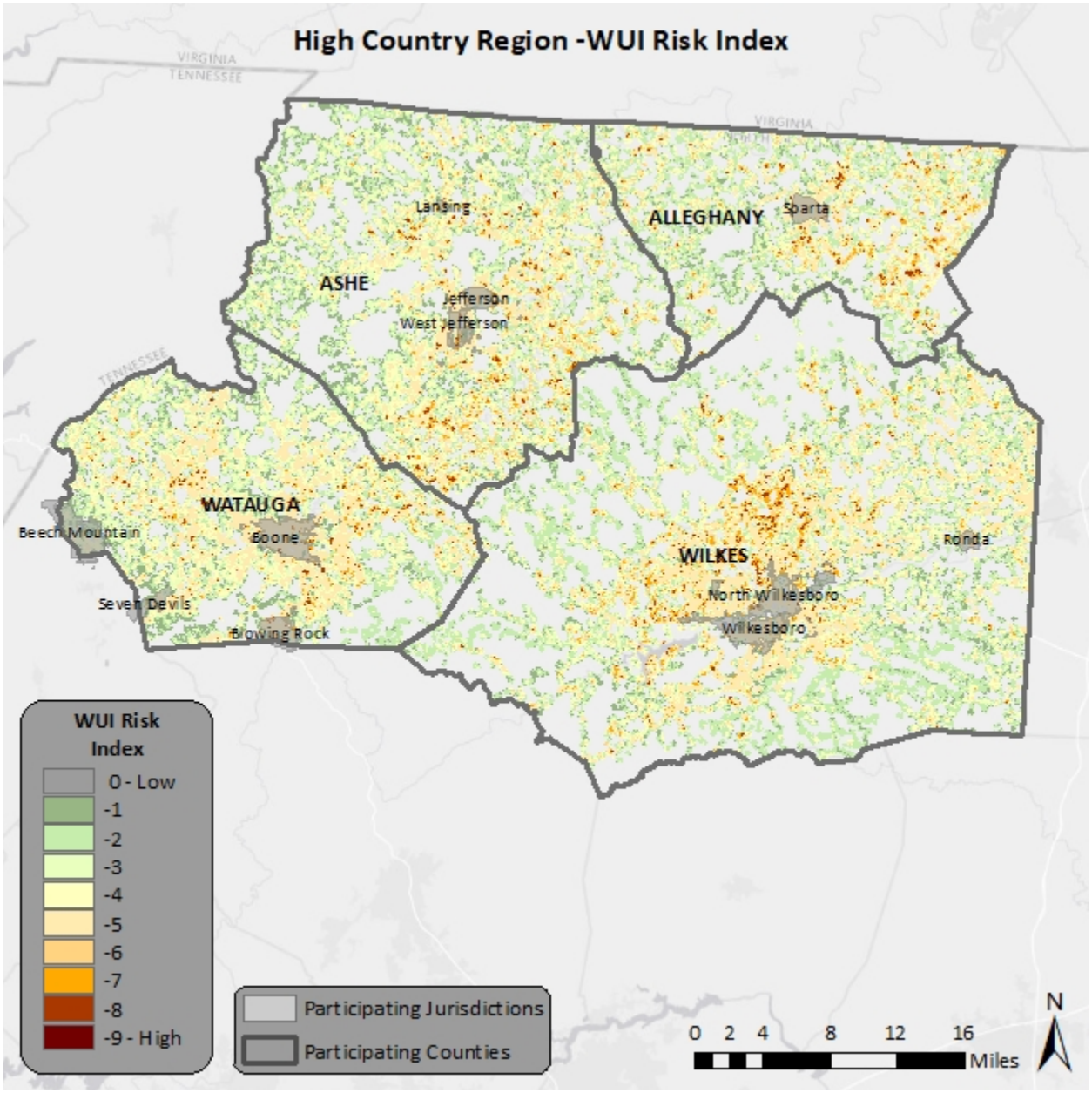
FIGURE 5.18: PERCENT OF TOTAL HOMES IN THE WILDLAND URBAN INTERFACE



Source: US Department of Agriculture

Below, **Figure 5.19** display the WUI Risk Index for the counties in the High-Country Region.

FIGURE 5.19: HIGH-COUNTRY REGION WUI RISK INDEX



Source: Southern Wildfire Risk Assessment

5.11.3 Historical Occurrences

Information from the National Association of State Foresters was used to ascertain historical wildfire events. The National Association of State Foresters reported that a total of 1,040 events that burned a total of 7,313 acres that impacted an area greater than 1 acre have occurred throughout the High-Country Region since 2001[26]. The High-Country region experiences an average of 24 wildfires annually which burned a combined 87 acres. A summary of these events is presented in **Table 5.30**. **Figure 5.20** below shows wildfire occurrences in the High-Country region. The largest of these events was the

[26] These events are only inclusive of those reported by NASFI. It is likely that additional occurrences have occurred and have gone unreported.

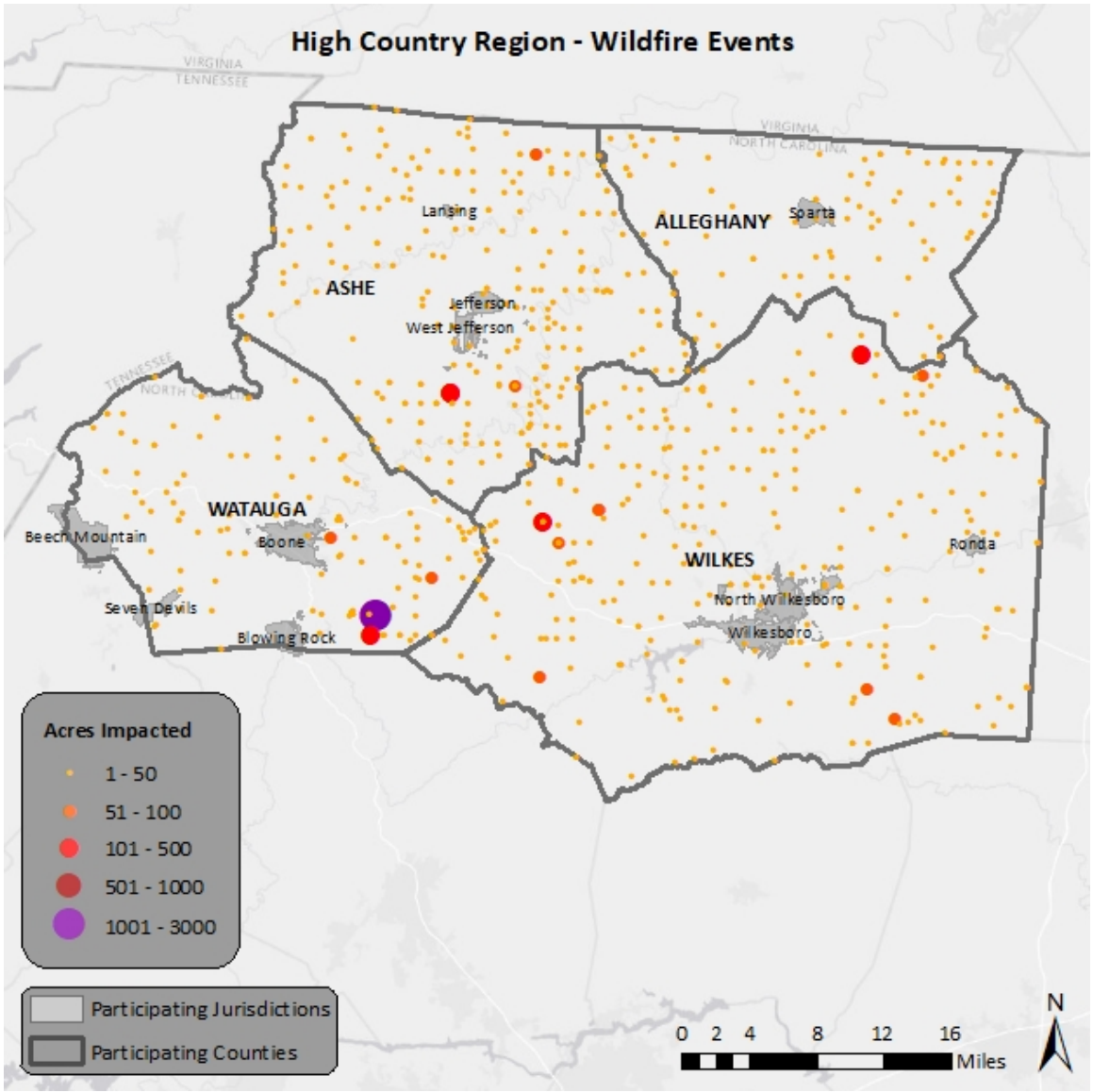
Pinnacle Road Fire which occurred in Aho, NC in Watauga County in 2016 and impacted 1,379 acres.

TABLE 5.30: SUMMARY OF WILDFIRE INCIDENTS (2001-2018)

Location	Number of Wildfires	Total Acres Burned
Alleghany County	126	449
Ashe County	308	1515
Watauga County	175	2528
Wilkes County	431	2821
High Country Region Total	**1040**	**7313**

Source: NASF

FIGURE 5.20: WILDFIRE INCIDENTS IN THE HIGH-COUNTRY REGION



Source: Southern Wildfire Risk Assessment

5.11.4 Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in the High-Country Region. The likelihood of a wildfire increases during drought cycles and abnormally dry conditions. Fires are likely to stay small in size but could increase due local climate and ground conditions. Dry, windy conditions with an accumulation of forest floor fuel (potentially due to ice storms or lack of fire) could create conditions for a large fire that spreads quickly. It should also be noted that some areas do vary somewhat in risk. For example, highly developed areas are less susceptible unless they are located near the wildland urban index boundary. The risk will also vary due to assets. Areas in the wildland urban interface will have much more property at risk, resulting in increased vulnerability and need to mitigate compared to rural, mainly forested areas. The probability assigned to the High-Country Region for future wildfire events is likely (10 to 100 percent annual probability).

5.12 INFECTIOUS DISEASE

For the purposes of this plan, this section will assess infectious diseases and vector-borne diseases within the High-Country region.

5.12.1 Background and Description

Infectious Disease

Communicable, or infectious, diseases are conditions that result in clinically evident illness which are transmissible directly from one person to another or indirectly through vectors such as insects, air, water, blood, or other objects. The impact of communicable disease can range from the mild effects of the common cold to the extreme lethality of pneumonic plague or anthrax. The public health system in the United States was developed in large part as a response to the often urgent need to respond to or prevent outbreaks of communicable diseases. Through public health methods of disease reporting, vaccinations, vector control, and effective treatments, most communicable diseases are well controlled in the United States and across the High-Country region. However, control systems can fail and when people come together from locations outside of the state, outbreaks can occur, even in the most modern of communities. In this section, some of the more significant potential communicable disease concerns are described.

The threats discussed in this section usually do not occur on a regular basis, though some are more frequent. The diseases described herein do not originate from intentional exposure (such as through terrorist actions) but do present significant issues and concerns for the public health community. There are numerous infectious diseases that rarely, if ever, occur in the State of North Carolina, such as botulism or bubonic plague. Some highly dangerous diseases which could potentially be used as biological weapons, such as anthrax, pneumonic plague, and smallpox, are safely housed and controlled in laboratory settings such as at the Center for Disease Control and Prevention (CDC). Other diseases have not (yet) mutated into a form that can infect humans, or otherwise lie dormant in nature.

There have been several significant viral outbreaks from emerging diseases in recent years of both national and international importance. The Zika virus and West Nile virus are viruses that are typically passed to humans or animals by mosquitoes and made major news as emergent disease threats. Meanwhile, diseases that are spread directly between human beings such as Severe Acute Respiratory Syndrome (SARS) and Ebola have also been identified as serious threats. While each of these conditions caused a great deal of public health concern when they were first identified, SARS has virtually disappeared, West Nile virus occurs with low frequency and causes serious disease in only a very small percentage of cases, Ebola has been more or less contained and a vaccine is in development, and many

people infected with Zika will not experience symptoms from the disease.

Other communicable diseases pose a much more frequent threat to the citizens of in the region. Some of the infectious diseases of greatest concern include influenza, particularly in a pandemic form, as well as norovirus, and multiple antibiotic-resistant tuberculosis. Even in one of its normal year-to-year variants, influenza (commonly referred to as “flu”) can result in serious illness and even death in young children, the elderly and immune-compromised persons. But there is always the potential risk of the emergence of influenza in one of the pandemics H1N1 forms, such as in the “Spanish Flu” outbreak of 1918-19, which killed over 50 million people worldwide. Every year, North Carolina sees hundreds of cases of influenza, leading to hundreds of hours of lost productivity in businesses due to sick employees.

Of note, a vaccine for influenza is produced every year and, according to the CDC, is highly effective in preventing the disease.

Norovirus is recognized as the leading cause of foodborne-disease outbreaks in the United States. The virus can cause diarrhea, vomiting, and stomach pain, and is easily spread from person to person through contaminated food or water and by surface-to-surface contact. Especially vulnerable populations to this virus include those living or staying in nursing homes and assisted living facilities and other healthcare facilities such as hospitals. Norovirus could also be a threat in the event of large public gatherings such as sporting events, concerts, festivals, and so forth. North Carolina often experiences norovirus outbreaks on an annual basis. No vaccine or treatment exists for the Norovirus, making it especially dangerous for the public in the event of an outbreak.

Public health threats can occur at any time and can have varying impacts. Discussions between public health professionals, planning officials, and first response agencies are essential in order to facilitate safe, effective, and collaborative efforts toward outbreaks.

Vector-Borne Diseases
Bacterial, viral and parasitic diseases that are transmitted by mosquitoes, ticks and fleas are collectively called "vector-borne diseases" (the insects and arthropods are the "vectors" that carry the diseases). Although the term "vector" can also apply to other carriers of disease — such as mammals that can transmit rabies or rodents that can transmit hantavirus — those diseases are generally called zoonotic (animal-borne) diseases.

The most common vector-borne diseases found in North Carolina and the High-Country region are carried by ticks and mosquitoes. The tick-borne illnesses most often seen in the state are Rocky Mountain Spotted Fever, ehrlichiosis, Lyme disease and Southern Tick-Associated Rash Illness (STARI). The most frequent mosquito-borne illnesses, or "arboviruses," in North Carolina include La Crosse encephalitis, West Nile virus and Eastern equine encephalitis. An outbreak of the West Nile Virus began showing up in the United States in 1999, with North Carolina reporting 63 cases from that time through the end of 2016.

5.12.2 Location and Spatial Extent

Extent is difficult to measure for an infectious disease event as the extent is largely dependent on the type of disease and on the effect that it has on the population (discussed above). Extent can be somewhat defined by the number of people impacted, which depending on the type of disease could number in the tens of thousands within the state.

5.12.3 Historical Occurrences

Infectious Disease

Information from the North Carolina Department of Health and Human services was used to monitor and track cases of the infectious disease COVID-19. A COVID – 19 Pandemic disaster declaration was declared for North Carolina on March 24, 2020. **Table 5.31** provides a summary of confirmed cases of COVID–19 in the High-Country Region (data current as of 1/8/22).

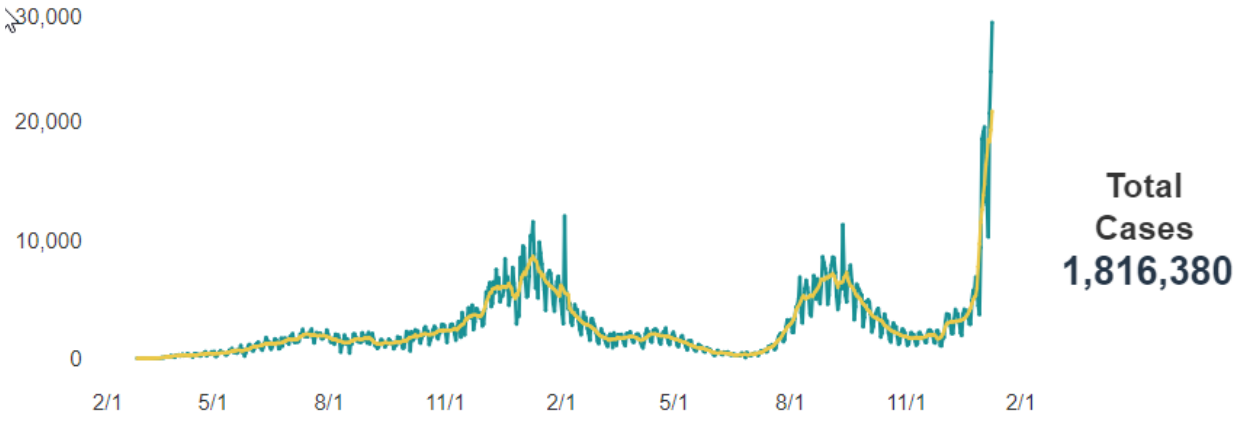
TABLE 5.31: SUMMARY OF CONFIRMED COVID-19 CASES IN THE HIGH-COUNTRY REGION

Location	Number of Cases	Number of Deaths*
Alleghany County	2,162	10
Ashe County	4,290	58
Watauga County	7,977	205
Wilkes County	12,715	44
High Country Region Total	**27,144**	**317**

Source: North Carolina Department of Health and Human Services
**Deaths reflect deaths in persons with laboratory-confirmed COVID-19 reported by local health departments to the NC Department of Health and Human Services*

As of January 8. 2022, NC DHHS reported there were 1,816,380 cases of COVID-19 in North Carolina[27]. These cases reflect cases that were tested and returned positive, including the NC State Laboratory of Public Health and reporting hospital and commercial labs. **Figure 5.21** below provides overview of the total number of COVID-19 cases by date of specimen collection for North Carolina.

FIGURE 5.22: CUMULATIVE TOTAL NUMBER OF COVID-19 CASES BY DATE OF SPECIMENT COLLECTION*



Source: North Carolina Department of Health and Human Services
**All data are preliminary and might change as cases are investigated. Numbers may not sum to 100% due to rounding*

[27] https://www.ncdhhs.gov/covid-19-case-count-nc#by-counties

Vector-Borne Diseases
In 2016, North Carolina state health officials encouraged citizens to take preventative measures against mosquito bites to avoid contracting the Zika virus. $477,500 dollars was allocated from the Governor's yearly budget to develop an infrastructure to detect, prevent, control, and respond to the Zika virus and other vector-borne illnesses[28].

5.12.4 Probability of Future Occurrences
It is difficult to predict the future probability of infectious diseases due to the difficulty with obtaining information on this type of hazard. The most common and probable disease in the state has shown to be influenza; however, based on historical data, it is certainly possible that the High Country region will experience additional outbreaks of infectious diseases in the future.

TECHNOLOGICAL HAZARDS

5.13 Hazardous Substances
5.13.1 Background and Description
Hazardous materials can be found in many forms and quantities that can potentially cause death; serious injury; long-lasting health effects; and damage to buildings, homes, and other property in varying degrees. Such materials are routinely used and stored in many homes and businesses and are also shipped daily on the nation's highways, railroads, waterways, and pipelines. This subsection on the hazardous material hazard is intended to provide a general overview of the hazard, and the threshold for identifying fixed and mobile sources of hazardous materials is limited to general information on rail, highway, and FEMA-identified fixed HAZMAT sites determined to be of greatest significance as appropriate for the purposes of this plan.

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways, and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents, and 266 are due to other causes[29]. In essence, HAZMAT incidents consist of solid, liquid, and/or gaseous contaminants that are released from fixed or mobile containers, whether by accident or by design as with an intentional terrorist attack. A HAZMAT incident can last hours to days, while some chemicals can be corrosive or otherwise damaging over longer periods of time. In addition to the primary release, explosions and/or fires can result from a release, and contaminants can be extended beyond the initial area by persons, vehicles, water, wind, and possibly wildlife as well.

HAZMAT incidents can also occur as a result of or in tandem with natural hazard events, such as floods, hurricanes, tornadoes, and earthquakes, which in addition to causing incidents can also hinder response efforts. In the case of Hurricane Floyd in September 1999, communities along the Eastern United States were faced with flooded junkyards, disturbed cemeteries, deceased livestock, floating propane tanks,

[28] https://www.ncdhhs.gov/news/press-releases/nc-prepared-zika-virus-risk-local-virus-carrying-mosquitoes-low
[29] FEMA, 1997.

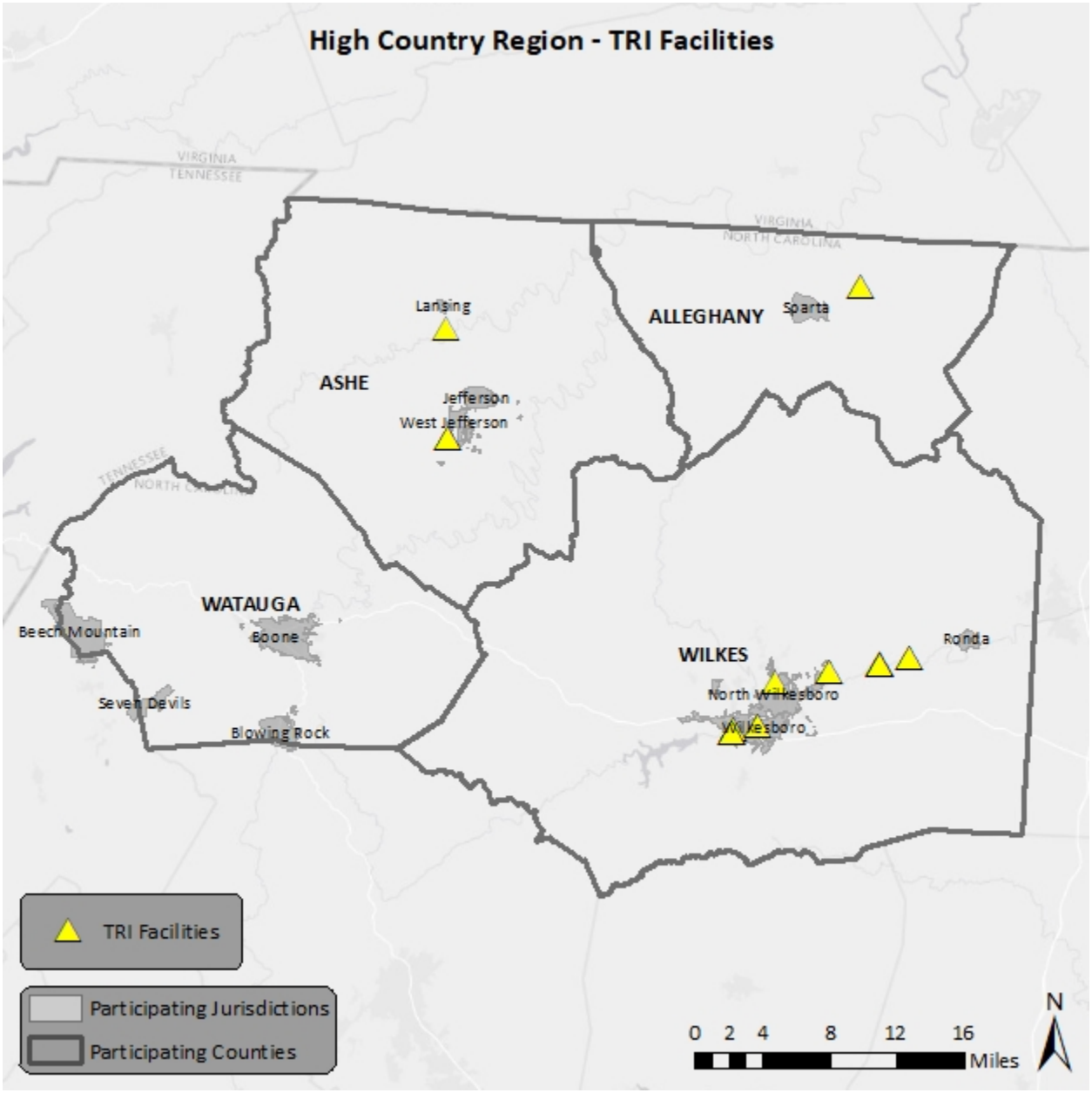
uncontrolled fertilizer spills, and a variety of other environmental pollutants that caused widespread toxological concern.

Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace with respect to claims which such persons may assert against the employer of such persons; (2) emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel or pipeline pumping station engine; (3) release of source, byproduct, or special nuclear material from a nuclear incident; and (4) the normal application of fertilizer.

5.13.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency provides public information on hazardous materials. One facet of this program is to collection information from industrial facilities on the releases and transfers of certain toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites indicate where such activity is occurring. The High-Country Region has eight TRI sites. These sites are shown in **Figure 5.23.**

FIGURE 5.23: TOXIC RELEASE INVENTORY (TRI) SITES IN THE HIGH-COUNTRY REGION



Source: EPA

In additional to "fixed" hazardous materials locations, hazardous materials may also impact the region via roadways and rail. Many roads in the region are narrow and winding, making hazardous material transport in the area especially treacherous. All roads that permit hazardous material transport are considered potentially at risk to an incident.

5.13.3 Historical Occurrences

The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) lists historical occurrences throughout the nation. A "serious incident" (highlighted in **Table**

5.32 below) is a hazardous materials incident that involves:

- a fatality or major injury caused by the release of a hazardous material,
- the evacuation of 25 or more persons as a result of release of a hazardous material or exposure to fire,
- a release or exposure to fire which results in the closure of a major transportation artery,
- the alteration of an aircraft flight plan or operation,
- the release of radioactive materials from Type B packaging,
- the release of over 11.9 galls or 88.2 pounds of a severe marine pollutant, or
- the release of a bulk quantity (over 199 gallons or 882 pounds) of a hazardous material.

However, prior to 2002, a hazardous material "serious incident" was defined as follows:

- a fatality or major injury due to a hazardous material,
- closure of a major transportation artery or facility or evacuation of six or more person due to the presence of hazardous material, or
- a vehicle accident or derailment resulting in the release of a hazardous material.

Table 5.32 presents detailed information on historic HAZMAT incidents reported in the High-Country Region.

TABLE 5.32: SUMMARY OF HAZMAT INCIDENTS IN THE HIGH-COUNTRY REGION

Location	Incidents Reported	Injuries	Fatalities	Type	Costs
Alleghany County	**1**	**0**	**0**	**Highway**	**$62,600**
Sparta	0	0	0	n/a	$0
Unincorporated Area	1	0	0	Highway	$62,600
Ashe County	**6**	**0**	**0**	**Highway**	**$585,539**
Jefferson	1	0	0	Highway	$0
Lansing	0	0	0	n/a	$0
West Jefferson	3	0	0	Highway	$22,042
Unincorporated Area	2	0	0	Highway	$563,497
Watauga County	**17**	**0**	**0**	**Highway**	**$65,945**
Beech Mountain	0	0	0	n/a	$0
Blowing Rock	0	0	0	n/a	$0
Boone	13	0	0	Highway	$50,515
Seven Devils	0	0	0	n/a	$0
Unincorporated Area	4	0	0	Highway	$15,430
Wilkes County	**15**	**0**	**0**	**Highway**	**$20,342**
North Wilkesboro	6	0	0	Highway	$19,392
Ronda	0	0	0	n/a	$0
Wilkesboro	7	0	0	Highway	$100
Unincorporated Area	2	0	0	Highway	$850
High Country Region Total	**39**	**0**	**0**		**$734,426**

Source: USDOT PHMSA

5.13.4 Probability of Future Occurrence

Given the location of eight toxic release inventory sites in the High-Country Region and several serious roadway incidents, it is possible that a hazardous material incident may occur in the region, though it is unlikely (less than one percent annual probability). County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring. Furthermore, there are detailed plans in place to respond to an occurrence.

5.14 Terrorism

5.14.1 Background and Description

Terrorism was not referenced in the previous High-Country Regional Hazard Mitigation Plan, but is addressed in this update. For the purpose of this report, terrorism encompasses explosive, chemical biological, nuclear, and other threats.

Terrorism is defined in the United States by the Code of Federal Regulations is "the unlawful use of force or violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof, in furtherance of political or social objectives." Terrorist acts may include assassinations, kidnappings, hijackings, bombings, small arms attacks, vehicle ramming attacks, edged weapon attacks, incendiary attacks, cyber-attacks (computer based), and the use of chemical, biological, nuclear and radiological weapons. For the purposes of this plan, cyber-attacks are included as a separate hazard.

Historically the main categories of weapons of mass destruction (WMDs) used in terror attacks are Chemical, Biological, Radiological, Nuclear, and Explosive (collectively referred to as CBRNE). As we rank these categories, considering immediate danger posed, impact, probability, technical feasibility, frequency, and historical success, they are typically ranked in the following way.

Explosive

Explosive attacks lead all others due to their immediate danger to life and health, immediate and measurable impact, high probability, low cost/easy degree of technical feasibility, and a long history of successful attacks.

Chemical

Chemical attacks can pose immediate danger to life and health depending upon the materials used. Chemicals are easy to access, low cost, and easy to deploy. Chemical terrorism can have high and persistent impacts to people and places. These types of attacks are probable and have enjoyed historical success.

Radiological

Radiological attacks can pose significant threats to life and health depending upon the specific materials used. Radiological materials while restricted and regulated are accessible to people with some knowledge in this discipline. While radiological incidents have occurred, they occur less frequently than explosive and chemical attacks.

Biological

Biological attacks can pose significant threats to life and health. They are typically deployed as diseases and bio-toxins. They require some degree of technical expertise in order to be deployed successfully. While biological incidents have occurred, they occur less frequently than explosive and chemical

attacks.

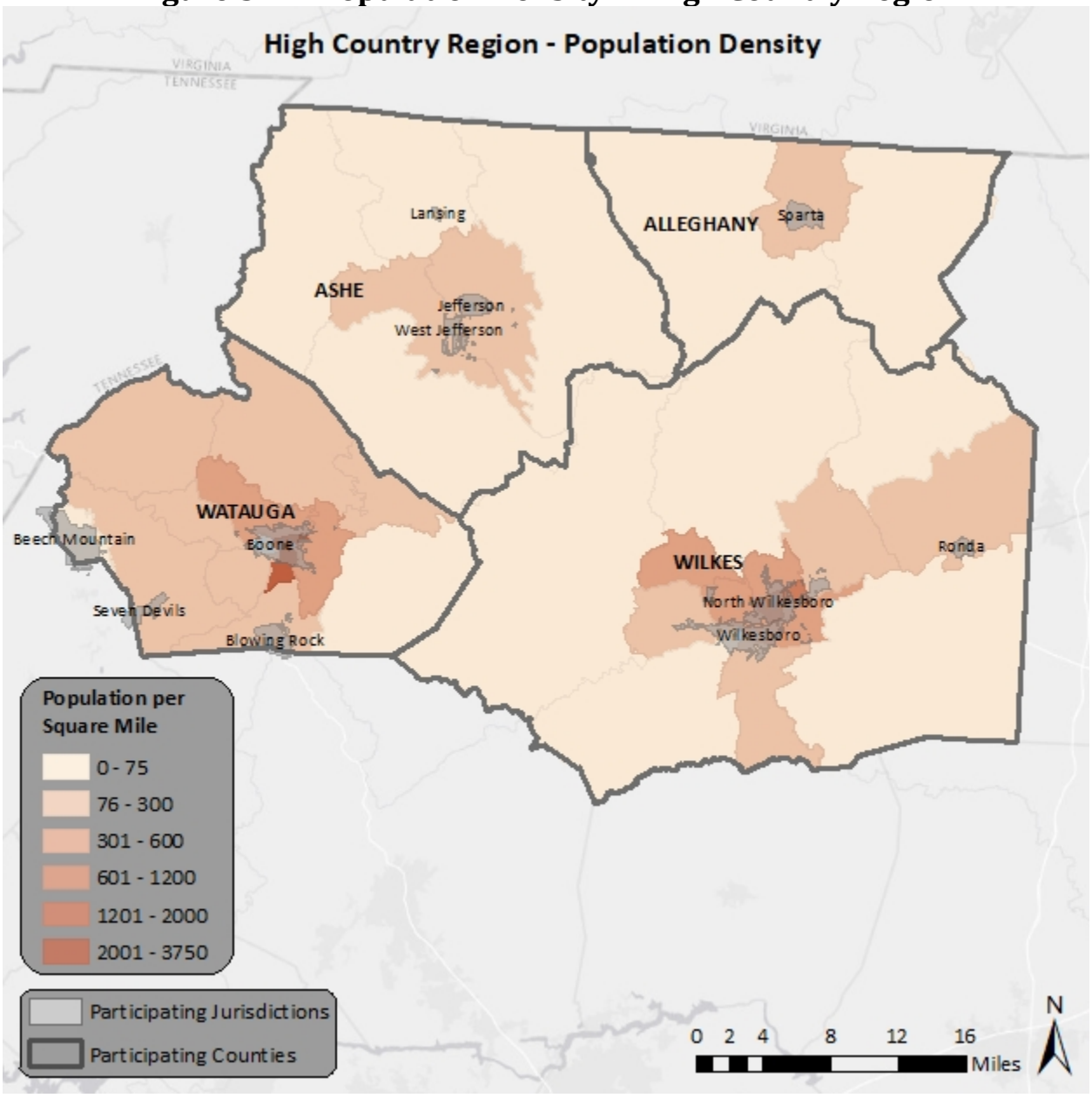
Nuclear
While yielding a very high impact, the nuclear attack is extremely rare due to the fact that it is cost prohibitive and very technically difficult to achieve. This type of attack, however, could be state sponsored which makes it viable.

OTHER
Terrorism Hazard Assessment must also account for modern trends and changes. An additional "OTHER" category should be considered that includes small arms attacks, vehicle ramming attacks, edged weapon attacks, and incendiary attacks.

5.14.2 Location and Spatial Extent

All parts of North Carolina are vulnerable to a terror event; however, terrorism tends to target more densely populated areas. The map in **Figure 5.24** displays the population density in each county in the High-Country Region using census tract levels.

Figure 5.24: Population Density in High Country Region



Source: US Census Bureau

Furthermore, the most recent population counts of each participating county and jurisdictions can be seen in **Table 5.33** below.

Table 5.33: 2018 Population Estimates

Location	2018 Population Estimate
Alleghany County	**11,137**
Sparta	1,770
Unincorporated Area	9,367
Ashe County	**27,203**
Jefferson	1,611
Lansing	158
West Jefferson	1,299
Unincorporated Area	24,135
Watauga County	**55,945**
Beech Mountain	320
Blowing Rock	1,241
Boone	17,122
Seven Devils	192
Unincorporated Area	37,070
Wilkes County	**68,557**
North Wilkesboro	4,245
Ronda	417
Wilkesboro	3,413
Unincorporated Area	60,482
High Country Region Total	**162,842**

Source: US Census Bureau, NC Office of Budget and Management

5.14.3 Historical Occurrences

No extreme cases of terror attacks have previously affected the High-Country region. However, as the population in the area continues to increase, so does the chance of an attack.

5.14.4 Probability of Future Occurrences

The High-Country region has experienced no major terrorist attacks, but the area's population is continuing to rise. The probability of future occurrences of a terrorist attack, while unlikely (between 1 and 10 percent annual probability) is a real possibility that the area must be prepared for.

5.15 Cyber

5.15.1 Background and Description

Cyberattacks are deliberate attacks on information technology systems in an attempt to gain illegal access to a computer, or purposely cause damage. As the world and the High-Country region become more technologically advanced and dependent upon computer systems, the threat of cyberattacks is becoming increasingly prevalent. Also known as computer network attacks, cyberattacks are difficult to recognize and typically use malicious code to alter computer data or steal information.

Mitigating and preparing for cyberattacks is challenging because of how diverse and complex attacks can

be. The FBI is the lead federal agency for investigating cyberattacks by criminals, overseas adversaries, and terrorists. In North Carolina, the Department of Information Technology is the lead agency that maintains Cybersecurity and Risk Management resources.

Cyberattacks can happen in both the public and private sector. They may be carried out by a specific individual, or by groups from afar. Many attacks attempt to steal money or to disturb normal operations. According to the 2017 Verizon Report of Data Breaching, 93% of all data breaches had a financial or espionage motive, and espionage cases are rising.

There are many types of cyberattack incident patterns, which include:

- Web App Attacks: Incidents in which web applications were attacked, which can include exploiting code-level vulnerabilities in the application.
- Point-of-Sale Intrusions: Remote attacks against environments where card-present retail transactions are conducted.
- Insider and Privilege Misuse: Unapproved or malicious use of organizational resources.
- Miscellaneous Errors: Incidents in which unintentional actions directly compromise an attribute of a security asset.
- Physical Theft and Loss: Incidents where an information asset went missing.
- Crimeware: Instances involving malware that do not fit into a more specific pattern.
- Payment Card Skimmers: Incidents involving skimming devices physically implanted on an asset that reads magnetic stripe data from payment cards.
- Cyber-espionage: Unauthorized network or system access linked to state-affiliated actors.
- Denial-of-Service Attacks: Any attack intended to compromise the availability of networks and systems that are designed to overwhelm systems, resulting in performance degradation or interruption of service.

Figure 5.25 below displays nationwide cyberattack incident patterns from the 2018 Verizon Data Breach Investigations Report.

FIGURE 5.25: PERCENTAGE AND COUNTS OF INCIDENTS PER PATTERN

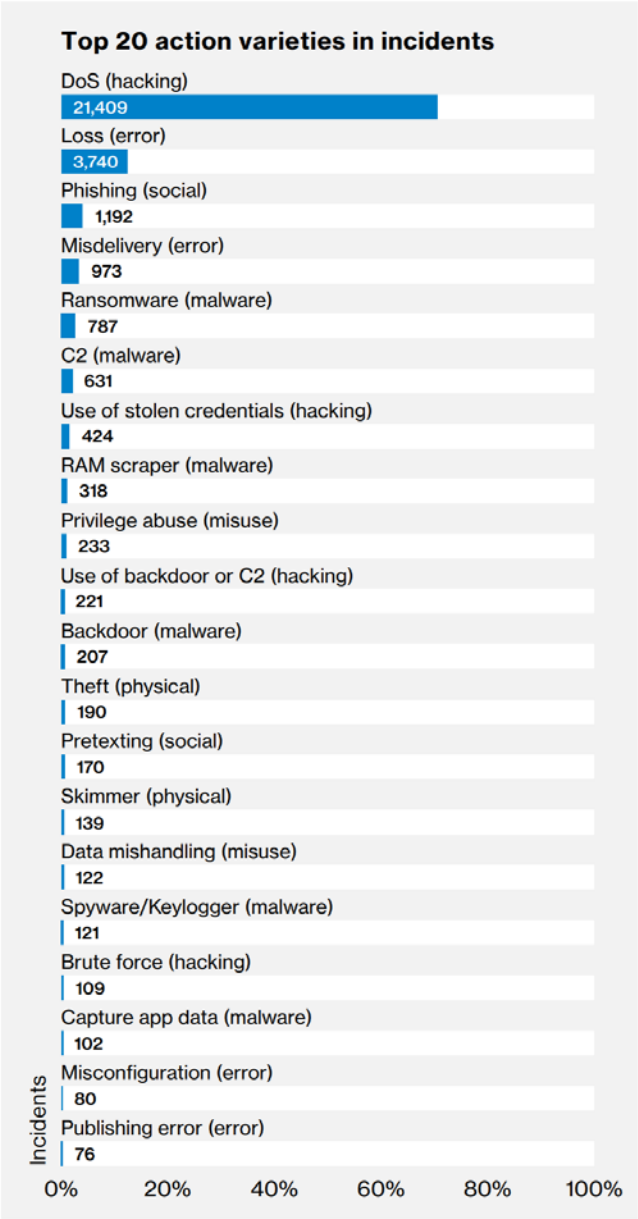


Figure 4. Top 20 threat action varieties (incidents) (n=30,362)

Source: 2018 Verizon Data Breach Investigations Report

5.15.2 Location and Spatial Extent

Cyberattacks happen all over the world and are not restricted to a certain locational boundary. They tend to affect the public industry rather than private industries.

5.15.3 Historical Occurrences

In North Carolina, the Department of Information Technology specializes in cybersecurity and risk management. Within the department, the NC Information Sharing and Analysis Center gathers information on cyber threats within the State raise cybersecurity.

In 2016, North Carolina reported the highest number of cybercrimes in the "non-payment/non-delivery" sector, which can be seen in **Table 5.34** below.

TABLE 5.34: NORTH CAROLINA CYBERCRIMES AND VICTIM COUNTS IN 2016

Crime Type by Victim Count			
Crime Type	*Victim Count*	*Crime Type*	*Victim Count*
419/Overpayment	614	Health Care Related	10
Advanced Fee	384	IPR/Copyright and Counterfeit	58
Auction	442	Identity Theft	345
BEC/EAC	254	Investment	28
Charity	10	Lottery/Sweepstakes	119
Civil Matter	28	Malware/Scareware	62
Confidence Fraud/Romance	326	Misrepresentation	102
Corporate Data Breach	74	No Lead Value	121
Credit Card Fraud	274	Non-payment/Non-Delivery	1,844
Crimes Against Children	19	Other	218
Criminal Forums	0	Personal Data Breach	569
Denial of Service	28	Phishing/Vishing/Smishing/Pharming	399
Employment	467	Ransomware	67
Extortion	468	Re-shipping	25
Gambling	1	Real Estate/Rental	280
Government Impersonation	319	Tech Support	298
Hacktivist	2	Terrorism	6
Harassment/Threats of Violence	364	Virus	29
Descriptors*			
Social Media	455	Virtual Currency	38

Source: FBI Internet Crime Complaint Center, 2016

5.15.4 Probability of Future Occurrences

As the world's dependency on technology grows, the possibility of experiencing cyberattacks rises as well. There have not been severe past occurrences in the region, and it is considered unlikely (less than 1 percent annual probability) to experience one in the near future.

5.16 Electromagnetic Pulse

5.16.1 Background and Description

The United States Department of Energy defines electromagnetic pulses (EMPs) as "intense pulses of electromagnetic energy resulting from solar-caused effects or man-made nuclear and pulse power devices." EMPs can be naturally occurring or human-caused hazards. Examples of natural EMP events include:

- Lightning electromagnetic pulse
- Electrostatic discharge
- Meteoric electromagnetic pulse, and
- Coronal mass ejection, also known as a solar electromagnetic pulse.

A human-caused EMP (such as a nuclear EMP) is a technological hazard that can cause severe damage to electrical components attached to power lines or communication systems. One of the most complex aspects of EMPs is the fact they are invisible, unpredictable, and rapid. They can also overload electronic devices that people heavily rely on every day. EMPs are harmless to people biologically; however, an EMP attack could damage electronic systems such as planes or cars. This could cause destruction of property and life and potentially generate disease or societal collapse.

In 2015, Congress amended the Homeland Security Act of 2002 by passing the Critical Infrastructure Protection Act (CIPA), which protects Americans from an EMP. It also required reporting of EMP threats, research and development, and a campaign to educate planners and emergency responders about EMP events.

5.16.2 Location and Spatial Extent

An EMP can happen in any location, and they are relatively unpredictable. Due to advancing technologies, densely populated may be more prone to damages from an EMP. Therefore, bigger cities in the High-Country region may be more susceptible.

5.16.3 Historical Occurrences

There have been no reports of EMP occurrences in the High-Country region.

5.16.4 Probability of Future Occurrences

The probability of an EMP is unlikely (less than 1 percent annual probability), but an occurrence could have catastrophic impacts.

5.17 CONCLUSIONS ON HAZARD RISK

The hazard profiles presented in this section were developed using best available data and result in what may be considered principally a qualitative assessment as recommended by FEMA in its "How-to" guidance document titled Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA Publication 386-2). It relies heavily on historical and anecdotal data, stakeholder input, and professional and experienced judgment regarding observed and/or anticipated hazard impacts. It also carefully considers the findings in other relevant plans, studies, and technical reports.

5.17.1 Hazard Extent

Table 5.35 describes the extent of each natural hazard identified for the High-Country Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

TABLE 5.35: EXTENT OF HIGH-COUNTRY REGION HAZARDS

Natural Hazards	
Drought	Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (Table 5.4). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional which has occurred in the region. The High-Country region experienced drought conditions for 18 of the last 20 years (2000 - 2019).
Hurricane and Tropical Storm Hazards	Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.6). Only one hurricane has traversed directly through the region. The greatest classification to directly impact the region was Hurricane Hugo in 1989 which reached a maximum wind speed of ~85 knots.
Tornadoes / Thunderstorms	Tornadoes: Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.6) as well as the Fujita/Enhanced Scale (Tables 5.9 and 5.10). The greatest magnitude reported as an F1, which occurred on several occasions in the region. *Alleghany County*: F1 *Ashe County*: EF0 *Watauga County*: F1 *Wilkes County*: F1 Thunderstorms: Thunderstorm extent is defined by the number of thunder events and wind speed reported. According to a 63-year history from the National Centers for Environmental Information, the strongest recorded wind speed event in the High-Country region was reported on April 10, 2003 at 87 knots (approximately 100 mph). It should be noted that future events may exceed these historical occurrences. *Alleghany County*: 71 knots *Ashe County*: 87 knots *Watauga County*: 77 knots *Wilkes County*: 65 knots Lightning: According to the Vaisala flash density map (Figure 5.7), a majority of the High-Country region is located in an area that experiences 1.5 to 3 per square mile per year. It should be noted that future lightning occurrences may exceed these figures. Hailstorms: Hail extent can be defined by the size of the hail stone. The largest hail stone reported in the High-Country region was 4.00 inches (reported on June 2, 1998). It should be noted that future hailstorm occurrences may exceed these

	figures. *Alleghany County*: 1.50 inches *Ashe County*: 2.00 inches *Watauga County*: 4.00 inches *Wilkes County*: 2.00 inches
Severe Winter Weather	The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in the region was 24 inches on March 13, 1993. Due to extreme variations in elevation throughout the region, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available. *Alleghany County*: 19.5 inches *Ashe County*: 24.00 inches *Watauga County*: 24.00 inches *Wilkes County*: 20.00 inches
Earthquakes	Earthquake extent can be measured by the Richter Scale (Table 5.19) and the Modified Mercalli Intensity (MMI) Scale (Table 5.20) and the distance of the epicenter from the High-Country region. According to data provided by the National Geophysical Data Center, the greatest MMI to impact the region was reported on August 31, 1861 with an MMI of VI (Strong), but there was no correlating Richter Scale measurement reported by the National Geophysical Data Center. Greatest MMI Reported: *Alleghany County*: VII *Ashe County*: V *Watauga County*: V *Wilkes County*: VI
Geological	Landslide: As noted above in the landslide profile, the landslide data provided by the North Carolina Geological Survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is high for a majority of the High-Country region. There is also a high susceptibility throughout the region. Number of Landslides Reported in High Country Region: *Alleghany County*: 2 *Ashe County*: 4 *Watauga County*: 484 *Wilkes County*: 1 Sinkhole: The High-Country region has a relatively low risk for sinkholes. The region has no historical information related to sinkholes. Even though there is no historical information from the North Carolina Geological Survey or the National

<table>
<tr><td></td><td>Centers for Environmental Information, there is a possibility of unreported occurrences.

<u>Erosion</u>: The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records available for the High-Country region.</td></tr>
<tr><td>Dam Failure</td><td>Dam failure extent is defined using the North Carolina Division of Energy, Mineral, and Land Resources criteria (Table 5.24). Of the 115 dams in the High-Country region, 33 dams are considered High Hazard.
<u>Number of High Hazard Dams:</u>
Alleghany County: 3
Ashe County: 7
Watauga County: 17
Wilkes County: 6</td></tr>
<tr><td>Flooding</td><td>Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity. The amount of land in the floodplain accounts for 3.5 percent of the total land area in the High-Country region. Flood depth and velocity are recorded via the United States Geological Survey stream gauges throughout the region. While a gauge does not exist for each of the participating jurisdiction, there is one at or near many areas. The greatest peak discharge recorded for the region was reported on July 16, 1916. Water reached a discharge of 160,000 cubic feet per second and the stream gauge height was recorded at 37.6 feet. Additional peak discharge readings and gauge heights are in the table below.

<table>
<tr><th>Location/Jurisdiction</th><th>Date</th><th>Peak Discharge (cfs)</th><th>Gage Height (ft)</th></tr>
<tr><td colspan="4">Alleghany County</td></tr>
<tr><td>Town of Sparta</td><td>8/17/1961</td><td>930</td><td>20.9</td></tr>
<tr><td colspan="4">Ashe County</td></tr>
<tr><td>South Fork New River near Jefferson, NC</td><td>8/14/1940</td><td>52,800</td><td>22.5</td></tr>
<tr><td colspan="4">Watauga County</td></tr>
<tr><td>Watauga River near Sugar Grove, NC</td><td>8/13/1940</td><td>50,800</td><td>29.6</td></tr>
<tr><td colspan="4">Wilkes County</td></tr>
<tr><td>Reddies River at North Wilkesboro, NC</td><td>8/14/1940</td><td>27,000</td><td>22.02</td></tr>
<tr><td>Yadkin River at Wilkesboro, NC</td><td>8/14/1940</td><td>160,000</td><td>37.6</td></tr>
</table>
</td></tr>
</table>

		Yadkin River Bl W Kerr Scott Dam near Buck, NC	2/14/2008	5,820	9.28	
		Elk Creek at Elkville, NC	8/13/1940	70,000	22	
		Typical flood depths in the region range from 2-3 feet with greater depths possible. However, there are no official records of the flood depths. Additionally, and potentially of greater concern are the velocity of flood waters that impact the region as a result of mountain valley flooding which can be strong enough to cause major damage (as evidenced by recent events as Tropical Storm Fred in 2021).				
Other Hazards						
Wildfires		Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county. Analyzing the data by count indicates the following wildfire hazard extent for each county. ***Alleghany County*** The greatest number of fires to occur in any year was 14 in 2001 and in 2007. The greatest number of acres burned in any single year occurred in 2016 when 123 acres burned. ***Ashe County*** The greatest number of fires to occur in any year was 42 in 2007. The greatest number of acres burned in any single year occurred in 2016 when 477 acres burned. ***Watauga County*** The greatest number of fires to occur in any year was 25 in 2001. The greatest number of acres burned in any single year occurred in 2016 when 1,394 acres burned. ***Wilkes County*** The greatest number of fires to occur in any year was 46 in 2001. The greatest number of acres burned in any single year occurred in 2006 when 726 acres burned. Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the region.				
Infectious Disease		Extent of infectious disease events can be measured by the number of lives lost due to a particular event. As of the time of this report, the COVID-19 pandemic is still taking place, but the number of deaths associated with that event for the High Country Region is 317 (as of 1/8/2022).				
Technological Hazard						
Hazardous Materials Incident		According to the USDOT PHMSA, the largest hazardous materials incident reported in the region was 7800 LGA on May 20, 2014 in Grassy Creek, NC. It should be noted that larger events are possible.				

Terrorism	Although no severe terrorism attacks have been reported in High-Country region, the entire area is still at risk to a future event. Densely populated areas, such as cities, are considered more susceptible. Terror events have the potential to affect the human population, buildings and infrastructure, and the economy in the region.
Cyber	No cyber-attacks have been historically reported in the High-Country region. Technology usage, however, is increasing. A cyber-attack could potentially devastate the region's economy and could have lasting negative impacts.
Electromagnetic Pulse	Electromagnetic Pulse (EMP) occurrences have not taken place in the High-Country region, but the risk still exists. If an EMP were to occur, the effects would negatively impact first responders and communication efforts and may cause panic within the area.

5.17.2 Priority Risk Index

In order to draw some meaningful planning conclusions on hazard risk for the High-Country Region, the results of the hazard profiling process were used to generate countywide hazard classifications according to a "Priority Risk Index" (PRI). The purpose of the PRI is to categorize and prioritize all potential hazards for the High-Country Region as high, moderate, or low risk. Combined with the asset inventory and quantitative vulnerability assessment provided in the next section, the summary hazard classifications generated through the use of the PRI allows for the prioritization of those high hazard risks for mitigation planning purposes, and more specifically, the identification of hazard mitigation opportunities for the High-Country Region to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for the High-Country Region is based principally on the PRI, a tool used to measure the degree of risk for identified hazards in a particular planning area. The PRI is used to assist the High-Country Regional Hazard Mitigation Planning Committee (HCRHMPC) in gaining consensus on the determination of those hazards that pose the most significant threat to the High-Country counties based on a variety of factors. The PRI is not scientifically based, but is rather meant to be utilized as an objective planning tool for classifying and prioritizing hazard risks in the High-Country Region based on standardized criteria.

The application of the PRI results in numerical values that allow identified hazards to be ranked against one another (the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard (probability, impact, spatial extent, warning time, and duration). Each degree of risk has been assigned a value (1 to 4) and an agreed upon weighting factor[30], as summarized in **Table 5.36**. To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories

[30] The HCRHM Planning Committee, based upon any unique concerns or factors for the planning area, may adjust the PRI weighting scheme during future plan updates

equals the final PRI value, as demonstrated in the example equation below:

PRI VALUE = [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)]

According to the weighting scheme and point system applied, the highest possible value for any hazard is 4.0. When the scheme is applied for the High-Country Region, the highest PRI value is 3.3 (winter storm and freeze hazard). Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the Regional Planning Committee.

TABLE 5.36: PRIORITY RISK INDEX FOR THE HIGH-COUNTRY REGION

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
	More than 24 hours	Self-explanatory	1	
	12 to 24 hours	Self-explanatory	2	

Warning Time	6 to 12 hours	Self-explanatory	3	10%
	Less than 6 hours	Self-explanatory	4	
Duration	Less than 6 hours	Self-explanatory	1	10%
	Less than 24 hours	Self-explanatory	2	
	Less than one week	Self-explanatory	3	
	More than one week	Self-explanatory	4	

5.17.3 Priority Risk Index Results

Table 5.37 summarizes the degree of risk assigned to each category for all initially identified hazards based on the application of the PRI. Assigned risk levels were based on the detailed hazard profiles developed for this section, as well as input from the HCRHM Planning Committee. The results were then used in calculating PRI values and making final determinations for the risk assessment.

TABLE 5.37: SUMMARY OF PRI RESULTS FOR THE HIGH-COUNTRY REGION

Hazard	Sub hazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Drought		Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Hurricane and Coastal Hazards		Possible	Critical	Large	More than 24 hours	Less than 24 hours	2.6
Tornadoes/ Thunderstorms	Hailstorm, Lightning	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	2.8
Severe Winter Weather		Highly Likely	Critical	Large	More than 24 hours	Less than 1 week	3.3
Earthquakes		Possible	Minor	Moderate	Less than 6 hours	Less than 6 hours	2
Geological	Landslide, Sinkholes, Erosion	Likely	Limited	Small	Less than 6 hours	Less than 6 hours	2.4
Dam Failure		Unlikely	Critical	Moderate	Less than 6 hours	Less than 24 hours	2.4
Flooding		Likely	Critical	Small	6 to 12 hours	Less than 1 week	2.8
Other Hazards							
Wildfires		Likely	Minor	Small	Less than 6 hours	Less than 1 week	2.7
Infectious Disease		Possible	Critical	Small	More than 24 hours	More than 1 week	2.5
Technological Hazards							
Hazardous Substances		Unlikely	Limited	Small	Less than 6 hours	Less than 24 hours	2.3
Terrorism		Unlikely	Critical	Small	Less than 6 hours	Less than 24 hours	2.6
Cyber		Possible	Critical	Small	Less than 6 hours	Less than 1 week	3
Electromagnetic Pulse		Unlikely	Critical	Large	Less than 6 hours	Less than week	3.1

5.18 FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for the High-Country Region, including the PRI results and input from the Regional Planning Committee, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table 5.38**). For purposes of these classifications, risk is expressed in relative terms according to the estimated impact that a hazard will have on human life and property throughout all of the High-Country Region. A more quantitative analysis to estimate potential dollar losses for each hazard has been performed separately, and is described in Section 6: *Vulnerability Assessment*. It should be noted that although some hazards are classified below as posing low risk, their occurrence of varying or unprecedented magnitudes is still possible in some cases and their assigned classification will continue to be evaluated during future plan updates.

TABLE 5.38: CONCLUSIONS ON HAZARD RISK FOR THE HIGH-COUNTRY REGION

HIGH RISK	Severe Winter Weather Tornadoes/Thunderstorms Flooding
MODERATE RISK	Hurricanes and Coastal Hazards Drought Infectious Disease Geological Wildfire Dam Failure Earthquake
LOW RISK	Hazardous Substances Cyber Electromagnetic Pulse Terrorism

SECTION 6
VULNERABILITY ASSESSMENT

This section identifies and quantifies the vulnerability of the jurisdictions within the High-Country Region to the significant hazards identified in the previous sections (*Hazard Identification and Profiles*). It consists of the following subsections:

- 6.1 Overview
- 6.2 Methodology
- 6.3 Explanation of Data Sources
- 6.4 Asset Inventory
- 6.5 Vulnerability Assessment Results
- 6.6 Conclusions on Hazard Vulnerability

44 CFR Requirement

44 CFR Part 201.6(c)(2)(ii): The risk assessment shall include a description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. The description shall include an overall summary of each hazard and its impact on the community. The plan should describe vulnerability in terms of: (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate; (C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

6.1 OVERVIEW

This section builds upon the information provided in Section 4: *Hazard Identification and* Section 5*: Hazard Profiles* by identifying and characterizing an inventory of assets in the High-Country Region. Additionally, an assessment is conducted for each identified hazard, including the potential impact and expected number of damages it may cause. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, each county and their participating jurisdictions may better understand their unique risks to identified hazards and be better prepared to evaluate and prioritize specific hazard mitigation actions.

This section begins with an explanation of the methodology applied to complete the vulnerability assessment, followed by a summary description of the asset inventory as compiled for jurisdictions in the High-Country Region. The remainder of this section focuses on the results of the assessment conducted.

6.2 METHODOLOGY

This vulnerability assessment was conducted using two distinct methodologies: (1) a geographic information system (GIS)-based analysis; and (2) a risk modeling software analysis. Each approach provides estimates for the potential impact of hazards by using a common, systematic framework for evaluation. A brief description of the two different approaches is provided on the following pages.

6.2.1 GIS-Based Analysis

Other hazards have specified geographic boundaries that permit additional analysis using Geographic Information Systems (GIS). These hazards include:

- Flooding
- Hazardous Substances
- Geological (Landslide)
- Wildfires

The objective of the GIS-based analysis was to determine the estimated vulnerability of critical facilities and populations for the identified hazards in the High-Country Region using best available geospatial data. Digital data was collected from local, regional, state, and national sources for hazards and buildings. This included local tax assessor records for individual parcels and buildings and georeferenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.) when available. ESRI® ArcGIS™ 10.6.1 was used to assess hazard vulnerability utilizing digital hazard data, as well as local building data. Using these data layers, hazard vulnerability can be quantified by estimating the assessed building value for parcels and/or buildings determined to be located in identified hazard areas. To estimate vulnerable populations in hazard areas, digital Census 2010 data by census tract was obtained and was supplemented with current population estimates from the US Census Bureau. This was intersected with hazard areas to determine exposed population counts. Unfortunately, due to the large scale of census tracts, the results are limited, but will be revised as population by census block becomes available for all areas in the region. The results of the analysis provided an estimate of the number of people and critical facilities, as well as the assessed value of parcels and improvements, determined to be potentially at risk to those hazards with delineable geographic hazard boundaries.

6.2.2 Risk Management Tool

The Risk Management Tool (RMT) was developed by NCEM-Risk Management (RM) as a tool to simplify hazard mitigation plan development into a single, automated, tool-based format to include geospatially based risk assessment data, also developed by NCEM-RM. The RMT is a twofold system used to create and/or update a local and state hazard mitigation plan. The two parts of the RMT are a step-by-step system that will prompt a user to input information and narrative as well as upload pictures, documents and other information as needed. The second part of the system is the Risk Tool. The Risk Tool will run a risk assessment at the building level for certain hazards selected based on predetermined calculations for each hazard. Some hazards will have a single return period and others have multi-return periods. The availability of multi-returns periods are based on the availability of datasets for each hazard and the degree of detail in each dataset.

The Risk Assessment produced by the Risk Tool will also identify high-risk structures in the planning area and estimate cost by types of mitigation projects (wind retrofits, elevation, acquisition, mitigation reconstruction) and benefit-cost estimates by type of mitigation. The mitigation tool is only meant to

begin the process of thinking about problem areas where mitigation may be of interest to the jurisdiction and property owners. It is also designed to drive mitigation actions that are specific, measurable, attainable, realistic and timely.

Finally, the Risk Management Tool also assesses vulnerable populations, such as children and elderly persons. Data used to assess these populations is from the US 2010 Census. According to the US Census Bureau, those defined as "elderly," are 65 years old or older, while those defined as "children" are 5 years old or younger. It is important to note that the numbers assessed are from the most recent Census in 2010.

Once all of the information was input into the system, a hazard mitigation plan can then be exported into multiple document formats. The system will also store the plan so that when it is time to update the plan, the information is already in the system.

The RMT was originally developed as part of the Integrated Hazard Risk Management (IHRM) pilot project which included Durham, Edgecombe, Macon and New Hanover counties. The pilot was successful and it was determined that there is a need and interest in a system designed to be used statewide and potentially nationwide in the future. The RMT used in this update was the second version created by NCEM.

A list of the hazards assessed by the RMT follows:

- Hurricane and Coastal Hazards
- Tornadoes/Thunderstorms
- Earthquakes
- Flooding
- Wildfires

All conclusions are presented in "**Conclusions on Hazard Vulnerability**" at the end of this section.

Hazard Prioritization

When it comes to evaluating hazards and determining which hazards a jurisdiction should spend the most time and effort addressing, a number of factors affect the prioritization. As discussed in *Section 5: Hazard Profiles,* the risk (magnitude, probability, location) of a hazard is one of the primary driving forces that helps determine the relative importance of addressing the potential impacts of a hazard. However, the assessment of a hazard's risk is generally focused on the hazard itself and how severe or likely it could be within geographic scope of the study area. This assessment does not necessarily analyze the potential effects of that hazard on humans and the built environment. This is a critical component of planning for hazards since a hazard that does not impact human life, safety, or welfare is typically not considered as important to address through mitigation. The analysis that follows attempts to bring this consideration into the planning process by estimating the impacts on humans and the built environment and prioritizing hazards accordingly.

6.3 EXPLANATION OF DATA SOURCES

Hurricane and Coastal Hazards

NCEM's Risk Management Tool assessed vulnerable areas to the Hurricane and Coastal Hazards. For this assessment, vulnerable buildings and populations were analyzed against damages caused by hurricane winds.

Tornadoes/Thunderstorms

NCEM's Risk Management Tool analyzed the vulnerable buildings and populations to the Tornadoes/Thunderstorms hazard. Sub hazards assessed under the thunderstorms hazard include hail and lightning; however, for the purposes of this assessment, thunderstorm winds were the only risk analyzed.

Earthquakes

NCEM's Risk Management Tool assessed vulnerable areas to the earthquake hazard. This assessment included susceptible buildings by the type of structure, and the potential dollar losses associated with the buildings. It also analyzed susceptible populations, such as children and elderly.

Geological (Landslide)

Data from the U.S. Geological Survey was used to first determine what areas are considered high, moderate, or low susceptibility areas to the landslide hazard. Data was downloaded in an ArcGIS compatible format. This allowed the parcel data received by local governments to be layered on top of the landslide regions to assess vulnerability to landslide occurrences.

Flooding

FEMA Digital Flood Insurance Rate Maps (DFIRMs) were used to determine flood vulnerability. DFIRM data can be used in ArcGIS for mapping purposes and, they identify several features including floodplain boundaries and base flood elevations. Identified areas on the DFIRM represent some features of a Flood Insurance Rate Maps including the 100-year flood areas (1.0-percent annual chance flood), and the 500-year flood areas (0.2-percent annual chance flood). For the vulnerability assessment, local parcel data and critical facilities were overlaid on the 100-year floodplain areas and 500-year floodplain areas. This data was also supplemented with the NCEM RMT data, which assessed structure type and vulnerable populations within the floodplain areas. It should be noted that such an analysis does account for building elevation.

Wildfires

The data used to determine vulnerability to wildfires in the High-Country Region is based on GIS data called the Southern Wildfire Risk Assessment (SWRA). It was provided for use in this plan by the North Carolina Division of Forest Resources. A specific layer known as the "Wildland Urban Interface" (WUI) was used to determine vulnerability of people and property. This layer uses the key input of housing density to define potential wildfire impacts to people and homes. The WUI Risk Index is then derived from a scale of -1 to -9, with the least negative impact being a -1, and uses flame length to measure fire intensity. The primary purpose of this data is to highlight areas of concern that may be conducive to mitigation actions. Many assumptions are made, making it not a true probability; however, it does provide a comparison of risk throughout the region. Data was also supplemented with the data from NCEM's RMT, which assessed vulnerable buildings, potential dollar losses of those buildings, and susceptible populations.

Hazardous Substances

Hazardous materials incidents can occur in both fixed facilities and through mobile transportation. For the fixed incident analysis, Toxic Release Inventory (TRI) data was used. The Toxic Release Inventory is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemicals, releases, and other waste management activities reported annually by certain covered industry groups, as well as federal facilities. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and was further expanded by the Pollution Prevention Act of 1990. Facilities that meet certain activity thresholds must annually report their releases and other waste management activities for listed toxic chemicals to the EPA and to their state or tribal entity. A facility must report if it meets the following criteria:

- The facility falls within one of the following industrial categories: manufacturing; metal mining; coal mining; electric generating facilities that combust coal and/or oil; chemical wholesale distributors; petroleum terminals and bulk storage facilities; RCRA Subtitle C treatment, storage, and disposal (TSD) facilities; and solvent recovery services;
- Has 10 or more full-time employee equivalents; and
- Manufactures or processes more than 25,000 pounds or otherwise uses more than 10,000 pounds of any listed chemical during the calendar year. Persistent, bioaccumulative, and toxic (PBT) chemicals are subject to different thresholds of 10 pounds, 100 pounds, or 0.1 grams depending on the chemical.

For the mobile hazardous materials incident analysis, transportation data including major highways and railroads were obtained from the North Carolina Department of Transportation. This data is ArcGIS compatible, lending itself to buffer analysis to determine risk.

6.4 ASSET INVENTORY

An inventory of geo-referenced assets within Alleghany, Ashe, Watauga, and Wilkes Counties and jurisdictions was compiled in order to identify and characterize those properties potentially at risk to the identified hazards[1]. By understanding the type and number of assets that exist and where they are located in relation to known hazard areas, the relative risk and vulnerability for such assets can be assessed. Under this assessment, two categories of physical assets were created and then further assessed through GIS analysis. Additionally, social assets are addressed to determine population at risk to the identified hazards. These are presented below in Section 6.4.2.

6.4.1 Physical and Improved Assets

The two categories of physical assets consist of:

1. Improved Property: Includes all improved properties in the High-Country Region according to local parcel data provided by the counties. The information has been expressed in terms of the number of parcels and total assessed value of improvements (buildings) that may be exposed to the identified hazards.

2. Critical Facilities: Critical facilities vary by jurisdiction. Each county provided data from their respective critical facilities that were used in this section. Identified critical facilities are fire stations, police

[1] While potentially not all-inclusive for the jurisdictions in the High-Country region, "georeferenced" assets include those assets for which specific location data is readily available for connecting the asset to a specific geographic location for purposes of GIS analysis.

stations, medical care facilities, schools, government facilities, emergency operation centers, or other important buildings. It should be noted that this listing is not all-inclusive for assets located in the region, but it is anticipated that it will be expanded during future plan updates as more geo-referenced data becomes available for use in GIS analysis.

The following tables provide a detailed listing of the geo-referenced assets that have been identified for inclusion in the vulnerability assessment for the High-Country Region.

Table 6.1 lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for participating areas of the High-Country Region (study area of vulnerability assessment)[2].

TABLE 6.1: IMPROVED PROPERTY IN THE HIGH-COUNTRY REGION

Location[3]	Number of Parcels	Total Assessed Value of Parcels	Estimated Number of Buildings	Total Assessed Value of Improvements
Alleghany County	**15,282**	**$1,137,815,000**	**8,742**	**$1,159,228,130**
Sparta	1,018	$34,993,400	810	$146,171,050
Unincorporated Area	14,264	1,102,821,600	7,932	1,013,057,080
Ashe County	**38,843**	**$1,913,617,400**	**18,782**	**$2,396,161,700**
Lansing	119	$1,144,900	86	$6,347,300
Jefferson	777	$26,544,700	579	$101,267,800
West Jefferson	759	$31,446,100	572	$101,973,000
Unincorporated Area	37,188	$1,854,481,700	17,545	$2,186,573,600
Watauga County	**46,902**	**$3,056,050,400**	**26,725**	**$6,372,994,378**
Beech Mountain	4,505	$87,870,700	1,641	$348,720,100
Blowing Rock	2,091	$321,739,000	1,469	$573,241,490
Boone	3,323	$494,854,500	2,588	$1,158,008,108
Seven Devils	657	$20,005,600	304	$68,098,800
Unincorporated Area	36,326	$2,131,580,600	20,723	$4,224,925,880
Wilkes County	**51,544**	**$2,390,364,350**	**33,276**	**$3,665,850,290**
North Wilkesboro	2,076	$86,681,420	1,496	$289,957,550
Ronda	284	$3,959,690	207	$12,292,750
Wilkesboro	1,822	$130,717,900	1,433	$384,319,260
Unincorporated Area	47,362	$2,169,005,340	30,140	$2,979,280,730
High Country Regional Total	**152,571**	**$8,497,847,150**	**87,525**	**$13,594,234,498**

Source: Local governments

The following table lists the fire stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in the High-Country Region. Local governments at the county level provided a majority of the data for this analysis. In addition, **Figure 6.1** shows the locations of essential facilities in the High-Country Region. **Table 6.26**, at the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all inclusive and only includes information provided by the counties.

[2] Total assessed values for improvements are based on tax assessor records as joined to digital parcel data. This data does not include dollar figures for tax-exempt improvements such as publicly-owned buildings and facilities. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

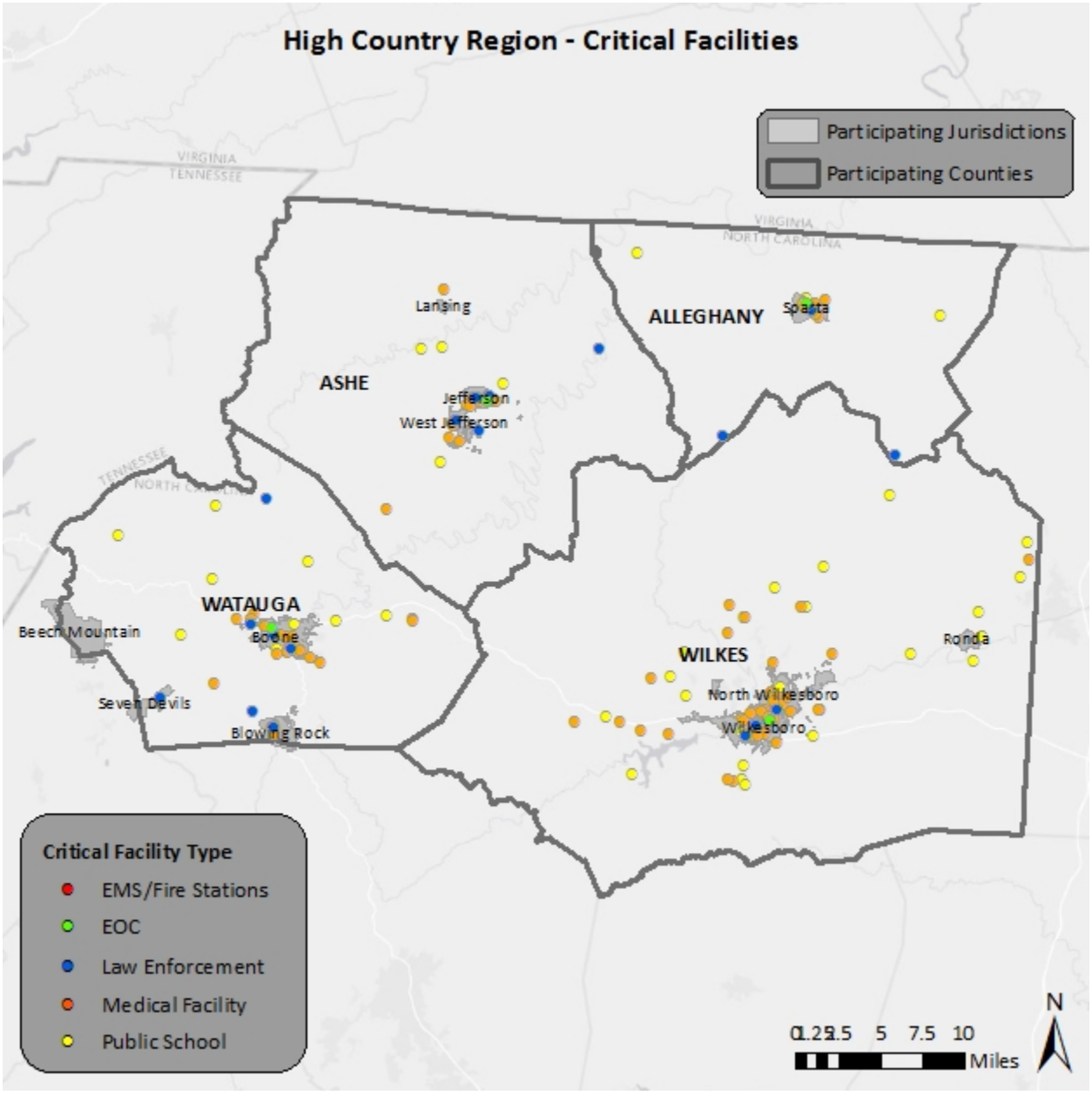
[3] Number of buildings for each county is based on the number of parcels with an improved building value greater than zero.

TABLE 6.2: CRITICAL FACILITY INVENTORY IN THE HIGH COUNTRY REGION

Location	Fire/EMS Stations	Law Enforcement	Medical Facilities	Public Schools	Other
Alleghany County	**10**	**4**	**13**	**4**	**1**
Sparta	3	2	12	2	1
Unincorporated Area	7	2	1	2	0
Ashe County	**20**	**7**	**20**	**5**	**1**
Jefferson	3	4	8	0	1
Lansing	2	0	0	0	0
West Jefferson	2	1	7	2	0
Unincorporated Area	13	2	5	3	0
Watauga County	**31**	**8**	**30**	**10**	**1**
Beech Mountain	3	0	0	0	0
Blowing Rock	3	1	4	1	0
Boone	6	2	17	2	1
Seven Devils	1	1	0	0	0
Unincorporated Area	18	4	9	7	0
Wilkes County	**57**	**4**	**51**	**23**	**1**
North Wilkesboro	3	1	19	2	0
Ronda	2	0	0	0	0
Wilkesboro	4	3	13	2	1
Unincorporated Area	48	0	19	19	0
High Country Regional Total	**118**	**23**	**114**	**42**	**4**

Source: Local governments

FIGURE 6.1: CRITICAL FACILITIES IN THE HIGH-COUNTRY REGION



Source: Local governments

6.4.2 Social Vulnerability

In addition to identifying those assets potentially at risk to identified hazards, it is important to identify and assess those particular segments of the resident population in the High-Country Region that are potentially at risk to these hazards.

Table 6.3 lists the population by county according to U.S. Census 2010 population estimates. The population estimates are updated using the most recent vintage tables dated July 1, 2018. The total population in the High-Country Region according to Census data is 46,424.

TABLE 6.3: TOTAL POPULATION IN THE HIGH-COUNTRY REGION

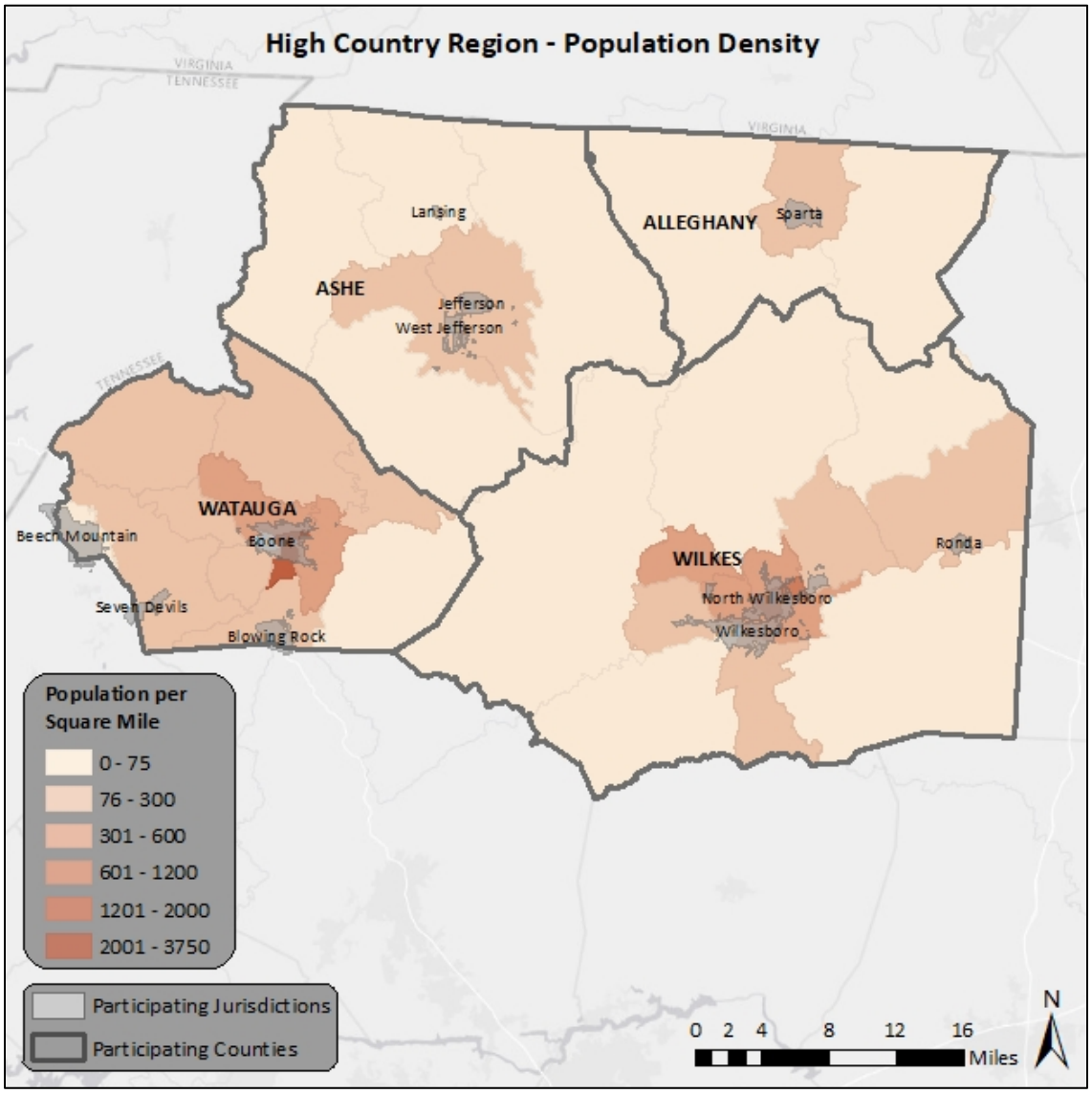
Location	2019 Population Estimates
Alleghany County	11,137
Ashe County	27,203
Watauga County	56,177
Wilkes County	68,412
High Country Regional Total	**162,929**

Source: US Census Bureau

Additional population estimates are presented in Section 3: *Community Profile*.

In addition, **Figure 6.2** illustrates the population density by census tract as it was reported by the US Census Bureau in 2010 and updated with 2017 population estimates.

FIGURE 6.2: POPULATION DENSITY IN THE HIGH-COUNTRY REGION



6.4.3. Development Trends and Changes in Vulnerability

Since the previous regional hazard mitigation plan was approved (in 2015), the High-Country Region has experienced strong growth and development. **Table 6.4** shows the number of building units constructed since 2010 according to the US Census American Community Survey.

TABLE 6.4: BUILDING COUNTS FOR THE HIGH-COUNTRY REGION

Location	Total Housing Units (2019)	Units Built 2010 or Later	% Building Stock Built Post-2010
Alleghany County	**8,034**	**127**	**2%**
Sparta	321	0	0%
Unincorporated Area	7,713	127	2%
Ashe County	**17,649**	**555**	**3%**
Lansing	90	0	0%
Jefferson	2934	112	4%
West Jefferson	799	10	1%
Unincorporated Area	13,826	433	3%
Watauga County	**33,520**	**1132**	**3%**
Beech Mountain	2403	49	2%
Blowing Rock	3651	61	2%
Boone	2778	145	5%
Seven Devils	589	5	1%
Unincorporated Area	24,099	872	4%
Wilkes County	**33,480**	**870**	**3%**
North Wilkesboro	3598	51	1%
Ronda	208	2	1%
Wilkesboro	5050	102	2%
Unincorporated Area	24,624	715	3%
High Country Regional Total	**92,683**	**2,684**	**3%**

Source: US Census Bureau

Table 6.5 shows population growth estimates for the region from 2010 to 2018 based on the US Census Annual Estimates of Resident Population and 2018 population estimates.

TABLE 6.5: POPULATION GROWTH FOR THE HIGH-COUNTRY REGION

Location	2010	2013	2016	2019	% Change 2010-2019
Alleghany County	**11,155**	**10,903**	**10,919**	**11,137**	**-0.2%**
Sparta	1,770	1,699	1,699	1,723	-2.7%
Unincorporated Area	9,385	9,204	9,220	9,414	0.3%
Ashe County	**27,281**	**26,840**	**26,600**	**27,203**	**-0.3%**
Lansing	158	153	150	153	-3.2%
Jefferson	1,611	1,523	1,510	1,533	-4.8%
West Jefferson	1,299	1,310	1,290	1,315	1.2%
Unincorporated Area	24,213	23,854	23,650	24,202	0.0%
Watauga County	**51,079**	**52,295**	**54,140**	**56,177**	**10.0%**
Beech Mountain	320	317	319	324	1.3%
Blowing Rock	1,241	1,196	1,247	1,324	6.7%

Location	2010	2013	2016	2019	% Change 2010-2019
Boone	17,122	18,145	18,898	19,667	14.9%
Seven Devils	192	205	209	216	12.5%
Unincorporated Area	32,204	32,432	33,467	34,646	7.6%
Wilkes County	**69,340**	**68,609**	**68,581**	**68,412**	**-1.3%**
North Wilkesboro	4,245	4,202	4,182	4,200	-1.1%
Ronda	417	413	411	411	-1.4%
Wilkesboro	3,413	3,538	3,520	3,453	1.2%
Unincorporated Area	61,265	60,456	60,468	60,348	-1.5%
High Country Regional Total	158,855	158,647	160,240	162,929	**2.6%**

Source: US Census Bureau

Based on the above data, the rate of residential development and population growth in the region since 2010 has increased, most dramatically in Watauga County. The overall population decreased across the remaining counties. Changes in development do impact the region's vulnerability since the last update. The greater the population, the greater the risk is that persons are impacted by hazards. It should be noted that if future development occurs in vulnerable areas, populations and infrastructure will be exposed to potential hazards.

6.5 VULNERABILITY ASSESSMENT RESULTS

As noted earlier, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results are presented here. All other hazards are assumed to impact the entire planning region (drought, excessive heat, hailstorm, lightning, and severe winter weather) or, due to lack of data, analysis would not lead to credible results (sinkholes, erosion, dam failure, infectious disease, terrorism, cyber, EMP). The total region exposure for critical facilities is presented in **Table 6.26**.

The annualized loss estimate for all hazards is presented at the end of this section in **Table 6.25.**

The hazards presented in this subsection include: hurricane and coastal hazards, tornadoes/ thunderstorms, earthquakes, landslides, flooding, wildfires, and hazardous substances.

6.5.1. Hurricane and Coastal Hazards

Historical evidence indicates that the High-Country Region has a significant risk to the hurricane and tropical storm hazard, mostly due to the location of the state of North Carolina as a coastal state. Many more storm tracks have come near or traversed through the region, as shown and discussed in Section 5: *Hazard Profiles.*

Numerous secondary hazards, such as erosion, flooding, tornadoes, and high winds, tend to be a result of hurricanes or tropical storms. These cumulative effects often make potential loss estimates difficult to calculate and track.

NCEM's Risk Management Tool analyzes hurricane winds and no other hazards often associated with hurricanes; therefore, only hurricane winds are analyzed in this section. Building and population vulnerabilities to hurricane winds in a 100-year frequency event (return period) are reported in the following **Table 6.6** and **Table 6.7**.

It is assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard.

TABLE 6.6: BUILDING VULNERABILITIES TO HURRICANE WINDS IN THE HIGH-COUNTRY REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Alleghany County	**10,318**	**9,598**	**3,121,291**	**623**	**543,726**	**97**	**124,055**	**10,318**	**3,789,072**
Sparta	1,567	1,346	$372,302	183	$158,574	38	$40,059	1,567	$570,935
Unincorporated Area	8,751	8,252	$2,748,989	440	$385,152	59	$83,996	8,751	$3,218,137
Ashe County	**18632**	**16982**	**4350438**	**1222**	**1289525**	**425**	**465313**	**18629**	**6105276**
Lansing	104	77	$12,094	20	$8,295	7	$1,253	104	$21,643
Jefferson	636	516	$149,905	84	$217,056	36	$49,754	636	$416,715
West Jefferson	838	586	$188,194	197	$107,855	54	$77,285	837	$373,334
Unincorporated Area	17,054	15,803	$4,000,245	921	$956,319	328	$337,021	17,052	$5,293,584
Watauga County	**17,814**	**29,400**	**6,876,091**	**2,288**	**2,731,653**	**360**	**1,228,219**	**32,048**	**10,835,963**
Beech Mountain	1,807	1,770	$384,054	51	$86,550	7	$36,129	1,828	$506,733
Blowing Rock	1,035	1,737	$524,609	148	$245,287	19	$13,885	1,904	$783,781
Boone	2,846	4,251	$1,275,238	700	$802,855	141	$979,574	5,092	$3,057,667
Seven Devils	25	444	$105,665	20	$31,002	1	$5,620	465	$142,287
Unincorporated Area	12,101	21,198	$4,586,525	1,369	$1,565,959	192	$193,011	22,759	$6,345,495
Wilkes County	**50,039**	**15,288**	**14,076,297**	**3,150**	**3,750,658**	**1,964**	**2,400,367**	**50,402**	**20,227,320**
North Wilkesboro	4,232	3,797	$1,151,713	600	$334,616	204	$248,358	4,601	$1,734,687
Ronda	319	288	$50,299	15	$31,031	16	$11,207	319	$92,537
Wilkesboro	4,712	3,885	$1,315,910	524	$422,914	297	$396,959	4,706	$2,135,782
Unincorporated Area	40,776	7,318	$11,558,375	2,011	$2,962,097	1,447	$1,743,843	40,776	$16,264,314
High Country Regional Total	**96,803**	**71,268**	**28,424,117**	**7,283**	**8,315,562**	**2,846**	**4,217,954**	**111,397**	**40,957,631**

Source: NCEM Risk Management Tool

TABLE 6.7: POPULATION VULNERABILITIES TO HURRICANE WINDS IN THE HIGH-COUNTRY REGION

Location	Elderly at Risk	Children at Risk	Total at Risk
Alleghany County	**2,301**	**580**	**11,129**
Sparta	545	138	2,637
Unincorporated Area	1,756	442	8,492
Ashe County	**5,495**	**1,449**	**27,159**
Lansing	32	8	158
Jefferson	326	86	1,613
West Jefferson	256	67	1,263
Unincorporated Area	4,881	1,288	24,125
Watauga County	**6,343**	**1,953**	**51,156**
Beech Mountain	40	12	315

Location	Elderly at Risk	Children at Risk	Total at Risk
Blowing Rock	172	54	1,378
Boone	2,524	777	20,367
Seven Devils	23	7	176
Unincorporated Area	3,584	1,103	28,920
Wilkes County	**11,768**	**3,986**	**69,364**
North Wilkesboro	1,385	469	8,165
Ronda	66	22	389
Wilkesboro	1,387	470	8,174
Unincorporated Area	8,930	3,025	52,636
High Country Regional Total	**25,907**	**7,968**	**158,808**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

Given the equal susceptibility across the entire High-Country Region, it can be assumed that the entire population is at risk to the hurricane and tropical storm hazard.

CRITICAL FACILITIES

Given equal vulnerability across the High-Country Region, all critical facilities are considered to be at risk. Although some buildings may perform better than others in the face of such an event due to construction, age, and other factors, determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation actions for vulnerable structures, including critical facilities, to reduce the impacts of the hurricane wind hazard. A list of specific critical facilities and their associated risk can be found in **Table 6.26** at the end of this section.

In conclusion, a hurricane event has the potential to impact many existing and future buildings, critical facilities, and populations in the High-Country Region. Hurricane events can cause substantial damage in their wake including fatalities, extensive debris clean-up, and extended power outages.

6.5.2 Tornadoes/Thunderstorms

Tornadoes

A probabilistic scenario was created to estimate building and population vulnerabilities in the High-Country region for the tornado hazard. For this scenario, a tornado ranked F2 on the Fujita scale was analyzed. The Risk Management Tool analyzed this information which has been reported in **Table 6.8** and **Table 6.9**.

TABLE 6.8: BUILDING VULNERABILITY TO THE TORNADOES HAZARD IN THE HIGH-COUNTRY REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Alleghany County	**10,330**	**9,610**	**$1,160,375,201**	**623**	**$385,421,094**	**97**	**$77,442,204**	**10,330**	**$1,623,238,501**
Sparta	1,567	1,346	$158,303,360	183	$143,070,052	38	$37,384,038	1,567	$338,757,451
Unincorporated Area	8,763	8,264	$1,002,071,841	440	$242,351,042	59	$40,058,166	8,763	$1,284,481,050
Ashe County	**18654**	**17002**	**$1,854,793,991**	**1223**	**$738,139,300**	**426**	**$233,573,565**	**18651**	**$2,826,506,855**
Lansing	104	77	$7,298,007	20	$3,049,345	7	$3,551,942	104	$13,899,294
Jefferson	636	516	$64,078,041	84	$105,846,686	36	$27,601,892	636	$197,526,620
West Jefferson	838	586	$80,948,160	197	$164,754,913	54	$40,820,588	837	$286,523,660
Unincorporated Area	17,076	15,823	$1,702,469,783	922	$464,488,356	329	$161,599,143	17,074	$2,328,557,281
Watauga County	**17,819**	**29,404**	**$3,136,194,842**	**2,289**	**$1,580,032,535**	**360**	**$389,504,454**	**32,053**	**$5,105,731,830**
Beech Mountain	1,807	1,770	$201,754,291	51	$31,484,407	7	$4,153,521	1,828	$237,392,219
Blowing Rock	1,035	1,737	$267,906,960	148	$116,548,162	19	$15,146,981	1,904	$399,602,104
Boone	2,846	4,251	$502,781,078	700	$610,935,811	141	$254,599,515	5,092	$1,368,316,404
Seven Devils	25	444	$56,127,965	20	$17,864,476	1	$1,164,459	465	$75,156,899
Unincorporated Area	12,106	21,202	$2,107,624,548	1,370	$803,199,679	192	$114,439,978	22,764	$3,025,264,204
Wilkes County	**50,039**	**45,288**	**$5,331,562,472**	**3,150**	**$2,445,108,234**	**1,964**	**$1,074,319,166**	**50,402**	**$8,850,989,874**
North Wilkesboro	4,232	3,797	$448,030,714	600	$430,939,955	204	$150,010,176	4,601	$1,028,980,845
Ronda	319	288	$19,814,047	15	$20,841,401	16	$7,096,037	319	$47,751,486
Wilkesboro	4,712	3,885	$505,413,210	524	$557,858,939	297	$173,308,421	4,706	$1,236,580,571
Unincorporated Area	40,776	37,318	$4,358,304,501	2,011	$1,435,467,939	1,447	$743,904,532	40,776	$6,537,676,972
High Country Regional Total	**96,842**	**101,304**	**$11,482,926,506**	**7,285**	**$5,148,701,163**	**2,847**	**$1,774,839,389**	**111,436**	**$18,406,467,060**

Source: NCEM Risk Management Tool

TABLE 6.9: POPULATION VULNERABILITY TO THE TORNADOES HAZARD IN THE HIGH-COUNTRY REGION

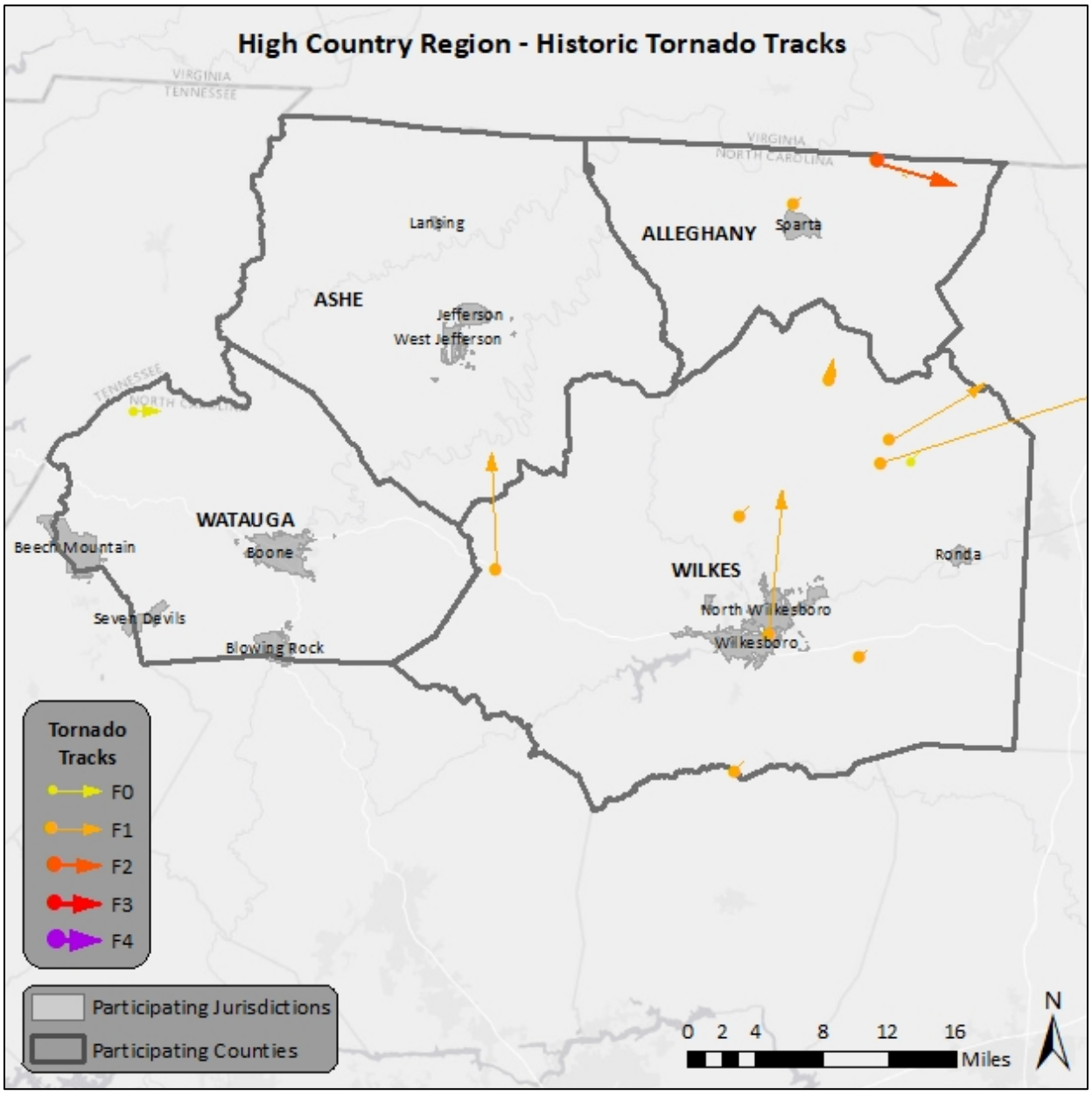
Location	Elderly at Risk	Children at Risk	Total at Risk
Alleghany County	**2304**	**581**	**11,141**
Sparta	545	138	2,637
Unincorporated Area	1,759	443	8,504
Ashe County	**5,501**	**1,451**	**27,189**
Lansing	32	8	158
Jefferson	326	86	1,613
West Jefferson	256	67	1,263
Unincorporated Area	4,887	1,290	24,155
Watauga County	**6,344**	**1,953**	**51,161**
Beech Mountain	40	12	315
Blowing Rock	172	54	1,378
Boone	2,524	777	20,367
Seven Devils	23	7	176
Unincorporated Area	3,585	1,103	28,925
Wilkes County	**11,768**	**3,986**	**69,364**

Location	Elderly at Risk	Children at Risk	Total at Risk
North Wilkesboro	1,385	469	8,165
Ronda	66	22	389
Wilkesboro	1,387	470	8,174
Unincorporated Area	8,930	3,025	52,636
High Country Regional Total	**25,917**	**7,971**	**158,855**

Source: NCEM Risk Management Tool

A map of historical tornado points of origin and paths can be seen below in **Figure 6.3.**

FIGURE 6.3: HISTORICAL TORNADO TRACKS IN THE HIGH-COUNTRY REGION



Source: NOAA

Thunderstorms

A probabilistic scenario was created to estimate building and population vulnerabilities in the High-Country region for the thunderstorm hazard. For this scenario, damages due to thunderstorm winds on a 50-year frequency event (return period) were analyzed. It is important to note that this data does not include damages caused by other remnants of thunderstorms, such as lightning or hail. The Risk Management Tool analyzed this information which has been reported below in **Table 6.10** and **Table 6.11**.

TABLE 6.10: BUILDING VULNERABILITY TO THUNDERSTORM WINDS IN THE HIGH-COUNTRY REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Alleghany County	**10,318**	**9,598**	**$4,786,761**	**623**	**$935,020**	**97**	**$205,151**	**10,318**	**$5,926,933**
Sparta	1,567	1,346	$372,302	183	$158,574	38	$40,059	1,567	$570,935
Unincorporated Area	8,751	8,252	$4,414,459	440	$776,446	59	$165,092	8,751	$5,355,998
Ashe County	**18632**	**16982**	**$6,796,373**	**1222**	**$2,242,103**	**425**	**$811,460**	**18629**	**$9,849,936**
Lansing	104	77	$12,094	20	$8,295	7	$1,253	104	$21,643
Jefferson	636	516	$149,905	84	$217,056	36	$49,754	636	$416,715
West Jefferson	838	586	$188,194	197	$107,855	54	$77,285	837	$373,334
Unincorporated Area	17,054	15,803	$6,446,180	921	$1,908,897	328	$683,168	17,052	$9,038,244
Watauga County	**17,814**	**29,400**	**$10,661,501**	**2,288**	**$5,151,459**	**360**	**$2,271,276**	**32,048**	**$18,084,236**
Beech Mountain	1,807	1,770	$384,054	51	$86,550	7	$36,129	1,828	$506,733
Blowing Rock	1,035	1,737	$524,609	148	$245,287	19	$13,885	1,904	$783,781
Boone	2,846	4,251	$2,229,446	700	$1,629,426	141	$1,828,853	5,092	$5,687,725
Seven Devils	25	444	$105,665	20	$31,002	1	$5,620	465	$142,287
Unincorporated Area	12,101	21,198	$7,417,727	1,369	$3,159,194	192	$386,789	22,759	$10,963,710
Wilkes County	**50,039**	**45,288**	**$20,947,089**	**3,150**	**$6,692,521**	**1,964**	**$4,153,255**	**50,402**	**$31,792,865**
North Wilkesboro	4,232	3,797	$1,151,713	600	$334,616	204	$248,358	4,601	$1,734,687
Ronda	319	288	$50,299	15	$31,031	16	$11,207	319	$92,537
Wilkesboro	4,712	3,885	$1,315,910	524	$422,914	297	$396,959	4,706	$2,135,782
Unincorporated Area	40,776	37,318	$18,429,167	2,011	$5,903,960	1,447	$3,496,731	40,776	$27,829,859
High Country Regional Total	**96,803**	**101,268**	**$43,191,724**	**7,283**	**$15,021,103**	**2,846**	**$7,441,142**	**111,397**	**$65,653,970**

Source: NCEM Risk Management Tool

TABLE 6.11: POPULATION VULNERABILITY TO THUNDERSTORM WINDS IN THE HIGH-COUNTRY REGION

Location	Elderly at Risk	Children at Risk	Total at Risk
Alleghany County	**2,301**	**580**	**11,129**
Sparta	545	138	2,637
Unincorporated Area	1,756	442	8,492
Ashe County	**5,495**	**1,449**	**27,159**
Lansing	32	8	158
Jefferson	326	86	1,613
West Jefferson	256	67	1,263
Unincorporated Area	4,881	1,288	24,125
Watauga County	**6,343**	**1,953**	**51,156**

Location	Elderly at Risk	Children at Risk	Total at Risk
Beech Mountain	40	12	315
Blowing Rock	172	54	1,378
Boone	2,524	777	20,367
Seven Devils	23	7	176
Unincorporated Area	3,584	1,103	28,920
Wilkes County	**11,768**	**3,986**	**69,364**
North Wilkesboro	1,385	469	8,165
Ronda	66	22	389
Wilkesboro	1,387	470	8,174
Unincorporated Area	8,930	3,025	52,636
High Country Regional Total	**25,907**	**7,968**	**158,808**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

It is assumed that all existing populations and future populations are at risk to the tornadoes/ thunderstorms hazard.

CRITICAL FACILITIES

All critical facilities should still be considered at-risk to damage should an event occur. A list of all individual critical facilities in the region can be found in **Table 6.26**.

6.5.3. Earthquakes

A probabilistic scenario was created to estimate building and population vulnerabilities in the High-Country region for the earthquake hazard with a 500-year frequency (return period). The Risk Management Tool analyzed this information which has been reported below in **Table 6.12** and **Table 6.13**.

TABLE 6.12: BUILDING VULNERABILITY TO THE EARTHQUAKE HAZARD IN THE HIGH-COUNTRY REGION

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Alleghany County	**10,330**	**9,610**	**$1,438,317**	**623**	**$1,074,464**	**97**	**$205,859**	**10,330**	**$2,718,639**
Sparta	1,567	1,346	$256,888	183	$445,565	38	$104,723	1,567	$807,175
Unincorporated Area	8,763	8,264	$1,181,429	440	$628,899	59	$101,136	8,763	$1,911,464
Ashe County	**18654**	**17002**	**$2,718,296**	**1223**	**$2,283,172**	**426**	**$777,858**	**18651**	**$5,779,326**
Lansing	104	77	$11,583	20	$11,051	7	$14,218	104	$36,852
Jefferson	636	516	$119,002	84	$401,137	36	$106,062	636	$626,202
West Jefferson	838	586	$177,308	197	$564,726	54	$135,946	837	$877,980
Unincorporated Area	17,076	15,823	$2,410,403	922	$1,306,258	329	$521,632	17,074	$4,238,292
Watauga County	**17,819**	**29,404**	**$5,922,924**	**2,289**	**$5,707,657**	**360**	**$1,468,677**	**32,053**	**$13,099,257**
Beech Mountain	1,807	1,770	$460,944	51	$126,172	7	$22,283	1,828	$609,399

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Blowing Rock	1,035	1,737	$531,158	148	$429,446	19	$68,453	1,904	$1,029,057
Boone	2,846	4,251	$1,170,854	700	$2,320,553	141	$943,546	5,092	$4,434,952
Seven Devils	25	444	$118,456	20	$77,999	1	$2,373	465	$198,828
Unincorporated Area	12,106	21,202	$3,641,512	1,370	$2,753,487	192	$432,022	22,764	$6,827,021
Wilkes County	**50,039**	**45,288**	**$5,916,202**	**3,150**	**$7,151,142**	**1,964**	**$3,125,832**	**50,402**	**$16,193,176**
North Wilkesboro	4,232	3,797	$582,274	600	$1,330,595	204	$465,795	4,601	$2,378,664
Ronda	319	288	$22,177	15	$60,955	16	$19,108	319	$102,239
Wilkesboro	4,712	3,885	$591,259	524	$1,747,055	297	$492,168	4,706	$2,830,483
Unincorporated Area	40,776	37,318	$4,720,492	2,011	$4,012,537	1,447	$2,148,761	40,776	$10,881,790
High Country Regional Total	**96,842**	**101,304**	**$15,995,739**	**7,285**	**$16,216,435**	**2,847**	**$5,578,226**	**111,436**	**$37,790,398**

Source: NCEM Risk Management Tool

TABLE 6.13: POPULATION VULNERABILITY TO THE EARTHQUAKE HAZARD IN THE HIGH-COUNTRY REGION

Location	Elderly at Risk	Children at Risk	Total at Risk
Alleghany County	**2304**	**581**	**11141**
Sparta	545	138	2,637
Unincorporated Area	1,759	443	8,504
Ashe County	**5501**	**1451**	**27189**
Lansing	32	8	158
Jefferson	326	86	1,613
West Jefferson	256	67	1,263
Unincorporated Area	4,887	1,290	24,155
Watauga County	**6344**	**1953**	**51161**
Beech Mountain	40	12	315
Blowing Rock	172	54	1,378
Boone	2,524	777	20,367
Seven Devils	23	7	176
Unincorporated Area	3,585	1,103	28,925
Wilkes County	**11,768**	**3,986**	**69,364**
North Wilkesboro	1,385	469	8,165
Ronda	66	22	389
Wilkesboro	1,387	470	8,174
Unincorporated Area	8,930	3,025	52,636
High Country Regional Total	**25,917**	**7,971**	**158,855**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY
It is assumed that all existing populations and future populations are at risk to the earthquake hazard.

CRITICAL FACILITIES
All critical facilities should still be considered at-risk to minor damage should an event occur. A list of all individual critical facilities in the region can be found in **Table 6.26**.

In conclusion, an earthquake could potentially impact all existing and future buildings, facilities, and populations in the High-Country region. Though minor earthquakes are often recorded but not felt, they may rattle breakables and cause minimal damage. Furthermore, major earthquakes have potential to damage structures. Severe impacts of earthquakes may result in debris clean-up, service disruption, building collapse, and fatalities. Specific vulnerabilities for assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available. Furthermore, mitigation actions to address earthquake vulnerability will be considered.

6.5.4. Geological (Landslide)

GIS analysis was used to complete the vulnerability assessment for landslides in the High-Country Region. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section 5: *Hazard Profiles*), county level tax parcel data, and GIS analysis. **Table 6.14** presents the potential at-risk property where available. All areas of the High-Country Region are identified as moderate or high incidence areas by the USGS landslide data. The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below.

TABLE 6.14: TOTAL POTENTIAL AT-RISK PARCELS FOR THE GEOLOGICAL (LANDSLIDE) HAZARD IN THE HIGH-COUNTRY REGION

Location	Number of Parcels at Risk		Number of Improvements at Risk		Total Value of Improvements at Risk ($)	
Incidence Level	**Moderate**	**High**	**Moderate**	**High**	**Moderate**	**High**
Alleghany County	**6,304**	**9,200**	**3,998**	**4,879**	**$381,079,210**	**$669,830,200**
Sparta	1,018	-	810	-	$34,993,400	$0
Unincorporated Area	5,286	9,200	3,188	4,879	$346,085,810	$669,830,200
Ashe County	**22,139**	**16,529**	**11,181**	**7,312**	**$1,135,578,500**	**$723,319,100**
Lansing	-	119	-	86	$0	$1,144,900
Jefferson	777	-	579	-	$26,544,700	$0
West Jefferson	-	-	-	-	$0	$0
Unincorporated Area	21,362	16,410	10,602	7,226	$1,109,033,800	$722,174,200
Watauga County	**2,867**	**33,607**	**1,665**	**19,134**	**$128,818,500**	**$2,014,860,400**
Beech Mountain	-	4,505	-	1,641	$0	$87,870,700
Blowing Rock	-	2,091	-	2,588	$0	$321,739,000
Boone	-	3,323	-	1,496	$0	$494,854,500
Seven Devils	-	657	-	304	$0	$20,005,600
Unincorporated Area	2,867	33,607	1,665	19,134	$128,818,500	$2,014,860,400

Location	Number of Parcels at Risk		Number of Improvements at Risk		Total Value of Improvements at Risk ($)	
Incidence Level	Moderate	High	Moderate	High	Moderate	High
Wilkes County	**-**	**46,437**	**-**	**29,522**	**$0**	**$2,108,404,000**
North Wilkesboro	-	2,076	-	1,496	$0	$86,681,420
Ronda	-	284	-	207	$0	$3,959,690
Wilkesboro	-	1,822	-	1,433	$0	$130,717,900
Unincorporated Area	-	46,437	-	29,522	$0	$2,108,404,000
High Country Regional Total	**31,310**	**105,773**	**16,844**	**60,847**	**$1,645,476,210**	**$5,516,413,700**

Source: United States Geological Survey, Local governments

SOCIAL VULNERABILITY

Given moderate to high susceptibility across the entire High-Country Region, it is assumed that a moderate amount of population is at risk.

CRITICAL FACILITIES

There are 35 critical facilities located in a high susceptibility area, including the following: 9 Medical facilities, 11 fire/EMS stations, 5 police stations, and 10 public schools. The remaining critical facilities are located in low incidence areas. A list of specific critical facilities and their associated risk can be found in **Table 6.26** at the end of this section.

In conclusion, a landslide has the potential to impact many existing and future buildings, facilities, and populations in the High-Country Region, though some areas are at a higher risk than others due to a variety of factors. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for High Country assets will be greatly dependent on their individual design and the mitigation measures in place, where appropriate. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates if data becomes available.

6.5.5 Flooding

Historical evidence indicates that the High-Country Region is susceptible to flood events. A total of 87 flood events have been reported by the National Centers for Environmental Information since 1993, resulting in over $1.69 million (2019 dollars) in damages.

In order to assess flood risk, a GIS-based analysis was used to estimate exposure to flood events using Digital Flood Insurance Rate Map (DFIRM) data in combination with local tax assessor records for each of the High-Country counties. The determination of assessed value at-risk (exposure) was calculated using GIS analysis by summing the total assessed building values for only those improved properties that were confirmed to be located within an identified floodplain. **Table 6.15** presents the potential at-risk property. Both the number of parcels and the approximate value are presented.

TABLE 6.15: ESTIMATED EXPOSURE OF PARCELS TO THE FLOODING HAZARD

Location	1% Annual Chance of Flooding (100-year)			0.2% Annual Chance of Flooding (500-year)		
	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings	Approx. Number of Parcels	Approx. Number of Improved Buildings	Approx. Improved Value of Buildings
Alleghany County	**874**	**497**	**$77,645,100**	**940**	**518**	**$80,217,300**
Sparta	112	71	$13,719,400	114	73	$13,908,600
Unincorporated Area	762	426	$63,925,700	826	445	$66,308,700
Ashe County	**5437**	**2875**	**$341,697,600**	**5760**	**3045**	**$370,249,800**
Lansing	54	43	$3,629,100	62	50	$3,962,200
Jefferson	46	32	$4,158,100	48	34	$4,299,300
West Jefferson	56	46	$9,568,200	63	51	$18,247,000
Unincorporated Area	5281	2754	$324,342,200	5587	2910	$343,741,300
Watauga County	**3421**	**2192**	**$761,630,800**	**3725**	**2421**	**$874,104,400**
Beech Mountain	0	0	$0	0	0	$0
Blowing Rock	104	59	$23,307,100	111	65	$24,826,100
Boone	471	335	$389,125,800	553	408	$477,552,100
Seven Devils	0	0	$0	0	0	$0
Unincorporated Area	2846	1798	$349,197,900	3061	1948	$371,726,200
Wilkes County	**4749**	**2759**	**$482,143,880**	**4993**	**2926**	**$513,917,860**
North Wilkesboro	273	178	$75,590,790	338	223	$88,955,200
Ronda	17	14	$1,400,440	27	22	$1,738,970
Wilkesboro	176	122	$88,500,090	214	149	$97,249,450
Unincorporated Area	4283	2445	$316,652,560	4414	2532	$325,974,240
High Country Regional Total	**14,481**	**8,323**	**$1,663,117,380**	**15,418**	**8,910**	**$1,838,489,360**

Source: FEMA DFIRM

To assess flood risk, the NCEM Risk Management Tool (RMT) analyzed buildings located in the 1 percent chance of annual floodplains. The buildings are assessed by the type of building (commercial, residential, or public) and also assesses Pre-Firm buildings, or structures built before flood code regulations were installed. This data is shown by jurisdiction in **Table 6.16**.

TABLE 6.16: BUILDING VULNERABILITY FOR THE 100-YEAR FLOODPLAINS IN THE HIGH-COUNTRY REGION

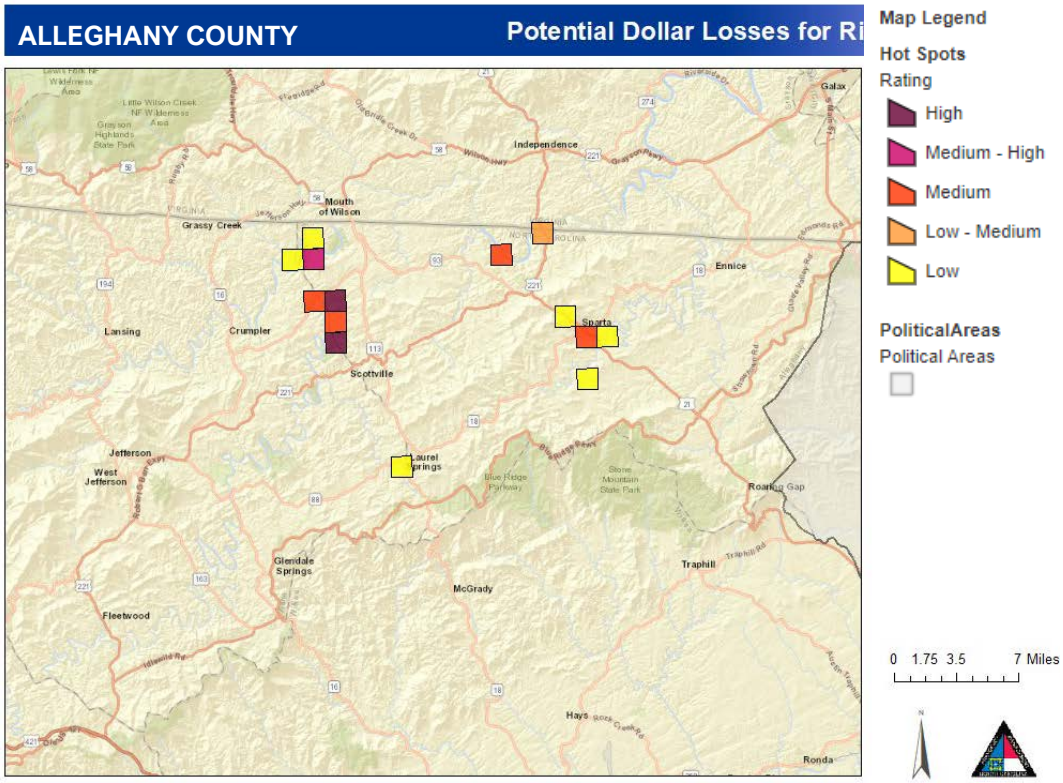
Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Alleghany County	**34**	**33**	**$331,245**	**1**	**$608**	**0**	**$0**	**34**	**$331,853**
Sparta	15	14	$71,597	1	$608	0	$0	15	$72,205
Unincorporated Area	19	19	$259,648	0	$0	0	$0	19	$259,648
Ashe County	**707**	**581**	**$5,331,788**	**111**	**$2,576,565**	**15**	**$341,221**	**707**	**$8,249,575**
Lansing	28	15	$202,194	11	$307,239	2	$107,094	28	$616,527
Jefferson	9	4	$75,305	5	$148,980	0	$0	9	$224,285

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
West Jefferson	43	7	$57,087	33	$1,239,880	3	$41,536	43	$1,338,504
Unincorporated Area	627	555	$4,997,202	62	$880,466	10	$192,591	627	$6,070,259
Watauga County	**541**	**870**	**$15,975,816**	**113**	**$6,494,565**	**19**	**$3,026,987**	**1,002**	**$25,497,367**
Beech Mountain	0	0	$0	0	$0	0	$0	0	$0
Blowing Rock	13	6	$60,120	9	$255,766	0	$0	15	$315,886
Boone	186	253	$9,886,776	72	$4,887,406	7	$1,321,624	332	$16,095,806
Seven Devils	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	342	611	$6,028,920	32	$1,351,393	12	$1,705,363	655	$9,085,675
Wilkes County	**421**	**285**	**$2,000,897**	**121**	**$7,100,185**	**16**	**$1,336,892**	**422**	**$10,437,976**
North Wilkesboro	65	6	$23,449	59	$3,230,933	4	$192,563	69	$3,446,946
Ronda	2	1	$35,854	1	$3,671	0	$0	2	$39,526
Wilkesboro	45	11	$65,047	24	$3,150,343	7	$618,528	42	$3,833,919
Unincorporated Area	309	267	$1,876,547	37	$715,238	5	$525,801	309	$3,117,585
High Country Regional Total	**1,703**	**1,769**	**$23,639,746**	**346**	**$16,171,923**	**50**	**$4,705,100**	**2,165**	**$44,516,771**

Source: NCEM Risk Management Tool

Figure 6.4 below displays visual hotspots of potential dollar losses for the flood hazard in Alleghany County. Based on the photo, most hot spots are in an area with low vulnerability.

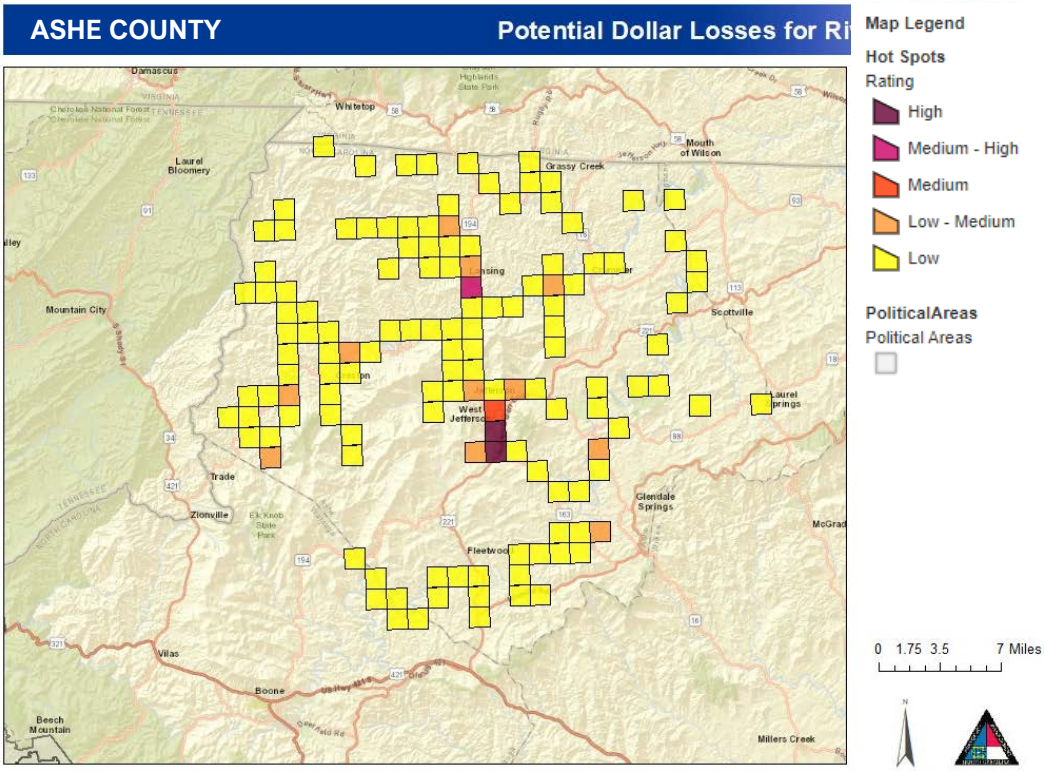
FIGURE 6.4: POTENTIAL DOLLAR LOSSES FOR FLOODING IN ALLEGHANY COUNTY



Source: NCEM Risk Management Tool

The same information for Ashe County is presented below in **Figure 6.6.**

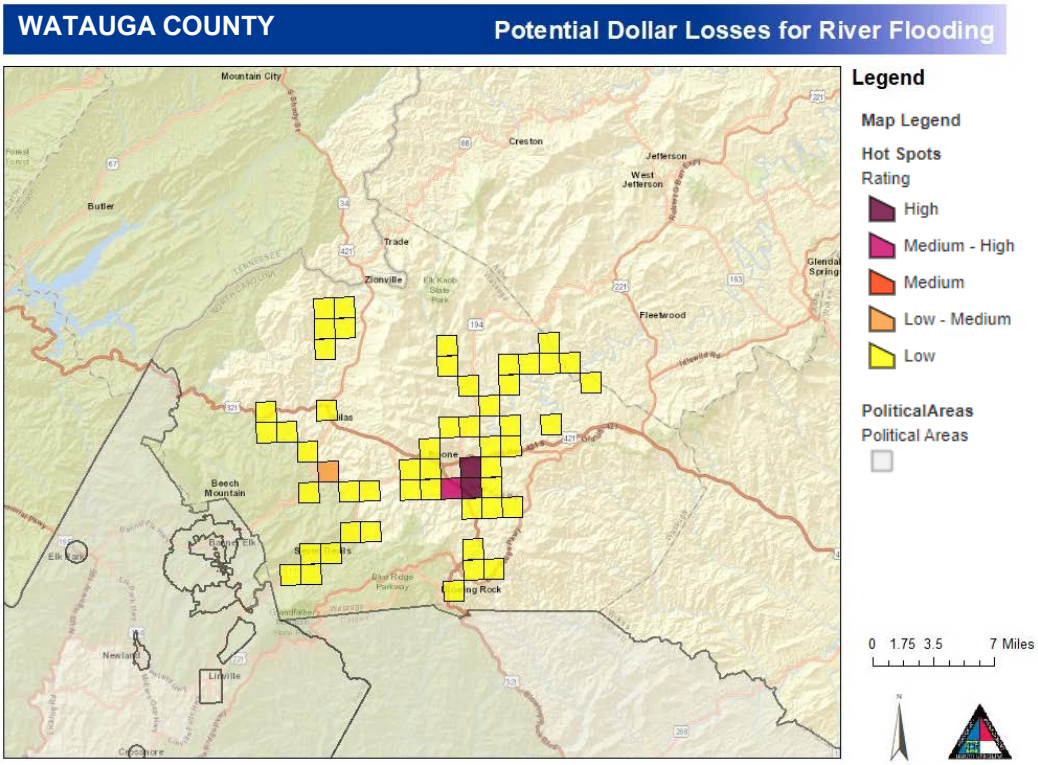
FIGURE 6.6: POTENTIAL DOLLAR LOSSES FOR FLOODING IN ASHE COUNTY



Source: NCEM Risk Management Tool

The same information for Watauga County is presented below in **Figure 6.6.**

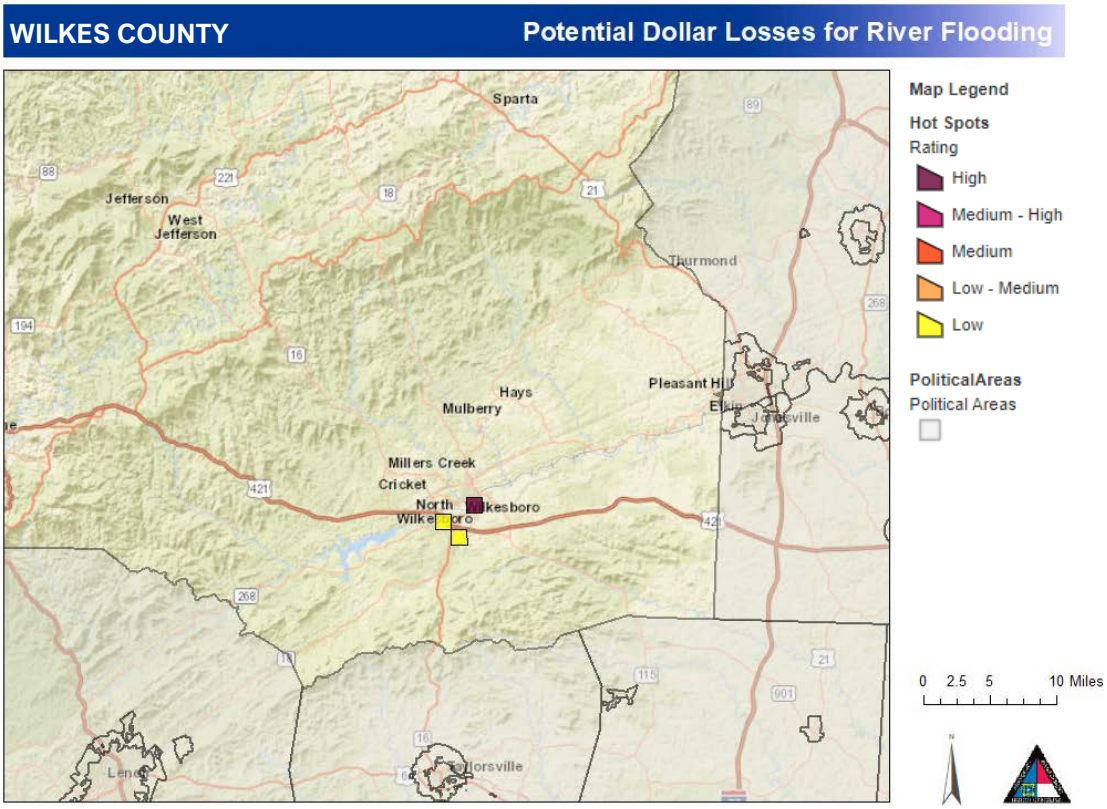
FIGURE 6.6: POTENTIAL DOLLAR LOSSES FOR FLOODING IN WATAUGUA COUNTY



Source: NCEM Risk Management Tool

The same information for Wilkes County is presented below in **Figure 6.6.**

FIGURE 6.6: POTENTIAL DOLLAR LOSSES FOR FLOODING IN WILKES COUNTY



Source: NCEM Risk Management Tool

Table 6.17 assesses the vulnerability of the region's population. This data is also from the RMT and analyzes the populations of elderly and children living at risk to the 1 percent annual flooding.

TABLE 6.17: POPULATION VULNERABILITY FOR 100-YEAR FLOODPLAINS IN THE HIGH-COUNTRY REGION

Incidence Level	Elderly at Risk	Children at Risk	Total at Risk
Alleghany County	**10**	**2**	**46**
Sparta	6	1	27
Unincorporated Area	4	1	19
Ashe County	**183**	**49**	**907**
Lansing	6	2	31
Jefferson	3	1	15
West Jefferson	3	1	15
Unincorporated Area	171	45	846
Watauga County	**253**	**78**	**2,040**
Beech Mountain	0	0	0
Blowing Rock	1	0	5

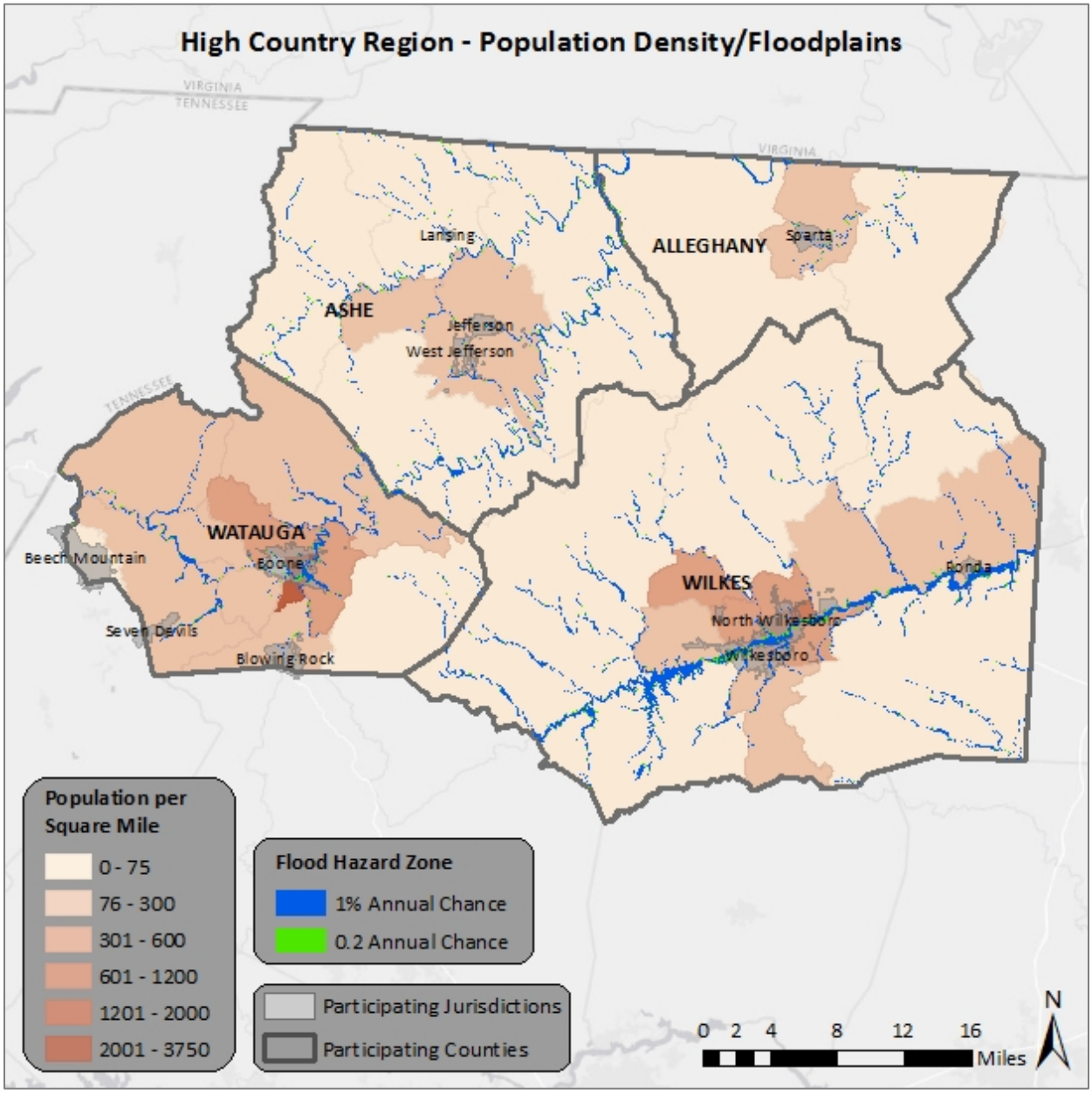
Incidence Level	Elderly at Risk	Children at Risk	Total at Risk
Boone	149	46	1,205
Seven Devils	0	0	0
Unincorporated Area	103	32	830
Wilkes County	**70**	**24**	**413**
North Wilkesboro	2	1	13
Ronda	0	0	1
Wilkesboro	4	1	23
Unincorporated Area	64	22	376
High Country Regional Total	**516**	**153**	**3,406**

Source: NCEM Risk Management Tool

SOCIAL VULNERABILITY

A national Census has not been conducted since 2010; therefore, 2010 Census tract level population counts are outdated for this update. However, population estimates from the US Census Bureau as of July 1, 2017 were available at a jurisdictional level. This data was analyzed to present at-risk populations to the flooding hazard in the High-Country region and can be seen below in **Figure 6.11**.

FIGURE 6.11: POPULATION DENSITY NEAR FLOODPLAINS



Source: FEMA DFIRM, US Census Bureau

CRITICAL FACILITIES

The critical facility analysis revealed that there are 19 critical facilities located in the High Country Region's 1.0-percent and 2.0-percent annual chance floodplain based on FEMA DFIRM boundaries and GIS analysis. (As previously noted, this analysis does not consider building elevation, which may negate risk.) These facilities include 1 Public School, 10 Medical Facilities, and 8 Fire/EMS Stations. A list of specific critical facilities and their associated risk can be found in **Table 6.26** at the end of this section.

In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in the High-Country Region, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain

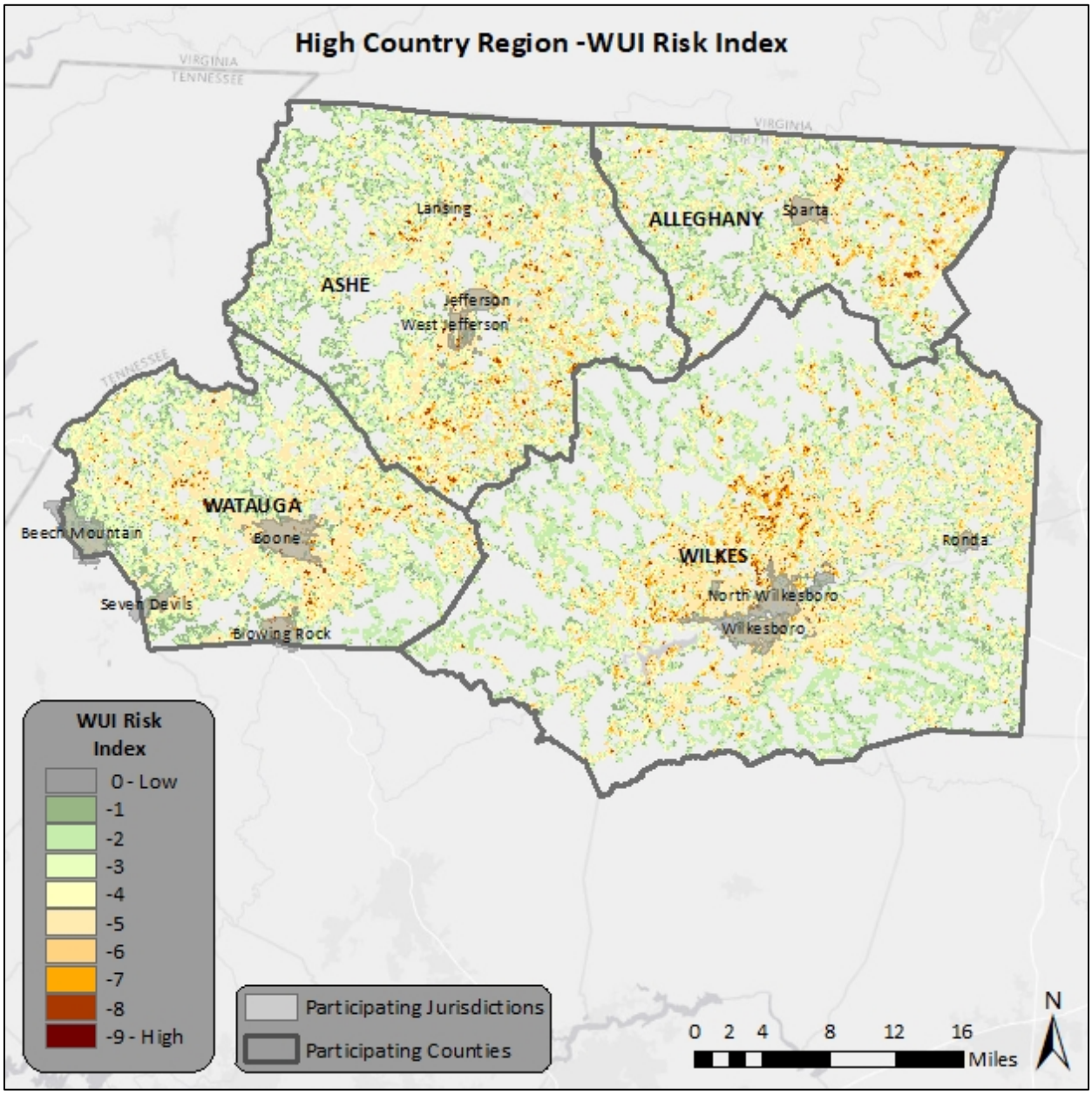
boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations should be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

6.5.6 Wildfires

Although historical evidence indicates that the High-Country Region is susceptible to wildfire events, there are few reports of damage. Therefore, it is difficult to calculate a reliable annualized loss figure. Annualized loss is considered negligible though it should be noted that a single event could result in significant damages throughout the region.

To estimate exposure to wildfire, the Wildland Urban Interface (WUI) Risk Index for the region was obtained through the Southern Wildfire Risk Assessment. The WUI uses a Response Function modeling approach and rates the potential impact of a wildfire on people and their homes. The index ranges from -1 to -9, with -9 being the most negative impact. For example, an area with high housing density and high flame lengths are rated -9, while an area with low housing density and low flame lengths are rated -1. At-risk areas fall within the range of -7 to -9. This index was layered with parcel data using GIS analysis. **Figure 6.12** shows the WUI Risk Index for the region below.

FIGURE 6.12: WILDLAND URBAN INTERFACE RISK INDEX



Source: Southern Wildfire Risk Assessment

The region contains some lands where the value falls into the at-risk category, in particular Yancey and McDowell County, while areas such as Mitchell County have less land labeled as at-risk. Overall, there is a high-to-medium wildfire ignition density risk index in the region which is somewhat than other areas in North Carolina.

SOCIAL VULNERABILITY

Even though not all areas have equal vulnerability, there is some susceptibility across the entire High-Country Region. It is assumed that the total population is at risk to the wildfire hazard. Determining the exact number of people in certain wildfire zones is difficult with existing data and could be misleading.

CRITICAL FACILITIES

Few of the High-Country Region critical facilities are in the at-risk area (-7 or higher) for wildfires. **Table 6.18** shows the results of the GIS analysis.

TABLE 6.18: CRITICAL FACILITIES IN THE AT-RISK WUI RISK INDEX AREA

Location	Number of At-Risk Critical Facilities
Alleghany County	2
Ashe County	3
Watauga County	1
Wilkes County	4
High Country Regional Total	**10**

Source: Southern Wildfire Risk Assessment, Local governments

Additional information was provided through the NCEM Risk Management Tool (RMT). This data can be seen in below in **Table 6.19** and **Table 6.20**.

TABLE 6.19: BUILDING VULNERABILITY TO WILDFIRE HAZARDS

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Alleghany County									
Sparta	1,419	1,237	$211,821,302	152	$159,409,239	30	$53,524,813	1,419	$424,755,354
Unincorporated Area	5,357	5,054	$791,003,381	263	$207,338,701	40	$49,274,601	5,357	$1,047,616,683
Ashe County									
Lansing	83	68	$8,169,922	11	$2,444,956	4	$5,162,901	83	$15,777,780
Jefferson	407	327	$61,828,378	62	$135,100,281	18	$21,385,072	407	$218,313,731
West Jefferson	70	49	$18,453,720	21	$52,653,364	0	$0	70	$71,107,084
Unincorporated Area	8,762	8,116	$1,107,755,312	494	$353,509,184	150	$131,922,657	8,760	$1,593,187,153
Watauga County									
Beech Mountain	467	471	$80,087,494	10	$13,173,549	4	$1,742,046	485	$95,003,089
Blowing Rock	326	978	$207,953,180	68	$83,694,665	8	$10,981,608	1,054	$302,629,453
Boone	1,337	2,435	$402,956,421	318	$463,363,334	65	$259,966,404	2,818	$1,126,286,160
Seven Devils	21	244	$40,637,514	11	$15,336,768	0	$0	255	$55,974,282
Unincorporated Area	8,545	14,890	$1,914,084,714	967	$788,601,538	132	$106,762,574	15,989	$2,809,448,826
Wilkes County									
North Wilkesboro	1,600	1,498	$252,721,853	99	$157,666,747	67	$72,047,810	1,664	$482,436,411
Ronda	198	181	$14,791,761	4	$991,619	13	$7,636,936	198	$23,420,316
Wilkesboro	1,079	937	$122,311,651	74	$128,340,257	68	$54,155,929	1,079	$304,807,837
Unincorporated Area	18,712	17,159	$2,325,220,349	802	$826,461,765	751	$704,914,425	18,712	$3,856,596,539
High Country Regional Total	**48,383**	**53,644**	**$7,559,796,952**	**3,356**	**$3,388,085,967**	**1,350**	**$1,479,477,776**	**58,350**	**$ 12,427,360,698**

Source: NCEM Risk Management Tool

TABLE 6.20: POPULATION VULNERABILITY TO WILDFIRE HAZARD

Incidence Level	Elderly at Risk	Children at Risk	Total at Risk
Alleghany County			
Sparta	500	127	2,419
Unincorporated Area	1,077	271	5,208
Ashe County			
Lansing	28	7	140
Jefferson	206	54	1,021
West Jefferson	22	6	109
Unincorporated Area	2,505	661	12,381
Watauga County			
Beech Mountain	11	3	84
Blowing Rock	96	30	771
Boone	1,441	444	11,629
Seven Devils	13	4	96
Unincorporated Area	2,515	774	20,289
Wilkes County			
North Wilkesboro	546	185	3,217
Ronda	41	14	244
Wilkesboro	334	113	1,971
Unincorporated Area	4,105	1,391	24,197
High Country Regional Total	13,440	4,084	83,776

Source: NCEM Risk Management Tool

6.5.7 Hazardous Substances

Although historical evidence and existing Toxic Release Inventory sites indicate that the High-Country Region is susceptible to hazardous substance events, there are few reports of damage. Therefore, a calculated annualized loss figure may not be completely reliable.

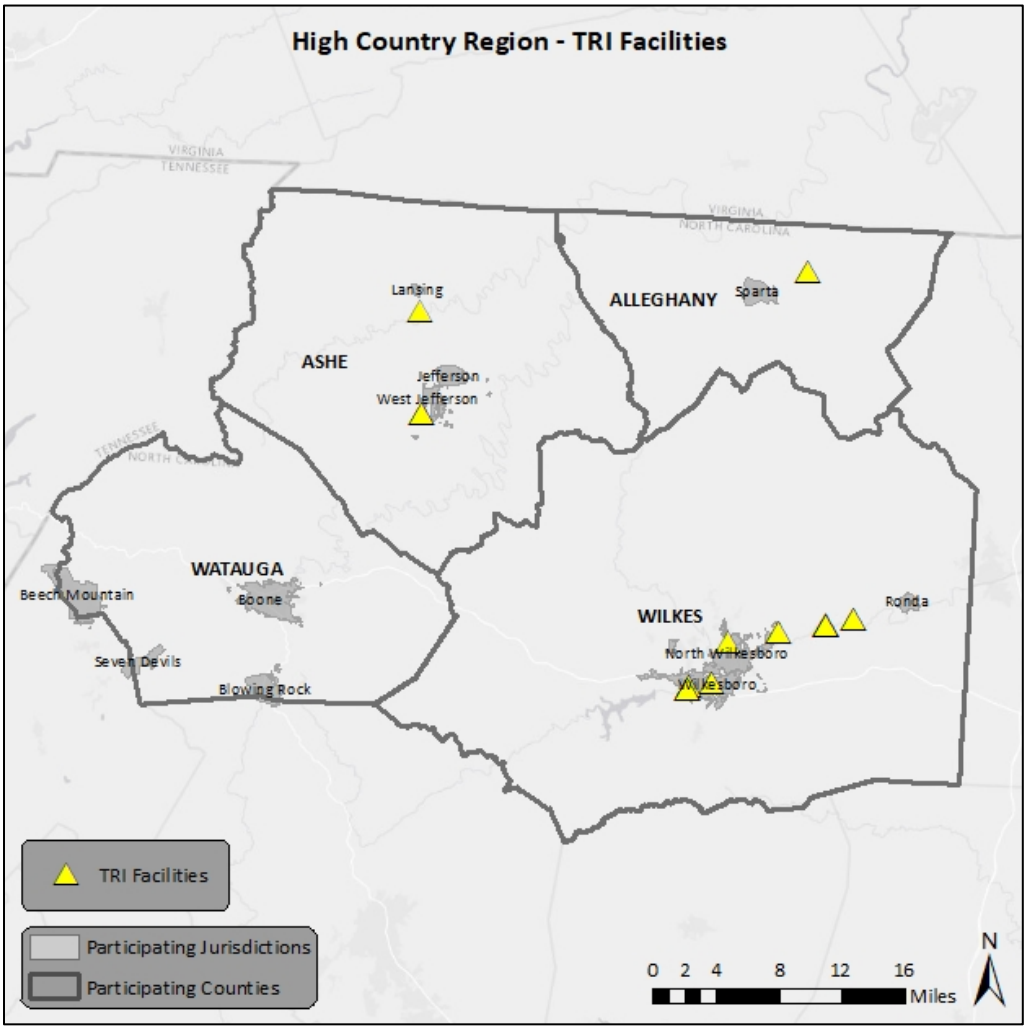
Most hazardous substance incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. In a hazardous substance incident, solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers. Weather conditions will directly affect how the hazard develops. Certain chemicals may travel through the air or water, affecting a much larger area than the point of the incidence itself. Non-compliance with fire and building codes, as well as failure to maintain existing fire and containment features, can substantially increase the damage from a hazardous materials release. The duration of a hazardous materials incident can range from hours to days. Warning time is minimal to none.

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels[4]. In both scenarios, two sizes of buffers—0.5 mile and 1 mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and

[4] This type of analysis will likely yield inflated results (generally higher than what is actually reported after an actual event).

secondary. Primary and secondary impact sites were selected based on guidance from FEMA 426, Reference Manual to Mitigate Potential Terrorist Attacks against Buildings and engineering judgment. For the fixed site analysis, geo-referenced TRI listed toxic sites in the High-Country Region, along with buffers, were used for analysis as shown in **Figure 6.13.** For the mobile analysis, the major roads (Interstate highway, U.S. highway, and State highway) and railroads, where hazardous materials are primarily transported that could adversely impact people and buildings, were used for the GIS buffer analysis. **Figure 6.14** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table 6.21** (fixed sites), **Table 6.22** (mobile road sites) and **Table 6.23** (mobile railroad sites)[5].

FIGURE 6.13: TOXIC RELEASE INVENTORY (TRI) FACILITIES IN THE HIGH-COUNTRY REGION



Source: EPA

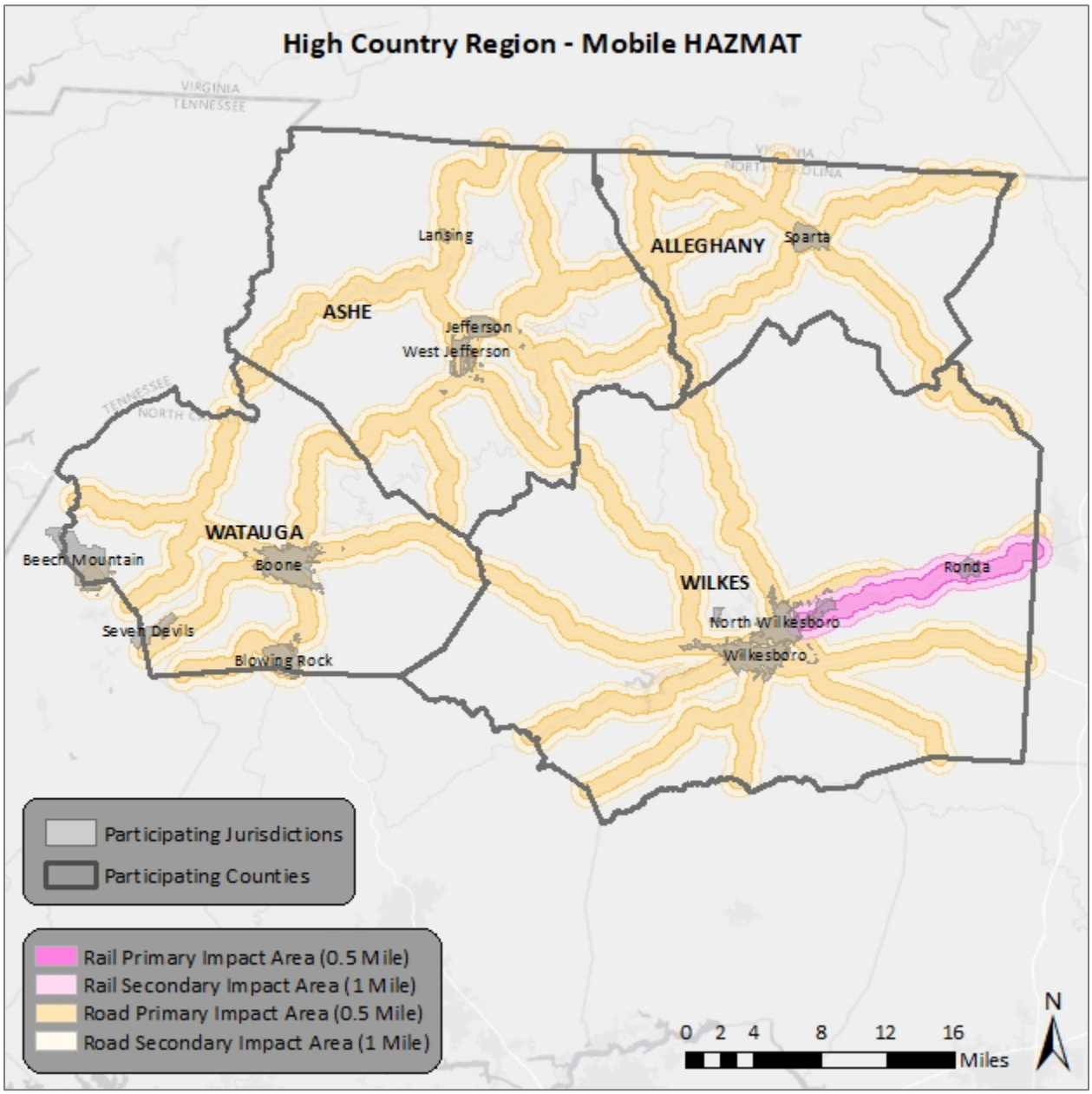
[5] Note that parcels included in the 1-mile analysis are also included in the 0.5-mile analysis.

TABLE 6.21: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (FIXED SITES) IN THE HIGH-COUNTRY REGION

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Alleghany County	**69**	**37**	**$7,996,100**	**177**	**100**	**$14,081,000**
Sparta	-	-	$0	-	-	$0
Unincorporated Area	69	37	$7,996,100	177	100	$14,081,000
Ashe County	**487**	**346**	**$56,851,300**	**1,587**	**1,030**	**$154,508,800**
Lansing	-	-	$0	-	-	$0
Jefferson	-	-	$0	-	-	$0
West Jefferson	18	9	$11,597,400	230	155	$31,428,900
Unincorporated Area	469	337	$45,253,900	1,357	875	$123,079,900
Watauga County	**-**	**-**	**$0**	**-**	**-**	**$0**
Beech Mountain	-	-	$0	-	-	$0
Blowing Rock	-	-	$0	-	-	$0
Boone	-	-	$0	-	-	$0
Seven Devils	-	-	$0	-	-	$0
Unincorporated Area	-	-	$0	-	-	$0
Wilkes County	**1,383**	**1,021**	**$260,947,150**	**3,935**	**2,857**	**$626,712,620**
North Wilkesboro	253	194	$42,651,300	918	661	$124,565,400
Ronda	-	-	$0	-	-	$0
Wilkesboro	670	504	$167,114,780	1,401	1,107	$321,843,940
Unincorporated Area	460	323	$51,181,070	1,616	1,089	$180,303,280
High Country Regional Total	**1,939**	**1,404**	**$325,794,550**	**5,699**	**3,987**	**$795,302,420**

Source: EPA, Local governments

FIGURE 6.14: MOBILE HAZMAT BUFFER ZONES IN THE HIGH-COUNTRY REGION



Source: NC Department of Transportation

TABLE 6.22: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (MOBILE ANALYSIS – ROAD) IN THE HIGH-COUNTRY REGION

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Alleghany County	**6,088**	**3,917**	**$542,596,400**	**6,088**	**3,917**	**$542,596,400**
Sparta	1,018	810	$146,171,050	1,018	810	$146,171,050
Unincorporated Area	5,070	3,107	$396,425,350	5,070	3,107	$396,425,350
Ashe County	**15,570**	**8,281**	**$1,170,364,200**	**15,570**	**8,281**	**$1,170,364,200**
Lansing	119	86	$6,347,300	119	86	$6,347,300
Jefferson	731	540	$97,318,400	731	540	$97,318,400
West Jefferson	743	562	$92,450,700	743	562	$92,450,700
Unincorporated Area	13,977	7,093	$974,247,800	13,977	7,093	$974,247,800
Watauga County	**20,252**	**13,005**	**$3,596,078,618**	**20,252**	**13,005**	**$3,596,078,618**
Beech Mountain	1,120	593	$119,616,700	1,120	593	$119,616,700
Blowing Rock	1,901	1,343	$519,683,590	1,901	1,343	$519,683,590
Boone	3,021	2,375	$1,105,630,308	3,021	2,375	$1,105,630,308
Seven Devils	160	86	$18,808,600	160	86	$18,808,600
Unincorporated Area	14,050	8,608	$1,832,339,420	14,050	8,608	$1,832,339,420
Wilkes County	**19,696**	**13,594**	**$1,842,001,300**	**19,696**	**13,594**	**$1,842,001,300**
North Wilkesboro	1,775	1,340	$252,014,710	1,775	1,340	$252,014,710
Ronda	232	172	$10,824,020	232	172	$10,824,020
Wilkesboro	1,705	1,350	$362,007,570	1,705	1,350	$362,007,570
Unincorporated Area	15,984	10,732	$1,217,155,000	15,984	10,732	$1,217,155,000
High Country Regional Total	**61,606**	**38,797**	**$7,151,040,518**	**61,606**	**38,797**	**$7,151,040,518**

Source: NC Department of Transportation, Local Governments

TABLE 6.23: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (MOBILE ANALYSIS – RAILROAD) IN THE HIGH-COUNTRY REGION

Location	0.5 Mile Buffer			1.0 Mile Buffer		
	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value	Approx. Number of Parcels	Approx. Number Improved	Approx. Improved Value
Alleghany County	**0**	**0**	**$0**	**0**	**0**	**$0**
Sparta	0	0	$0	0	0	$0
Unincorporated Area	0	0	$0	0	0	$0
Ashe County	**0**	**0**	**$0**	**0**	**0**	**$0**
Lansing	0	0	$0	0	0	$0
Jefferson	0	0	$0	0	0	$0
West Jefferson	0	0	$0	0	0	$0
Unincorporated Area	0	0	$0	0	0	$0
Watauga County	**0**	**0**	**$0**	**0**	**0**	**$0**
Beech Mountain	0	0	$0	0	0	$0
Blowing Rock	0	0	$0	0	0	$0
Boone	0	0	$0	0	0	$0
Seven Devils	0	0	$0	0	0	$0
Unincorporated Area	0	0	$0	0	0	$0
Wilkes County	**991**	**627**	**$85,934,330**	**2895**	**1908**	**$205,006,740**
North Wilkesboro	22	10	$3,250,730	204	127	$28,814,690
Ronda	217	163	$10,342,170	284	207	$12,292,750
Wilkesboro	0	0	$0	0	0	$0
Unincorporated Area	752	454	$72,341,430	2407	1574	$163,899,300
High Country Regional Total	**991**	**627**	**$85,934,330**	**2895**	**1908**	**$205,006,740**

Source: NC Department of Transportation, Local Governments

SOCIAL VULNERABILITY

Given high susceptibility across the entire High-Country Region, it is assumed that the total population is at risk to hazardous materials incidents. It should be noted that areas of population concentration may be at an elevated risk due to a greater burden to evacuate population quickly.

CRITICAL FACILITIES

Fixed Site Analysis:

The critical facility analysis for fixed TRI sites revealed that there are 14 facilities located in a HAZMAT risk zone. The primary impact zone (0.5-mile buffer) includes 1 facility in the region, while the remaining facilities are in the secondary, 1-mile zone. A list of specific critical facilities and their associated risk can be found in **Table 6.26** at the end of this section.

Mobile Analysis:

The critical facility analysis for road and railroad transportation corridors revealed that there are 72 critical facilities located in the primary (0.5 mile) mobile HAZMAT buffer areas for roads and railroads throughout the region. Although this is a worst-case scenario model, it indicates that most of the critical facilities in the High-Country region are vulnerable to a potential mobile HAZMAT incident. Additionally,

there are 75 critical facilities located in the secondary (1 mile) buffer area of both roads and railroads, accounting for approximately 79 percent of the total number of critical facilities in the region. This may be the result of many critical facilities being located near major roadways for ease of access, but it is nonetheless important to recognize what a large percentage of critical facilities in the region are located in the smaller buffer area. A list of specific critical facilities and their associated risk can be found in **Table 6.26** at the end of this section.

In conclusion, a hazardous material incident has the potential to impact many existing and future buildings, critical facilities, and populations in the High-Country Region. Those areas in a primary buffer are at the highest risk, though all areas carry some vulnerability due to variations in conditions that could alter the impact area such direction and speed of wind, volume of release, etc.

6.6 CONCLUSIONS ON HAZARD VULNERABILITY

The results of this vulnerability assessment are useful in at least three ways:

- Improving our understanding of the risk associated with the natural hazards in the High-Country region through better understanding of the complexities and dynamics of risk, how levels of risk can be measured and compared, and the myriad of factors that influence risk. An understanding of these relationships is critical in making balanced and informed decisions on managing the risk.
- Providing a baseline for policy development and comparison of mitigation alternatives. The data used for this analysis presents a current picture of risk in the High-Country Region. Updating this risk "snapshot" with future data will enable comparison of the changes in risk with time. Baselines of this type can support the objective analysis of policy and program options for risk reduction in the region.
- Comparing the risk among the natural hazards addressed. The ability to quantify the risk to all these hazards relative to one another helps in a balanced, multi-hazard approach to risk management at each level of governing authority. This ranking provides a systematic framework to compare and prioritize the very disparate natural hazards that are present in the High-Country Region. This final step in the risk assessment provides the necessary information for local officials to craft a mitigation strategy to focus resources on only those hazards that pose the most threat to Alleghany, Ashe, Watauga, and Wilkes counties.

Exposure to hazards can be an indicator of vulnerability. Economic exposure can be identified through locally assessed values for improvements (buildings), and social exposure can be identified by estimating the population exposed to each hazard. This information is especially important for decision-makers to use in planning for evacuation or other public safety related needs.

The types of assets included in these analyses include all building types in the participating jurisdictions. Specific information about the types of assets that are vulnerable to the identified hazards is included in each hazard subsection (for example, all building types are considered at risk to the winter storm hazard and commercial, residential, and government owned facilities are at risk to repetitive flooding, etc).

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to natural hazards including drought, hurricane and coastal hazards, tornadoes/ thunderstorms, and severe winter weather. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table 6.24** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**").

Table 6.24 Critical Facility Vulnerability in the High Country Region

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Alleghany County Emergency Management	EOC	X	X	X	X	X	X				X				X	X		
Alleghany County Emergency Medical Services	EMS	X	X	X	X	X	X				X				X	X		
Alleghany County Rescue Squad Inc.	EMS	X	X	X	X	X	X				X				X	X		
Cherry Lane Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X		X			X	X		
Laurel Springs Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X					X	X		
Piney Creek Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X					X	X		
Cherry Lane Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X		X			X	X		
Glade Creek Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X								
Laurel Springs Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X					X	X		
Piney Creek Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X					X	X		
Sparta-Alleghany Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X				X				X	X		
Alleghany County Sheriffs Department / Alleghany County Jail	Law Enforcement	X	X	X	X	X	X				X				X	X		
National Park Service - Blue Ridge Parkway - Rangers Office	Law Enforcement	X	X	X	X	X	X			X								
Sparta Police Department	Law Enforcement	X	X	X	X	X	X				X				X	X		
Stone Mountains State Park Rangers	Law Enforcement	X	X	X	X	X	X			X								
Alleghany Assisted Living	Medical Facility	X	X	X	X	X	X				X				X	X		
Alleghany Memorial Hospital	Medical Facility	X	X	X	X	X	X				X				X	X		
Alleghany Memorial Hospital Community Health Service	Medical Facility	X	X	X	X	X	X				X				X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Generations Home Health Agency	Medical Facility	X	X	X	X	X	X				X				X	X		
High Country Health Care System	Medical Facility	X	X	X	X	X	X				X				X	X		
Hospice Of Alleghany	Medical Facility	X	X	X	X	X	X				X				X	X		
New River Behavioral Healthcare - Outpatient Facility	Medical Facility	X	X	X	X	X	X				X				X	X		
New River Cottage, Inc.	Medical Facility	X	X	X	X	X	X				X				X	X		
Samuel C. Evans Jr. Group Home	Medical Facility	X	X	X	X	X	X				X				X	X		
Services Unlimited	Medical Facility	X	X	X	X	X	X				X				X	X		
Substance Abuse Drop-In Center	Medical Facility	X	X	X	X	X	X				X				X	X		
Sunbridge Care & Rehabilitation Of Alleghany	Medical Facility	X	X	X	X	X	X				X				X	X		
Yadkin Valley Extended Services, Inc	Medical Facility	X	X	X	X	X	X				X				X	X		
Alleghany High	Public School	X	X	X	X	X	X				X				X	X		
Glade Creek Elementary	Public School	X	X	X	X	X	X			X								
Piney Creek Elementary	Public School	X	X	X	X	X	X			X					X	X		
Sparta Elementary	Public School	X	X	X	X	X	X				X				X	X		
Ashe County Emergency Management	EOC	X	X	X	X	X	X				X				X	X		
Ashe County Rescue Squad Inc.	EMS	X	X	X	X	X	X				X				X	X		
Blue Ridge Medical Transport Inc.	EMS	X	X	X	X	X	X				X				X	X		
Fleetwood Volunteer Fire And Rescue	EMS	X	X	X	X	X	X			X					X	X		
Glendale Springs Volunteer Fire Department	EMS	X	X	X	X	X	X			X					X	X		
Helton Ambulance Service	EMS	X	X	X	X	X	X		X	X					X	X		
Jefferson Volunteer Fire Department	EMS	X	X	X	X	X	X				X				X	X		
Lansing Volunteer Fire And Rescue Inc.	EMS	X	X	X	X	X	X	X	X	X					X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
New River Volunteer Fire And Rescue	EMS	X	X	X	X	X	X				X	X			X	X		
Pond Mountain Volunteer Fire And Rescue	EMS	X	X	X	X	X	X	X	X	X								
Warrensville Volunteer Fire And Rescue	EMS	X	X	X	X	X	X				X				X	X		
West Jefferson Volunteer Fire Department	EMS	X	X	X	X	X	X				X			X	X	X		
Creston Volunteer Fire Department	Fire Stations	X	X	X	X	X	X				X				X	X		
Fleetwood Volunteer Fire And Rescue	Fire Stations	X	X	X	X	X	X			X					X	X		
Glendale Springs Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		
Jefferson Volunteer Fire Department	Fire Stations	X	X	X	X	X	X				X				X	X		
Lansing Volunteer Fire And Rescue Inc.	Fire Stations	X	X	X	X	X	X	X	X	X					X	X		
New River Volunteer Fire And Rescue	Fire Stations	X	X	X	X	X	X				X	X			X	X		
Pond Mountain Volunteer Fire And Rescue	Fire Stations	X	X	X	X	X	X	X	X	X								
Warrensville Volunteer Fire And Rescue	Fire Stations	X	X	X	X	X	X				X				X	X		
West Jefferson Volunteer Fire Department	Fire Stations	X	X	X	X	X	X				X			X	X	X		
Ashe County Sheriffs Department	Law Enforcement	X	X	X	X	X	X				X				X	X		
Ashe Memorial Hospital Police Department	Law Enforcement	X	X	X	X	X	X				X				X	X		
Jefferson Police Department	Law Enforcement	X	X	X	X	X	X				X				X	X		
NC Park Rangers - Mount Jefferson State Park	Law Enforcement	X	X	X	X	X	X				X					X		
NC Park Rangers - New River State Park	Law Enforcement	X	X	X	X	X	X				X				X	X		
NC State Highway Patrol Troop F District II - Substation	Law Enforcement	X	X	X	X	X	X				X				X	X		
West Jefferson Police Department	Law Enforcement	X	X	X	X	X	X				X				X	X		
Alpha Omega Health, Inc.	Medical Facility	X	X	X	X	X	X				X				X	X		
Ashe County Advp	Medical Facility	X	X	X	X	X	X			X					X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Ashe Living Center	Medical Facility	X	X	X	X	X	X	X	X		X				X	X		
Ashe Manor	Medical Facility	X	X	X	X	X	X				X				X	X		
Ashe Memorial Hospital, Inc.	Medical Facility	X	X	X	X	X	X				X				X	X		
Choices Counseling Services	Medical Facility	X	X	X	X	X	X				X				X	X		
High Country Health Care System	Medical Facility	X	X	X	X	X	X				X	X		X	X	X		
Hill View Family Care Inc., Number 1	Medical Facility	X	X	X	X	X	X				X					X		
Homefolks	Medical Facility	X	X	X	X	X	X				X				X	X		
Jefferson Care Center	Medical Facility	X	X	X	X	X	X				X				X	X		
Lincare, Inc.	Medical Facility	X	X	X	X	X	X				X				X	X		
New River Family Services	Medical Facility	X	X	X	X	X	X				X		X	X		X		
Premier Personal Care	Medical Facility	X	X	X	X	X	X				X				X	X		
Ridgecrest I	Medical Facility	X	X	X	X	X	X				X			X	X	X		
Ridgecrest II	Medical Facility	X	X	X	X	X	X				X			X	X	X		
Summit Support Services Of Ashe, Inc. - Ark	Medical Facility	X	X	X	X	X	X				X				X	X		
Summit Support Services Of Ashe-Lighthouse	Medical Facility	X	X	X	X	X	X				X				X	X		
Unique Care Inc.	Medical Facility	X	X	X	X	X	X				X				X	X		
Willow Place Group Home	Medical Facility	X	X	X	X	X	X				X				X	X		
Yadkin Valley Extended Services	Medical Facility	X	X	X	X	X	X				X				X	X		
Ashe County High	Public School	X	X	X	X	X	X				X				X	X		
Ashe County Middle	Public School	X	X	X	X	X	X				X				X	X		
Blue Ridge Elementary	Public School	X	X	X	X	X	X				X				X	X		
Mountain View Elementary	Public School	X	X	X	X	X	X				X				X	X		
Westwood Elementary	Public School	X	X	X	X	X	X				X				X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Watauga County Emergency Management	EOC	X	X	X	X	X	X			X					X	X		
Beaverdam Volunteer Fire Department of Watauga County	EMS	X	X	X	X	X	X			X								
Beech Mountain Volunteer Fire Department Inc. Station 1	EMS	X	X	X	X	X	X			X					X	X		
Blowing Rock Volunteer Fire Department	EMS	X	X	X	X	X	X			X					X	X		
Blowing Rock Volunteer Rescue Squad	EMS	X	X	X	X	X	X			X					X	X		
Boone Fire Department- Headquarters	EMS	X	X	X	X	X	X			X					X	X		
Boone Fire Department Station 2	EMS	X	X	X	X	X	X	X	X	X					X	X		
Cove Creek Volunteer Fire Department	EMS	X	X	X	X	X	X			X					X	X		
Deep Gap Volunteer Fire Department	EMS	X	X	X	X	X	X			X					X	X		
Foscoe Volunteer Fire Department	EMS	X	X	X	X	X	X			X					X	X		
Meat Camp Volunteer Fire Department	EMS	X	X	X	X	X	X				X				X	X		
Shawneehaw Volunteer Fire Department	EMS	X	X	X	X	X	X			X					X	X		
Stewart Simmons Volunteer Fire Department	EMS	X	X	X	X	X	X			X								
Todd Volunteer Fire And Rescue Department	EMS	X	X	X	X	X	X				X				X	X		
Watauga County Rescue Squad	EMS	X	X	X	X	X	X			X					X	X		
Watauga Medics	EMS	X	X	X	X	X	X			X					X	X		
Zionville Volunteer Fire Department	EMS	X	X	X	X	X	X			X								
Beaverdam Volunteer Fire Department Of Watauga County	Fire Stations	X	X	X	X	X	X			X								
Beech Mountain Volunteer Fire Department Inc. Station 1	Fire Stations	X	X	X	X	X	X			X					X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Beech Mountain Volunteer Fire Department Inc. Station 2	Fire Stations	X	X	X	X	X	X			X								
Blowing Rock Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		
Boone Fire Department- Headquarters	Fire Stations	X	X	X	X	X	X			X					X	X		
Boone Fire Department Station 2	Fire Stations	X	X	X	X	X	X	X	X	X					X	X		
Cove Creek Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		
Deep Gap Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		
Foscoe Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		
Meat Camp Volunteer Fire Department	Fire Stations	X	X	X	X	X	X				X				X	X		
Seven Devils Fire Department	Fire Stations	X	X	X	X	X	X			X						X		
Shawneehaw Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		
Stewart Simmons Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X								
Todd Volunteer Fire And Rescue Department	Fire Stations	X	X	X	X	X	X				X				X	X		
Zionville Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X								
Appalachian State University Campus Police	Law Enforcement	X	X	X	X	X	X			X					X	X		
Blowing Rock Police Department	Law Enforcement	X	X	X	X	X	X			X					X	X		
Boone Police Department	Law Enforcement	X	X	X	X	X	X			X					X	X		
NPS - J. Price Memorial Park Ranger Station	Law Enforcement	X	X	X	X	X	X			X					X	X		
NC Park Rangers - Elk Knob State Park	Law Enforcement	X	X	X	X	X	X				X							
NC State Highway Patrol Troop F District III - Substation	Law Enforcement	X	X	X	X	X	X			X					X	X		
Seven Devils Police Department	Law Enforcement	X	X	X	X	X	X			X						X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Watauga County Sheriffs Department/Detention Center	Law Enforcement	X	X	X	X	X	X			X					X	X		
Appalachian Cardiopulmonary Rehabilitation Program	Medical Facility	X	X	X	X	X	X		X	X					X	X		
Blowing Rock Hospital	Medical Facility	X	X	X	X	X	X			X					X	X		
Boone Drug & Healthcare At Deerfield	Medical Facility	X	X	X	X	X	X		X	X					X	X		
Brian Estates Assisted Services	Medical Facility	X	X	X	X	X	X			X					X	X		
Carolina Friendship House	Medical Facility	X	X	X	X	X	X			X					X	X		
Creekside Group Home	Medical Facility	X	X	X	X	X	X			X					X	X		
Dillard Hall And Hebron House	Medical Facility	X	X	X	X	X	X			X					X	X		
First Things First, Inc.	Medical Facility	X	X	X	X	X	X			X					X	X		
Glenbridge Health And Rehabilitation	Medical Facility	X	X	X	X	X	X			X								
High Country Health Care System	Medical Facility	X	X	X	X	X	X			X					X	X		
Highland Hall Retirement Center	Medical Facility	X	X	X	X	X	X			X						X		
Hodges Valley Group Home	Medical Facility	X	X	X	X	X	X			X					X	X		
Home Care Services Of Blowing Rock Hospital	Medical Facility	X	X	X	X	X	X			X					X	X		
Homecare Management Corporation	Medical Facility	X	X	X	X	X	X			X					X	X		
Hospice Of Watauga	Medical Facility	X	X	X	X	X	X		X	X					X	X		
Kellwood Group Home	Medical Facility	X	X	X	X	X	X			X						X		
Landship House	Medical Facility	X	X	X	X	X	X			X					X	X		
Lincare, Inc.	Medical Facility	X	X	X	X	X	X			X					X	X		
Mcleod Addictive Disease Center-Watauga	Medical Facility	X	X	X	X	X	X			X					X	X		
Medical Center Home Health	Medical Facility	X	X	X	X	X	X			X					X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Mountain Care Facilities, Inc.	Medical Facility	X	X	X	X	X	X			X					X	X		
New River Behavioral Healthcare	Medical Facility	X	X	X	X	X	X			X					X	X		
New River Vocational Center	Medical Facility	X	X	X	X	X	X			X						X		
Rha Health Services, Inc.	Medical Facility	X	X	X	X	X	X			X						X		
Serenity Farm	Medical Facility	X	X	X	X	X	X			X					X	X		
Watauga County Project On Aging	Medical Facility	X	X	X	X	X	X			X					X	X		
Watauga Medical Center, Inc.	Medical Facility	X	X	X	X	X	X		X	X					X	X		
Watauga Opportunities, Inc.	Medical Facility	X	X	X	X	X	X			X					X	X		
Wildcat Group Home	Medical Facility	X	X	X	X	X	X			X						X		
Bethel Elementary	Public School	X	X	X	X	X	X			X								
Blowing Rock Elementary	Public School	X	X	X	X	X	X			X					X	X		
Cove Creek Elementary	Public School	X	X	X	X	X	X			X						X		
Green Valley Elementary	Public School	X	X	X	X	X	X				X				X	X		
Hardin Park Elementary	Public School	X	X	X	X	X	X			X					X	X		
Mabel Elementary	Public School	X	X	X	X	X	X			X					X	X		
Parkway Elementary	Public School	X	X	X	X	X	X			X					X	X		
Two Rivers Community School	Public School	X	X	X	X	X	X			X					X	X		
Valle Crucis Elementary	Public School	X	X	X	X	X	X	X	X	X		X			X	X		
Watauga High	Public School	X	X	X	X	X	X			X					X	X		
Wilkes County Emergency Management	EOC	X	X	X	X	X	X			X				X	X	X		
Austin Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X								
Boomer Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X					X	X		
Broadway Fire Department Inc.	EMS	X	X	X	X	X	X			X					X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Brushy Mountain Volunteer Fire Department	EMS	X	X	X	X	X	X			X								
Cricket Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X						X		
Goshen Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X					X	X		
Knotville Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X		X		X	X	X		
Little Brushy Mountain Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X								
Mcgrady Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X					X	X		
Millers Creek Volunteer Fire Department Station 1	EMS	X	X	X	X	X	X			X					X	X		
Millers Creek Volunteer Fire Department Station 2	EMS	X	X	X	X	X	X			X								
Moravian Falls Volunteer Fire Department	EMS	X	X	X	X	X	X			X					X	X		
Mulberry-Fairplains Fire Department	EMS	X	X	X	X	X	X			X					X	X		
Pleasant Hill Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X						X		
Roaring River Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X			X				X	X	X	X	X
Roaring River Volunteer Fire Department Inc. - Substation	EMS	X	X	X	X	X	X			X					X	X		
Ronda Community Volunteer Fire Department	EMS	X	X	X	X	X	X			X					X	X	X	X
State Road Volunteer Fire Department	EMS	X	X	X	X	X	X			X								
Traphill Volunteer Fire Department Inc. - Main Station	EMS	X	X	X	X	X	X			X								
Traphill Volunteer Fire Department Inc. - Substation	EMS	X	X	X	X	X	X			X								
Wilbar Volunteer Fire Department Inc. - Main Station	EMS	X	X	X	X	X	X			X					X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Wilbar Volunteer Fire Department Inc. - Substation	EMS	X	X	X	X	X	X			X								
Wilkes County Emergency Medical Services	EMS	X	X	X	X	X	X			X					X	X		
Wilkes Volunteer Rescue Squad Inc.	EMS	X	X	X	X	X	X			X				X	X	X		
Wilkesboro Fire Department Station 1	EMS	X	X	X	X	X	X			X			X	X	X	X		
Wilkesboro Fire Department Station 2	EMS	X	X	X	X	X	X			X				X	X	X		
Wilkes-Iredell Volunteer Fire Department Inc.	EMS	X	X	X	X	X	X								X	X		
Austin Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X								
Boomer Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X					X	X		
Broadway Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X					X	X		
Brushy Mountain Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X								
Champion Volunteer Fire Department - Main Station	Fire Stations	X	X	X	X	X	X			X					X	X		
Cricket Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X						X		
Ferguson Fire Department	Fire Stations	X	X	X	X	X	X		X	X					X	X		
Goshen Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X					X	X		
Knotville Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X		X		X	X	X		
Little Brushy Mountain Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X								
Mcgrady Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X					X	X		
Millers Creek Volunteer Fire Department Station 1	Fire Stations	X	X	X	X	X	X			X					X	X		
Millers Creek Volunteer Fire Department Station 2	Fire Stations	X	X	X	X	X	X			X								
Moravian Falls Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Mountain View Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X								
Mulberry-Fairplains Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		
North Wilkesboro Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X		
Pleasant Hill Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X						X		
Roaring River Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X			X				X	X	X	X	X
Roaring River Volunteer Fire Department Inc. - Substation	Fire Stations	X	X	X	X	X	X			X					X	X		
Ronda Community Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X					X	X	X	X
Shepherds Crossroads Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X								
State Road Volunteer Fire Department	Fire Stations	X	X	X	X	X	X			X								
Traphill Volunteer Fire Department Inc. - Main Station	Fire Stations	X	X	X	X	X	X			X								
Traphill Volunteer Fire Department Inc. - Substation	Fire Stations	X	X	X	X	X	X			X								
Wilbar Volunteer Fire Department Inc. - Main Station	Fire Stations	X	X	X	X	X	X			X					X	X		
Wilbar Volunteer Fire Department Inc. - Substation	Fire Stations	X	X	X	X	X	X			X								
Wilkesboro Fire Department Station 1	Fire Stations	X	X	X	X	X	X			X			X	X	X	X		
Wilkesboro Fire Department Station 2	Fire Stations	X	X	X	X	X	X			X				X	X	X		
Wilkes-Iredell Volunteer Fire Department Inc.	Fire Stations	X	X	X	X	X	X								X	X		
NC State Highway Patrol Troop F District II	Law Enforcement	X	X	X	X	X	X			X				X	X	X		
North Wilkesboro Police Department	Law Enforcement	X	X	X	X	X	X			X					X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Wilkes County Sheriffs Office	Law Enforcement	X	X	X	X	X	X			X			X	X	X	X		
Wilkesboro Police Department	Law Enforcement	X	X	X	X	X	X			X				X	X	X		
Avante At Wilkesboro	Medical Facility	X	X	X	X	X	X			X			X	X	X	X		
Bailey Home	Medical Facility	X	X	X	X	X	X			X					X	X		
Britthaven Of Wilkesboro	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Carolina Select Home Care, Llc	Medical Facility	X	X	X	X	X	X			X					X	X		
Carrigan And Associates Counseling And Assessment	Medical Facility	X	X	X	X	X	X			X					X	X		
Carter Center	Medical Facility	X	X	X	X	X	X			X								
Continuum Home Care Of Wilkesboro	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Donlin Counseling Services	Medical Facility	X	X	X	X	X	X			X					X	X		
Eller Home	Medical Facility	X	X	X	X	X	X			X						X		
Generations Home Health Agency	Medical Facility	X	X	X	X	X	X			X					X	X		
Hackett III Home	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Health Services Unlimited, Inc.	Medical Facility	X	X	X	X	X	X			X					X	X		
Helping Hands Home Care Agency	Medical Facility	X	X	X	X	X	X			X					X	X		
Holly Hills Group Home	Medical Facility	X	X	X	X	X	X			X					X	X		
Home Care Of Wilkes Regional Medical Center	Medical Facility	X	X	X	X	X	X	X	X	X				X	X	X		
Hospice Of Wilkes Regional Medical Center	Medical Facility	X	X	X	X	X	X	X	X	X				X	X	X		
Johnson Home	Medical Facility	X	X	X	X	X	X			X					X	X		
Lakewood	Medical Facility	X	X	X	X	X	X			X					X	X		
Lewis Fork Homes I & II	Medical Facility	X	X	X	X	X	X			X								
Lifespan Services-Wilkesboro	Medical Facility	X	X	X	X	X	X			X				X	X	X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Lincare, Inc.	Medical Facility	X	X	X	X	X	X		X	X				X	X	X		
Main Street Station	Medical Facility	X	X	X	X	X	X			X					X	X		
Mulberry Group Home	Medical Facility	X	X	X	X	X	X			X								
New River Psr	Medical Facility	X	X	X	X	X	X	X	X	X				X	X	X		
New River Recovery Center	Medical Facility	X	X	X	X	X	X	X	X	X				X	X	X		
New River Substance Abuse Center	Medical Facility	X	X	X	X	X	X			X					X	X		
Omni Visions, Inc. Hackett Street II	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Omni-Vision Inc./Hackett Iv	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Omni-Vision/Hackett Street I	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Pendry Family Care #II	Medical Facility	X	X	X	X	X	X			X					X	X		
Pendry Family Care Home	Medical Facility	X	X	X	X	X	X			X								
Professional Assessment And Counseling Center	Medical Facility	X	X	X	X	X	X			X					X	X		
Randall And Rebecca Walsh	Medical Facility	X	X	X	X	X	X			X		X						
Reflections Home For Girls	Medical Facility	X	X	X	X	X	X			X					X	X		
Respite Care Of Wilkes	Medical Facility	X	X	X	X	X	X			X					X	X		
Swain Street Group Home	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Synergy Recovery At The Bundy Center	Medical Facility	X	X	X	X	X	X			X					X	X		
The Village Of Wilkes Traditional Living	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Total Care, Inc.	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Voca-Apple Valley	Medical Facility	X	X	X	X	X	X			X		X				X		
Voca-Blairfield	Medical Facility	X	X	X	X	X	X			X					X	X		
Voca-College Street	Medical Facility	X	X	X	X	X	X			X			X	X	X	X		
Voca-Kimsey	Medical Facility	X	X	X	X	X	X			X						X		

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
Voca-Welborn Ave.	Medical Facility	X	X	X	X	X	X			X			X	X	X	X		
Wilkes Adap	Medical Facility	X	X	X	X	X	X			X					X	X		X
Wilkes Assisted Living Building I	Medical Facility	X	X	X	X	X	X			X					X	X		
Wilkes Boys Town	Medical Facility	X	X	X	X	X	X			X					X	X		
Wilkes County Vocational Workshop	Medical Facility	X	X	X	X	X	X			X					X	X		
Wilkes Regional Medical Center	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Wilkes Regional Medical Center Ambulatory Surg.Faci	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Wilkes Senior Village	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Yadkin Valley Extended Services	Medical Facility	X	X	X	X	X	X			X				X	X	X		
Boomerferguson Elementary	Public School	X	X	X	X	X	X			X					X	X		
Bridges Charter School	Public School	X	X	X	X	X	X			X								
C B Eller Elementary	Public School	X	X	X	X	X	X			X								
C C Wright Elementary	Public School	X	X	X	X	X	X			X					X	X		
Central Wilkes Middle	Public School	X	X	X	X	X	X			X					X	X		
East Wilkes High	Public School	X	X	X	X	X	X			X					X	X	X	X
East Wilkes Middle	Public School	X	X	X	X	X	X			X								
Millers Creek Elementary	Public School	X	X	X	X	X	X			X					X	X		
Moravian Falls Elementary	Public School	X	X	X	X	X	X			X					X	X		
Mount Pleasant Elementary	Public School	X	X	X	X	X	X			X					X	X		
Mountain View Elementary	Public School	X	X	X	X	X	X			X								
Mulberry Elementary	Public School	X	X	X	X	X	X			X					X	X		
North Wilkes High	Public School	X	X	X	X	X	X			X								

Facility Name	Facility Type	Natural								Geological		Other						
		Drought	Excessive Heat	Hurricane & Coastal Hazards	Tornadoes/Thunderstorms	Severe Winter Weather	Earthquakes	Flood 100-year	Flood 500-year	Landslide - High Incidence	Landslide - Mod. Incidence	Wildfires	Fixed HAZMAT 0.5 Mile	Fixed HAZMAT 1 Mile	Mobile HAZMAT 0.5 Mile (Road)	Mobile HAZMAT 1 Mile (Road)	Mobile HAZMAT 0.5 Mile (Rail)	Mobile HAZMAT 1 Mile (Rail)
North Wilkes Middle	Public School	X	X	X	X	X	X			X								
North Wilkesboro Elementary	Public School	X	X	X	X	X	X			X			X	X	X	X		
Roaring River Elementary	Public School	X	X	X	X	X	X			X			X	X	X	X	X	X
Rondaclingman Elementary	Public School	X	X	X	X	X	X			X						X		X
Traphill Elementary	Public School	X	X	X	X	X	X			X								
West Wilkes High	Public School	X	X	X	X	X	X			X								
West Wilkes Middle	Public School	X	X	X	X	X	X			X					X	X		
Wilkes Central High	Public School	X	X	X	X	X	X			X					X	X		
Wilkes Early College High	Public School	X	X	X	X	X	X			X			X	X	X	X		
Wilkesboro Elementary	Public School	X	X	X	X	X	X			X				X	X	X		

SECTION 7
CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of the communities in the High-Country Region to implement hazard mitigation activities. It consists of the following four subsections:

- 7.1 What is a Capability Assessment?
- 7.2 Conducting the Capability Assessment
- 7.3 Capability Assessment Findings
- 7.4 Conclusions on Local Capability

7.1 WHAT IS A CAPABILITY ASSESSMENT?

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs, or projects[1]. As in any planning process, it is important to try to establish which goals, objectives, and/or actions are feasible based on an understanding of the organizational capacity of those agencies or departments tasked with their implementation. A capability assessment helps to determine which mitigation actions are practical, and likely to be implemented over time, given a local government's planning and regulatory framework, level of administrative and technical support, amount of fiscal resources, and current political climate.

A capability assessment has two primary components: 1) an inventory of a local jurisdiction's relevant plans, ordinances, or programs already in place and 2) an analysis of its capacity to carry them out. Careful examination of local capabilities will detect any existing gaps, shortfalls, or weaknesses with ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. A capability assessment also highlights the positive mitigation measures already in place or being implemented at the local government level, which should continue to be supported and enhanced through future mitigation efforts.

The capability assessment completed for the High Country Region serves as a critical planning step and an integral part of the foundation for designing an effective hazard mitigation strategy. Coupled with the Risk Assessment, the Capability Assessment helps identify and target meaningful mitigation actions for incorporation in the Mitigation Strategy portion of the Hazard Mitigation Plan. It not only helps establish the goals and objectives for the region to pursue under this Plan, but it also ensures that those goals and objectives are realistically achievable under given local conditions.

[1] While the Final Rule for implementing the Disaster Mitigation Act of 2000 does not require a local capability assessment to be completed for local hazard mitigation plans, it is a critical step in developing a mitigation strategy that meets the needs of the region while taking into account their own unique abilities. The Rule does state that a community's mitigation strategy should be "based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools" (44 CFR, Part 201.6(c)(3)).

7.2 CONDUCTING THE CAPABILITY ASSESSMENT

In order to facilitate the inventory and analysis of local government capabilities within the High-Country counties, a detailed Capability Assessment Survey[2] was completed for each of the participating jurisdictions based on the information found in existing hazard mitigation plans and local government websites. The survey questionnaire compiled information on a variety of "capability indicators" such as existing local plans, policies, programs, or ordinances that contribute to and/or hinder the region's ability to implement hazard mitigation actions. Other indicators included information related to the region's fiscal, administrative, and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes. The current political climate, an important consideration for any local planning or decision-making process, was also evaluated with respect to hazard mitigation.

At a minimum, survey results provide an extensive inventory of existing local plans, ordinances, programs, and resources that are in place or under development in addition to their overall effect on hazard loss reduction. However, the survey instrument can also serve to identify gaps, weaknesses, or conflicts that counties and local jurisdictions can recast as opportunities for specific actions to be proposed as part of the hazard mitigation strategy.

The information collected in the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology[3] was then applied to quantify each jurisdiction's overall capability. According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation.

Using this scoring methodology, a total score and an overall capability rating of "high," "moderate," or "limited" could be determined according to the total number of points received. These classifications are designed to provide nothing more than a general assessment of local government capability. The results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

7.3 CAPABILITY ASSESSMENT FINDINGS

The findings of the capability assessment are summarized in this Plan to provide insight into the relevant capacity of the High-Country Region to implement hazard mitigation activities. All information is based upon the review of existing hazard mitigation plans and local government websites through the Capability Assessment Survey and input provided by local government officials during meetings of the High Country Regional Hazard Mitigation Planning Committee.

7.3.1 Planning and Regulatory Capability

Planning and regulatory capability is based on the implementation of plans, ordinances, and programs that demonstrate a local jurisdiction's commitment to guiding and managing growth, development, and redevelopment in a responsible manner while maintaining the general welfare of the community. It includes emergency response and mitigation planning, comprehensive land use planning, and transportation planning; the enforcement of zoning or subdivision ordinances and building codes that regulate how land is developed and structures are built; as well as protecting environmental, historic,

[2] The Capability Assessment Survey instrument is available in Appendix B.

[3] The scoring methodology used to quantify and rank the region's capability can be found in Appendix B.

and cultural resources in the community. Although some conflicts can arise, these planning initiatives generally present significant opportunities to integrate hazard mitigation principles and practices into the local decision making process.

This assessment is designed to provide a general overview of the key planning and regulatory tools and programs that are in place or under development for the High Country Region along with their potential effect on loss reduction. This information will help identify opportunities to address existing gaps, weaknesses, or conflicts with other initiatives in addition to integrating the implementation of this Plan with existing planning mechanisms where appropriate.

Table 7.1 provides a summary of the relevant local plans, ordinances, and programs already in place or under development for the High Country Region. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. Each of these local plans, ordinances, and programs should be considered available mechanisms for incorporating the requirements of the High Country Regional Hazard Mitigation Plan.

TABLE 7.1: RELEVANT PLANS, ORDINANCES, AND PROGRAMS

Planning / Regulatory Tool	ALLEGHNAY COUNTY	Sparta	ASHE COUNTY	Jefferson	Lansing	West Jefferson	COUNTY	Beech Mountain	Blowing Rock	Boone	Seven Devils	WILKES COUNTY	North Wilkesboro	Ronda	Wilkesboro
Hazard Mitigation Plan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Comprehensive Land Use Plan	✓	✓	✓			✓	✓	*	✓	✓	✓	✓	✓		✓
Floodplain Management Plan										✓					
Open Space Management Plan (Parks & Rec/Greenway Plan)								*							
Stormwater Management Plan/Ordinance				✓	✓	✓			✓	✓					
Natural Resource Protection Plan										✓					
Flood Response Plan															
Emergency Operations Plan	✓		✓				✓			✓		✓	✓	✓	✓
Continuity of Operations Plan							✓								
Evacuation Plan															
Disaster Recovery Plan															
Capital Improvements Plan			✓			✓	✓		✓	✓			✓		✓
Economic Development Plan															
Historic Preservation Plan															
Flood Damage Prevention Ordinance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Zoning Ordinance		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓		✓
Subdivision Ordinance	✓		✓			✓	✓	✓	✓	✓	✓	✓	✓		✓

Planning / Regulatory Tool	ALLEGHNAY COUNTY	Sparta	ASHE COUNTY	Jefferson	Lansing	West Jefferson	COUNTY	Beech Mountain	Blowing Rock	Boone	Seven Devils	WILKES COUNTY	North Wilkesboro	Ronda	Wilkesboro
Unified Development Ordinance										✓					
Post-Disaster Redevelopment Ordinance															
Building Code	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Fire Code	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
National Flood Insurance Program (NFIP)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NFIP Community Rating System							✓			✓					

A more detailed discussion on the region's planning and regulatory capability follows.

7.3.2 Emergency Management

Hazard mitigation is widely recognized as one of the four primary phases of emergency management. The three other phases include preparedness, response, and recovery. In reality, each phase is interconnected with hazard mitigation, as **Figure 7.1** suggests. Opportunities to reduce potential losses through mitigation practices are most often implemented before disaster strikes, such as the elevation of flood prone structures or the continuous enforcement of policies that prevent and regulate development that is vulnerable to hazards due to its location, design, or other characteristics. Mitigation opportunities will also be presented during immediate preparedness or response activities, such as installing storm shutters in advance of a hurricane, and certainly during the long-term recovery and redevelopment process following a hazard event.

FIGURE 7.1: THE FOUR PHASES OF EMERGENCY MANAGEMENT

Planning for each phase is a critical part of a comprehensive emergency management program and a key to the successful implementation of hazard mitigation actions. As a result, the Capability Assessment Survey asked several questions across a range of emergency management plans in order to assess the High Country Region's willingness to plan and their level of technical planning proficiency.

Hazard Mitigation Plan: A hazard mitigation plan represents a community's blueprint for how it intends to reduce the impact of natural and human-caused hazards on people and the built environment. The essential elements of a hazard mitigation plan include a risk assessment, capability assessment, and mitigation strategy.

- Each of the four counties participating in this multi-jurisdictional plan has previously adopted a hazard mitigation plan. Each municipality in the region was included their respective county's plan.

Disaster Recovery Plan: A disaster recovery plan serves to guide the physical, social, environmental, and economic recovery and reconstruction process following a disaster. In many instances, hazard mitigation principles and practices are incorporated into local disaster recovery plans with the intent of capitalizing on opportunities to break the cycle of repetitive disaster losses. Disaster recovery plans can also lead to the preparation of disaster redevelopment policies and ordinances to be enacted following a hazard event.

- None of the four counties participating in this multi-jurisdictional plan have adopted a disaster recovery plan. The counties should consider developing a plan to guide the recovery and reconstruction process following a disaster.

Emergency Operations Plan: An emergency operations plan outlines responsibilities and the means by which resources are deployed during and following an emergency or disaster.

- Alleghany County, Ashe County, Watauga County, and Wilkes County each maintain emergency operations plans through their respective Emergency Management Departments.
- Wilkes County's emergency operations plan covers the participating jurisdictions of North Wilkesboro, Ronda, and Wilkesboro.
- The Town of Boone maintains an All Hazard Planning and Operations Manual that identifies hazards and measure that can be taken to properly mitigate them. The manual also outlines operations regarding disasters and what functions of specific agencies will be during disasters.

Continuity of Operations Plan: A continuity of operations plan establishes a chain of command, line of succession, and plans for backup or alternate emergency facilities in case of an extreme emergency or disaster event. In addition to general preparedness, communities can realize a number of benefits from having a COOP in place. For example, communities will have a greater capability to adapt to rapid changes in the operational environment and improve the overall effectiveness of their governance by identifying essential functions, processes, and communication methods among various agencies and people within the governing structure.

- None of the counties participating in this multi-jurisdictional plan have adopted continuity of operations plans.

7.3.3 General Planning

The implementation of hazard mitigation activities often involves agencies and individuals beyond the emergency management profession. Stakeholders may include local planners, public works officials, economic development specialists, and others. In many instances, concurrent local planning efforts will help to achieve or complement hazard mitigation goals, even though they are not designed as such. Therefore, the Capability Assessment Survey also asked questions regarding general planning capabilities and the degree to which hazard mitigation is integrated into other on-going planning efforts in the High-Country Region.

Comprehensive Land Use Plan: A comprehensive land use plan establishes the overall vision for what a community wants to be and serves as a guide for future governmental decision making. Typically, a comprehensive plan contains sections on demographic conditions, land use, transportation elements, and community facilities. Given the broad nature of the plan and its regulatory standing in many communities, the integration of hazard mitigation measures into the comprehensive plan can enhance the likelihood of achieving risk reduction goals, objectives, and actions.

- Alleghany County and the Town of Sparta have adopted land development plans.
- Ashe County adopted the Ashe County 2020: A Comprehensive Plan for Growth and Change in 1995. The participating jurisdiction of West Jefferson maintains a land use plan that was originally adopted in 2008.
- Watauga County updated its comprehensive plan with the Citizens' Plan for Watauga. The participating jurisdictions of Blowing Rock, Boone, and Seven Devils also maintain comprehensive plans and Beech Mountain is currently in the process of developing one.
- Wilkes County has adopted the Wilkes County Growth Management Plan. The participating jurisdictions of North Wilkesboro and Wilkesboro have also adopted comprehensive plans.

Capital Improvements Plan: A capital improvements plan guides the scheduling of spending on public improvements. A capital improvements plan can serve as an important mechanism for guiding future development away from identified hazard areas. Limiting public spending in hazardous areas is one of the most effective long-term mitigation actions available to local governments.

- Ashe County included a capital improvement plan in the Ashe County Community Transportation Service Plan. The participating jurisdiction of West Jefferson used funding from the North Carolina Rural Economic Development Center to fund a Storm Sewer & Streetscape Enhancement Capital Improvement Plan.
- The Town of North Wilkesboro completed a capital improvement plan as part of a comprehensive sewer system assessment and improvement schedule.
- Watauga County maintains a capital improvements plan. The participating jurisdictions of Blowing Rock, Boone, and Seven Devils also maintain their own capital improvements plans.

Historic Preservation Plan: A historic preservation plan is intended to preserve historic structures or districts within a community. An often overlooked aspect of the historic preservation plan is the assessment of buildings and sites located in areas subject to natural hazards and the identification of ways to reduce future damages. This may involve retrofitting or relocation techniques that account for

the need to protect buildings that do not meet current building standards or are within a historic district that cannot easily be relocated out of harm's way.

- None of the counties participating in this multi-jurisdictional plan have a historic preservation plan.

Zoning Ordinance: Zoning represents the primary means by which land use is controlled by local governments. As part of a community's police power, zoning is used to protect the public health, safety, and welfare of those in a given jurisdiction that maintains zoning authority. A zoning ordinance is the mechanism through which zoning is typically implemented. Since zoning regulations enable municipal governments to limit the type and density of development, a zoning ordinance can serve as a powerful tool when applied in identified hazard areas.

- Alleghany County does not have a zoning ordinance. However, the Town of Sparta has adopted a zoning ordinance that is administered by the Town Manager.
- Ashe County does not have a zoning ordinance. The Towns of Jefferson and West Jefferson have adopted zoning ordinances.
- Watauga County has adopted a zoning ordinance that is administered and enforced by the County Department of Planning and Inspections, but it only covers certain areas of the County and was enacted upon the request of two communities, Foscoe-Grandfather and Valle Crucis. All of the participating jurisdictions in Watauga County have adopted zoning ordinances.
- Wilkes County has a zoning ordinance that is maintained by the County Planning Department. The Towns of North Wilkesboro and Wilkesboro have also adopted zoning ordinances.

Subdivision Ordinance: A subdivision ordinance is intended to regulate the development of residential, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Subdivision design that accounts for natural hazards can dramatically reduce the exposure of future development.

- Alleghany County has a subdivision ordinance that is administered by the Planning Department and applies to all areas of unincorporated Alleghany County that are not included in the extraterritorial jurisdiction of the Town of Sparta. The Town of Sparta has not adopted a subdivision ordinance.
- Ashe County has a subdivision ordinance that was adopted by the Board of County Commissioners and applies to all areas of unincorporated Ashe County. The Town of West Jefferson has also adopted a subdivision ordinance.
- Watauga County has a subdivision ordinance that was adopted by the County Commissioners and applies to all areas of unincorporated Watauga County. One of the stated purposes is "to insure against flood damage and soil erosion." All of the participating jurisdictions in Watauga County also have adopted subdivision ordinances.
- Wilkes County has adopted a subdivision ordinance that applies to all areas of unincorporated Wilkes County. The Towns of North Wilkesboro and Wilkesboro have also adopted subdivision ordinance.

Building Codes, Permitting, and Inspections: Building codes regulate construction standards. In many communities, permits, and inspections are required for new construction. Decisions regarding the adoption of building codes (that account for hazard risk), the type of permitting process required both before and after a disaster, and the enforcement of inspection protocols all affect the level of hazard risk faced by a community.

- North Carolina has a state compulsory building code, which applies throughout the state; however, jurisdictions may adopt codes if approved as providing adequate minimum standards.
- All of the participating counties and jurisdictions have adopted a building code except for the Town of Ronda. The building code is enforced by each county's building inspector.
- The Towns of Beech Mountain, Blowing Rock, Boone, North Wilkesboro, and Wilkesboro have their own inspections departments that enforce the building code within their town limits.

The adoption and enforcement of building codes by local jurisdictions is routinely assessed through the Building Code Effectiveness Grading Schedule (BCEGS) program developed by the Insurance Services Office, Inc. (ISO)[4]. In North Carolina, the North Carolina Department of Insurance assesses the building codes in effect in a particular community and how the community enforces its building codes *with special emphasis on mitigation of losses from natural hazards*. The results of BCEGS assessments are routinely provided to ISO's member private insurance companies, which in turn may offer ratings credits for new buildings constructed in communities with strong BCEGS classifications. The concept is that communities with well-enforced, up-to-date codes should experience fewer disaster-related losses and, as a result, should have lower insurance rates.

In conducting the assessment, ISO collects information related to personnel qualification and continuing education as well as the number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10 with a BCEGS grade of 1 representing exemplary commitment to building code enforcement and a grade of 10 indicating less than minimum recognized protection.

7.3.4 Floodplain Management

Flooding represents the greatest natural hazard facing the nation. At the same time, the tools available to reduce the impacts associated with flooding are among the most developed when compared to other hazard-specific mitigation techniques. In addition to approaches that cut across hazards such as education, outreach, and the training of local officials, the *National Flood Insurance Program* (NFIP) contains specific regulatory measures that enable government officials to determine where and how growth occurs relative to flood hazards. Participation in the NFIP is voluntary for local governments; however, program participation is strongly encouraged by FEMA as a first step for implementing and sustaining an effective hazard mitigation program. It is therefore used as part of this assessment as a key indicator for measuring local capability.

In order for a county or municipality to participate in the NFIP, they must adopt a local flood damage

[4] Participation in BCEGS is voluntary and may be declined by local governments if they do not wish to have their local building codes evaluated.

prevention ordinance that requires jurisdictions to follow established minimum building standards in the floodplain. These standards require that all new buildings and substantial improvements to existing buildings will be protected from damage by a 100-year flood event and that new development in the floodplain will not exacerbate existing flood problems or increase damage to other properties.

A key service provided by the NFIP is the mapping of identified flood hazard areas. Once completed, the Flood Insurance Rate Maps (FIRMs) are used to assess flood hazard risk, regulate construction practices, and set flood insurance rates. FIRMs are an important source of information to educate residents, government officials, and the private sector about the likelihood of flooding in their community.

Table 7.2 provides NFIP policy and claim information for each participating jurisdiction in the High Country Region. Each of the jurisdictions that are participating in the development of this plan that also participate in the NFIP are committed to maintaining and enforcing their floodplain management ordinances and regulating new development in floodplains.

TABLE 7.2: NFIP POLICY AND CLAIM INFORMATION

Jurisdiction	Date Joined NFIP	Current Effective Map Date	NFIP Policies in Force	Insurance in Force	Closed Claims	Total Payments to Date
ALLEGHANY COUNTY	2/1/04	11/4/09	13	$2,576,600	2	$51,459.92
Sparta	7/3/86	11/4/09	5	$289,900	1	$1,225.00
ASHE COUNTY	8/16/88	12/3/09	199	$41,748,000	47	$405,024.40
Jefferson	8/16/88	12/3/09	4	$1,600,000	3	$8,618.01
Lansing	8/5/86	12/3/09	6	$626,500	1	$24,194.26
West Jefferson	6/4/87	12/3/09	10	$1,948,700	9	$139,128.27
WATAUGA COUNTY	6/18/80	12/3/09	331	$80,154,800	99	$1,083,844.59
Beech Mountain	3/12/04	(NSFHA)	37	$12,250,000	0	$0.00
Blowing Rock	6/1/78	12/3/09	30	$8,089,400	6	$75,264.15
Boone	9/28/79	12/3/09	273	$41,486,400	37	$624,853.77
Seven Devils	4/13/98	(NSFHA)	5	$1,610,000	--	--
WILKES COUNTY	3/31/03	12/3/09	39	$7,605,900	1	$469.82
North Wilkesboro	2/15/78	12/3/09	19	$7,469,000	--	--
Ronda	7/03/86	12/3/09(M)	--	--	--	--
Wilkesboro	6/1/87	12/3/09	16	$5,247,100	10	$433,100.30

(S) – Suspended Community
(NSFHA) – No Special Flood Hazard Area, all Zone C

(M) – No Elevation Determined, all Zone A, C, and X
Source: NFIP claims and policy information as of 2/29/12; NFIP Community Status information as of 4/19/12

Community Rating System: An additional indicator of floodplain management capability is the active participation of local jurisdictions in the Community Rating System (CRS). The CRS is an incentive-based program that encourages counties and municipalities to undertake defined flood mitigation activities that go beyond the minimum requirements of the NFIP by adding extra local measures to provide protection from flooding. All of the 18 creditable CRS mitigation activities are assigned a range of point values. As points are accumulated and reach identified thresholds, communities can apply for an improved CRS class rating. Class ratings, which range from 10 to 1, are tied to flood insurance premium reductions as shown in **Table 7.3**. As class rating improves (the lower the number the better), the percent reduction in flood insurance premiums for NFIP policyholders in that community increases.

TABLE 7.3: CRS PREMIUM DISCOUNTS, BY CLASS

CRS Class	Premium Reduction
1	45%
2	40%
3	35%
4	30%
5	25%
6	20%
7	15%
8	10%
9	5%
10	0

Source: *FEMA*

Community participation in the CRS is voluntary. Any community that is in full compliance with the rules and regulations of the NFIP may apply to FEMA for a CRS classification better than class 10. The CRS application process has been greatly simplified over the past several years based on community comments. Changes were made with the intent to make the CRS more user-friendly and make extensive technical assistance available for communities who request it.

- Watauga County and the Town of Boone participate in the CRS. Participation in the CRS program should be considered as a mitigation action by the other counties and municipalities. The program would be most beneficial to Ashe County, which has 200 NFIP policies.

Flood Damage Prevention Ordinance: A flood damage prevention ordinance establishes minimum building standards in the floodplain with the intent to minimize public and private losses due to flood conditions.

- All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance and therefore, establish a floodplain administrator. All counties and

municipalities participating in this hazard mitigation plan participate in the NFIP,have adopted flood damage prevention regulations, and have a designated floodplain administrator.

Floodplain Management Plan: A floodplain management plan (or a flood mitigation plan) provides a framework for action regarding corrective and preventative measures to reduce flood-related impacts.

- The Town of Boone has adopted a floodplain management plan to help prevent damages associated with flooding and flood loss.

Open Space Management Plan*:* An open space management plan is designed to preserve, protect, and restore largely undeveloped lands in their natural state and to expand or connect areas in the public domain such as parks, greenways, and other outdoor recreation areas. In many instances, open space management practices are consistent with the goals of reducing hazard losses, such as the preservation of wetlands or other flood-prone areas in their natural state in perpetuity.

- None of the participating counties or municipalities has an open space management plan. However, the Town of Blowing Rock includes open space regulations in their Land Use Ordinance.
- The Town of Beech Mountain's Park and Recreation Department is currently in the process of creating a Parks Master Plan.

Stormwater Management Plan: A stormwater management plan is designed to address flooding associated with stormwater runoff. The stormwater management plan is typically focused on design and construction measures that are intended to reduce the impact of more frequently occurring minor urban flooding.

- None of the participating counties have adopted a stormwater management plan or ordinance.
- The Towns of Jefferson, Lansing, and West Jefferson in Ashe County have adopted stormwater management plans.
- The Towns of Blowing Rock and Boone in Watauga County have also adopted stormwater management regulations.

7.3.5 Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies, and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.

Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and assess community hazard vulnerability. The Capability Assessment Survey was used to capture information on administrative and technical capability through the identification of

available staff and personnel resources.

Table 7.4 provides a summary of the Capability Assessment Survey results for the High Country Region with regard to relevant staff and personnel resources. A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

TABLE 7.4: RELEVANT STAFF / PERSONNEL RESOURCES

Staff / Personnel Resource	ALLEGHANY COUNTY	Sparta	ASHE COUNTY	Jefferson	Lansing	West Jefferson	WATAUGA COUNTY	Beech Mountain	Blowing Rock	Boone	Seven Devils	WILKES COUNTY	North Wilkesboro	Ronda	Wilkesboro
Planners with knowledge of land development / land management practices	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓		✓
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	✓	✓	✓			✓	✓	✓	✓	✓		✓	✓		✓
Planners or engineers with an understanding of natural and/or human-caused hazards	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓		✓
Emergency Manager	✓		✓				✓					✓			
Floodplain Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Land Surveyors															
Scientists familiar with the hazards of the community	✓		✓				✓					✓			
Staff with education or expertise to assess the community's vulnerability to hazards	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓
Personnel skilled in GIS and/or HAZUS	✓		✓				✓	✓	✓	✓		✓			
Resource development staff or grant writers	✓											✓			

Credit for having a floodplain manager was given to those jurisdictions that have a flood damage prevention ordinance, and therefore an appointed floodplain administrator, regardless of whether the appointee was dedicated solely to floodplain management. Credit was given for having a scientist familiar with the hazards of the community if a jurisdiction has a Cooperative Extension Service or Soil and Water Conservation Department. Credit was also given for having staff with education or expertise to assess the community's vulnerability to hazards if a staff member from the jurisdiction was a participant on the existing hazard mitigation plan's planning committee.

7.3.6 Fiscal Capability

The ability of a local government to take action is often closely associated with the amount of money available to implement policies and projects. This may take the form of outside grant funding awards or locally-based revenue and financing. The costs associated with mitigation policy and project implementation vary widely. In some cases, policies are tied primarily to staff time or administrative costs associated with the creation and monitoring of a given program. In other cases, direct expenses are linked to an actual project, such as the acquisition of flood-prone homes, which can require a substantial commitment from local, state, and federal funding sources.

The Capability Assessment Survey was used to capture information on the region's fiscal capability through the identification of locally available financial resources.

Table 7.5 provides a summary of the results for the High Country Region with regard to relevant fiscal resources. A checkmark (✓) indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds) according to the previous county hazard mitigation plans.

TABLE 7.5: RELEVANT FISCAL RESOURCES

Fiscal Tool / Resource	ALLEGHANY COUNTY	Sparta	ASHE COUNTY	Jefferson	Lansing	West Jefferson	WATAUGA COUNTY	Beech Mountain	Blowing Rock	Boone	Seven Devils	WILKES COUNTY	North Wilkesboro	Ronda	Wilkesboro
Capital Improvement Programming	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Community Development Block Grants (CDBG)	✓	✓	✓	✓	✓	✓						✓	✓	✓	✓
Special Purpose Taxes (or taxing districts)	✓	✓	✓				✓	✓	✓	✓	✓				
Gas / Electric Utility Fees															
Water / Sewer Fees															
Stormwater Utility Fees															
Development Impact Fees															
General Obligation, Revenue, and/or Special Tax Bonds															
Partnering Arrangements or Intergovernmental Agreements			✓	✓	✓	✓	✓					✓			

7.3.7 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 reduce the impact of future hazard events. Hazard mitigation may not be a local priority or may conflict with or be seen as an impediment to other goals of the community, such as growth and economic development. Therefore, the local political climate must be considered in designing mitigation strategies as it could be the most difficult hurdle to overcome in accomplishing their adoption and implementation.

The Capability Assessment Survey was used to capture information on political capability of the High Country Region. Previous county-level hazard mitigation plans were reviewed for general examples of local political capability, such as guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (i.e., building codes, floodplain management, etc.).

- The previous county hazard mitigation plans identified existing ordinances that address natural hazards or are related to hazard mitigation, such as emergency management, flood damage prevention, watershed protection, zoning, high impact land uses, subdivision, mountain ridge protection, community planning guidelines, and erosion control ordinances.
- Several of the communities indicated that their residents may be open to new hazard mitigation activities that could lessen the impact of natural disasters as a result of the past winter storms and flooding that have created a greater sense of awareness of "being prepared."

7.4 CONCLUSIONS ON LOCAL CAPABILITY

A Capability Assessment examines local capabilities to detect any existing gaps or weaknesses within ongoing government activities that could hinder proposed mitigation activities and possibly exacerbate community hazard vulnerability. These gaps or weaknesses have been identified for each jurisdiction in the tables found throughout this section. The participating jurisdictions used the Capability Assessment as part of the basis for the Mitigation Actions that are identified in Section 9; therefore, each jurisdiction addresses their ability to expand on and improve their existing capabilities through the identification of their Mitigation Actions.

There is clear indication from this capability assessment exercise, the hazard mitigation plan update process, and recent hazard events that the region, counties, and jurisdictions generally work together to assist in meeting needs. This is will likely continue to be the case in the future and is a benefit for all communities in the region.

7.4.1 Linking the Capability Assessment with the Risk Assessment and the Mitigation Strategy

The conclusions of the Risk Assessment and Capability Assessment serve as the foundation for the development of a meaningful hazard mitigation strategy. During the process of identifying specific mitigation actions to pursue, the Regional Hazard Mitigation Planning Committee considered not only each jurisdiction's level of hazard risk, but also their existing capability to minimize or eliminate that risk.

SECTION 8
MITIGATION STRATEGY

This section of the Plan provides the blueprint for the participating jurisdictions in the High-Country Region to follow in order to become less vulnerable to its identified hazards. It is based on general consensus of the High County Regional Hazard Mitigation Planning Committee and the findings and conclusions of the *Capability Assessment* and *Risk Assessment*. It consists of the following five subsections:

- 8.1 Introduction
- 8.2 Mitigation Goals
- 8.3 Identification and Analysis of Mitigation Techniques
- 8.4 Selection of Mitigation Techniques for the High-Country Region
- 8.5 Plan Update Requirement

8.1 INTRODUCTION

The intent of the Mitigation Strategy is to provide the High-Country Region with the goals that will serve as guiding principles for future mitigation policy and project administration, along with an analysis of mitigation techniques deemed available to meet those goals and reduce the impact of identified hazards. It is designed to be comprehensive, strategic, and functional in nature:

- In being *comprehensive*, the development of the strategy includes a thorough review of all hazards and identifies extensive mitigation measures intended to not only reduce the future impacts of high-risk hazards, but also to help the region achieve compatible economic, environmental, and social goals.
- In being *strategic*, the development of the strategy ensures that all policies and projects proposed for implementation are consistent with pre-identified, long-term planning goals.
- In being *functional,* each proposed mitigation action is linked to established priorities and assigned to specific departments or individuals responsible for their implementation with target completion deadlines. When necessary, funding sources are identified that can be used to assist in project implementation.

The first step in designing the Mitigation Strategy includes the identification of mitigation goals. Mitigation goals represent broad statements that are achieved through the implementation of more specific mitigation actions. These actions include both hazard mitigation policies (such as the regulation of land in known hazard areas through a local ordinance) and hazard mitigation projects that seek to address specifically targeted hazard risks (such as the acquisition and relocation of a repetitive loss structure).

The second step involves the identification, consideration, and analysis of available mitigation measures to help achieve the identified mitigation goals. This is a long-term, continuous process sustained through the development and maintenance of this Plan. Alternative mitigation measures will continue to be considered as future mitigation opportunities are identified, as data and technology improve, as mitigation funding becomes available, and as this Plan is maintained over time.

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions for the High-Country Region (provided separately in Section 9: *Mitigation Action Plan*). Each county and participating jurisdiction has its own Mitigation Action Plan (MAP) that reflects the needs and concerns of that jurisdiction. The MAP represents an unambiguous and functional plan for action and is considered to be the most essential outcome of the mitigation planning process.

The MAP includes a prioritized listing of proposed hazard mitigation actions (policies and projects) for the High-Country counties and jurisdictions to complete. Each action has accompanying information, such as those departments or individuals assigned responsibility for implementation, potential funding sources, and an estimated target date for completion. The MAP provides those departments or individuals responsible for implementing mitigation actions with a clear roadmap that also serves as an important tool for monitoring success or progress over time. The cohesive collection of actions listed in the MAP can also serve as an easily understood menu of mitigation policies and projects for those local decision makers who want to quickly review the recommendations and proposed actions of the Regional Hazard Mitigation Plan.

In preparing each Mitigation Action Plan for the High-Country Region, officials considered the overall hazard risk and capability to mitigate the effects of hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted mitigation goals and unique needs of the community.

8.1.1 Mitigation Action Prioritization

All existing mitigation actions found in the Mitigation Action Plan were previously prioritized by the participating jurisdictions. For the 2022 update of the plan the members of the Regional Hazard Mitigation Planning Committee were asked, as part of the process of providing a status update for each action, to make sure that the assigned priority for each action was still appropriate. Prioritization of the proposed mitigation actions was based on the following strategies:

1. High Priority – Highly cost-effective, administratively feasible and politically feasible strategies that should be implemented in fiscal years 2022/2023 and 2023/2024 and be continued.
2. Medium Priority – Strategies that have at least two of the following characteristics (but not all three) and should be implemented in fiscal years 2023/2024 to 2024/2025:
    a. Highly cost-effective; or
    b. Administratively feasible, given current levels of staffing and resources; or
    c. Are politically popular and supportable given the current environment.
3. Low Priority – Strategies that have at least one of the following characteristics (but not two or three) and should be implemented in the next five (5) years (by the end of 2026/2027):
    d. Highly cost-effective; or
    e. Administratively feasible, given current levels of staffing and resources; or
    f. Are politically popular and supportable given the current environment.

The point of contact for each county helped coordinate the prioritization process by reviewing each action and working with the lead agency/department responsible to determine a priority for each action using the six factors listed above.

Using these criteria, actions were classified as high, moderate, or low priority by the participating jurisdiction officials.

8.2 MITIGATION GOALS

44 CFR Requirement

44 CFR Part 201.6(c)(3)(i): The mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

The primary goal of all local governments is to promote the public health, safety, and welfare of its citizens. In keeping with this standard, the High-Country counties and the participating municipalities have developed five goal statements for local hazard mitigation planning in the region.

As part of the 2022 plan update, the existing mitigation goals for the region were presented, reviewed, voted on, and accepted by the Planning Committee at the second Regional Hazard Mitigation Planning Committee meeting. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more mitigation actions. The High-Country Regional Mitigation Goals are presented in **Table 8.1**. Consistent implementation of actions over time will ensure that community goals are achieved.

TABLE 8.1: HIGH COUNTRY REGIONAL MITIGATION GOALS

	Goal
Goal #1	Enhance existing, or design new, county policies that will reduce the potentially damaging effects of hazards without hindering other community goals such as: preserving environmentally sensitive areas, maintaining a stable and growing business community and providing infrastructure that accommodates future growth.
Goal #2	Increase resiliency in the region by protecting the most vulnerable populations, buildings and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
Goal #3	Increase internal capabilities of local governments in the region to mitigate the effects of natural hazards.
Goal #4	Decrease the region's vulnerability to future hazard events.
Goal #5	Protect public health, safety and welfare by increasing public awareness of existing hazards and by fostering both individual and public responsibility in mitigating risks due to those hazards and by ensuring that emergency services are adequate to protect life and safety.

8.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

44 CFR Requirement
44 CFR Part 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 effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In formulating the Mitigation Strategy for the High-Country Region, a wide range of activities were considered in order to help achieve the established mitigation goals, in addition to addressing any specific hazard concerns. These activities were discussed during the High-Country Regional Hazard Mitigation Planning Committee meetings. In general, all activities considered by the Regional Hazard Mitigation Planning Committee can be classified under one of the following six (6) broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

8.3.1 Prevention

Preventative activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Building codes
- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Riverine / fault zone setbacks

8.3.2 Property Protection

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (e.g., wind proofing, floodproofing, seismic design techniques, etc.)
- Safe rooms, shutters, shatter-resistant glass
- Insurance

8.3.3 Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, steep slopes, and sand dunes. Parks, recreation, or conservation agencies and organizations often implement these protective measures. Examples include:

- Floodplain protection
- Watershed management
- Riparian buffers
- Forest and vegetation management (e.g., fire resistant landscaping, fuel breaks, etc.)
- Erosion and sediment control
- Wetland preservation and restoration
- Habitat preservation
- Slope stabilization

8.3.4 Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Reservoirs
- Dams / levees / dikes / floodwalls
- Diversions / detention / retention
- Channel modification
- Storm sewers

8.3.5 Emergency Services

Although not typically considered a “mitigation” technique, emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

- Warning systems
- Evacuation planning and management
- Emergency response training and exercises
- Sandbagging for flood protection
- Installing temporary shutters for wind protection

8.3.6 Public Education and Awareness

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Outreach projects
- Speaker series / demonstration events

- Hazard map information
- Real estate disclosure
- Library materials
- School children's educational programs
- Hazard expositions

8.4 SELECTION OF MITIGATION TECHNIQUES FOR THE HIGH-COUNTRY REGION

In order to determine the most appropriate mitigation techniques for the communities in the High-Country Region, the Regional Hazard Mitigation Planning Committee members thoroughly reviewed and considered the findings of the *Capability Assessment* and *Risk Assessment* to determine the best activities for their respective communities. Other considerations included the effect of each mitigation action on overall risk to life and property, its ease of implementation, its degree of political and community support, its general cost-effectiveness, and funding availability (if necessary).

8.5 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous High Country Region County plans were evaluated to determine their 2022 implementation status. Updates on the implementation status of each action are provided. The mitigation actions provided in Section 9*: Mitigation Action Plan* include the mitigation actions from the previous plans as well as any new mitigation actions proposed through the 2022 planning process.

SECTION 9
MITIGATION ACTION PLAN

This section describes the planning process undertaken by the High-Country Region in the development of its 2022 Regional Hazard Mitigation Plan. It consists of the following two subsections:

- 9.1 Overview
- 9.2 Mitigation Action Plans

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44 CFR Requirement
44 CFR Part 201.6(c)(3)(iii): The mitigation strategy shall include an action plan describing how the actions identified in paragraph (c)(2)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.

9.1 OVERVIEW

As described in the previous section, the Mitigation Action Plan, or MAP, provides a functional plan of action for each jurisdiction. It is designed to achieve the mitigation goals established in Section 8: *Mitigation Strategy* and will be maintained on a regular basis according to the plan maintenance procedures established in Section 10: *Plan Maintenance*.

Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard risk for the High-Country Region. Each action is listed in the MAP in conjunction with background information such as hazard(s) addressed, relative priority, and estimated cost. Other information provided in the MAP includes potential funding sources to implement the action should funding be required (not all proposed actions are contingent upon funding). Most importantly, implementation mechanisms are provided for each action, including the designation of a lead agency or department responsible for carrying the action out as well as a timeframe for its completion. These implementation mechanisms ensure that the High-Country Regional Hazard Mitigation Plan remains a functional document that can be monitored for progress over time. The proposed actions are not listed in priority order, though each has been assigned a priority level of “high,” “moderate,” or “low” as described below and in Section 8 (page 8.2).

Table 9.1 describes the key elements of the Mitigation Action Plan.

Jurisdiction Name Mitigation Action Number	Title of Action (Description of action to be undertaken.)
Hazard(s) Addressed:	Hazard which the action addresses.
Category:	Category of Mitigation Strategy that is met: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, Public Education and Awareness
Priority (High, Moderate, Low):	In preparing their own individual Mitigation Actions Place, each jurisdiction considered their overall hazard risk and capability to mitigate natural hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted countywide mitigation goals and the unique needs of the unique needs of their community. Prioritizing mitigation actions for each jurisdiction was based on the following five (5) factors: (1) effect on overall risk to life and property; (2) ease of implementation; (3) political and community support; (4) a general economic cost/benefit review; and (5) funding availability. This process is also described on page 8:2, Section 8: *Mitigation Strategy*.
Lead Agency/Department Responsible:	Department responsible for undertaking the action.
Estimated Cost:	Anticipated cost of the action.
Potential Funding Sources:	Local, State, or Federal sources of funds are noted here, where applicable.
Implementation Schedule:	Date by which the action the action should be completed. More information is provided when possible.
Implementation Status (2022):	An indication of completion, progress, deferment, or no change with each action since the previous (2010) plan. If the action is new, that will be noted here.

9.2 MITIGATION ACTION PLANS

The mitigation actions proposed by each of the participating jurisdictions are listed in fifteen individual MAPs on the following pages. **Table 9.1** shows the location of each jurisdiction's MAP within this section as well as the number of mitigation actions proposed by each jurisdiction.

TABLE 9.1: INDIVIDUAL MAP LOCATIONS

Alleghany County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-3	Establish locations in the county where residents can obtain potable and non-potable water supplies.	Drought	Moderate	County Emergency Management Coordinator; County Public Works	Unknown	Local; State	2027	In progress. County Emergency Management is working to secure potable water supplies to be distributed at PODS.
Property Protection								
PP-2	Gather information from USDA, Agricultural Extension and other agencies regarding crop insurance information.	Severe Storm; Drought; Winter Storm; Flood	Moderate	County Cooperative Extension	Unknown	State	2027	Local County Ag. Extension distributes information and flyers to farmers with info about available insurance. Additional information and resources will be required.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-3	Acquire destroyed or substantially damaged properties and relocated households through a voluntary program funded by FEMA grants.	Flood; Dam Failure	Moderate	County Emergency Management Coordinator; County Planner	Unknown	Federal	2030	There has been limited political will to complete this action over the last five years. County is working on ordinance which addresses demo of abandoned structures. Otherwise, no opportunities to acquire property.
PP-4	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 Mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry food proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project cost, Staff Hours, and applicable Operating budget	Federal and State Grants, Local Operating budget	2030	New Action
Natural Resource Protection								
NRP-1	Acquire unbuildable properties from willing landowners through N.C. Clearwater Management Trust Fund to develop as a park or greenway.	Flood; Dam Failure	Moderate	County Planner	Unknown	State; Federal	2027	County developed "Veterans Park" on designated floodplain land in 2016. Additional properties may be acquired in the future.
Emergency Services								

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-1	Purchase additional 4-wheel drive vehicles that will deliver supplies to citizens stranded during a severe winter storm event.	Winter Storm	Moderate	County Emergency Management Coordinator; County Sheriff's Department	Unknown	Local; State; Federal	Completed	Completed. The Sheriff's Office, Emergency Management, Hospital, Rescue, Sparta Police, and EMS have all purchased 4-wheel drive vehicles that are available during emergency situations.
ES-2	Set up a volunteer network for the transportation of hospital workers to and from the Alleghany County Memorial Hospital.	Winter Storm	Moderate	Alleghany Memorial Hospital; County Emergency Management Coordinator	Unknown	Local; State; Federal	Completed	Completed. Sherriff's Office and Hospital personnel coordinate this transportation for the staff.
ES-3	Continue to provide training and equipment to volunteer firefighters on the latest technology in fire fighting techniques.	Wildfire	Moderate	County Fire Inspector; County Fire Commissioner	Unknown	Local; State; Federal	2030	County have a certified instructor. All departments meet OSFM standards for annual training. Haz-mat exercise was conducted Fall 2016 for local VFD's. Additional training and equipment will be sought as the needs arise.
ES-4	Install generator or generator hook-ups for critical facilities at budget and need arise.	Winter storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding, local and state	As budget permits; 2030	New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Structural Projects								
S-1	Restore streams in the county that are experiencing streambank erosion through grant monies available through the Army Corps of Engineers and the NC Clearwater Management Trust Fund.	Flood	Moderate	County Planner; County Cooperative Extension	Unknown	State; Federal	2030	Some property owners have restored streams on private property with monies available through Coop extension Opportunities for stream restoration projects to be sought.
Public Education and Awareness								
PEA-1	Develop news releases that inform the public of the dangers of lightning.	Severe Storm	Moderate	County Emergency Management Coordinator	Unknown	Federal	2030	County EM pushes out information to the public regularly via local newspaper, particularly during severe winter weather preparedness week. Additional opportunities will be sought be engaged and inform the public on lightning.
PEA-2	Continue to advertise the availability of flood insurance to county property owners through mailings or news releases.	Flood	Moderate	County Planner	Unknown	Local; State; Federal	2030	New maps and ordinance adopted in 2008. County has certified FPM. Information is available at county offices. There have been limited political will to complete this action over the last five years.
PEA-3	Inform citizens through mailings or news releases of the proper storage of highly combustible materials, campfire safety and proper brush burning techniques.	Wildfire	Moderate	County Fire Commissioner; County Emergency Management Coordinator	Unknown	Local; State; Federal	2027	County EM Works with NC Forest Service to promote safe burning practices and inform public about laws and any burning bans. There has been limited political will to complete this action over the last five years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-4	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management Coordinator; County Planner	Unknown	Local; State; Federal	2030	Public is involved in the planning process during the survey period, and plan is reviewed during open commissioner meetings. Additional opportunities will be sought to engage and inform the public.
PEA-5	Hold an annual elected official's workshop to provide an overview to officials on mitigation and emergency management activities.	All	Moderate	County Emergency Management	Staff Time	None Needed	Annually	New Action.

Town of Sparta Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Property Protection								
PP-1	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2022	New Action
Emergency Services								
ES-2	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030 or as budget/funding permits	New Action
Public Education and Awareness								
PEA-1	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management	Unknown	None Needed	2030	Post identified hazards in this plan and the mitigation techniques used to reduce the impacts of the hazards on Town Website and make copies available to the general public. There has been limited political will to complete this action over

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
								the last 5 years.
PEA-2	Coordinate with County Emergency Management to hold an annual elected official's workshop to provide an overview to officials on mitigation and emergency management activities.	All	Moderate	County Emergency Management	Staff Time	None Needed	Annually; 2030	Sparta Town Council and Alleghany Commissioners hold a joint meeting on months with 5 Mondays. County Emergency Management will present Mitigation and Management activities to officials at one of these joint meetings to elected officials.

Ashe County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-6	Update or develop comprehensive land use plan.	All	Moderate	County Planning	Unknown	Staff Time	In progress; 2030	In 2013 the Ashe County Planning Department and Planning Board began developing a formal land use plan. Between 2013 and current, a draft plan was developed. However, recent turnover on the Planning Board has delayed any work on the plan. The Ashe County Planning Department and Planning Board are developing a land use plan that will address areas of growth and development. The land use plan is in a draft stage and could be completed and approved in less than two years. The plan development will involve community stakeholders, public input, and assistance by the Rural Planning Division at NC Commerce.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-8	Support the statewide floodplain mapping initiative. The State of North Carolina, through the Federal Emergency Management Agency's Cooperating Technical Community partnership initiative, has been designated as a Cooperating Technical State (CTS). As a CTS, the State will assume primary ownership and responsibility for Flood Insurance Rate Maps (FIRMs) for all North Carolina communities. This project will include conducting flood hazard analysis and producing updated, digital FIRMs (DFIRMs).	Flood	High	State of NC; FEMA	Unknown	Staff Time to support mapping efforts	In progress; 2022	Ongoing. Preliminary Flood Insurance Rate map (FIRM) panels and a Flood Insurance Study (FIS) Report were issued to Ashe County and incorporated communities September 5, 2008. Following an official appeal period, the maps were formally adopted and effective in November 2009. The state of NC hosts a GIS system that allows local officials and the general public to access the new maps online via a website maintained by the North Carolina Floodplain Mapping Program.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-16	Identify potential mitigation activities, based on damage assessment, and prioritize locations for mitigation.	Flood	Moderate	County Emergency Management	Unknown	Staff Time	2030	Analyzed damage reports from recent disasters but did not identify any feasible mitigation measures that are not already included in our plan. This will continue to occur.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-23	Establish burning bans as necessary.	Drought	High	NC Forestry Service	Unknown	Staff Time	2030	NC Forest Service and local Fire Marshal issue burning bans when needed. Last one was issued briefly in November 2016.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-24	Work with Fire Departments and Forestry services to assess the effects of droughts.	Drought	High	County Emergency Management	Unknown	Staff Time	2030	Coordinated with NC Forest Service and fire departments last drought in 2016. Additional assessments will be performed as situation warrants.
P-25	Using flood mitigation resources, evaluate the areas where a landslide is likely to occur by noting especially the places where runoff water converges, increasing flow over soil-covered slopes and plot these activities on a map.	Landslide	High	NCDOT; County Emergency Management	Unknown	Staff Time and State or Federal Grant Sources	2030 or as resources permit.	Postponed. Lack of technical expertise, staff and funding.
P-26	Restrict development along ridgelines or hill tops.	Landslide	High	County Planning	Unknown	Staff Time	2030	No change in status of action item given limited political will. Planning staff will continue to review issues along ridgeline and on steep slopes for issues and possible mitigation or development standards.

P-27	Assess roads that are in danger of land or rockslide.	Landslide	Moderate	NCDOT	Unknown	Staff Time	2030	NCDOT has made repairs to five areas within last five years that are susceptible to land/rock slides. Additional studies are susceptible areas are necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-28	Ensure Ashe County Building Inspection Office enforces the North Carolina Building Code for commercial buildings which states every structure, shall as a minimum, be designed and constructed to resist the effects of earthquake motions.	Earthquake	High	County Building Inspections	Unknown	Staff Time	2030	Structures are inspected during construction to ensure adherence to NC Building Codes.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-30	Ensure that property owners follow all rules and regulations set forth for Dam operation and repairs.	Dam Failure	High	NCDEQ	Unknown	Staff Time	2030	The EM office maintains Dam Safety Plans for all local dams under state jurisdiction. Additional public education may be warranted.
Property Protection								
PP-1	Develop a plan to seek funding for a feasible (based upon cost efficiency and effectiveness) relocation of the Town of Lansing Waste Water Treatment Facility that sustains recurring disaster damages.	Flood	Moderate	Town of Lansing Board of Alderman	Unknown	Staff Time	2030	The Town is currently exploring options to relocate the plant.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-2	Town of Lansing will protect government documents and information from flood damage by elevating all critical documents, records, files at facilities in floodplains.	Flood	Moderate	Town of Lansing Board of Alderman	Unknown	Staff Time	2030	Lansing Fire Department moved all critical information to a second story of the facility. Lansing Town Hall was relocated to a structure with no history of flooding. Additional measures will be sought to mitigation risk
PP-4	Explore buyout programs for structures in known high hazard areas.	Flood	Low	County Floodplain Manager	Unknown	Staff Time	2030	This action item is still relevant however no action has been taken because of budget and personnel constraints
PP-5	Coordinate with North Carolina Department of Transportation to ensure that new roads are not located in the floodplain.	Flood	Moderate	County Planning	Unknown	Staff Time	2030	Planning staff will continue to work with the North Carolina Department of Transportation on new bridge replacements to see that they are constructed at or above the 100 year. New subdivision roads not taken into state maintenance are also reviewed to insure they are constructed outside of the 100-year floodplain when at all possible.
PP-6	Work with local Meals on Wheels and/or Habitat for Humanity chapters to apply non-structural mitigation measures to the homes of low-income senior citizens during a winter storm.	Winter Storm	Low	County Emergency Management	Unknown	Staff Time	2030	Ongoing as staff time permits and as the Habitat for Humanity and Meals on Wheels budgets permit. Requires continued coordination.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-8	Coordinate with U.S. Department of Agriculture officials to publicize information regarding the Federal Crop Insurance Corporation.	Tornado; Hurricane; Severe Storm	Moderate	NC Farm Service	Unknown	Staff Time	Long range, 2030; monthly	The FSA sends out monthly newsletters with informational materials.
PP-9	Coordinate with U.S. Department of Agriculture officials to publicize information regarding the Federal Crop Insurance Corporation.	Drought	Moderate	NC Farm Service	Unknown	Staff Time	Long range; 2030, monthly	The FSA sends out monthly newsletters with informational materials.
PP-12	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	Long range, 2030	New Action.
PP-13	Fuel reduction through burning activities.	Wildfire						New Action

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-14	Widen existing mountain trails and roads for fuel breaks.	Wildfire			Unknown		Unknown	New Action
PP-15	Evaluate current capacity of critical services to deal with power outages. Increase percent of fire services with generators. Increase percent of emergency/rescue services with generators. Evaluate other critical facilities to determine alternative power source needs.	All	Moderate	County Emergency Management	Unknown	Staff Time	2030 or as resources permit	Transfer switches for emergency generators have been installed at two shelter locations and at several fire stations. Funding is lacking at the remainder thus far.
Natural Resource Protection								
NRP-1	Whenever possible preserve natural wetlands, designate conservation corridors, especially along streams through acquisition or conservation easements.	All	Moderate	New River Conservancy / Blue Ridge Conservancy	Unknown	Staff Time	2030	Through the proposed land use plan, the Planning Department will identify sensitive areas along streams and wetlands that could be preserved through acquisition or conservation easements. While still relevant, there has been no political to complete this action over the last 5 years.
NRP-2	Support stream bank stabilization program conducted by the New River Community Partners and North Carolina Division of Park and Recreation.	Flood	Low	New River Community Partners; NCDPR	Unknown	Staff Time	2022	Continue to support local agencies that conduct stream/river bank restoration work like the New River Conservancy.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
NRP-3	Support land trusts/easements that New River Community Partners are seeking along the New River.	Flood	Moderate	New River Community Partners; County Emergency Management	Unknown	Staff Time	2030	Continue to support the New River Conservancy in their effort to protect land along the New River and tributaries through land acquisition and conservation easements.
Emergency Services								
ES-2	Identify, upgrade, emergency shelters throughout county and municipalities and designate at least one emergency shelter in each municipality.	All	Moderate	County Emergency Management	Unknown	Staff Time	2030	Shelter locations have been identified in Jefferson and West Jefferson and on the outskirts of Lansing. Upgrade and mapping have been cost prohibitive.
ES-4	Explore the possibility of developing a plan that would require street interconnectivity in all new subdivisions to allow multiple points for emergency vehicles.	All	Low	County Planning	Unknown	Staff Time	2030	Postponed/Deferred. A workable solution has not been obtained at this time.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-6	Coordinate response/recovery efforts with other communities and counties.	Winter Storm	High	County Emergency Management	Unknown	Staff Time	2022	EM works closely with surrounding counties during all hazard events. Additional formal agreements may be evaluated and implemented.
ES-7	Review and evaluate snow and ice removal plans for each town/county. Evaluate priority routes.	Winter Storm	Moderate	Town Maintenance Departments; NCDOT	Unknown	Staff Time	2030	Each municipality maintains and implements snow removal plans when needed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-13	Create Helo spots in mountainous areas with no other access – in Three Top Gamelands, The Peak and other areas throughout the county.	Wildfire			Unknown		Unknown	
Structural Projects								
S-1	Solicit Army Corps of Engineers in developing a plan for Naked Creek to avoid flooding of business parking lots in Jefferson.	Flood	Moderate	Town of Jefferson; USACE	Unknown	Staff Time	2030	There has been no political will to complete this action during the last 5 years.
S-2	Many of our private residents are isolated when floodwaters overtop bridges. An aggressive bridge and large diameter pipe culvert replacement program has or will replace over 25 bridges and pipes.	Flood	Moderate	NCDOT	Unknown	Staff Time, State Funds	2030	NCDOT has an aggressive bridge and culvert program however additional efforts need to be made to raise bridges above flood level.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Public Education and Awareness								
PEA-1	Provide information to local government and elected officials (decision makers) for consideration on hazard mitigation to be incorporated into policy and budgetary planning and the decision making process.	All	Moderate	County Emergency Management; County Planning	Unknown	Staff Time	2030	Updating existing policies and ordinances is an ongoing process that progresses gradually during each successive budgetary planning session as the board is informed on new factors and methodologies.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-12	Compile mitigation information and make it available to Ashe County residents and business owners by posting on a website. Place special emphasis on what people should do if they are caught outside.	Tornado; Hurricane; Severe Storm	Moderate	County Emergency Management	Unknown	Staff Time	Complete. Information and links are posted on the Ashe County Emergency Management website.	Complete. The County's Emergency Management website includes several links pertaining to disaster preparedness and planning. The County will update this page regularly to provide relevant information to ensure public safety and access to necessary resources.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-13	Provide educational material to citizens regarding ways to reduce the potential impacts of fire to structures through Public Service Announcement.	Wildfire	Moderate	County Emergency Management	Unknown	Staff Time	2030	Local NC Forest Service staff provides educational workshops to local citizen groups and conduct wildfire hazard evaluations of local communities. They also provide materials on the NC Firewise Program. In addition, the NC Forest Service issues public service announcements when conditions increase the risk of wildfires.
PEA-14	Prepare and conduct basic education programs and provide materials for residents to increase their awareness of the importance of the forest environment and the role of fire.	Wildfire	Moderate	NC Forestry Service	Unknown	Staff Time	2030	Ongoing. Local NC Forest Service staff provides educational workshops to local citizen groups and conduct wildfire hazard evaluations of local communities. They also provide materials on the NC Firewise Program.
PEA-15	Work with the curriculum directors of both the public and private schools to add wildfire disaster prevention information (i.e. Smokey the Bear Program).	Wildfire	Moderate	NC Forestry Service	Unknown	Staff Time	2030	Ongoing. Local NC Forest Service staff provides education to school aged children from the Smokey the Bear Program during an annual 5th grade environmental field day sponsored by the NC Farm Service Agency.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-17	Provide materials for homeowners and civic groups to increase their awareness of the importance of the forest environment and the role of fire.	Wildfire	Moderate	US Forestry Service	Unknown	Staff Time	2030	Local NC Forest Service staff provides educational workshops to local citizen groups and conduct wildfire hazard evaluations of local communities. They also provide materials on the NC Firewise Program.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-19	Provide educational material to citizens regarding ways to reduce the potential impacts of droughts through Public Service Announcement.	All	Moderate	County Emergency Management	Unknown	Staff Time	Completed, information and links are posted on the Ashe County Emergency Management website and distributed via social media.	Completed. Numerous drought-related news releases and articles were published in two local newspapers through the 2006-2008 drought conditions.
PEA-20	Prepare and conduct basic education programs and provide materials for residents to increase their awareness of the importance of the environment and the role of drought.	Drought	Moderate	County Fire Departments	Unknown	Staff Time	2030	Ongoing. NC Cooperative Extension educates citizen groups continuously on water conservation through landscape and crop planting techniques, efficient irrigation, wise water use, and residential water conservation programs.

Town of Jefferson Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-2	Determine the reason(s) why specific roads within town limits become flooded or damaged (i.e. debris in adjacent stream leading to blockage and overflow, overwhelmed storm drain, road in floodplain).	Flood	Moderate	Town Maintenance	Unknown	Staff Time	2030	Addressing by Keeping drains cleaned so debris do not build up and cause unnecessary flooding. However, additional action including a study or more permanent solutions (increased capacity) may be necessary.
P-3	Keep drains cleaned or construct additional drains in town areas to increase water carrying capacity.	Flood	High	Town Maintenance	Unknown	Staff Time	2027; ongoing	Maintenance at all times to keep those drains cleaned. Additional action including a study or more permanent solutions (increased capacity) may be necessary.
P-4	Enforce sign ordinances limited height or size of signs which states that all signs must be installed according to design requirements in accordance with velocity and working stress.	Tornado; Hurricane; Severe Storm	High	Town Administration; County Building Inspections	Unknown	Staff Time	Ongoing	Signs must meet specifications before permit is issued.
P-5	Enforce conservation of water when required.	Drought	High	Town; Town Fire Department	Unknown	Staff Time	Annual, 2027	Mailings are sent out annually but additional action, education, or enforcement may be necessary when drought conditions are imminent.
P-6	Enforce burning bans when established.	Drought	High	Town; Town Fire Department	Unknown	Staff Time	2027	No burning is allowed in town. Requires enforcement.
P-7	Jefferson Fire Department will work with the Forestry Services to assess and document the effects of droughts.	Drought	High	Town Fire Department	Unknown	Staff Time	2027; ongoing	This action is applicable during periods of drought conditions. The town fire department works closely

								with the County and the NC Forest Service during drought conditions and Red Flag Alerts to assess wildfire risk. Additional action including a formal agreement may be explored.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-10	Ensure that property owners follow all rules and regulations set forth for dam operation and repairs.	Dam Failure	Moderate	NCDENR	Unknown	Staff Time	2030	This action requires continuous coordination and enforcement. Further action or education may be necessary.
Property Protection								
PP-2	For sewer lines in the floodplain, fasten and seal manhole covers to prevent floodwater infiltration.	Flood	Moderate	Town Maintenance	Unknown	Staff Time	Completed	Completed.
PP-7	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management , Engineering and/or Planning Department	Project cost, Staff hours, and applicable cost share	Federal and state grants, Local Operating Budget	Long Range, 2035	New Action
PP-8	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2035	Looking into options, as budget allows.
Emergency Services								
ES-1	Coordinate response/recovery efforts with other communities and the county (for winter storms).	Winter Storm	High	Town Administration; Emergency Services	Unknown	Staff Time	2027	Continuous coordination with emergency management. Further agreements may be necessary.

ES-2	Review and evaluate snow and ice removal plans for each town/county. Evaluate priority routes.	Winter Storm	Moderate	Town Maintenance; NCDOT	Unknown	Staff Time	2035	There has been limited political will to complete this action over the last five years.
ES-3	Coordinate response/recovery efforts with other communities and counties (for tornado, hurricane, windstorm, and severe thunderstorm).	Tornado; Hurricane; Severe Storm	High	Town Administration	Unknown	Staff Time	2027	Hydrants are checked regularly.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-4	Have resources and training in place in order to evacuate places with wide-span roofs, such as auditoriums, cafeterias, or shopping centers.	Tornado; Hurricane; Severe Storm	High	Town Fire Department	Unknown	Staff Time	2027	There has been limited political will, staff and funding to complete this action over the last five years.
ES-5	Ensure that fire hydrants are functioning properly.	Wildfire	High	Town Maintenance; Town Fire Department	Unknown	Staff Time	Completed.	Hydrants are checked regularly.
ES-6	Coordinate fire-fighting response with other communities.	Wildfire	High	Town Fire Department	Unknown	Staff Time	2027	This action requires continuous coordination and staff time as fire incidents occur. Further coordination or agreements may be necessary.
Structural Projects								
S-1	Solicit Army Corps of Engineers assistance in developing a plan for Naked Creek to avoid flooding of business parking lots in Jefferson.	Flood	Moderate	Town; USACE	Unknown	Staff Time	2030	Some planning and bank control projects are in progress but this has not been fully completed due to lack of political will.
Public Education and Awareness								
PEA-1	Provide educational material to citizens on what to do during an earthquake through Public Service Announcement.	Earthquake	Moderate	Town Administration	Unknown	Staff Time	2030	There has been limited political will to be address this action over the last five years.
PEA-2	Use other mitigation alternatives to assist in reducing the effects of nor'easters. Ensure that winter storm and flood mitigation information is distributed when at risk from the effects of nor'easters.	Winter Storm	High	Town Administration	Unknown	Staff Time	2027	There has been limited political will to be address this action over the last five years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-3	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management	Unknown	None Needed	2027	

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-4	Coordinate with County Emergency Management to hold an annual elected officials workshop to provide an overview to officials on mitigation and emergency management activities.	All	Moderate	County Emergency Management	Staff Time	None Needed	Annual, 2030	

Town of Lansing Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-3	Determine the reason(s) why specific roads within town limits become flooded or damaged (i.e. debris in adjacent steam leading to blockage and overflow, overwhelmed storm drain, road in floodplain.	Flood	Moderate	NCDOT	Unknown	Staff Time	2024	Town Board of Aldermen hired a maintenance technician January 2016 whose main priority is to keep debris out of streams from causing blockage and make sure storm drains are running properly. Additional action may be needed.
P-4	Enforce conservation of water when required.	Drought	High	Town Fire Department	Unknown	Staff Time	2027	Ongoing. More community wide information being posted at kiosks and sent by mail. Additional enforcement may be required as needed.
P-5	Enforce burning bans when established.	Drought	High	Town Fire Department	Unknown	Staff Time	2027	Ongoing. More community awareness being made by posting signage in new park area. Additional enforcement may be required as needed.
P-6	Lansing Fire Department will work with the Forestry Services to assess and document the effects of droughts.	Drought	High	Town Fire Department	Unknown	Staff Time	2027	This action is applicable during periods of drought conditions and was completed over the last 5 years. However, need may arise again in the future with drought conditions.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-7	Support the Ashe County Building Inspection Office in enforcing the North Carolina Building Code for commercial buildings which states every structure, and portion thereof, shall as a minimum, be designed and constructed to resist the effects of earthquake motions.	Earthquake	Moderate	Town Board of Alderman	Unknown	Staff Time	2030	Education being done with new business owners at time of application for water/sewer services. Additional action may be required to educate and enforce.
P-8	Support the Ashe County Building Inspection Office in mitigating these hazards by following the North Carolina Building and Residential Codes which in some instance require the classification and investigation of soil by a registered design professional.	Earthquake	Moderate	Town Board of Alderman	Unknown	Staff Time	2030	Working to ensure every new business or property owner is referred to the County Inspection Office as soon as possible. Additional enforcement may be necessary.
Property Protection								
PP-1	Develop a plan to seek funding for a feasible (based upon cost efficiency and effectiveness) relocation of the Town of Lansing Waste Water Treatment Facility that sustains recurring disaster damages.	Flood	Moderate	Town Emergency Management	Unknown	Staff Time	2030	There was limited political will to complete this action over the last five years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-2	Many of our private residents are isolated when floodwaters overtop bridges, Lansing will help mitigate this by supporting the North Carolina Department of Transportation aggressive bridge and large diameter pipe culvert replacement.	Flood	Moderate	Town; NCDOT	Unknown	Staff Time	2030+	NCDOT has replaced bridges (two in Lansing) or culverts. More are in various stages of construction or repair. The bridge at Teaberry Rd has been scheduled for replacement in 2019. Additional projects will likely be necessary.
PP-4	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030; As budget permits	New Action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-8	The Town of Lansing acquired flood-prone land within the city limits to be turned into the extended town park and walking trail with bike trail and restored historic pole barn.	Flood	High	Town Board of Aldermen	$1,047,000	PARTF, CWMTF, ARC, BRNHA, NC Wildlife, NC Water Resources Division, County and local funds	Completed	By receiving the PARTF grant, and the others listed above, the funds allowed the acquisition of the property in order to build a walking trail and renovate the historic pole barn to current FEMA floodplain standards to promote the preservation of flood-prone area.
PP-9	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.
Natural Resource Protection								
NRP-1	Restoration of Big Horse Creek streambank with 30 foot buffers. We are in Phase 3 (Old Field Creek to Sewer Plant).	Erosion	High	Town Administration	$110,000	US Fish and Wildlife/Fish America Grant and County and local funds	2023-2015	Ongoing. By receiving the US Fish and Wildlife/Fish America grant the funds allowed for the restoration of the streambank with the installation of several rock vanes and planting of live stakes to promote strong

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
								root bases on the streambank and more appropriate sloping for the preservation of the floodprone area.
Emergency Services								
ES-1	Coordinate response/recovery efforts with other communities and the county (for winter storms).	Winter Storm	High	Town Board of Alderman	Unknown	Staff Time	2027	There has been limited political to formalize this action over the last five years. Continually referring residents to local radio 93.5 FM for severe weather warnings.
ES-3	Coordinate response/recovery efforts with other communities and counties (for tornadoes, hurricanes, wind storms, and severe thunderstorms).	Tornado; Hurricane; Severe Storm	High	Town Board of Alderman	Unknown	Staff Time	2027	In communication with County Emergency Management Patty Gambill at onset of possible threat. There has been limited political will to advance this action over the last 5 years.
ES-5	Coordinate fire-fighting response with other communities.	Wildfire	High	Town Fire Department	Unknown	Staff Time	2027	Fire Chief to make sure he and the assistant Fire Chiefs are in direct communication with County Emergency Management Patty Gambill. There has been limited political will to advance this action over the last 5 years

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Public Education and Awareness								
PEA-1	Provide educational material to citizens on what to do during an earthquake through Public Service Announcement.	Earthquake	Moderate	Town Board of Alderman	Unknown	Staff Time	2027	Being mailed and will soon be posted on updated website.
PEA-2	Use other mitigation alternatives to assist in reducing the effects of Nor'easters. Ensure that winter storm and flood mitigation information is distributed when at risk from the effects of Nor'easters.	Winter Storm	High	Town Board of Alderman	Unknown	Staff Time	2027	Ongoing. Information has be posted at park kiosks and residents referred to local radio 93.5 FM to keep up with severe weather alerts. Further actions to increase awareness may be necessary.
PEA-3	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management	Unknown	None Needed	2030	More community meetings being held for education and information. There has been limited political will to advance this action over the last 5 years

Town of West Jefferson Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-2	Determine the reason(s) why specific roads within town limits become flooded or damaged (i.e. debris in adjacent stream leading to blockage and overflow, overwhelmed storm drain, road in floodplain).	Flood	High	Town Maintenance	Unknown	Staff Time	2022	Reviewed stormwater remedies w/BR Conservation & Development Council 2016. Additional work is necessary and there was no political will to take it further over the last 5 years
P-3	Keep drains cleared or construct additional drains in town areas to increase water carrying capacity.	Flood	High	Town Maintenance	Unknown	Staff Time	2027	NCDOT added three storm drains at Long St & S Jefferson Ave. additional drains may be necessary to accommodate capacity.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-6	Enforce conservation of water when required.	Drought	High	Town; Town Fire Department	Unknown	Staff Time	2027	2016 - posted for voluntary conservation. Future enforcement may be necessary
P-7	Enforce burning bans when established.	Drought	High	Town; Town Fire Department	Unknown	Staff Time	2027	Worked with NC Forest Service & County Fire Marshal in November 2016 for burning ban enforcement. Future enforcement may be necessary.
P-8	West Jefferson Fire Department will work with the Forestry Services to assess and document the effects of droughts.	Drought	High	Town Fire Department	Unknown	Staff Time	2027	Ongoing. Coordinate w/Fire departments/emergency management as needed. There has been limited political will to advance this action over the last 5 years
P-11	Ensure that property owners follow all rules and regulations set forth for dam operation and repairs.	Dam Failure	High	NCDENR	Unknown	Staff Time	Deferred	Town has deferred to and will continue to defer to NCDENR

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Property Protection								
PP-3	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	Work with Ashe County Emergency Management.
PP-4	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	As budget permits; 2030	Add generator 2022/2023 at Wastewater treatment plant for ability to run additional pumps/motors.
Emergency Services								
ES-1	Coordinate response/recovery efforts with other communities and the county (for winter storms).	Winter Storm	High	Town Administration	Unknown	Staff Time	2022	Coordinated with Emergency Management during winter storm events. There has been limited political will to formalized this action over the last 5 years

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-2	Review and evaluate snow and ice removal plans for the Town of West Jefferson. Evaluate priority routes.	Winter Storm	Moderate	Town Maintenance; NCDOT	Unknown	Staff Time	2030	Ongoing. NCDOT assists w/downtown snow removal. There has been limited political will to formalize this action over the last 5 years
ES-3	Coordinate response/recovery efforts with other communities and counties (for tornadoes, hurricanes, wind storms, and severe thunderstorms).	Tornado Hurricane Severe Storm	High	Town Administration	Unknown	Staff Time	2027	Work through Emergency Management. There has been no political will to advance this further over the last five years.
ES-4	Have resources and training in place in order to evacuate places with wide-span roofs, such as auditoriums, cafeterias, or shopping centers.	Tornado Hurricane Severe Storm	High	Town Fire Department	Unknown	Staff Time	2022	Insufficient resources available to advance over the last year 5 years.
ES-5	Ensure fire hydrants are working properly.	Wildfire	High	Town Maintenance; Town Fire Department	Unknown	Staff Time	Annual; 2026	Ongoing. All flowed and tested 2021 - will flow a % per year to ensure all working properly
ES-6	Coordinate fire-fighting response with other communities.	Wildfire	High	Town Fire Department	Unknown	Staff Time	2027	Assisted NC Forest Service and Emergency Management in November 2016 to provide resources for wildfire responses in a neighboring jurisdiction. Future coordination will likely be necessary. No political will to formalize this agreement further over the last 5 years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Public Education and Awareness								
PEA-1	Provide educational material to citizens on what to do during an earthquake through Public Service Announcement.	Earthquake	Moderate	Town Administration	Unknown	Staff Time	2030	Work through Emergency Management. There has been no political will to formalize this action further over the past 5 years.
PEA-2	Use other mitigation alternatives to assist in reducing the effects of Nor'easters. Ensure that winter storm and flood mitigation information is distributed when at risk from the effects of Nor'easters.	Winter Storm	High	Town Administration	Unknown	Staff Time	2022	Work through Emergency Management. There has been no political will to advance this action further over the past 5 years.
PEA-3	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management	Unknown	None Needed	2030	Work with Ashe County Emergency Management
PEA-4	Coordinate with County Emergency Management to hold an annual elected official's workshop to provide an overview to officials on mitigation and emergency management activities.	All	Moderate	County Emergency Management	Staff Time	None Needed	2030	Work with Ashe County Emergency Management

Watauga County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-2	Clear debris from streams.	Flood	High	Community; County Emergency Management; Other organizations	Unknown	Private; Public	2022	Volunteer groups schedule multiple stream clean-ups throughout the year. No formal city program exists to date.
P-3	Prevent construction of new public buildings within the identified floodplain.	Flood	Low	Governing boards	Unknown	None required	Complete	There has been limited political will to advance this action over the last 5 years. Each project is reviewed on a case-by-case basis.
P-4	Make efficient repairs to potential problems such as culverts and bridges.	Flood; Earthquake	Low	NCDOT; Municipalities; Private developments	Unknown	Private; Public	2030	Some bridges and culverts have been repaired and there is potential for others to be improved in the future. There has been limited political will to advance this action over the last 5 years
P-6	Conduct a basin-wide drainage study.	Flood	Low	County Emergency Management; Private consultant; County Planning and Inspections; State/Federal government	Unknown	Federal and State programs/grants	Complete	New River conservancy has conducted multiple studies. Other studies need to be done and will be completed as funding becomes available.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-7	Expand disaster tracking capability.	All	Low	County Emergency Management	Unknown	In house	Complete	Utilizing State WebEOC platform along with in-house RMS for local issues. May consider expended virtual EOC platform in the future.
Property Protection								
PP-1	Bury power lines.	Winter Storm; Freeze; Wind; Flood; Wildfire	Low	Electric utility providers	Unknown	Private	Deferred	Local utilities advised this is not feasible and is not currently being planned for.
PP-2	Pave or gravel roads at stream crossings.	Flood; Winter Storm	Low	NCDOT; municipalities; Public and private developments	Unknown	Private	Complete	Several planned to be completed by November 1, 2017. Further projects may be necessary
PP-3	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	Initial review began, transitioning to focus on hardening and redundancy of CIKR facilities. Will work to develop a countywide plan for evaluating the status of the infrastructure.
PP-4	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030	Revisions based on CIKR definitions, review ongoing for approved facilities
Emergency Services								

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-1	Constant revision and distribution of resource list.	All	Moderate	Emergency Management	Unknown	Homeland Security monies; In house	Updated Annually; 2030	Completed on an annual basis.
ES-2	Create interagency communications system.	All	Moderate	Emergency Management	Unknown	Public; Grants	2024	Construction underway; meetings regarding further actions ongoing.
Public Education and Awareness								
PEA-1	Educate the public on the importance of being prepared for a disaster	All	High	Emergency Management	Unknown	Federal and State programs/grants	2027	County EM participates in multiple education events throughout the year. Future education may be necessary

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-2	Improve public awareness.	All	High	County Emergency Management	Unknown	Federal and State programs/grants	Complete	Public awareness messages are given out frequently by multiple avenues. The Planning Department has brochures and other publications available (including some mailed with tax bills) regarding flood plain issues. Additional information is available on the County Website.
PEA-3	Educate the public about the function of plans and how they work.	All	High	All government agencies	Unknown	Federal and State programs/grants	Merge with PEA-1	

Town of Beech Mountain Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-1	Make efficient repairs to potential problems such as culverts and bridges.	Flood; Earthquake	Low	NCDOT; municipalities; Private developments	Unknown	Private; Public	2030	The Town implements an annual program of cleaning all ditches and culverts. Aging, damaged, and undersized culverts have recently been replaced at several key locations. Additional work may be required.
P-2	Prevent construction of new public buildings within the identified floodplain.	Flood	Low	Governing boards	Unknown	None required	2030	Although Beech Mountain participates in the NFIP, and has a Flood Damage Prevention Ordinance, there are no identified floodplains within the Town.
P-3	Continue to facilitate the integration of the Hazard Mitigation Plan into other plans and/or policies if possible.	All	Moderate	Municipalities; County Emergency Management	Unknown	Staff Time	2030	A cross reference to the Hazard Mitigation Plan is included in the Town's Comprehensive Plan adopted in 2013. Additional integration is necessary for other plans and will be addressed as plans are developed. There has been no political will to advance this action further over the past 5 years.
Property Protection								
PP-1	Pave or gravel roads at stream crossings.	Flood; Winter Storm	Low	NCDOT; municipalities; Public and private developments	Unknown	Private	2030	The Town expends approximately $80,000 per year on gravel restabilization and $250,000 per year on resurfacing. An effort is

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
								made to prioritize areas where safety is a concern, including stream crossings.
PP-2	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.
Public Education and Awareness								
PEA-1	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management	Unknown	None Needed	2030	The Town has an avenue for public education about hazards in its public access TV channel. Also, the Town now participates in a "Code Red" program in which residents and others are provided with emails, texts, and other information regarding potential hazards. The Fire Department disseminates a regular newsletter that educates the public about hazards such as wildfire and associated mitigation techniques. Additional education may be needed

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
								or opportunities may arise

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-2	Coordinate with County Emergency Management to hold an annual elected official's workshop to provide an overview to officials on mitigation and emergency management activities.	All	Moderate	County Emergency Management	Staff Time	None Needed	2030	An elected officials workshop is scheduled for 2023 or later. Future awareness may be necessary.

Town of Blowing Rock Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-1	Make efficient repairs to potential problems such as culverts and bridges.	Flood; Earthquake	Low	NCDOT; municipalities; Private developments	Unknown	Private; Public	2030	Some repairs have been done and more in the future as funding allows.
P-2	Prevent construction of new public buildings within the identified floodplain.	Flood	Low	Governing boards	Unknown	None required	2030	There has been no political will to advance this action further over the past 5 years.
P-3	Continue to facilitate the integration of the Hazard Mitigation Plan into other plans and/or policies if possible.	All	Moderate	Municipalities; County Emergency Management	Unknown	Staff Time	2030	As new plans are developed, integration will be done as needed. There has been limited political will to advance this action further over the past 5 years.
Property Protection								
PP-1	Pave or gravel roads at stream crossings.	Flood; Winter Storm	Low	NCDOT; municipalities; Public and private developments	Unknown	Private	2030	Several roads have been upgraded, more to be done in the future as funding allows.
PP-2	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
	and other activities that reduce to the loss of life and property.							
PP-3	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030	New Action.
Public Education and Awareness								
PEA-1	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management	Unknown	None Needed	2030	Several public programs scheduled throughout the year. Additional education may be necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-2	Coordinate with County Emergency Management to hold an annual elected officials workshop to provide an overview to officials on mitigation and emergency management activities.	All	Moderate	County Emergency Management	Staff Time	None Needed	2022	Working with County EM and the state to provide these classes.

Town Boone Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-1	Make efficient repairs to potential problems such as culverts and bridges.	Flood; Earthquake	Low	NCDOT; municipalities; Private developments	Unknown	Private; Public	2030	Some repairs have been done and more in the future as funding allows.
P-2	Prevent construction of new public buildings within the identified floodplain.	Flood	Low	Governing boards	Unknown	None required	2030	There has been no political will to advance this action further over the past 5 years. Buildings are permitted on a case by case basis.
P-3	Continue to facilitate the integration of the Hazard Mitigation Plan into other plans and/or policies if possible.	All	Moderate	Municipalities; County Emergency Management	Unknown	Staff Time	2022	As new plans are developed, integration will be done as needed. There has been no political will to advance this action further over the past 5 years.
Property Protection								
PP-1	Pave or gravel roads at stream crossings.	Flood; Winter Storm	Low	NCDOT; municipalities; Public and private developments	Unknown	Private	2030	Several roads have been upgraded, more to be done in the future as funding allows.
PP-2	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
	critical facilities, storm shelters and other activities that reduce to the loss of life and property.							
PP-3	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030	New Action.
Public Education and Awareness								
PEA-1	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management	Unknown	None Needed	2030	Several public programs scheduled throughout the year.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-2	Coordinate with County Emergency Management to hold an annual elected officials workshop to provide an overview to officials on mitigation and emergency management activities.	All	Moderate	County Emergency Management	Staff Time	None Needed	2030	Working with County EM and the state to provide these classes. There has been no political will to advance this action further over the past 5 years.

Town of Seven Devils Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-1	Make efficient repairs to potential problems such as culverts and bridges.	Flood; Earthquake	Low	NCDOT; municipalities; Private developments	Unknown	Private; Public	2030	Some repairs have been done and more in the future as funding allows.
P-2	Prevent construction of new public buildings within the identified floodplain.	Flood	Low	Governing boards	Unknown	None required	2030	There has been no political will to advance this action further over the past 5 years.
P-3	Continue to facilitate the integration of the Hazard Mitigation Plan into other plans and/or policies if possible.	All	Moderate	Municipalities; County Emergency Management	Unknown	Staff Time	2030	As new plans are developed, integration will be done as needed.
Property Protection								
PP-1	Pave or gravel roads at stream crossings.	Flood; Winter Storm	Low	NCDOT; municipalities; Public and private developments	Unknown	Private	2030	Several roads have been upgraded, more to be done in the future as funding allows.
PP-2	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-3	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030	New Action.
Public Education and Awareness								
PEA-1	Increase public awareness about the hazards identified in this plan and the mitigation techniques that can be used to reduce the impacts of the hazards.	All	Moderate	County Emergency Management	Unknown	None Needed	2030	Several public programs scheduled throughout the year. Additional education may be necessary

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-2	Coordinate with County Emergency Management to hold an annual elected official's workshop to provide an overview to officials on mitigation and emergency management activities.	All	Moderate	County Emergency Management	Staff Time	None Needed	2030	Working with County EM and the state to provide these classes. There has been no political will to advance this action further over the past 5 years.

Wilkes County Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-1	Develop a central repository of information regarding hazards, including documents from the county and all the municipalities. This repository would become the central focus for research into such hazards.	All	High	Emergency Management and GIS	TBD	General Revenue	In progress, 2022	GIS overlays and Data collection continuing. There has been limited political will to advance this action further over the past 5 years.
P-2	Up-to-date digital (GIS) floodplain layers and maps that would allow the county mapping department to access parcels, addresses and ownership as well as define or otherwise delineate the type of structure in the floodplain (residential, commercial, etc.) and incorporate an up-to-date (GIS) inundation map from the US Army Corps of Engineers to access parcels, addresses and ownership as well as define or otherwise delineate the type of structure in the area of potential inundation (residential, commercial, etc.)	Flood	High	Wilkes County GIS	TBD	General Revenue	Completed (unless new data becomes available, 2022)	Completed - New floodplain maps being utilized. Additional new data will be added as available.
P-3	Use of technology to accomplish an automated system to coordinate plans information, development information, road expansion information or other demographics is desire. Further, it is desired that towns and county automated systems that contain such information have the ability to be integrated with one another and relative information shared between the systems.	All	High	Wilkes County GIS, Town of Wilkesboro Planning, Town of North Wilkesboro Planning, and Town of Ronda Planning	TBD	General Revenue	In progress, 2022	GIS Data and layers continue to be added.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
P-4	To establish, where feasible, joint (town and county) guidelines for hazard mitigation implementation and to use all available information in the decision making process that is likely to effect within a five (5) year period, based on growth projections, a municipal jurisdiction. This includes planning and zoning authority that is currently exercised by either the municipality or the county.	All	High	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2027	In process but completed over the last 5 years.
P-5	Establish, where feasible, joint (town and county) mitigation funding sources. To establish joint sources for opportunities to implement hazard mitigation goals, objectives, or recommendations.	All	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Put on hold for lack of funding and limited political will.
P-6	The integration of a cooperative hazard mitigation program into new development, commercial districts, infrastructure and land use planning become imperative as Wilkes County continues to grow.	All	Moderate	Wilkes County Planning, Wilkesboro Planning	TBD	General Revenue	2030	Put on hold due to lack of funding and limited political will.
P-7	Effectively assess and document “at risk” Urban-Interface areas in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Put on hold due to lack of funding and limited political will.

P-8	Continue to provide for an effective forest management program.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Forest Service is currently working on Forest Management plans monitoring and dealing with forest pest and invasive species.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Property Protection								
PP-1	To establish, where feasible, the retrofit, relocation or purchase of habitable structures in the 100 year (1%) floodplain. To plan for the retrofit, relocation or purchase of habitable structures at the rate of 10% per annum until the project is complete.	Flood	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Put on hold for lack of funding and limited political will.
PP-2	To establish, where feasible, additional structural and fixture integrity by 25%. At a minimum all critical facilities should be surveyed by earthquake planners and structural engineers employed by the Division of Emergency Management that are trained, equipped and knowledgeable to prepare reports and recommendations to local officials.	Earthquake, Hurricanes and Tornados	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Put on hold for lack of funding and limited political will.
PP-3	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-4	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030	New Action.
Emergency Services								
ES-1	Consolidation of written (electronic or plain copy) documents into a single, seamless, integrated plan that incorporates all phases of a comprehensive emergency management program. This would allow emergency managers, planner and elected officials an opportunity to examine their mitigation efforts in conjunction with preparedness plans, response procedures and recovery activity.	All	High	Wilkes County Emergency Management	TBD	General Revenue	2030	Action is generally completed, but Maintenance Ongoing

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-2	To establish, where feasible, additional emergency response forces, by at least 10% that are trained, equipped and prepared to respond to a variety of emergency and disaster situations.	All	Moderate	Wilkes County, Town of Wilkesboro, North Wilkesboro and Ronda	TBD	General Revenue	2030	Put on hold for lack of funding.
ES-3	Warning systems that would be both visual and audible to boaters and other users of the waterway (W. Kerr Scott Reservoir and Yadkin River), as well as residences that may be occupied downstream would be beneficial in the attempt to save lives in a fast breaking event.	Dam Failure	Moderate	Wilkes County Emergency Management	TBD	General Revenue	2030	Wilkes County continues to evaluate the situation and funding source. There has been no political will to advance this action further over the past 5 years.
ES-4	Provide for a full-time structure protection position to implement the require actions in urban-interface readiness and response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Wilkes County continues to evaluate the situation and funding source. Have added part time staff for this. Fulltime is still desired.
ES-5	Provide for the development and instruction of Wildland/Urban-Interface training for fire suppression agencies and other response agencies in Wilkes County	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	As new employees and volunteers are being recruited they continue to be trained.
ES-6	Provide strategic and tactical interagency operational planning for Wildland/Urban-interface incidents response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Wilkes County met with NCFS to discuss options. Additional work is necessary to formalize this planning and response.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-7	Assist in the advancement of local firefighting techniques and introduce new technologies to local personnel.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Wilkes County has met with local Fire Departments over the past 5 years to discuss techniques and technologies. Additional work is necessary to formalize this planning and response.
ES-8	Continue to provide for effective initial attack capabilities in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Met with NCFS officials to examine options. Additional coordination and resources are needed to formalize this capability.
ES-9	Continue to provide for the development and instruction of wildfire suppression training for fire suppression agencies and other response agencies in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Coordinate across agencies. Additional resources are needed to formalize this capability.
ES-10	Provide strategic and tactical interagency operational planning for wildfire incident response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Developing of a database for the wildfires will be added in the Wilkes County GIS Database. This is an ongoing process as the GIS database is new as the county has implemented an ArcView system which allows for the sharing of data since it is a standard format. Have two different systems working on combining systems

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Public Education and Awareness								
PEA-1	Establish, where feasible, joint (town and county) public education materials and public education public for hazard mitigation implementation.	All	Moderate	Wilkes County, Town of Wilkesboro, Town of North Wilkesboro, Town of Ronda	TBD	General Revenue	2030	County and municipalities continue to work toward providing this education. Some information is available on websites. Plans are to continue to provide additional education to the public. Bringing interested organizations to educate property owners. Additional action is Needed.
PEA-2	Inform and educate property owners of Wilkes County about the wildfire risks associated with living in a wildland environment.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Bringing in interested organizations to educate property owners. Additional information and education is needed.
PEA-3	Inform and educate property owners of Wilkes County about effective methods of wildfire prevention, structure preparation, and mitigating wildfire risk in the Urban-Interface.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Limited political will to complete this action over the last 5 years.

Town of North Wilkesboro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-1	Establish, where feasible, joint (town and county) mitigation funding sources. To establish joint sources for opportunities to implement hazard mitigation goals, objectives, or recommendations.	All	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Deferred due to lack of funding and limited political will.
P-2	The integration of a cooperative hazard mitigation program into new development, commercial districts, infrastructure and land use planning become imperative as Wilkes County continues to grow.	All	Moderate	Wilkes County Planning, Wilkesboro Planning	TBD	General Revenue	2030	Program still under development. There has been limited political will to complete this action over the last five years.
P-3	Effectively assess and document “at risk” Urban-Interface areas in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	This is still of interest but limited staffing and 2016 fires has slowed process.
P-4	Continue to provide for an effective forest management program.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Ongoing have met with NC wildlife officials on program. There has been limited political will to complete this action over the last five years.
Property Protection								

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-1	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.
PP-2	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030	New Action.
Emergency Services								
ES-1	To establish, where feasible, additional emergency response forces, by at least 10% that are trained, equipped and prepared to respond to a variety of emergency and disaster situations.	All	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Working with WCC continuing to provide training. There has been limited political will to complete this action over the last five years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-2	Provide for a full-time structure protection position to implement the require actions in urban-interface readiness and response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	Deleted	Discarded due to lack of funding and political infeasibility of the position.
ES-3	Provide for the development and instruction of Wildland/Urban-Interface training for fire suppression agencies and other response agencies in Wilkes County	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Met with NC wildlife officials on training. There has been limited political will to complete this action over the last five years.
ES-4	Provide strategic and tactical interagency operational planning for Wildland/Urban-interface incidents response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Delayed due to lack of staffing and limited political will.
ES-5	Assist in the advancement of local firefighting techniques and introduce new technologies to local personnel.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Met with state and local officials to begin advancing. There has been limited political will to complete this action over the last five years.
ES-6	Continue to provide for effective initial attack capabilities in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Met with local and state officials and discussed training options. There has been limited political will to complete this action over the last five years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-7	Continue to provide for the development and instruction of wildfire suppression training for fire suppression agencies and other response agencies in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Continue to provide training through WCC. There has been limited political will to complete this action over the last five years.
ES-8	Provide strategic and tactical interagency operational planning for wildfire incident response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Working through software issues. There has been limited political will to complete this action over the last five years.
Public Education and Awareness								
PEA-1	Inform and educate property owners of Wilkes County about the wildfire risks associated with living in a wildland environment.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NC Forestry has provided educational opportunities for the public. Additional and ongoing training is necessary for this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-2	Inform and educate property owners of Wilkes County about effective methods of wildfire prevention, structure preparation, and mitigating wildfire risk in the Urban-Interface.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NC Forestry has provided educational opportunities for the public. Additional and ongoing training is necessary for this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PES-3	Inform and educate forest landowners of Wilkes County about the wildfire risks in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NC Forestry Service has provided educational opportunities for the public. Additional education may be necessary.

Town of Ronda Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-1	Establish, where feasible, joint (town and county) mitigation funding sources. To establish joint sources for opportunities to implement hazard mitigation goals, objectives, or recommendations.	All	High	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2022	Delayed due to lack of funding and limited political will.
P-2	Effectively assess and document "at risk" Urban-Interface areas in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2027	GIS Data layers under development. As development continues, these areas may change.
P-3	Continue to provide for an effective forest management program.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2022	Ongoing. Have met with local officials but there has been limited political will to complete this action.
Property Protection								
PP-1	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
	critical facilities, storm shelters and other activities that reduce to the loss of life and property.							
PP-2	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030	New Action.
Emergency Services								
ES-1	To establish, where feasible, additional emergency response forces, by at least 10% that are trained, equipped and prepared to respond to a variety of emergency and disaster situations.	All	Moderate	Wilkes County, Town of Wilkesboro, Town of North Wilkesboro, and Town of Ronda	TBD	General Revenue	2030	Continuing to work with WCC to provide training.
ES-2	Provide for a full-time structure protection position to implement the require actions in urban-interface readiness and response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Delayed due to the act of funding and limited political will.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-3	Provide for the development and instruction of Wildland/Urban-Interface training for fire suppression agencies and other response agencies in Wilkes County	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Working with WCC to continue training.
ES-4	Provide strategic and tactical interagency operational planning for Wildland/Urban-interface incidents response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Lack of staffing is slowing the process. There has been limited political will to complete this action over the last 5 years.
ES-5	Assist in the advancement of local firefighting techniques and introduce new technologies to local personnel.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Continue to work with WCC on training. There has been limited political will to complete this action over the last 5 years.
ES-6	Continue to provide for effective initial attack capabilities in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Met with NCFS and local Fire Departments. There has been limited political will to complete this action over the last 5 years.
ES-7	Continue to provide for the development and instruction of wildfire suppression training for fire suppression agencies and other response agencies in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Working with cc to provide training. There has been limited political will to complete this action over the last 5 years.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-8	Provide strategic and tactical interagency operational planning for wildfire incident response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Delayed due to software compatibility issues.
Public Education and Awareness								
PEA-1	Inform and educate property owners of Wilkes County about the wildfire risks associated with living in a wildland environment.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NCFS is providing educational opportunities for the public. Additional training resources will be needed.
PEA-2	Inform and educate property owners of Wilkes County about effective methods of wildfire prevention, structure preparation, and mitigating wildfire risk in the Urban-Interface.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NCFS is providing educational opportunities to the public. Additional training resources will be needed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PES-3	Inform and educate forest landowners of Wilkes County about the wildfire risks in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NCFS is providing educational opportunities to the public. Additional training resources will be needed.

Town of Wilkesboro Mitigation Action Plan

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
Prevention								
P-1	Establish, where feasible, joint (town and county) mitigation funding sources. To establish joint sources for opportunities to implement hazard mitigation goals, objectives, or recommendations.	All	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Delayed due to lack of funding and limited political will.
P-2	The integration of a cooperative hazard mitigation program into new development, commercial districts, infrastructure and land use planning become imperative as Wilkes County continues to grow.	All	Moderate	Wilkes County, Town of Wilkesboro	TBD	General Revenue	2030	Delayed due to lack of funding and limited political will.
P-3	Effectively assess and document “at risk” Urban-Interface areas in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Delayed due to lack of funding and limited political will.
P-4	Continue to provide for an effective forest management program.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Met with NCFS but there has been limited political will to complete this action over the last 5 years.
Property Protection								

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PP-1	Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation Guidance at the time of application. Projects could include but are not limited to: acquisition, elevation, mitigation reconstruction, and wet/dry flood proofing to commercial and/or residential structures as applicable; redundant power to critical facilities, wind retrofits to critical facilities, storm shelters and other activities that reduce to the loss of life and property.	All hazards	Moderate	Emergency Management, Engineering and/or Planning Department	Project Cost, Staff Hours, and applicable cost share	Federal and State Grants, Local Operating Budget	2030	New Action.
PP-2	Install generator or generator hook-ups for critical facilities as budget and need arise.	Winter Storm, Hurricane, Severe Storm, Flood, Wildfire, Earthquake	Moderate	Emergency Management	Varies	FEMA HMA funding; local; state	2030	New Action.
Emergency Services								
ES-1	To establish, where feasible, additional emergency response forces, by at least 10% that are trained, equipped and prepared to respond to a variety of emergency and disaster situations.	All	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Working with WCC to provide training. Additional training will be necessary.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-2	Provide for a full-time structure protection position to implement the require actions in urban-interface readiness and response.	All	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Delayed due to lack of funding and limited political will. Additional training will be necessary.
ES-3	Provide for the development and instruction of Wildland/Urban-Interface training for fire suppression agencies and other response agencies in Wilkes County	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Working with WCC to provide training. Additional training will be necessary.
ES-4	Provide strategic and tactical interagency operational planning for Wildland/Urban-interface incidents response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Delayed due to lack of staffing and limited political will.
ES-5	Assist in the advancement of local firefighting techniques and introduce new technologies to local personnel.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Working with WCC to provide training. Additional training will be necessary.
ES-6	Continue to provide for effective initial attack capabilities in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Met with local and state to discuss options but there has been limited political will to complete this action.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
ES-7	Continue to provide for the development and instruction of wildfire suppression training for fire suppression agencies and other response agencies in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2022	Working with WCC to provide training.
ES-8	Provide strategic and tactical interagency operational planning for wildfire incident response.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	Delayed due to software compatibility issues.
Public Education and Awareness								
PEA-1	Inform and educate property owners of Wilkes County about the wildfire risks associated with living in a wildland environment.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NCFS has provided educational opportunities for the public but additional trainings are necessary

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2022)
PEA-2	Inform and educate property owners of Wilkes County about effective methods of wildfire prevention, structure preparation, and mitigating wildfire risk in the Urban-Interface.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NCFS has provided educational opportunities for the public but additional trainings are necessary

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
PES-3	Inform and educate forest landowners of Wilkes County about the wildfire risks in Wilkes County.	Wildfire	Moderate	Wilkes County Planning, Wilkesboro Planning, North Wilkesboro Planning, Ronda Planning	TBD	General Revenue	2030	NCFS has provided educational opportunities for the public but additional trainings are necessary

SECTION 10
PLAN MAINTENANCE PROCEDURES

This section discusses how the High-Country Region Mitigation Strategy and Mitigation Action Plan will be implemented and how the Regional Hazard Mitigation Plan will be evaluated and enhanced over time. This section also discusses how the public will continue to be involved in a sustained hazard mitigation planning process. It consists of the following three subsections:

- 10.1 Implementation and Integration
- 10.2 Monitoring, Evaluation, and Enhancement
- 10.3 Continued Public Involvement
- 10.4 Evaluation of Monitoring, Evaluation and Update Process

44 CFR Requirement
44 CFR Part201.6(c)(4)(i): The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle. ***44 CFR Part 201.6(c)(4)(ii):*** The plan maintenance process 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

10.1 IMPLEMENTATION AND INTEGRATION

Each agency, department, or other partner participating under the High-Country Regional Hazard Mitigation Plan is responsible for implementing specific mitigation actions as prescribed in the Mitigation Action Plan. Every proposed action listed in the Mitigation Action Plan is assigned to a specific "lead" agency or department in order to assign responsibility and accountability and increase the likelihood of subsequent implementation.

In addition to the assignment of a local lead department or agency, an implementation time period or a specific implementation date has been assigned in order to assess whether actions are being implemented in a timely fashion. The counties in the High-Country Region will seek outside funding sources to implement mitigation projects in both the pre-disaster and post-disaster environments. When applicable, potential funding sources have been identified for proposed actions listed in the Mitigation Action Plan.

The participating jurisdictions will integrate this Hazard Mitigation Plan into relevant city and county

government decision-making processes or mechanisms, where feasible. This includes integrating the requirements of the Hazard Mitigation Plan into other local planning documents, processes, or mechanisms, such as comprehensive or capital improvement plans, when appropriate. The members of the High-Country Regional Hazard Mitigation Planning Committee will remain charged with ensuring that the goals and mitigation actions of new and updated local planning documents for their agencies or departments are consistent, or do not conflict with, the goals and actions of the Hazard Mitigation Plan, and will not contribute to increased hazard vulnerability in the High Country Region.

Since the communities in the region first adopted hazard mitigation plans, each County and participating jurisdiction has worked to integrate the hazard mitigation plan into other planning mechanisms where applicable/feasible. Examples of how this integration has occurred have been documented in the Implementation Status discussion provided for each of the mitigation actions found in Section 9. Specific examples of how integration has occurred include:

- Integrating the mitigation plan into reviews and updates of floodplain management ordinances;
- Integrating the mitigation plan into reviews and updates of County emergency operations plans;
- Integrating the mitigation plan into review and updates of building codes; and
- Integrating the mitigation plan into the capital improvements plan through identification of mitigation actions that require local funding

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the Regional Hazard Mitigation Planning Committee, individual county meetings, and the annual review process described herein. Although it is recognized that there are many possible benefits to integrating components of this Plan into other local planning mechanisms, the development and maintenance of this stand-alone Regional Hazard Mitigation Plan is deemed by the High-Country Regional Hazard Mitigation Planning Committee to be the most effective and appropriate method to implement local hazard mitigation actions at this time.

10.2 MONITORING, EVALUATION, AND ENHANCEMENT

Periodic revisions and updates of the Hazard Mitigation Plan are required to ensure that the goals of the Plan are kept current, taking into account potential changes in hazard vulnerability and mitigation priorities. In addition, revisions may be necessary to ensure that the Plan is in full compliance with applicable federal and state regulations. Periodic evaluation of the Plan will also ensure that specific mitigation actions are being reviewed and carried out according to the Mitigation Action Plan.

When determined necessary, the High-Country Regional Hazard Mitigation Planning Committee shall meet in March of every year to evaluate the progress attained and to revise, where needed, the activities set forth in the Plan. The findings and recommendations of the Regional Hazard Mitigation Planning Committee shall be documented in the form of a report that can be shared with interested municipal and County Council members. The Regional Hazard Mitigation Planning Committee will also meet following any disaster events warranting a reexamination of the mitigation actions being implemented or proposed for future implementation. This will ensure that the Plan is continuously updated to reflect changing conditions and needs within the High-Country Region. For future updates of the plan, North Carolina Emergency Management's Hazard Mitigation Planning Section will help coordinate the reconvening of the Regional Mitigation Planning Committee for these reviews through coordination with each County's Emergency Management Departments. Unless it is determined otherwise, the Emergency Management Directors from Alleghany, Ashe, Watauga and Wilkes Counties

will maintain ultimate responsibility for their respective County's plan implementation and monitoring, evaluation and update.

Five Year Plan Review

The Plan will be thoroughly reviewed by the Regional Hazard Mitigation Planning Committee every five years to determine whether there have been any significant changes in the High-Country Region that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, an increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan.

The plan review provides participating jurisdiction officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. North Carolina Emergency Management's Hazard Mitigation Planning section will help coordinate the reconvening the Regional Mitigation Planning Committee and conducting the five-year review through coordination with each County's Emergency Management Departments.

During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did County departments participate in the plan implementation process as assigned?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the High-Country Region Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at North Carolina Emergency Management (NCEM) for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

Disaster Declaration

Following a disaster declaration, the Southeastern NC Regional Hazard Mitigation Plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility North Carolina Emergency Management's Hazard Mitigation Planning section to coordinate the reconvening of the Regional Mitigation Planning Committee, through coordination with each County's Emergency Management Department, and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

Reporting Procedures

The results of the five-year review will be summarized by the Regional Hazard Mitigation Planning

Committee in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommended strategies to overcome them.

Plan Amendment Process

Upon the initiation of the amendment process, representatives from Alleghany, Ashe, Watauga and Wilkes counties will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County departments, residents, and businesses. Information will also be forwarded to North Carolina Emergency Management. This information will be disseminated in order to seek input on the proposed amendment(s) for no less than a 45-day review and comment period.

At the end of the 45-day review and comment period, the proposed amendment(s) and all comments will be forwarded to the Regional Hazard Mitigation Planning Committee for final consideration. The Planning Committee will review the proposed amendment along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the Regional Hazard Mitigation Planning Committee:

- There are errors, inaccuracies, or omissions made in the identification of issues or needs in the Plan.
- New issues or needs have been identified which are not adequately addressed in the Plan.
- There has been a change in information, data, or assumptions from those on which the Plan is based.

Upon receiving the recommendation from the Regional Hazard Mitigation Planning Committee, and prior to adoption of the Plan, the participating jurisdictions will hold a public hearing, if deemed necessary. The governing bodies of each participating jurisdiction will review the recommendation from the Regional Hazard Mitigation Planning Committee (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the governing bodies will take one of the following actions:

- Adopt the proposed amendments as presented;
- Adopt the proposed amendments with modifications;
- Refer the amendments request back to the Regional Hazard Mitigation Planning Committee for further revision; or
- Defer the amendment request back to the Regional Hazard Mitigation Planning Committee for further consideration and/or additional hearings.

10.3 CONTINUED PUBLIC INVOLVEMENT

44 CFR Requirement
44 CFR Part 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

Public participation is an integral component to the mitigation planning process and will continue to be essential as this Plan evolves over time. As described above, significant changes or amendments to the Plan shall require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation, and revision process will be made as necessary. These efforts may include:

- Advertising meetings of the Regional Hazard Mitigation Planning Committee in local newspapers, public bulletin boards and/or County office buildings;
- Designating willing and voluntary citizens and private sector representatives as official members of the Regional Hazard Mitigation Planning Committee;
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place;
- Utilizing the Alleghany, Ashe, Watauga and Wilkes County websites to advertise any maintenance and/or periodic review activities taking place; and
- Keeping copies of the Plan in public libraries.

10.4 EVALUATION OF PREVIOUS MONITORING, EVALUATION AND UPDATE PROCESS

Over the past five years, the participating jurisdictions have been independently implementing, monitoring and evaluating their own mitigation action plans. Progress made in implementing actions has been documented in Section 9: Mitigation Action Plan where each action contains a narrative about the implementation status of the action as of 2022. That said, the jurisdiction did waiver slightly from the monitoring and evaluation process defined in the original version of the plan, but still made significant process in implementing their mitigation action plans. During the 2022 update of this plan, the Regional Hazard Mitigation Planning Committee determined that the procedures for the upcoming five-year monitoring and evaluation process will remain as defined above and will be re-evaluated during the next plan update process.

The five-year comprehensive update process began as early as 2018 when North Carolina Emergency Management made the decision to set aside HMGP funding from Hurricane Matthew to fund the High-Country Regional Hazard Mitigation Plan. To facilitate this effort, NCEM assigned the plan update to their pre-qualified hazard mitigation planning consultants ESP Associates. Representatives from ESP Associates first reached out to High Country representatives in April of 2021 to initiate the plan update process. More details about the plan update process are provided in Section 2, Planning Process.

For the next update of this plan, NCEM's Hazard Mitigation Planning section will continue take the lead on organizing and initiating the 5-year update of the plan.

Appendix A Plan Adoption

This Appendix includes the local adoption resolutions for each of the participating jurisdictions.

Appendix B
Planning Tools

This Appendix includes the following:

1. A Blank Hazard Mitigation Public Participation Survey
2. GIS Data Inventory Spreadsheet
3. Scoring Criteria for Capability Assessment
4. A Blank Mitigation Action Worksheet

PUBLIC PARTICIPATION SURVEY
FOR HAZARD MITIGATION PLANNING

We need your help!

The Counties of Alleghany, Ashe, Watauga and Wilkes are currently engaged in a planning process to become less vulnerable to natural disasters, and your participation is important to us!

The Counties, along with participating local jurisdictions and other participating partners, are now working to prepare a update to the region's multi-jurisdictional *Hazard Mitigation Plan*. The purpose of this Plan is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks. Upon completion, the Plan will represent a comprehensive multi- jurisdictional *Hazard Mitigation Plan* for the four-county region.

This survey questionnaire provides an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impact of future hazard events.

Please help us by completing this survey and returning it to:

nslaughter@espassociates.com

If you have any questions regarding this survey or would like to learn about more ways you can participate in the development of the *High Country Regional Hazard Mitigation Plan*, please contact Nathan Slaughter (ESP Associates) at 919-415-2726 or by email at nslaughter@espassociates.com.

1. Where do you live?

- ❑ Unincorporated Alleghany County
- ❑ Unincorporated Ashe County
- ❑ Unincorporated Watauga County
- ❑ Unincorporated Wilkes County
- ❑ Town of Beech Mountain
- ❑ Town of Blowing Rock
- ❑ Town of Boone
- ❑ Town of Jefferson
- ❑ Town of Lansing
- ❑ Town of North Wilkesboro
- ❑ Town of Ronda
- ❑ Town of Seven Devils
- ❑ Town of Sparta
- ❑ Town of West Jefferson
- ❑ Town of Wilkesboro
- ❑ Other

2. Have you ever experienced or been impacted by a disaster?

- ❑ Yes
- ❑ No

a. If "Yes," please explain:

3. How concerned are you about the possibility of our community being impacted by a disaster?

- ❑ Extremely concerned
- ❑ Somewhat concerned
- ❑ Not concerned

4. Please select the <u>one</u> hazard you think is the *highest threat* to your neighborhood:

- ❑ Acts of Terror
- ❑ Dam / Levee Failure
- ❑ Drought
- ❑ Earthquake
- ❑ Expansive Soils
- ❑ Extreme Heat
- ❑ Flood
- ❑ Hailstorm
- ❑ Hurricane Remnants
- ❑ Land Subsidence
- ❑ Landslide
- ❑ Lightning
- ❑ Severe Winter/Ice Storm
- ❑ Severe Thunderstorm / High Wind
- ❑ Tornado
- ❑ Wildland Fire

5. Please select the <u>one</u> hazard you think is the *second highest threat* to your neighborhood:

- ❑ Acts of Terror
- ❑ Dam / Levee Failure
- ❑ Drought
- ❑ Earthquake
- ❑ Expansive Soils
- ❑ Extreme Heat
- ❑ Flood
- ❑ Hailstorm
- ❑ Hurricane Remnants
- ❑ Land Subsidence
- ❑ Landslide
- ❑ Lightning
- ❑ Severe Winter/Ice Storm
- ❑ Severe Thunderstorm / High Wind
- ❑ Tornado
- ❑ Wildland Fire

6. Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?

- ❑ Yes (please explain): _____
- ❑ No

7. Is your home located in a floodplain?

- ❑ Yes
- ❑ No
- ❑ I don't know

8. Do you have flood insurance?

- ❑ Yes
- ❑ No
- ❑ I don't know

a. If "No," why not?

- ❑ Not located in floodplain
- ❑ Too expensive
- ❑ Not necessary because it never floods
- ❑ Not necessary because I'm elevated or otherwise protected
- ❑ Never really considered it
- ❑ Other (please explain): _____

9. Have you taken any actions to make your home or neighborhood more resistant to hazards?

- ❑ Yes
- ❑ No

b. If "Yes," please explain:

10. Are you interested in making your home or neighborhood more resistant to hazards?

- ❑ Yes
- ❑ No

11. Do you know what office to contact regarding reducing your risks to hazards in your area?

- ❑ Yes
- ❑ No

12. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?

- ❑ Newspaper
- ❑ Television
- ❑ Radio
- ❑ Internet
- ❑ Mail
- ❑ Public workshops/meetings
- ❑ School meetings
- ❑ Other (please explain): _____

13. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?

14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

15. A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.

Category	Very Important	Somewhat Important	Not Important
1. Prevention Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.	❑	❑	❑
2. Property Protection Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters.	❑	❑	❑
3. Natural Resource Protection Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.	❑	❑	❑
4. Structural Projects Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, detention/retention basins, channel modification, retaining walls and storm sewers.	❑	❑	❑
5. Emergency Services Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.	❑	❑	❑
6. Public Education and Awareness Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials and demonstration events.	❑	❑	❑

THANK YOU FOR YOUR PARTICIPATION!

This survey may be submitted anonymously; however, if you provide us with your name and contact information below we will have the ability to follow up with you to learn more about your ideas or concerns (optional):

Name: _____

Address: _____

_____

Phone: _____ **E-Mail:** _____

GIS DATA INVENTORY

DATA DESCRIPTION	AVAILABLE?	RECEIVED?	SOURCE(S)
Administrative / Political Boundaries			
County boundaries			
Municipal boundaries			
Tax parcels *			
** At a minimum, attribute data for tax parcels should include address, building type, square footage, building value and year built.*			
Population and Demographics			
Census block data *			
** Anything better than Census 2000 data?*			
Buildings and Facilities			
Building footprints			
Existing building stock, by occupancy class			
Government buildings			
County offices, city/town halls, etc.			
Police stations			
Fire/Rescue stations			
Emergency Operations Centers			
Public works facilities			
Communication facilities			
Hazardous materials facilities			
Hospitals			
Schools			
Shelters			
Senior care facilities			
Day care facilities			
Historic properties			
Power generation facilities / transmission lines			
Water/wastewater facilities / distribution lines			
Pipelines			
Repetitive loss properties (NFIP)			
Topography, Hydrology, Geology			
Contour data (two foot)			
Digital Elevation Model			
Watershed boundaries			
Rivers and streams			
Lakes and ponds			
Ocean / shoreline			
Wetlands			
Geology			
Soils			
Transportation			
Highways and roads (center lines)			
Bridges			
Railways			
Airports			
Ports			
Land Use			
Land Use / Land Cover			
Zoning / Future Land Use			
Parks / Open Space			
Preserved Farmland			
Acquired properties (HMGP buyouts, etc.)			

GIS DATA INVENTORY

DATA DESCRIPTION	AVAILABLE?	RECEIVED?	SOURCE(S)
Aerial Imagery			
High-resolution digital orthophotography			
Hazards			
DROUGHT			
Palmer Drought Severity Index (PDSI)	X	X	National Drought Mitigation Center
FLOOD			
FEMA Digital Flood Data (DFIRMs)			FEMA
Location of dams, levees and any inundation zones			
HURRICANE AND TROPICAL STORM			
Historical storm tracks	X	X	NOAA
THUNDERSTORM			
Thunderstorm frequency	X	X	NOAA
Lightning frequency	X	X	NOAA
Hail frequency	X	X	NOAA
TORNADO			
Historical tornado locations	X	X	NOAA
WILDFIRE			
Wildfire hazard areas, fuel maps, etc.			
Urban/wildland interface communities			
WINTER STORM			
Annual snow/ice precipitation	X	X	NOAA
OTHER			
Any other data on historic events/ damages			

Points System for Capability Ranking

0-24 points = Limited overall capability **25-49 points = Moderate overall capability** **50-80 points = High overall capability**

I. Planning and Regulatory Capability (Up to 43 points)

Yes = 3 points
Under Development = 1 point
No = 0 points

- Hazard Mitigation Plan
- Comprehensive Land Use Plan
- Floodplain Management Plan
- Participate in NFIP
- Participate in CRS Program

Yes = 2 points
Under Development = 1 point
No = 0 points

- Open Space Management / Parks & Rec. Plan
- Stormwater Management Plan
- Natural Resource Protection Plan
- Flood Response Plan
- Emergency Operations Plan
- Continuity of Operations Plan
- Evacuation Plan
- Disaster Recovery Plan
- Flood Damage Prevention Ordinance
- Post-Disaster Redevelopment / Reconstruction Ordinance

Yes = 1 point
No = 0 points

- Capital Improvements Plan
- Economic Development Plan
- Historic Preservation Plan
- Zoning Ordinance
- Subdivision Ordinance
- Unified Development Ordinance
- Building Code
- Fire Code

II. Administrative and Technical Capability
(Up to 15 points)

Yes = 2 points
No = 0 points

- Planners with knowledge of land development and land management practices
- Engineers or professionals trained in construction practices related to buildings and/or infrastructure
- Planners or engineers with an understanding of natural and/or hazards
- Emergency manager
- Floodplain manager

Yes = 1 point
No = 0 points

- Land surveyors
- Scientist familiar with the hazards of the community
- Staff with education or expertise to assess the community's vulnerability to hazards
- Personnel skilled in Geographic Information Systems (GIS) and/or HAZUS
- Resource development staff or grant writers

III. Fiscal Capability
(Up to 10 points)

Yes = 1 point
No = 0 points

- Capital Improvement Programming
- Community Development Block Grants
- Special Purpose Taxes
- Gas / Electric Utility Fees
- Water / Sewer Fees
- Stormwater Utility Fees
- Development Impact Fees
- General Obligation/ Revenue/ Special Tax Bonds
- Partnering arrangements or intergovernmental agreements
- Other

IV. Self-Assessment of Overall Capability
(Up to 10 points)

High = 2 points
Moderate = 1 points
Low = 0 points

- Technical Capability
- Fiscal Capability
- Administrative Capability
- Political Capability
- Overall Capability

MITIGATION ACTION WORKSHEETS

Mitigation Action Worksheets are used to identify potential hazard mitigation actions that participating jurisdictions in the High Country Region will consider to reduce the negative effects of identified hazards. The worksheets provide a simple yet effective method of organizing potential actions in a user-friendly manner that can easily be incorporated into the Region's Hazard Mitigation Plan.

The worksheets are to be used as part of a strategic planning process and are designed to be:

a.) completed electronically (worksheets and instructions will be e-mailed to members of the Hazard Mitigation Planning Team following the Mitigation Strategy Workshop);

b.) reviewed with your department/organization for further consideration; and

c.) returned according to the contact information provided below.

Please return all completed worksheets no later than November 30, 2021 to:

Nathan Slaughter, Project Manager ESP Associates

Electronic copies may be e-mailed to: nslaughter@espassociates.com

INSTRUCTIONS

Each mitigation action should be considered to be a separate local project, policy or program and each individual action should be entered into a separate worksheet. By identifying the implementation requirements for each action, the worksheets will help lay the framework for engaging in distinct actions that will help reduce the community's overall vulnerability and risk. Detailed explanations on how to complete the worksheet are provided below.

Proposed Action: Identify a specific action that, if accomplished, will reduce vulnerability and risk in the impact area. Actions may be in the form of local policies (i.e., regulatory or incentive-based measures), programs or structural mitigation projects and should be consistent with any pre-identified mitigation goals and objectives.

Site and Location: Provide details with regard to the physical location or geographic extent of the proposed action, such as the location of a specific structure to be mitigated, whether a program will be citywide, countywide or regional, etc.

History of Damages: Provide a brief history of any known damages as it relates to the proposed action and the hazard(s) being addressed. For example, the proposed elevation of a repetitive loss property should include an overview of the number of times the structure has flooded, total dollar amount of damages if available, etc.

Hazard(s) Addressed: List the hazard(s) the proposed action is designed to mitigate against.

Category: Indicate the most appropriate category for the proposed action as discussed during the Mitigation Strategy Workshop (Prevention; Property Protection; Natural Resource Protection; Structural Projects; Emergency Services; Public Education and Awareness).

Priority: Indicate whether the action is a "high" priority, "moderate" priority or "low" priority based generally on the following criteria:

1. Effect on overall risk to life and property
2. Ease of implementation / technical feasibility
3. Project costs versus benefits
4. Political and community support
5. Funding availability

Estimated Cost: If applicable, indicate what the total cost will be to accomplish this action. This amount will be an estimate until actual final dollar amounts can be determined. Some actions (such as ordinance revisions) may only cost "local staff time" and should be noted so.

Potential Funding Sources: If applicable, indicate how the cost to complete the action will be funded. For example, funds may be provided from existing operating budgets or general funds, a previously established contingency fund, a cost-sharing federal or state grant program, etc.

Lead Agency/Department Responsible: Identify the local agency, department or organization that is best suited to implement the proposed action.

Implementation Schedule: Indicate when the action will begin and when the action is expected to be completed. Remember that some actions will require only a minimal amount of time, while others may require a long-term or continuous effort.

Comments: This space is provided for any additional information or details that may not be captured under the previous headings.

MITIGATION ACTION	
Proposed Action:	
BACKGROUND INFORMATION	
Site and Location:	
History of Damages:	

MITIGATION ACTION DETAILS	
Hazard(s) Addressed:	
Category:	
Priority (High, Moderate, Low):	
Estimated Cost:	
Potential Funding Sources:	
Lead Agency/Department Responsible:	
Implementation Schedule:	

COMMENTS

Appendix C
Local Mitigation Plan Review Tool

Appendix D

Planning Process Documentation

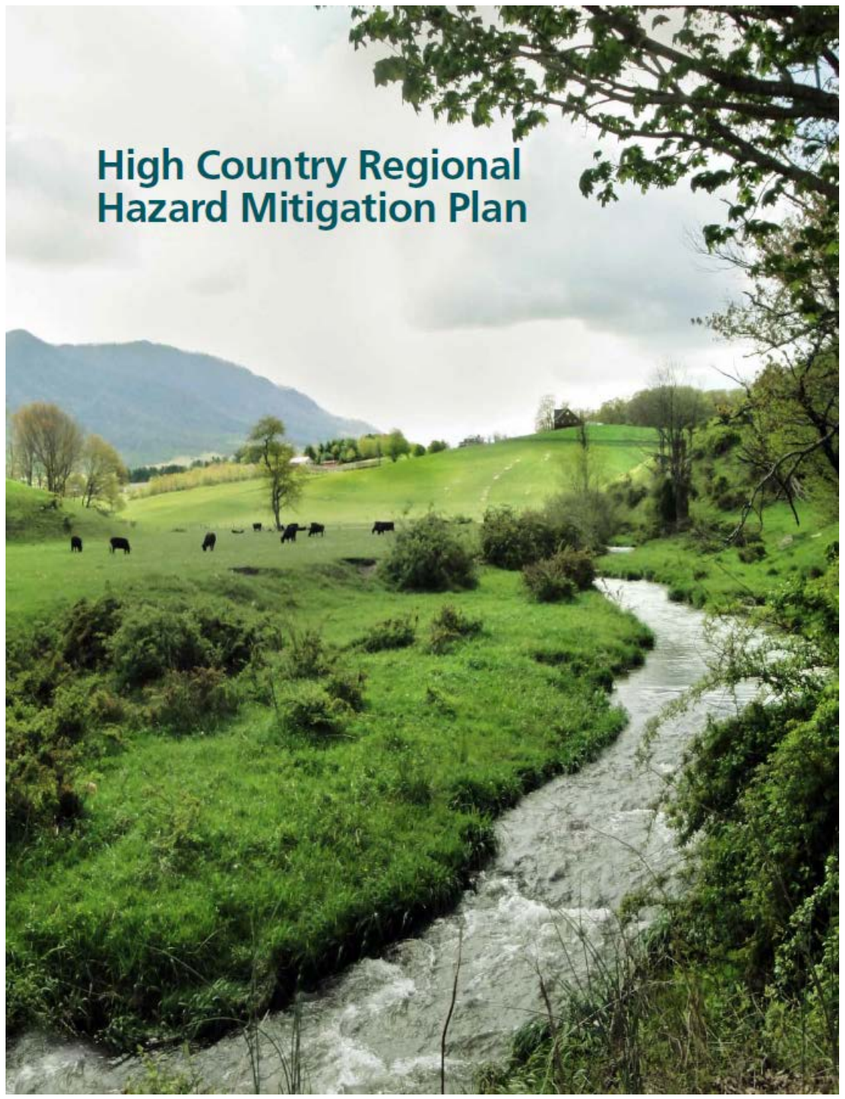
This appendix includes:

1. Meeting Presentations
2. Meeting Attendance Logs
3. Public Survey Summary Results
4. Notification of Neighboring Jurisdictions

HIGH COUNTRY REGIONAL HAZARD MITIGATION PLAN KICKOFF MEETING

AGENDA

- Introductions
- Mitigation Refresher
- Project Overview
  - Key Objectives
  - Project Tasks
  - Project Schedule
  - Project Staffing
- Roles & Responsibilities
- Next Steps
- Questions, Issues or Concerns



INTRODUCTIONS

- ESP Associates
  - Nathan Slaughter, AICP, CFM – Project Manager
- County Leads
- NCEM

PROJECT INFORMATION

- Funded with a Federal HMGP Grant (Hurricane Matthew)
- NCEM is managing the grant – providing contractor support
- Same Project Manager as prior plans
- No local match requirement (State is covering)

WHAT IS MITIGATION?

“mit-i-gate”

1: to cause to become less harsh or hostile.

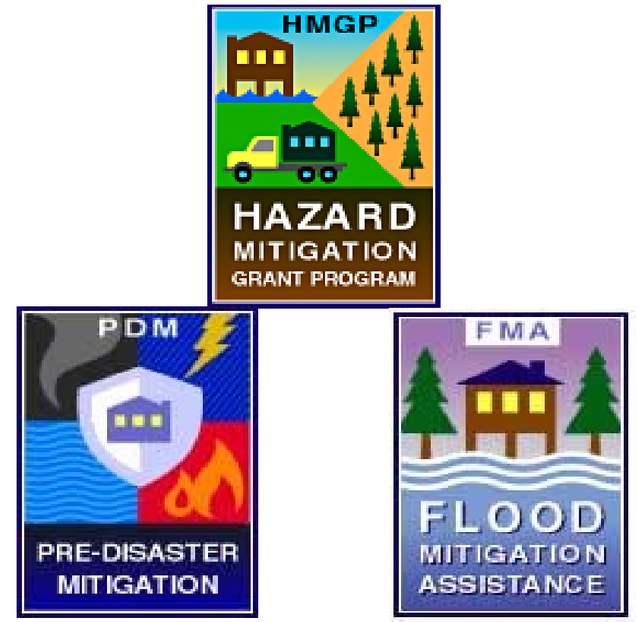
2: to make less severe or painful.

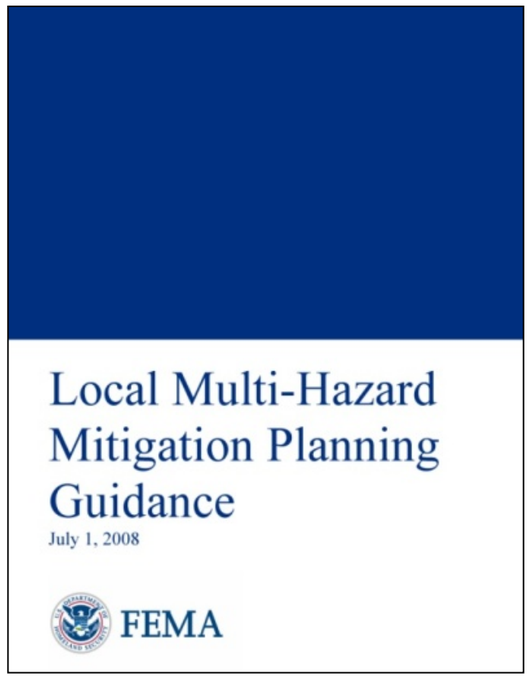
Hazard Mitigation

Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

DISASTER MITIGATION ACT OF 2000

- Revitalized Federal Planning Requirements
  - State and Local Hazard Mitigation Plans
- Federal Grant Funding Eligibility
  - Hazard Mitigation Grant Program (HMGP)
  - Building Resilient Infrastructure and Communities (BRIC)
    - Formerly Pre-Disaster Mitigation Program (PDM)
  - Flood Mitigation Assistance (FMA)
- DMA 2000 is intended to facilitate cooperation between state and local authorities on risk reduction measures and expedite funding allocation





NC SENATE BILL 300

- Passed in June of 2001, amends the North Carolina Emergency Management Act (166A)
  - Requires local hazard mitigation plans in order to maintain eligibility for Public Assistance (PA) for state-declared disasters

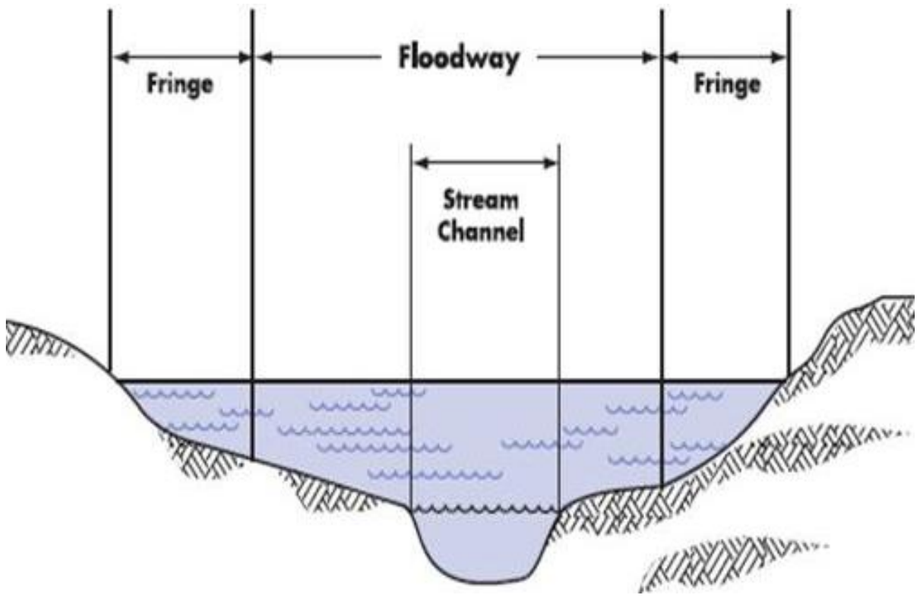
GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2001

SESSION LAW 2001-214
SENATE BILL 300

AN ACT TO AMEND THE LAWS REGARDING EMERGENCY MANAGEMENT AS RECOMMENDED BY THE LEGISLATIVE DISASTER RESPONSE AND RECOVERY COMMISSION.

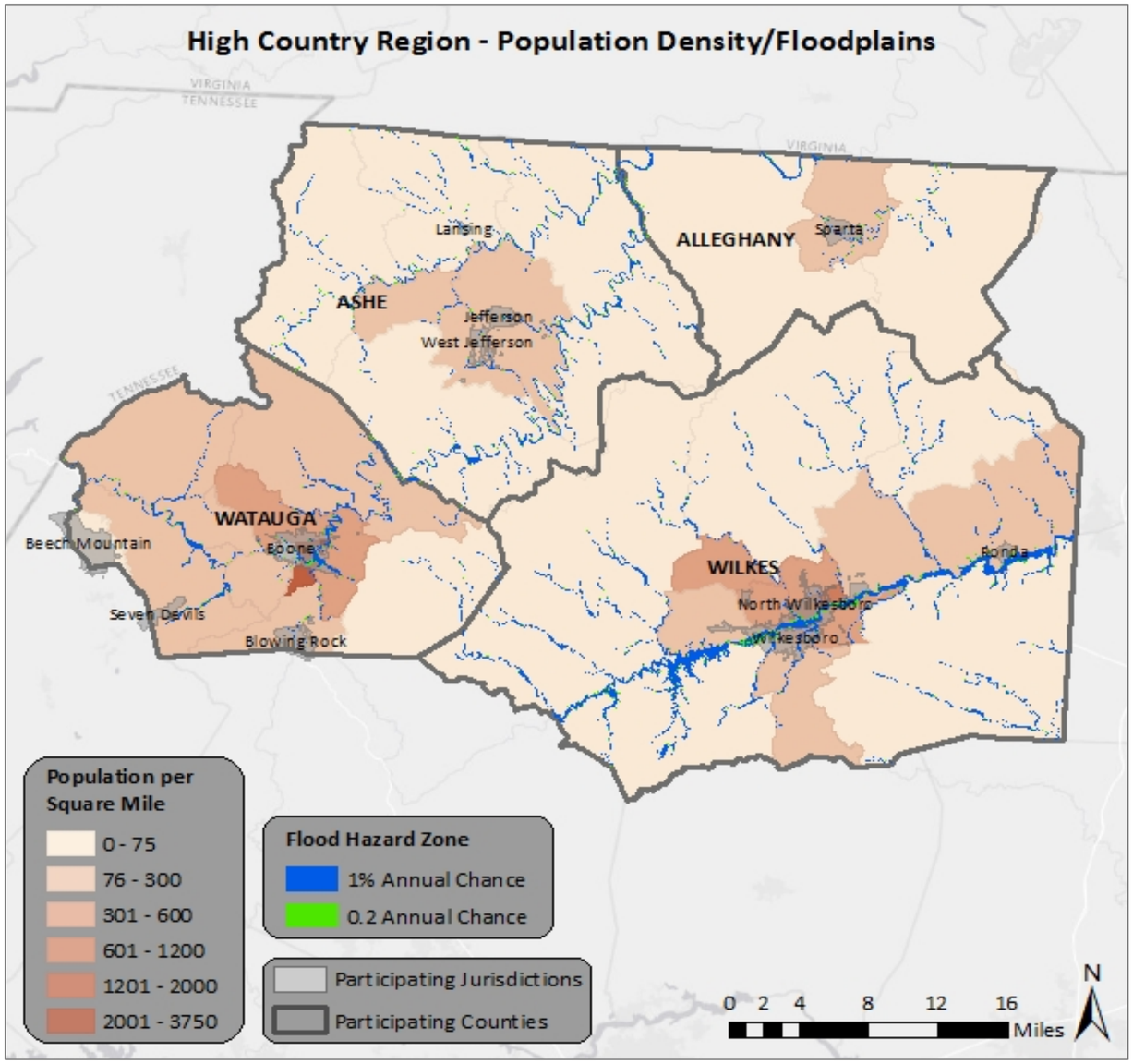
THINK OF MITIGATION IN THIS WAY…

1) We want to mitigate hazard impacts on the <u>existing development</u> in our communities
   - Houses, businesses, infrastructure, critical facilities, etc.
2) We want to ensure that <u>future development</u> is conducted in a way that doesn't increase our vulnerability
   - Best done by having good plans, policies and procedures in place



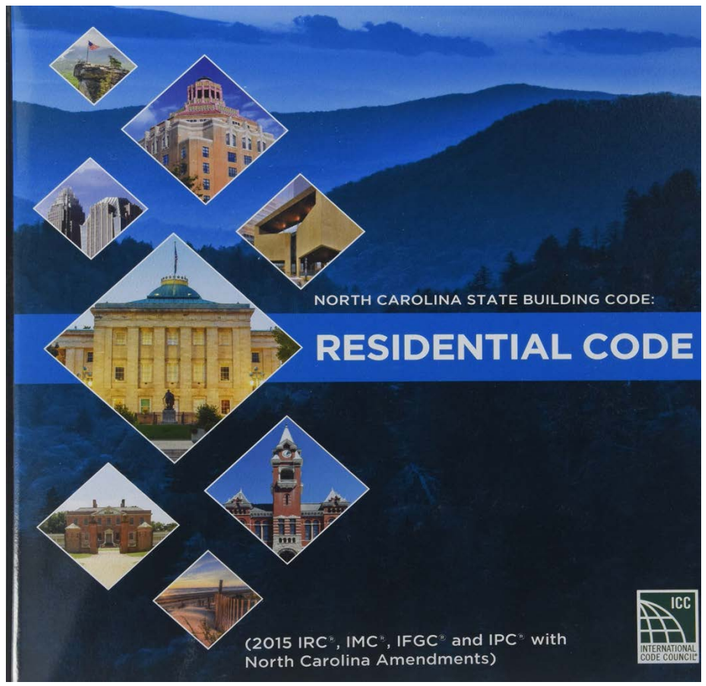
HAZARD MITIGATION TECHNIQUES

1) Prevention
2) Property Protection
3) Natural Resource Protection
4) Structural Projects
5) Emergency Services
6) Public Education and Awareness



Flood Hazard Areas in the High Country NC Region
Source: Federal Emergency Management Agency

PREVENTION



Planning and Zoning

Building codes

Open space preservation

Floodplain regulations

Stormwater management regulations

Drainage system maintenance

Capital improvements programming

PROPERTY PROTECTION

Acquisition

Relocation

Building elevation

Critical facilities protection

Retrofitting

Safe rooms

Shatter-resistant glass

Insurance

NATURAL RESOURCE PROTECTION

Floodplain protection

Watershed management

Riparian buffers

Forest management

Erosion and sediment control

Wetland restoration

Habitat preservation

STRUCTURAL PROJECTS

Reservoirs

Dams, levees

Floodwalls

Stormwater diversions

Detention/retention basins

Channel modification

Storm sewers

EMERGENCY SERVICES

Warning systems

Emergency response equipment

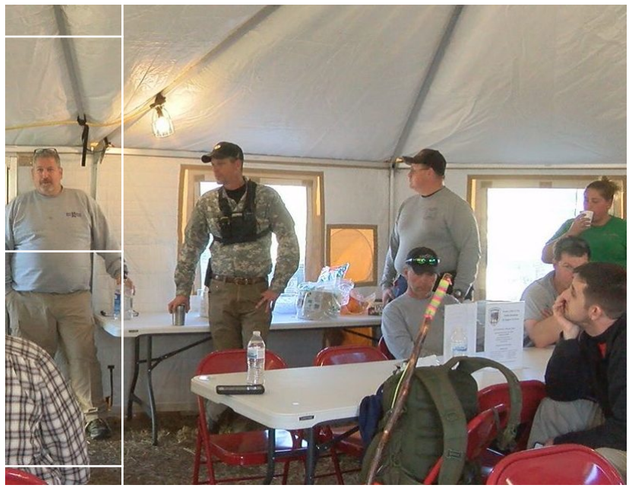
Shelters

Evacuation planning

Emergency response training

Sandbagging

Temporary shutters



PUBLIC EDUCATION AND AWARENESS

Outreach projects

Speaker series

Hazard map information

Library materials

School educational programs

Hazard expositions

Real estate disclosure

Demonstration events

ICEBREAKER EXERCISE

Prevention	Property Protection	Natural Resource Protection	Structural Projects	Emergency Services	Public Education/ Awareness
Planning and zoning Building codes Open space preservation Floodplain regulations Stormwater management regulations Drainage system maintenance Capital improvements programming Setbacks	Acquisition Relocation Building elevation Critical facilities protection Retrofitting Safe rooms, shutters, shatter-resistant glass Insurance	Floodplain protection Watershed management Riparian buffers Forest management Erosion and sediment control Wetland preservation and restoration Habitat preservation	Reservoirs Dams, levees, dikes Floodwalls Stormwater diversions Detention/ retention basins Channel modification Storm sewers	Warning systems Emergency response equipment Shelter Operations Evacuation planning and management Emergency response training and exercises Sandbagging for flood protection Temporary shutters	Outreach projects Speaker series/ demonstration events Hazard map information Real estate disclosure Library materials School children educational programs Hazard expositions

KEY OBJECTIVES

- Coordinate between four counties to update the regional plan
- Complete update of existing plan to demonstrate progress and reflect current conditions
- Current plan expires Dec 28, 2022
- Increase public awareness and education
- Maintain grant eligibility for participating jurisdictions
- Update plan in accordance with Community Rating System (CRS) requirements
- Maintain compliance with State and Federal requirements

NEW ELEMENTS

- Will use NCEM's RMT - Hazard Mitigation Plan Tool
  - Website used to create, update, customize, and monitor plans
  - Promotes consistency throughout NC
- Update plan to include CRS 510 Compliance
  - Relevant for CRS Communities
- Risk Mapping, Assessment and Planning (Risk MAP)
  - Flood Risk Products and Tools
- Integrate Community Wildfire Protection Plans (CWPPs) elements
- Conduct Resilience Assessment
  - North Carolina Scorecard
- EMAP Compliant
  - Technological and Manmade Hazards

PROJECT EXPECTATIONS

- Any hazards on which you would like us to focus?
- Any areas of vulnerability on which to focus?
  - More of a focus on identification of problems and the specific solutions to those problems
- Anything else to highlight or consider?

RMT – NCEM'S HAZARD MITIGATION PLAN TOOL

RMT HMP: Create Hot Spot Map for River Flooding

Information | Basemaps | Legend

Potential Dollar Losses By Sector

To view hot spots:

- If applicable, select a return period
- Select a sector
- Select county to display
- Click Show Results

Find address or place

Choose Return Period

10 Year | 25 Year | 50 Year | 100 Year | 500 Year

Choose A Sector

All Damages

Select County

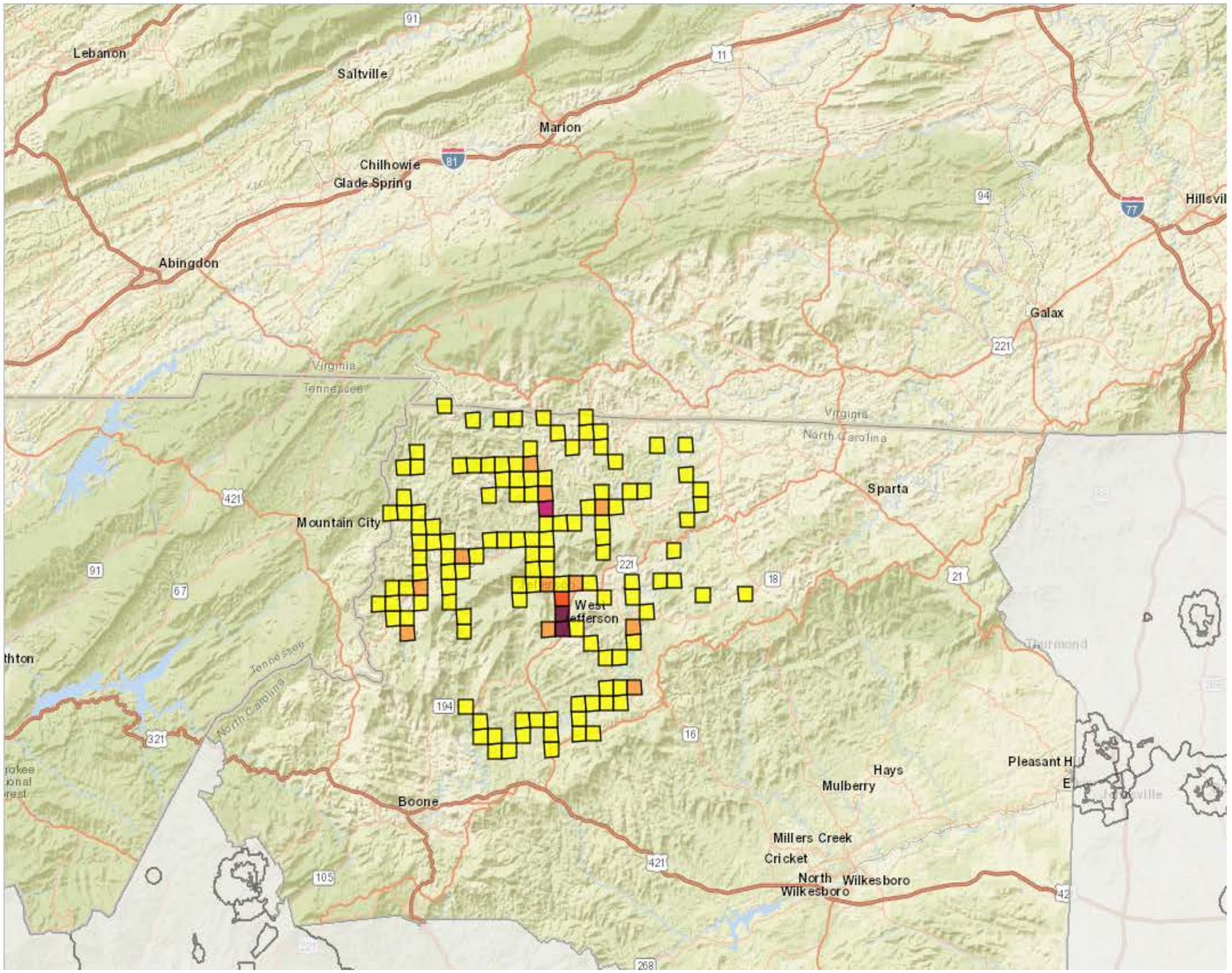
Ashe

Show Results

At Risk Properties

Show 10 entries Search:

Building #	Replacement Value ($)	Damages ($)	Occupancy
			No

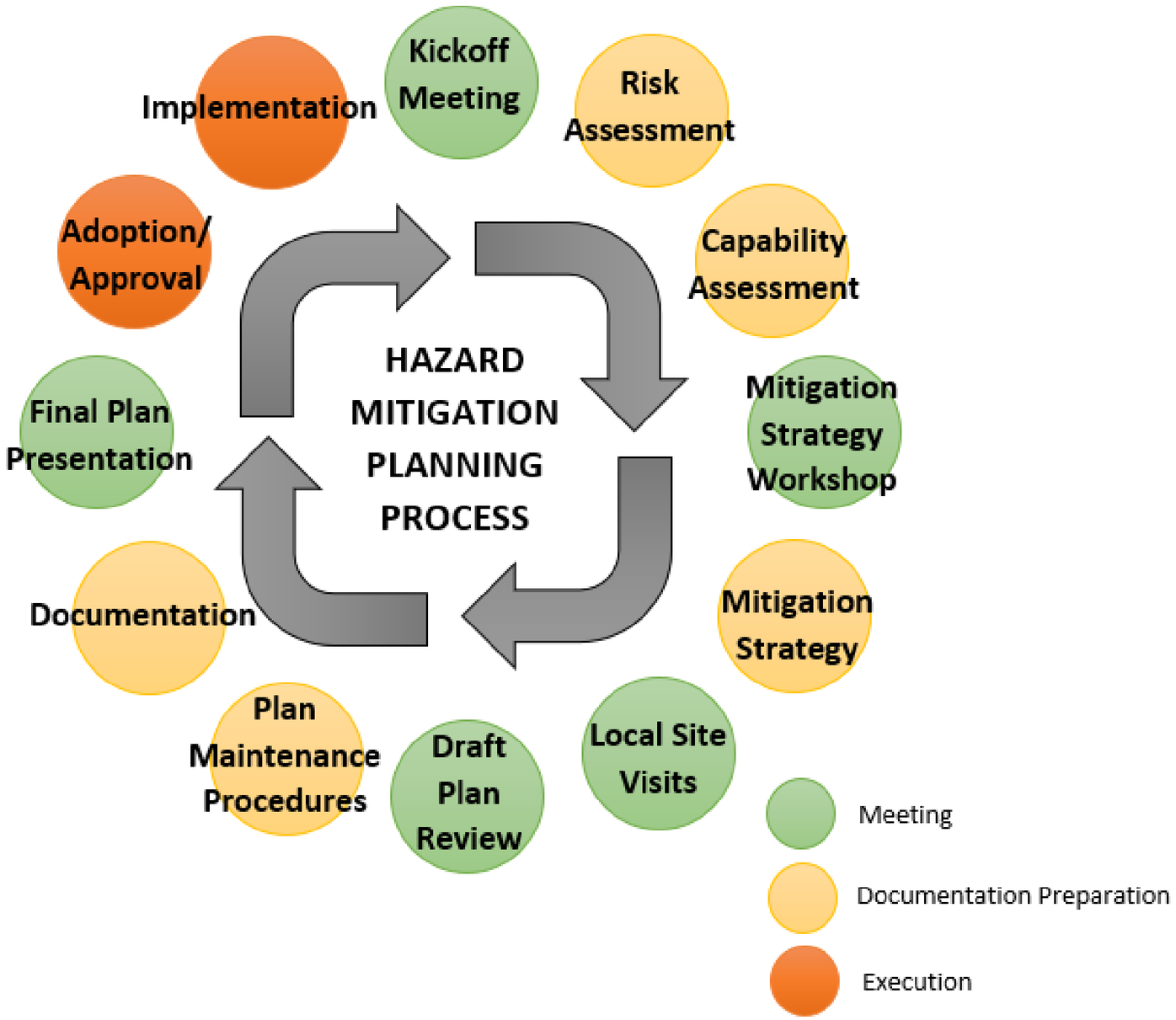


PARTICIPATING JURISDICTIONS

Alleghany County	• Sparta
Ashe County	• Lansing • Jefferson • West Jefferson
Watauga County	• Beech Mountain • Blowing Rock • Boone • Seven Devils
Wilkes County	• North Wilkesboro • Ronda • Wilkesboro

PROJECT TASKS

1. Planning Process
2. Risk Assessment
3. Capability Assessment
4. Mitigation Strategy
5. Plan Maintenance
6. Documentation



PLANNING PROCESS

- Reconvene the regional Hazard Mitigation Planning Team (HMPT)
- Widespread public participation and outreach to key stakeholders
- Data collection and analysis
- Plan preparation and submission

RISK ASSESSMENT

- Hazard Identification and Analysis
  - Detailed profiles for all hazards
    - Hazard description
    - Historical occurrences
    - Known hazard boundaries
  - Priority Risk Index (PRI)
- Vulnerability Assessment
  - Asset inventory (exposure)
  - Loss estimates
- Development Trends and Implications

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	

HAZARD IDENTIFICATION

State of North Carolina Hazard Mitigation Plan Hazards

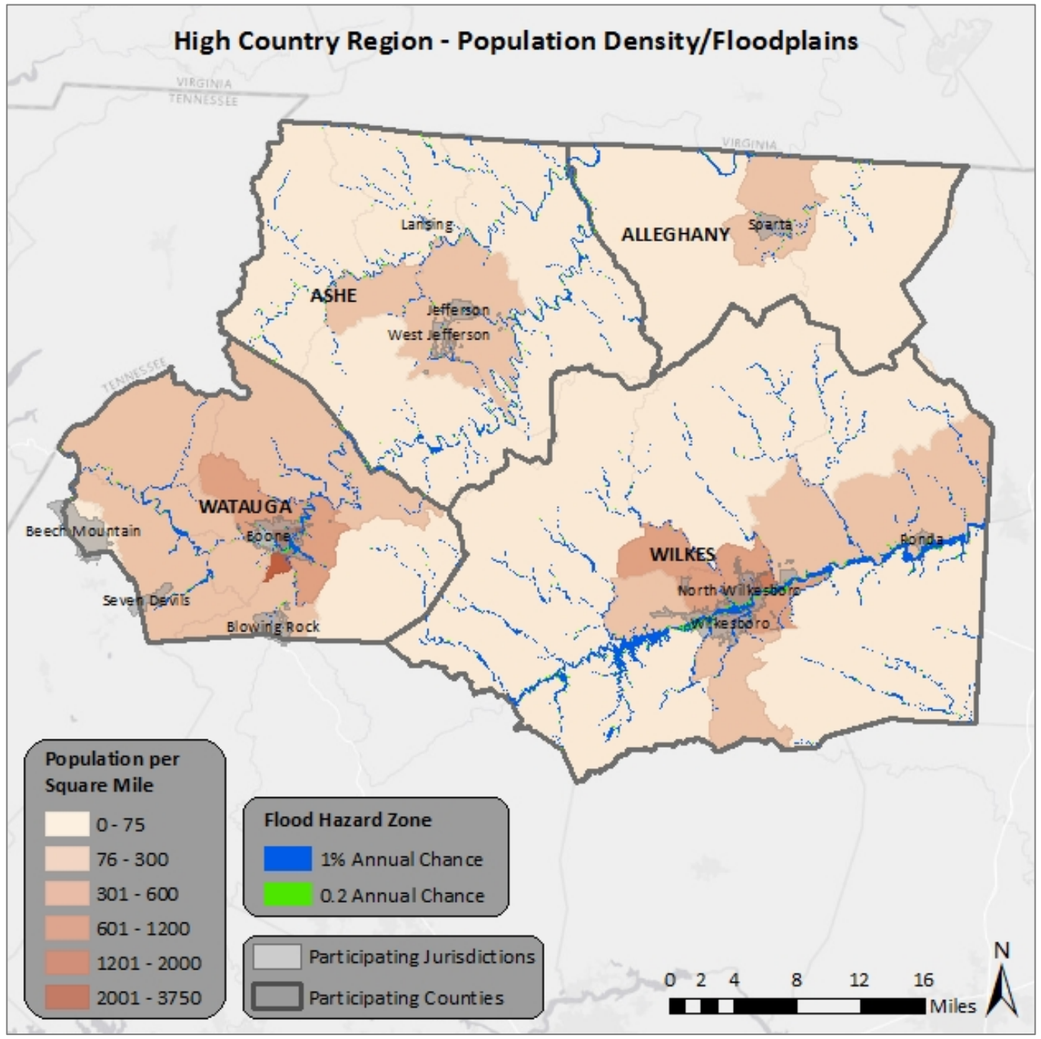
Natural Hazards	Technological Hazards
Flooding	Hazardous Substances
Hurricanes and Coastal Hazards	— Hazardous Materials
Severe Winter Weather	— Hazardous Chemicals
Excessive Heat	— Oil Spill
Earthquakes	Radiological Emergency – Fixed Nuclear Facilities
Wildfires	Terrorism
Dam Failures	— Chemical
Drought	— Biological
Tornadoes/Thunderstorms	— Radiological
Geological	— Nuclear
— Landslides/Rock Fall	— Explosive
— Sinkholes	Cyber
Infectious Disease	Electromagnetic Pulse

HAZARD IDENTIFICATION

HIGH RISK	Severe Winter Weather Tornadoes/Thunderstorms Flooding Hurricane and Coastal Hazards Terrorism
MODERATE RISK	Drought Electromagnetic Pulse Geological Wildfire Dam Failure
LOW RISK	Earthquakes Infectious Disease Hazardous Substances Cyber

VULNERABILITY ASSESSMENT

- Where possible, identify types and numbers of assets at risk to hazards.
- Consider other types of vulnerability as well
  - Social, economic, environmental



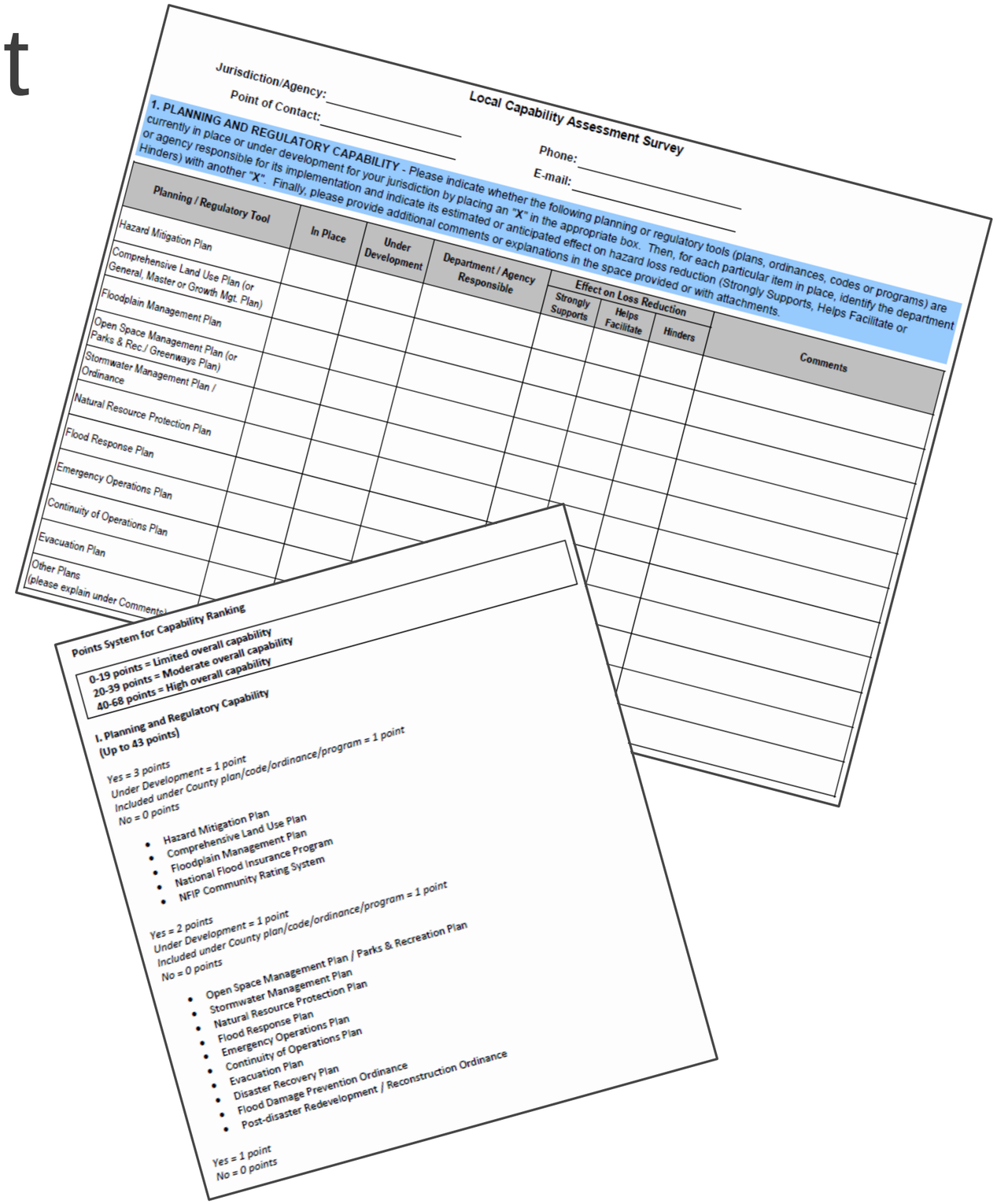
CAPABILITY ASSESSMENT

- Measures capability to implement hazard mitigation activities
- Identifies and targets gaps, conflicts and opportunities with existing local plans, programs, policies, etc.
- Identifies mitigation measures already in place or underway

Plan Policy, Program or Ordinance	Percentage
Capital Improvements Plan	54%
Historic Preservation Plan	0%
Zoning Ordinance	97%
Subdivision Ordinance	89%
Flood Damage Prevention Ordinance	86%
Post-Disaster Redevelopment Plan	0%
Building Code	100%
Fire Code	100%

CAPABILITY ASSESSMENT

- Capability Assessment Survey
  - Measures existing capabilities
    - Planning and regulatory
    - Administrative and technical
    - Fiscal
    - Political



Local Capability Assessment Survey

Jurisdiction/Agency: _____ Phone: _____

Point of Contact: _____ E-mail: _____

1. PLANNING AND REGULATORY CAPABILITY - Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box. Then, for each particular item in place, identify the department or agency responsible for its implementation and indicate its estimated or anticipated effect on hazard loss reduction (Strongly Supports, Helps Facilitate or Hinders) with another "X". Finally, please provide additional comments or explanations in the space provided or with attachments.

Planning / Regulatory Tool	In Place	Under Development	Department / Agency Responsible	Effect on Loss Reduction			Comments
				Strongly Supports	Helps Facilitate	Hinders	
Hazard Mitigation Plan							
Comprehensive Land Use Plan (or General, Master or Growth Mgt. Plan)							
Floodplain Management Plan							
Open Space Management Plan (or Parks & Rec./ Greenways Plan)							
Stormwater Management Plan / Ordinance							
Natural Resource Protection Plan							
Flood Response Plan							
Emergency Operations Plan							
Continuity of Operations Plan							
Evacuation Plan							
Other Plans (please explain under Comments)							

Points System for Capability Ranking

0-19 points = Limited overall capability
20-39 points = Moderate overall capability
40-68 points = High overall capability

I. Planning and Regulatory Capability
(Up to 43 points)

Yes = 3 points
Under Development = 1 point
Included under County plan/code/ordinance/program = 1 point
No = 0 points

- Hazard Mitigation Plan
- Comprehensive Land Use Plan
- Floodplain Management Plan
- National Flood Insurance Program
- NFIP Community Rating System

Yes = 2 points
Under Development = 1 point
Included under County plan/code/ordinance/program = 1 point
No = 0 points

- Open Space Management Plan / Parks & Recreation Plan
- Stormwater Management Plan
- Natural Resource Protection Plan
- Flood Response Plan
- Emergency Operations Plan
- Continuity of Operations Plan
- Evacuation Plan
- Disaster Recovery Plan
- Flood Damage Prevention Ordinance
- Post-disaster Redevelopment / Reconstruction Ordinance

Yes = 1 point
No = 0 points

MITIGATION STRATEGY

- Mitigation Goals
  - Based upon findings of the risk and capability assessments
- Identification and analysis of mitigation measures
  - Prevention, property protection, natural resource protection, structural projects, emergency services, and public education and awareness

MITIGATION ACTION PLAN

EXAMPLE from Previous Update

Action #	Description	Hazard(s) Addressed	Priority	Lead Agency/ Responsibility	Potential Funding Source	Target Completion Date	Status
ES-2	**Set up a volunteer network for the transportation of hospital workers to and from the Alleghany County Memorial Hospital.**	**Winter Storm**	**Moderate**	**Alleghany Memorial Hospital; County Emergency Management Coordinator**	**Unknown**	**Update as necessary**	**Completed. Sheriff's Office and Hospital personnel coordinate this transportation for the staff.**

PLAN MAINTENANCE

- Monitoring and reporting
- Evaluating and updating
- Implementation mechanisms
- Continued public involvement

DOCUMENTATION

- Full description of planning process
  - Use of best available data
- Plan adoption
  - Local resolution required for final FEMA approval
- Local Mitigation Plan Review Tool “Crosswalk”

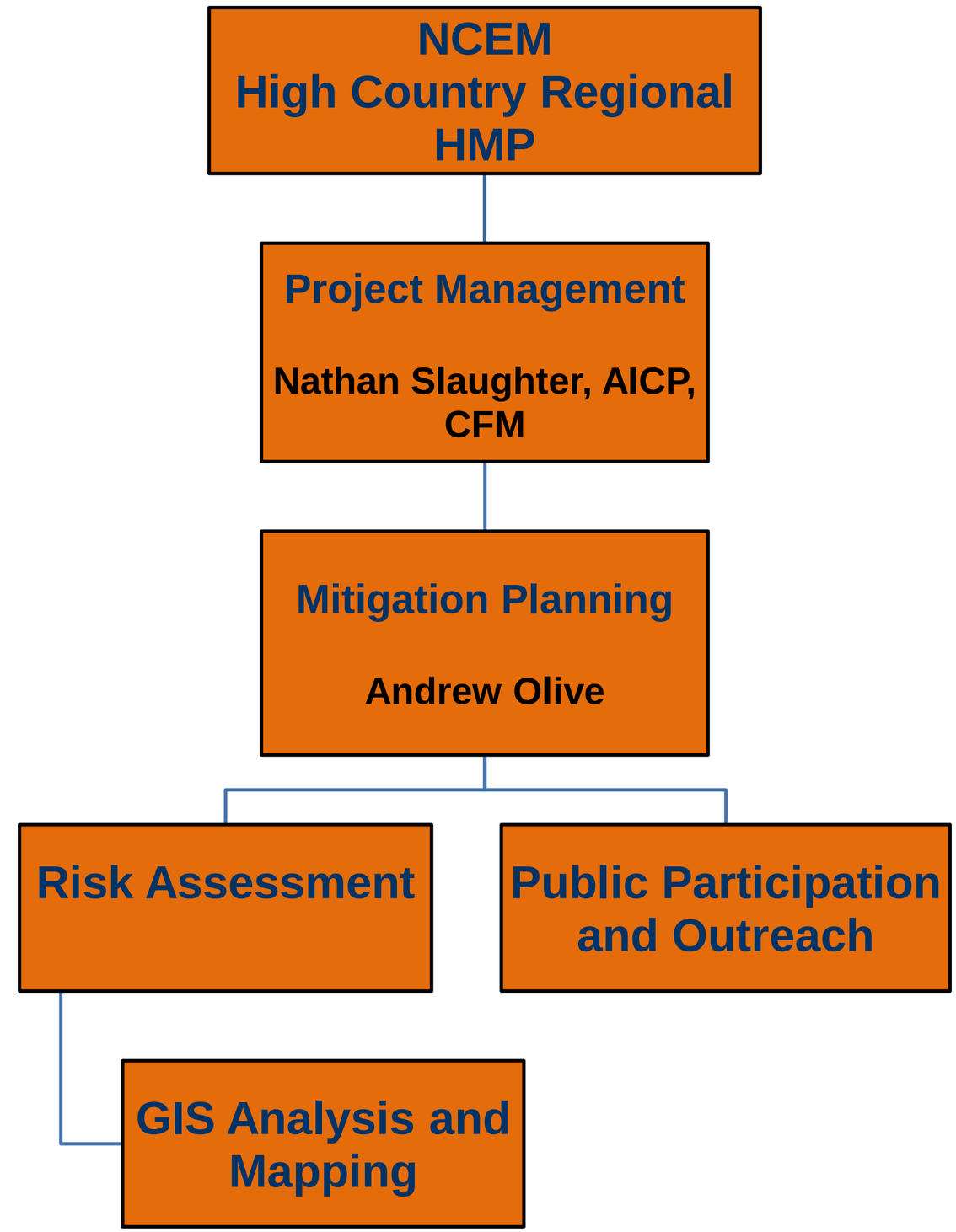
PROJECT SCHEDULE

Project Tasks	Month									
	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN 2021 – DEC 2022
Planning Process										
Risk Assessment										
Capability Assessment										
Mitigation Strategy										
Plan Maintenance Procedures										
Documentation										

Meetings										
Kickoff Meeting	√									
Regional Hazard Mitigation Team Meetings		√		√				√		
Open Public Meetings		√		√				√		

Milestones	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	JAN 2021 - DEC 2022
Submission of Draft Risk Assessment to Planning Team				√						
Submission of Draft Risk Assessment to NCEM					√					
Submission of Draft Plan to Planning Team						√				
Submission of Draft Plan to NCEM/FEMA						√				
Completion of Final Plan/Conditional FEMA Approval							√			
Local Adoption of Final Plan										√
Submission of Final Plan to NCEM/FEMA										√

PROJECT STAFFING



ROLES & RESPONSIBILITIES

ESP Associates, Inc.	County Leads	Participating Jurisdictions
• Technical Assistance - Planning guidance - State and federal compliance • Data Collection & Analysis - Risk assessment - Capability assessment - Summarize results / report findings • Facilitate HMP meetings, workshops and open public meetings • Plan Preparation	• Active participation in planning process - Data collection and exchange - Public awareness and stakeholder involvement - Arrange and host HMP meetings - Mitigation strategy development - Plan review & feedback • Plan Adoption • Project management - Central point of contact - Communication and coordination with participating jurisdictions, NCEM and FEMA	• Active participation in planning process - Data collection and exchange - Public awareness and stakeholder involvement - Attend HMPT meetings -Mitigation strategy development - Plan review & feedback • Plan Adoption

PUBLIC SURVEY

- Used to collect input from citizens and other stakeholders that aren’t able to actively participate in the planning process. The survey will be available in hard copy and online formats.

- Survey is live!

https://s.surveyplanet.com/dfFEXU761

- Please advertise on County and/or Municipal websites, Facebook, Twitter, etc so we can ensure good participation

NEXT STEPS

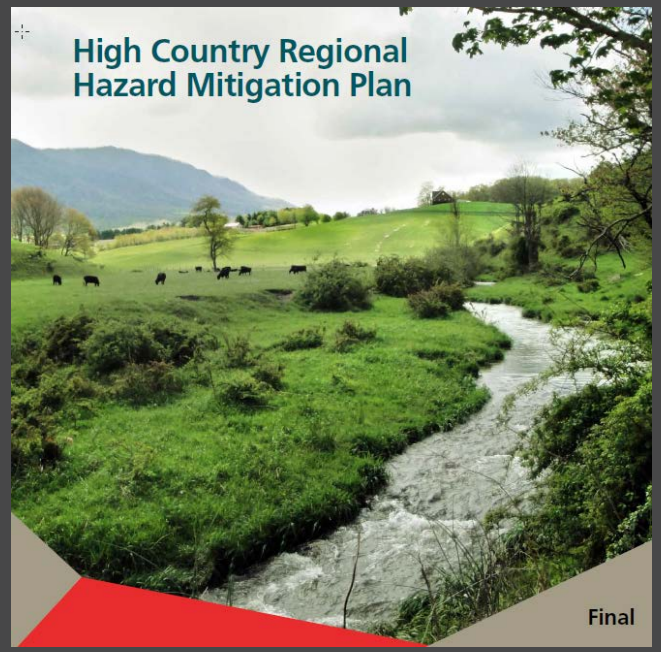
- Determine members to participate on the Hazard Mitigation Planning Team
- Schedule Hazard Mitigation Planning Team meeting
- Initiate data collection efforts – We'll need GIS data (**critical facility locations, parcels, building footprints**)
- Begin public outreach – for CRS we need to conduct public meeting within 60 days

QUESTIONS, ISSUES OR CONCERNS

- Nathan Slaughter
  - (919) 415-2726
  - nslaughter@espassociates.com
- Andrew Olive
  - (919) 415-2757
  - aolive@espassociates.com

HIGH COUNTRY REGIONAL HAZARD MITIGATION PLAN KICKOFF MEETING

High Country Regional Hazard Mitigation Plan Update

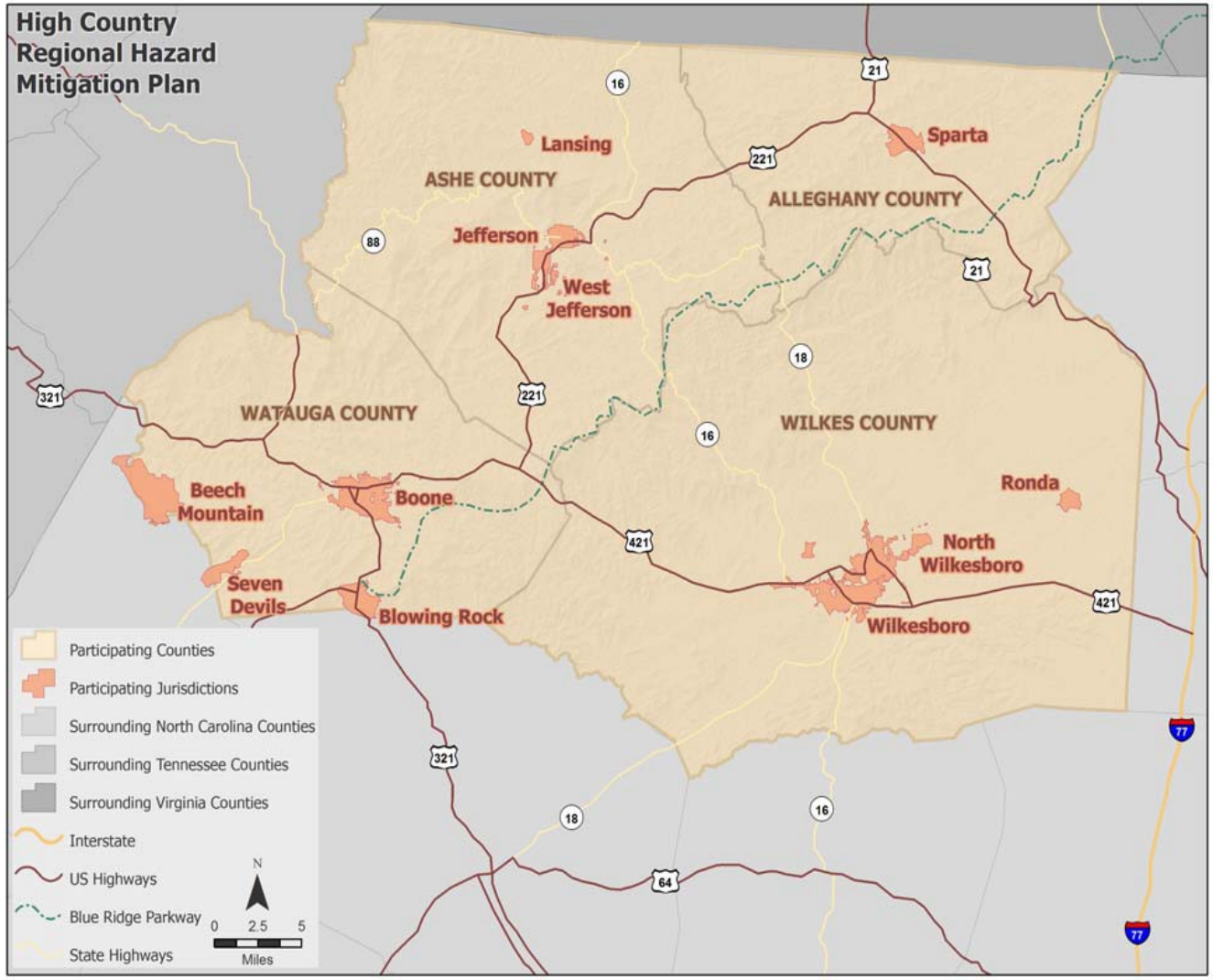


Mitigation Strategy Workshop

October 28, 2021

AGENDA

- Introductions
- Mitigation Recap
- Project Schedule
- Risk Assessment Findings
- Capability Assessment Findings
- Mitigation Strategy
- Summary of Public Involvement Activities
- Plan Maintenance
- Next Steps



INTRODUCTIONS

- ESP Associates, Inc.
  - Nathan Slaughter, AICP, CFM – Project Manager
  - Andrew Olive – Lead Planner
- County Leads
- Participating Municipalities
- Other Stakeholders
- NCEM

MITIGATION REFRESHER

“mit-i-gate”

1: to cause to become less harsh or hostile.

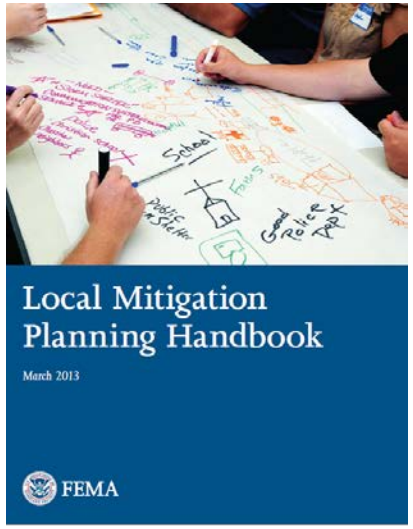
2: to make less severe or painful.

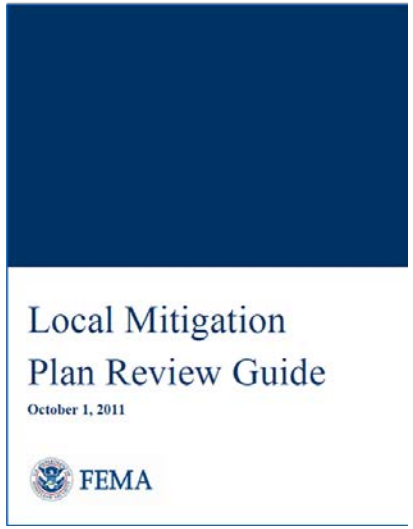
Hazard Mitigation

Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.

DISASTER MITIGATION ACT OF 2000

- Revitalized Federal Planning Requirements
  - State and Local Hazard Mitigation Plans
- Federal Grant Funding Eligibility
  - Hazard Mitigation Grant Program (HMGP)
  - Building Resilient Infrastructure and Communities (BRIC)
  - Flood Mitigation Assistance (FMA)
- DMA 2000 is intended to facilitate cooperation between state and local authorities on risk reduction measures and expedite funding allocation





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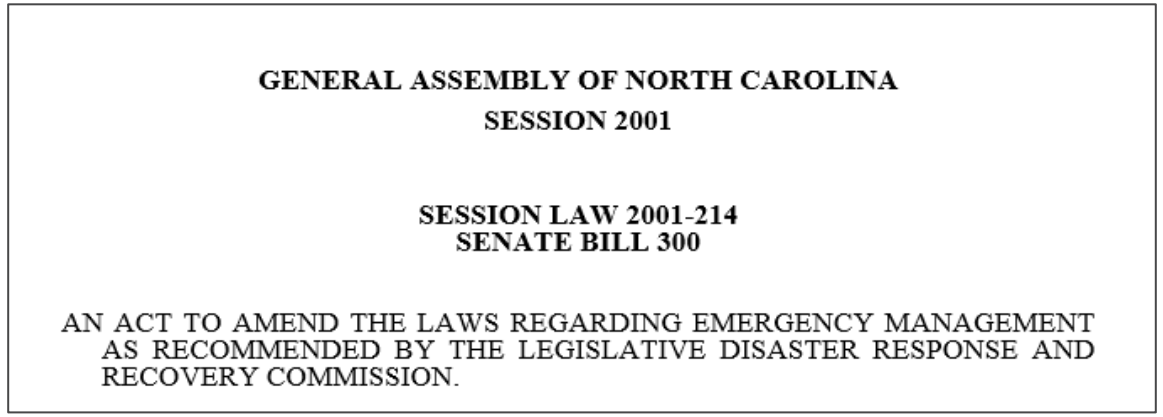

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KEY OBJECTIVES

- Coordinate between four counties to update the regional plan
- Complete update of existing plan to demonstrate progress and reflect current conditions
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- Update plan in accordance with Community Rating System (CRS) requirements (Boone, Watauga County)
- Maintain compliance with State and Federal requirements

PARTICIPATING JURISDICTIONS

Alleghany County
Sparta
Ashe County
Lansing
Jefferson
West Jefferson

Watauga County
Beech Mountain
Blowing Rock
Boone
Seven Devils
Wilkes County
North Wilkesboro
Ronda
Wilkesboro

PROJECT TASKS

1. Planning Process
2. Risk Assessment
3. Capability Assessment
4. Mitigation Strategy
5. Plan Maintenance
6. Documentation

PROJECT SCHEDULE

Project Tasks	Month								
	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC 2022-DEC 2023
Notice to Proceed	√								
Planning Process									
Risk Assessment									
Capability Assessment									
Mitigation Strategy									
Plan Maintenance Procedures									
Documentation									
Meetings	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC 2022-DEC 2023
Kickoff Meeting	√								
Regional Hazard Mitigation Planning Team Meetings	√						√		√
Open Public Meetings								√	√
Milestones	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC 2022-DEC 2023
Submission of Draft Plan to Planning Team									√
Submission of Draft Plan to NCEM/FEMA									√
Completion of Final Plan/Conditional FEMA Approval									√
Local Adoption of Final Plan									√
Submission of Final Plan to NCEM/FEMA									√

RISK ASSESSMENT

- Hazard Identification and Analysis
  - Detailed profiles for all natural hazards
    - Hazard description
    - Historical occurrences
    - Known hazard boundaries
  - Priority Risk Index (PRI)
- Vulnerability Assessment
  - Asset inventory (exposure)
  - Loss estimates
- Development Trends and Implications
- GIS Data Inventory

RISK ASSESSMENT FINDINGS

- Hazard Identification
- Hazard Profiles
- Hazard Vulnerability Assessment

STATE OF NC HAZARD MITIGATION PLAN

Identified and reviewed by:

- subject matter experts (SME)
- representatives from NCEM
- Risk Management Coordinating Council

Natural Hazards	Technological Hazards
Flooding	Hazardous Substances
Hurricanes and Coastal Hazards	– Hazardous Materials
Severe Winter Weather	– Hazardous Chemicals
Excessive Heat	– Oil Spill
Earthquakes	Radiological Emergency – Fixed Nuclear Facilities
Wildfires	Terrorism
Dam Failures	– Chemical
Drought	– Biological
Tornadoes/Thunderstorms	– Radiological
Geological	– Nuclear
– Landslides/Rock Fall	– Explosive
– Sinkholes	Cyber
Infectious Disease	Electromagnetic Pulse

NATURAL HAZARDS COMPARISON

NC HMP	High Country HMP
Flood	Flood
Hurricane/Coastal Hazards	Hurricane and Tropical Storm
Severe Winter Weather	Winter Storm and Freeze
Excessive Heat	Heat Wave
Wildfire	Wildfire
Dam Failure	Dam and Levee Failure
Drought	Drought
Tornadoes/Thunderstorm	Severe Thunderstorm
Geological	Erosion
-Landslide/Rock Fall	Hailstorm
-Sinkholes	Lightning
-Earthquakes	**Geological**
Infectious Disease	-Landslides
	-Earthquakes

TECHNOLOGICAL/OTHER HAZARD COMPARISON

NC HMP
Hazardous Substances
-HAZMAT
-Hazardous Chemicals
-Oil Spills
Radiological Emergency – Fixed Nuclear Facilities
Terrorism
-Chemical
-Biological
-Radiological
-Nuclear
-Explosive
Cyber
Electromagnetic Pulse

High Country HMP
Hazardous Materials Incident
Terrorism
Cyber
Electromagnetic Pulse

A COUPLE OF CAVEATS

1. **We utilized *Best Available Data***
   - Useful, but events are often under-reported
2. **Keep the end goal in sight**
   - The risk assessment's purpose is to compare hazards and determine which should be the focus of your mitigation actions
   - The detailed numbers are informative, but remember the big picture
3. **This is YOUR risk assessment**
   - The data we provide is beneficial, but YOU live here! Your recommendations for adjustments are welcomed and encouraged!

HAZARD EVENTS SINCE PREVIOUS PLAN

Hazard Type	Number of Reported Events in Alleghany County	Number of Reported Events in Ashe County	Number of Reported Events in Watauga County	Number of Reported Events in Wilkes County
Cold/Wind Chill	0	0	0	0
Flash Flood	4	6	11	6
Flood	3	4	13	9
Hail	7	4	3	8
Heavy Snow	2	2	3	1
High Wind	12	25	25	4
Lightning	3	0	0	2
Strong Wind	2	2	2	3
Thunderstorm Wind	5	6	3	55
Tornado	0	1	0	2
Tropical Storm	0	0	0	0
Winter Storm	6	7	8	7
Winter Weather	0	0	0	0
TOTAL NUMBER OF REPORTED EVENTS	**44**	**57**	**68**	**97**

PRESIDENTIAL DISASTER DECLARATIONS

Since the last plan (2015)

- DR-4393 – Hurricane Florence
- Emergency Declaration for Hurricane Dorian
- DR-4487 - COVID-19 Pandemic
  - January 20, 2020
- DR-4543 – Severe Storms
  - May 8, 2020 (Ashe County)
- State Disaster - Sparta EQ
- DR-4617 - TS Fred

Watauga County - Flooding from Hurricane Florence
Source: https://www.wataugademocrat.com/news/avoiding-florences-worst-high-country-soaked-but-heavy-rains-miss-area/article_dec3b766-0cf8-5d52-b7db-3f872f67e849.html

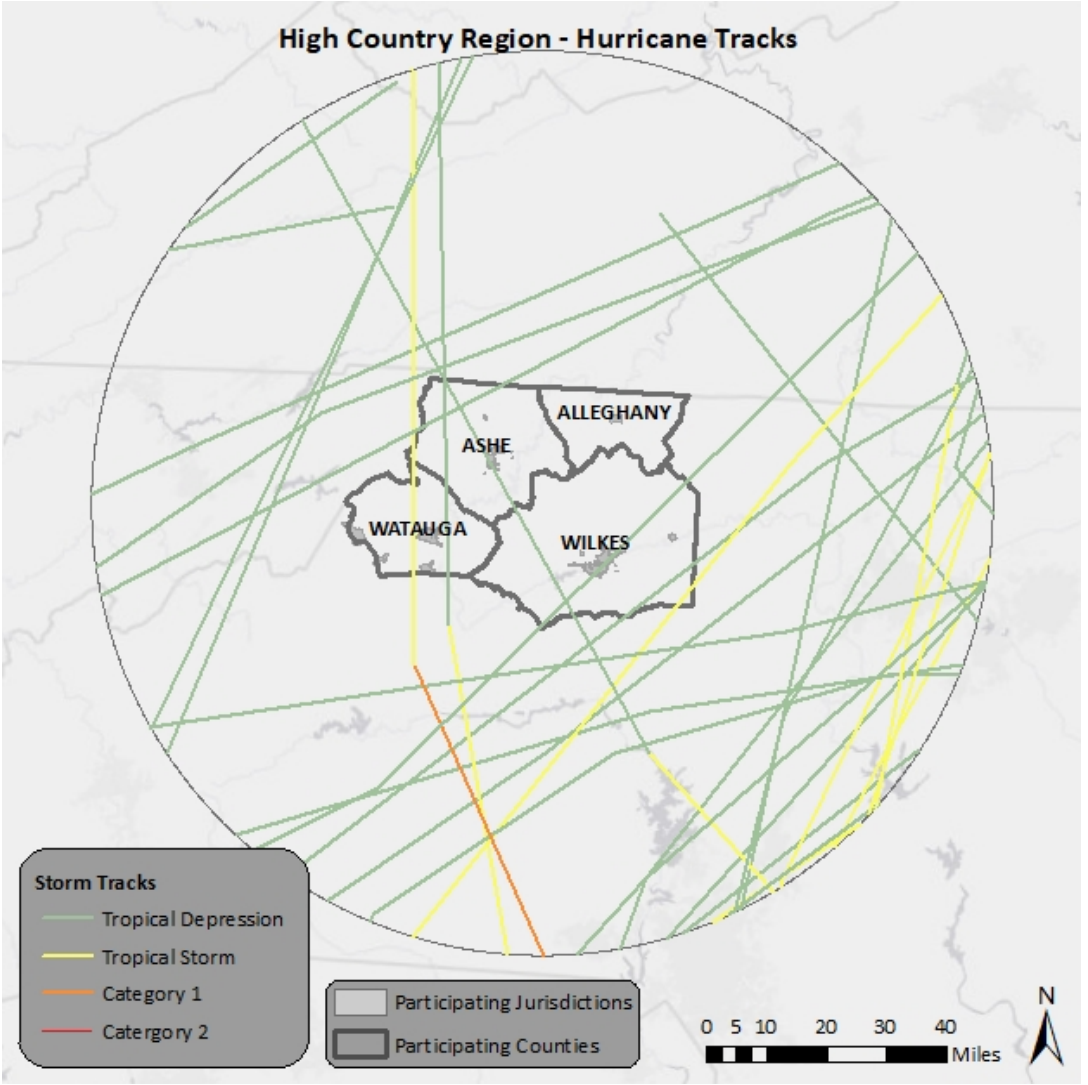
DROUGHT

- 7 regional drought events
  - Recorded from 2000 to 2020
    - Source: North Carolina Drought Monitor
    - Status is recorded weekly for each county
    - All events were regional (multiple counties affected)
- Losses are difficult to track
- Future occurrences are *likely*

Year	Alleghany County	Ashe County	Watauga County	Wilkes County
2000	Extreme Drought	Extreme Drought	Extreme Drought	Extreme Drought
2001	Extreme Drought	Extreme Drought	Extreme Drought	Extreme Drought
2002	Exceptional Drought	Exceptional Drought	Exceptional Drought	Exceptional Drought
2003	None	None	None	None
2004	None	Abnormally Dry	Abnormally Dry	Abnormally Dry
2005	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought
2006	Severe Drought	Severe Drought	Severe Drought	Severe Drought
2007	Extreme Drought	Exceptional Drought	Exceptional Drought	Extreme Drought
2008	Extreme Drought	Exceptional Drought	Exceptional Drought	Exceptional Drought
2009	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought
2010	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought
2011	Moderate Drought	Moderate Drought	Moderate Drought	Moderate Drought
2012	Moderate Drought	Moderate Drought	Abnormally Dry	Moderate Drought
2013	Moderate Drought	Abnormally Dry	None	Moderate Drought
2014	Abnormally Dry	Abnormally Dry	Abnormally Dry	Abnormally Dry
2015	Abnormally Dry	Abnormally Dry	Moderate Drought	Moderate Drought
2016	Moderate Drought	Severe Drought	Severe Drought	Severe Drought
2017	Moderate Drought	Moderate Drought	Moderate Drought	Severe Drought
2018	Abnormally Dry	Abnormally Dry	Abnormally Dry	Moderate Drought
2019	Moderate Drought	Moderate Drought	Severe Drought	Severe Drought

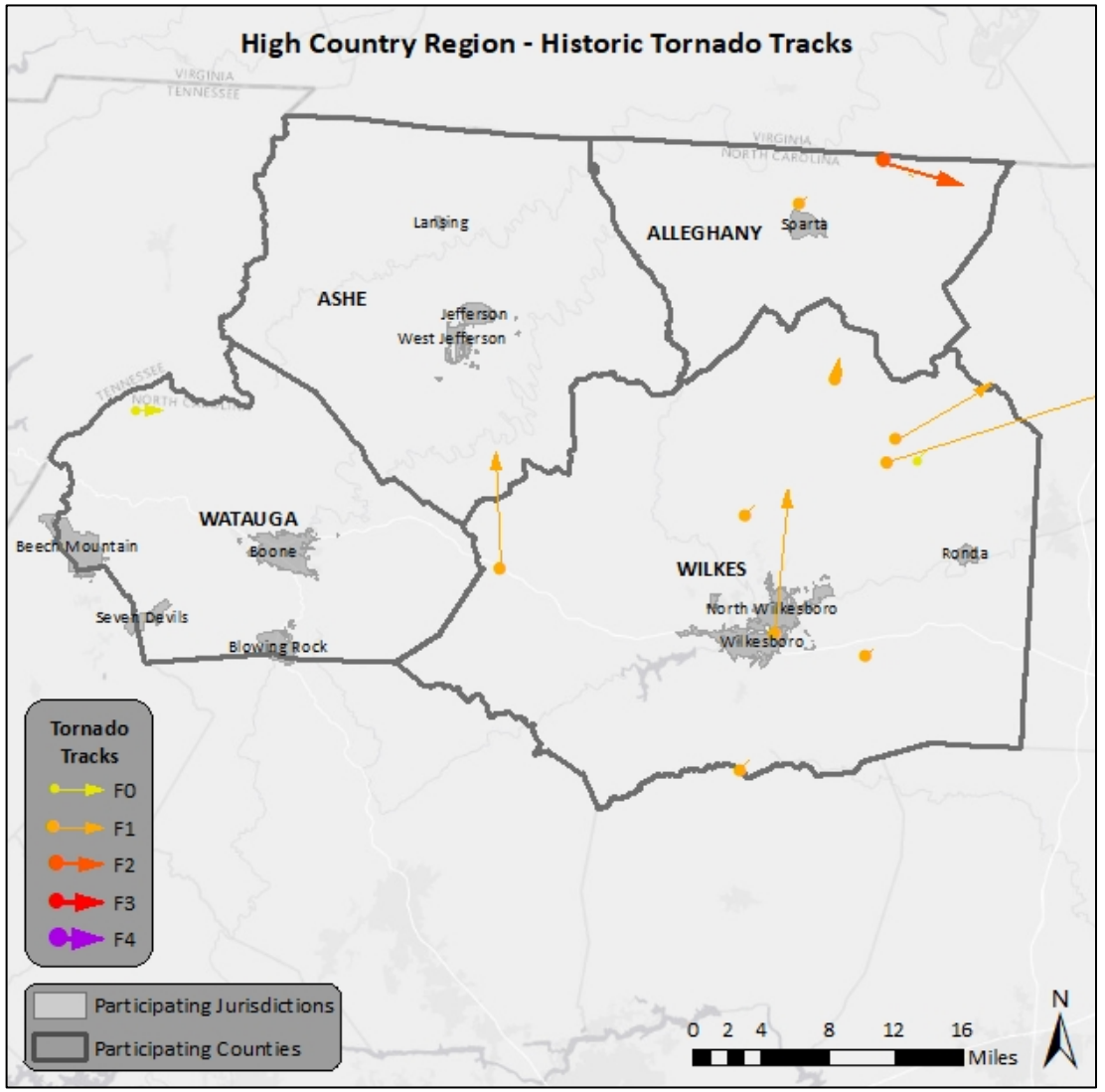
HURRICANE AND COASTAL HAZARDS

- 20 storm tracks have come within 75 miles of the region since 1850
  - 3 storms passed directly through the region
  - 3 classified as hurricane or tropical storm
- Remnants are often greater concern
  - Flooding, landslides
- Recent Events
  - Hurricane Florence 2018
  - TS Fred
- Future occurrences are *likely*



TORNADOES

- 14 recorded events since 1976
  - No deaths, 10 injuries
  - $3.05 million in property damage
- Uniform exposure across entire region
- Future occurrences are *likely*



TORNADO EVENTS

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**3**	**0**	**7**	**$455,000**
Sparta	0	0	0	$0
Unincorporated Area	3	0	7	$455,000
Ashe County	**1**	**0**	**0**	**$1,000**
Jefferson	0	0	0	$0
Lansing	0	0	0	$0
West Jefferson	0	0	0	$0
Unincorporated Area	1	0	0	$1,000

TORNADO EVENTS, CONTINUED

Watauga County	**2**	**0**	**2**	**$70,000**
Beech Mountain	0	0	0	$0
Blowing Rock	0	0	0	$0
Boone	1	0	2	$50,000
Seven Devils	0	0	0	$0
Unincorporated Area	1	0	0	$20,000
Wilkes County	**8**	**0**	**1**	**$2,527,500**
North Wilkesboro	0	0	0	$0
Ronda	0	0	0	$0
Wilkesboro	1	0	1	$1,000,000
Unincorporated Area	7	0	0	$1,527,500
High County Region Total	**14**	**0**	**10**	**$3,053,500**

SEVERE THUNDERSTORMS AND HIGH WINDS

- 784 severe thunderstorm events recorded since 1959
  - 3 deaths, 7 injuries
  - Over $5.18 million in property damage
- Uniform exposure across the entire region
  - High winds
- Future occurrences are *highly likely*

Source: *https://www.hcpress.com/news/high-winds-bring-down-trees-and-power-lines-across-the-high-country-gusts-over-100-mph-recorded-at-grandfather-mountain.html*

SEVERE THUNDERSTORM EVENTS

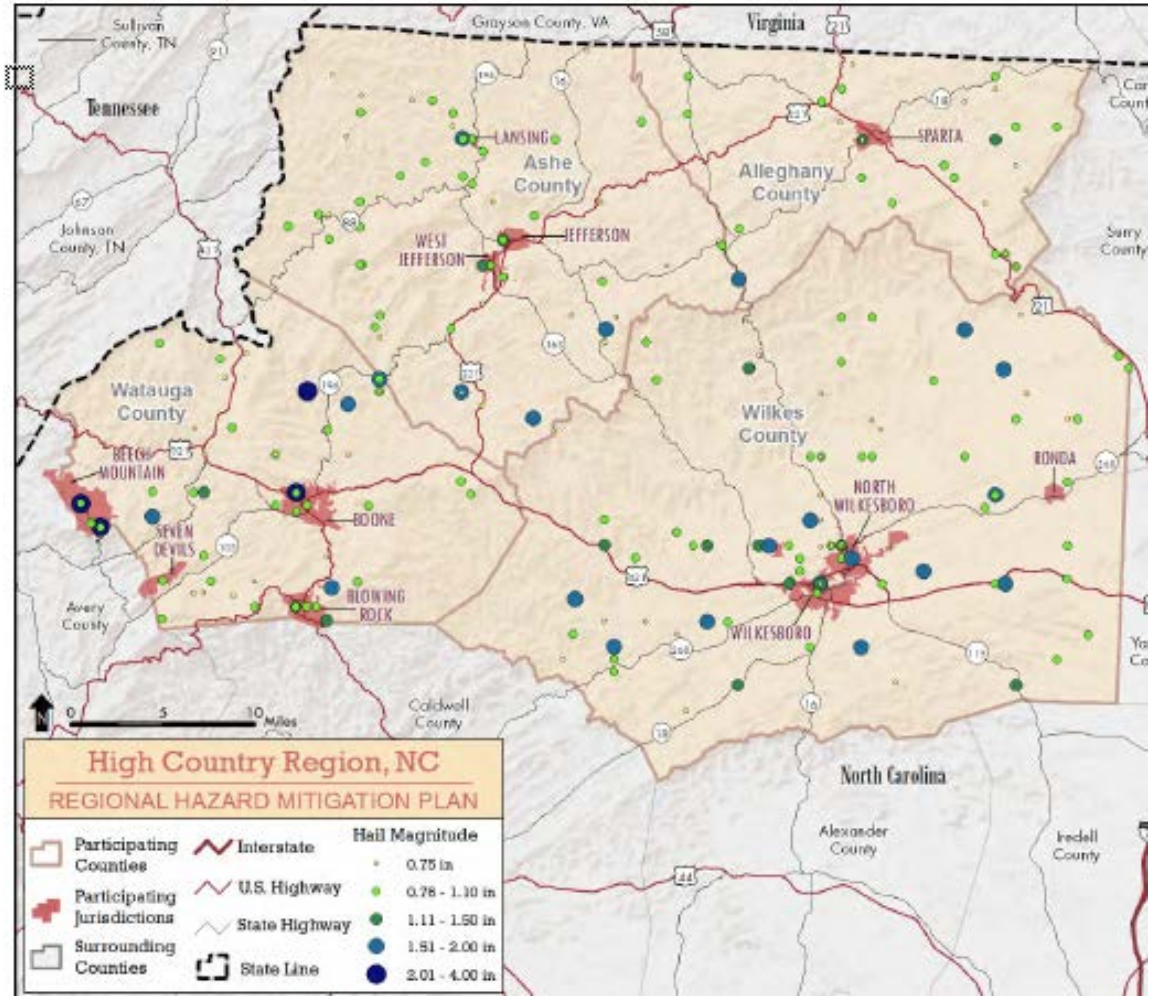
Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**94**	**0**	**0**	**$629,400**
Sparta	11	0	0	$62,900
Unincorporated Area	83	0	0	$566,500
Ashe County	**185**	**2**	**1**	**$962,750**
Jefferson	7	0	0	$11,050
Lansing	3	0	0	$0
West Jefferson	2	0	0	$1,000
Unincorporated Area	173	2	1	$950,700

SEVERE THUNDERSTORM EVENTS, CONTINUED

Watauga County	**177**	**0**	**3**	**$1,503,900**
Beech Mountain	0	0	0	$0
Blowing Rock	3	0	0	$0
Boone	15	0	0	$78,500
Seven Devils	0	0	0	$0
Unincorporated Area	159	0	3	$1,425,400
Wilkes County	**328**	**1**	**3**	**$2,092,100**
North Wilkesboro	22	0	0	$201,100
Ronda	11	0	0	$8,800
Wilkesboro	32	0	0	$64,900
Unincorporated Area	263	1	3	$1,817,300
High County Region Total	**784**	**3**	**7**	**$5,188,150**

HAILSTORMS

- 321 recorded events
  - 1962-2019
  - Over $400 thousand in property damage
- Similar exposure across entire region
- Future occurrences are *likely*



HAILSTORM EVENTS

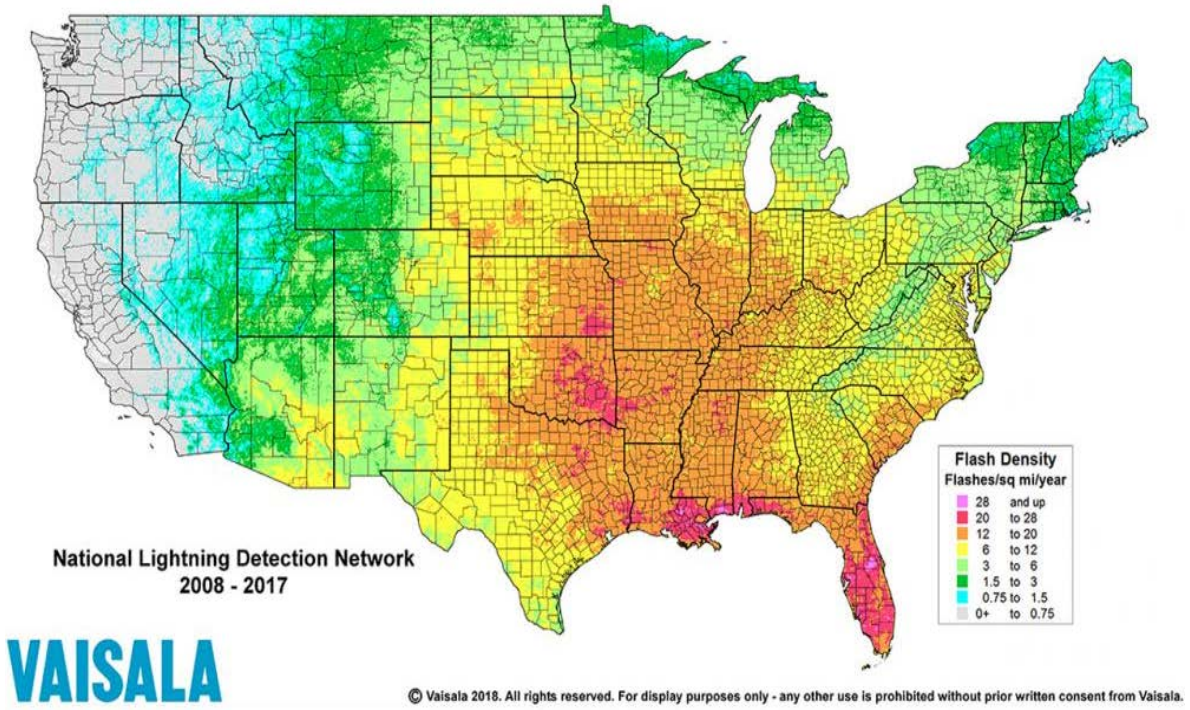
Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**51**	**0**	**0**	**$21,000**
Sparta	5	0	0	$20,000
Unincorporated Area	46	0	0	$1,000
Ashe County	**82**	**0**	**0**	**$8,000**
Jefferson	9	0	0	$0
Lansing	8	0	0	$0
West Jefferson	4	0	0	$0
Unincorporated Area	61	0	0	$8,000

HAILSTORM EVENTS, CONTINUED

Watauga County	**70**	**0**	**0**	**$426,000**
Beech Mountain	1	0	0	$0
Blowing Rock	13	0	0	$0
Boone	12	0	0	$350,000
Seven Devils	1	0	0	$0
Unincorporated Area	43	0	0	$76,000
Wilkes County	**118**	**0**	**0**	**$4,000**
North Wilkesboro	14	0	0	$0
Ronda	1	0	0	$0
Wilkesboro	13	0	0	$0
Unincorporated Area	90	0	0	$4,000
High County Region Total	**321**	**0**	**0**	**$459,000**

LIGHTNING

- 32 recorded lightning events since 1996
  - No deaths, 1 injury reported
  - Over $2.7 million in property damages
- Uniform exposure across the region
- Future occurrences are *highly likely*



LIGHTNING EVENTS

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**8**	**0**	**0**	**$856,500**
Sparta	1	0	0	$0
Unincorporated Area	7	0	0	$856,500
Ashe County	**3**	**0**	**0**	**$9,500**
Jefferson	0	0	0	$0
Lansing	0	0	0	$0
West Jefferson	0	0	0	$0
Unincorporated Area	3	0	0	$9,500

LIGHTNING EVENTS, CONTINUED

Watauga County	**7**	**0**	**1**	**$721,500**
Beech Mountain	0	0	0	$0
Blowing Rock	2	0	0	$20,000
Boone	4	0	0	$700,000
Seven Devils	0	0	0	$0
Unincorporated Area	1	0	0	$1,500
Wilkes County	**14**	**0**	**0**	**$679,500**
North Wilkesboro	0	0	0	$0
Ronda	1	0	0	$8,000
Wilkesboro	3	0	0	$45,500
Unincorporated Area	10	0	0	$626,000
High County Region Total	**32**	**0**	**1**	**$2,267,000**

SEVERE WINTER WEATHER

- 282 recorded winter weather events since 1996
  - Many events counted 2 times (once for each county)
  - Uniform exposure in the region
  - No deaths or injuries reported
  - Over $1.35 million in property damage
- 25 winter storms reported
- Future occurrences are *highly likely*

Source: HC Press

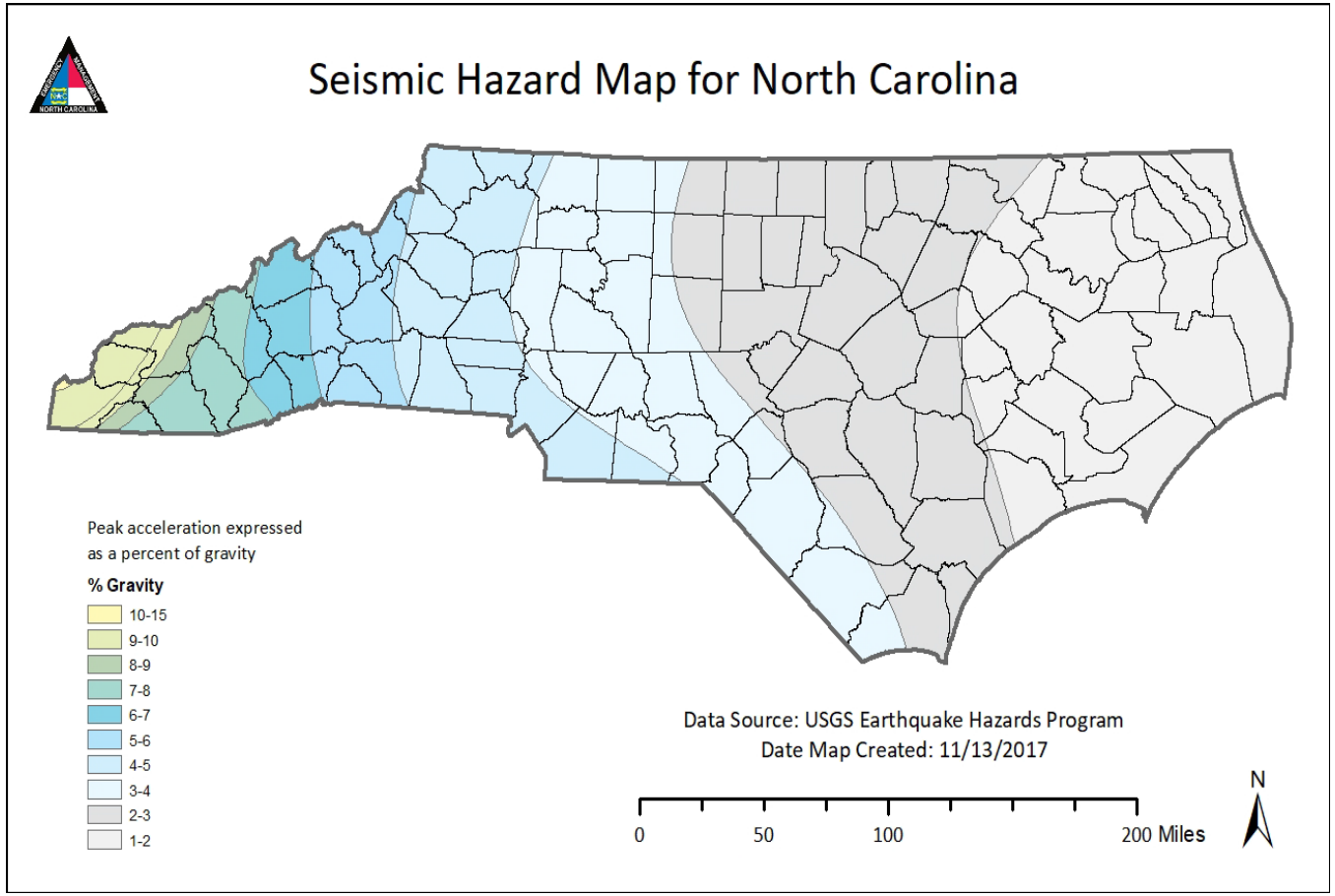
SEVERE WINTER WEATHER EVENTS

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	52	0	1	$50,000
Ashe County	84	0	0	$152,000
Watauga County	99	0	0	$393,000
Wilkes County	47	0	0	$757,800
High County Region Total	**282**	**0**	**1**	**$1,352,800**

EARTHQUAKE

- At least 86 earthquakes have affected the High Country region since 1886
- Future occurrences are *possible*

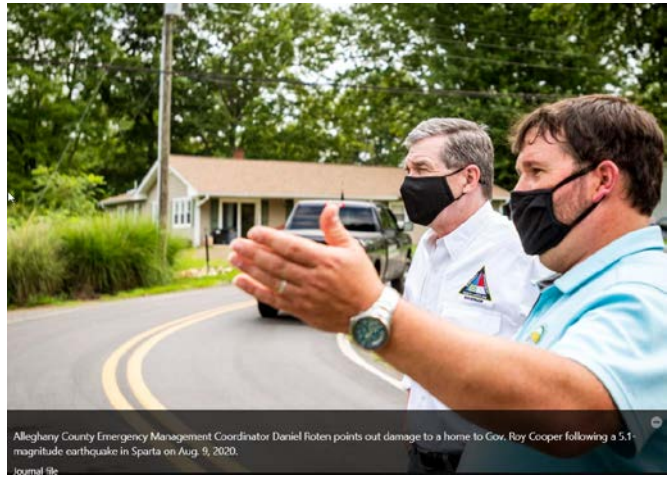
Probability of a major earthquake within the next 50 years:	
Alleghany County	% 10-14
Ashe County	% 14-20
Watauga County	% 14-20
Wilkes County	% 10-14



EARTHQUAKE, CONTINUED

- Sparta Earthquake
  - 5.2 magnitude earthquake
  - Second strongest in NC since 1900
  - Five other minor earthquakes were measured in the area

Source: The Weather Channel – "*Magnitude Earthquake Rattles North Carolina, South Carolina, Virginia, Tennessee; Roads Cracked, dishes broken*."; https://weather.com/news/news/2020-08-09-earthquake-north-carolina-south-carolina-tennessee


Allegheny County Emergency Management Coordinator Daniel Roten points out damage to a home to Gov. Roy Cooper following a 5.1-magnitude earthquake in Sparta on Aug. 9, 2020.

EARTHQUAKE EVENTS – ALLEGHANY COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Sparta	9	V	< 5.2
Unincorporated Area	17	V	< 4.8
Alleghany County	**26**	**V**	**< 4.8**

EARTHQUAKE EVENTS – ASHE COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Jefferson	3	IV	< 4.2
Lansing	3	III	< 4.2
West Jefferson	3	IV	< 4.2
Unincorporated Area	13	V	< 4.8
Ashe County	**22**	**V**	**< 4.8**

EARTHQUAKE EVENTS – WATAUGA COUNTY

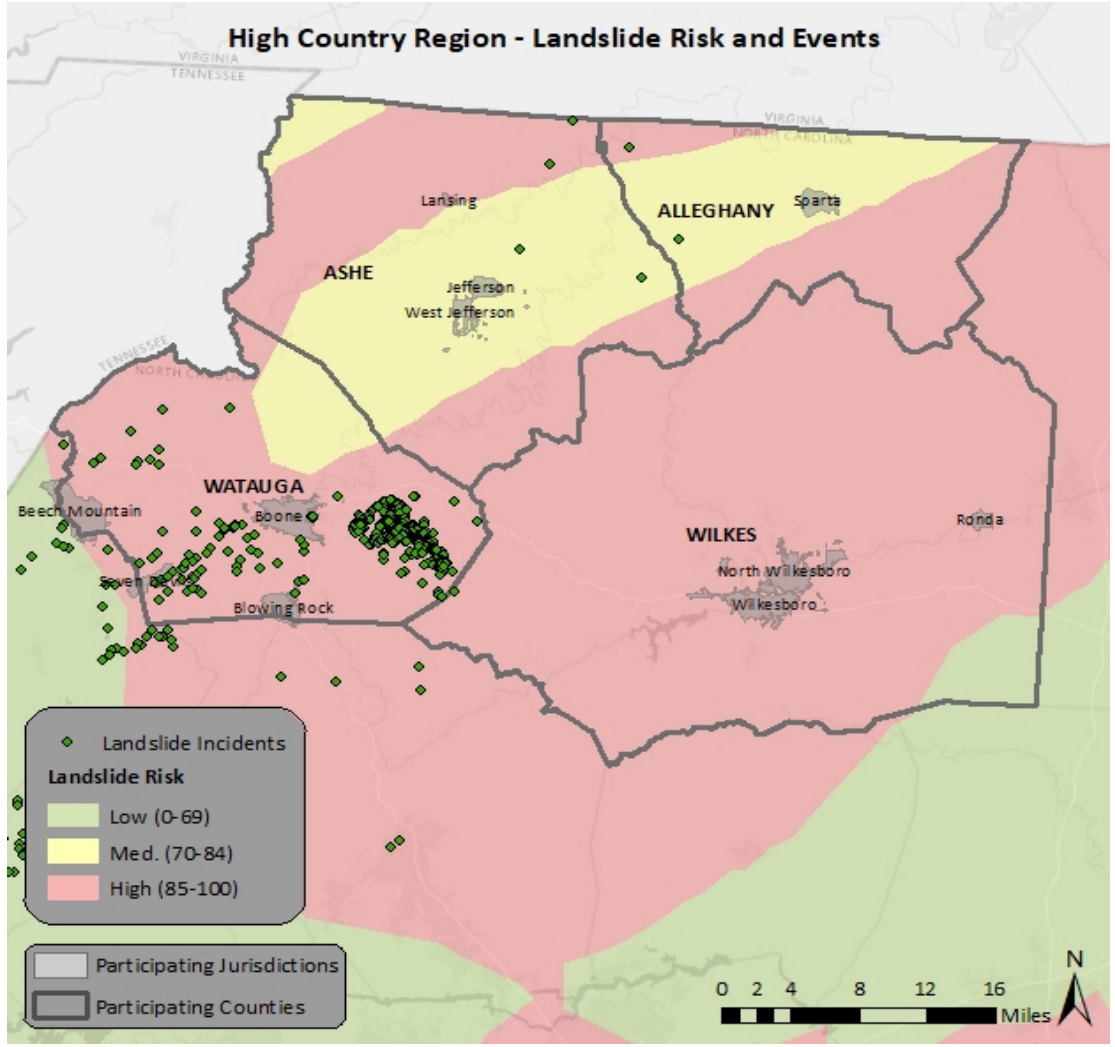
Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
Jefferson	3	IV	< 4.2
Lansing	3	III	< 4.2
West Jefferson	3	IV	< 4.2
Unincorporated Area	13	V	< 4.8
Watauga County	**27**	**V**	**< 4.8**

EARTHQUAKE EVENTS – WILKES COUNTY

Location	Number of Occurrences	Greatest MMI Reported	Richter Scale Equivalent
North Wilkesboro	3	V	< 4.8
Ronda	1	IV	< 4.2
Wilkesboro	2	VI	< 5.4
Unincorporated Area	5	IV	< 4.2
Wilkes County	**11**	**VI**	**< 5.4**

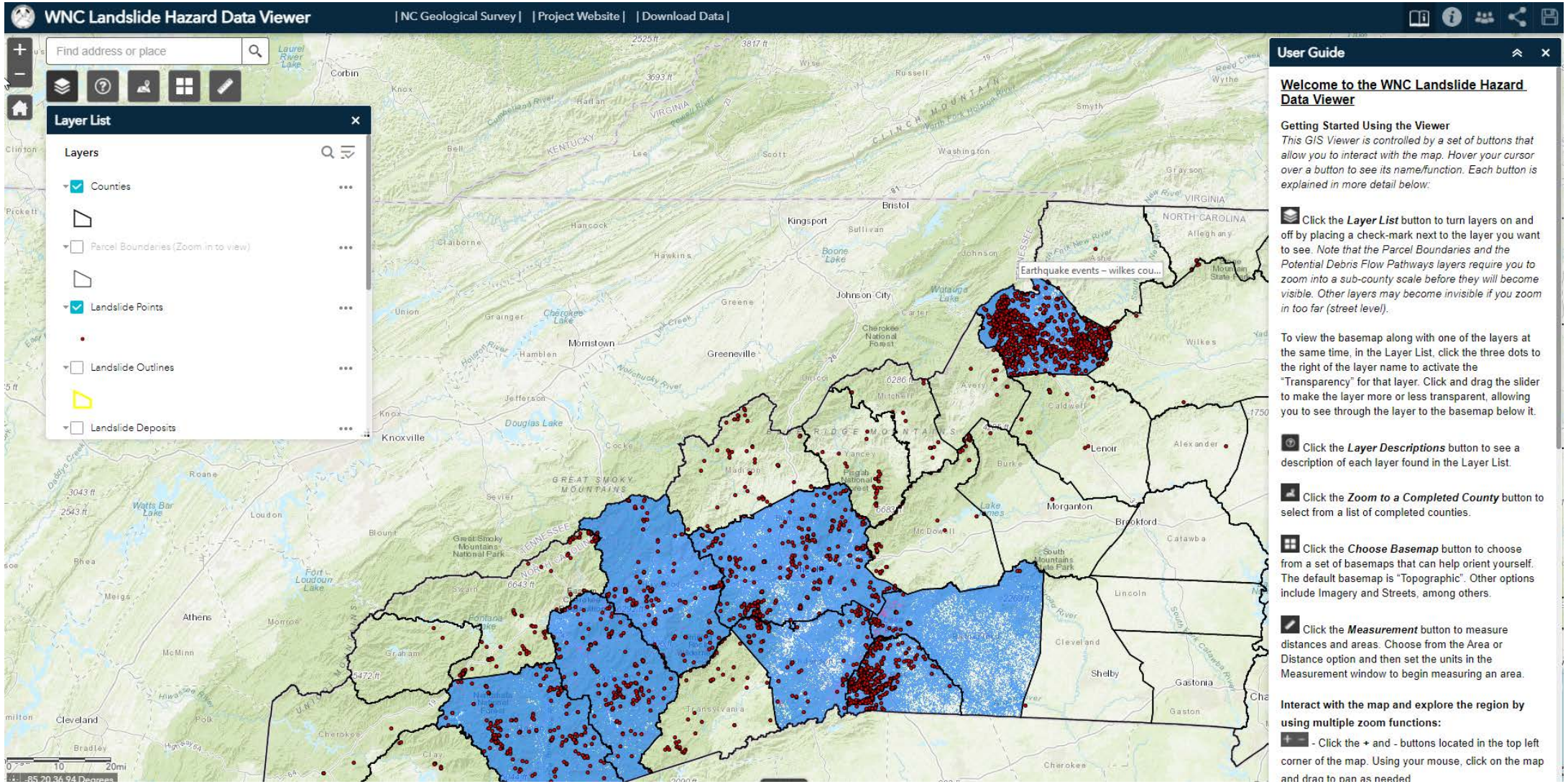
GEOLOGICAL - LANDSLIDE

- Most destructive to roads and structures
- Many slides associated with heavy rains or tropical systems
- Entire region is susceptible
  - Some areas more than others
- Future occurrences are *likely*
  - Slides frequently occur at sites of previous slides



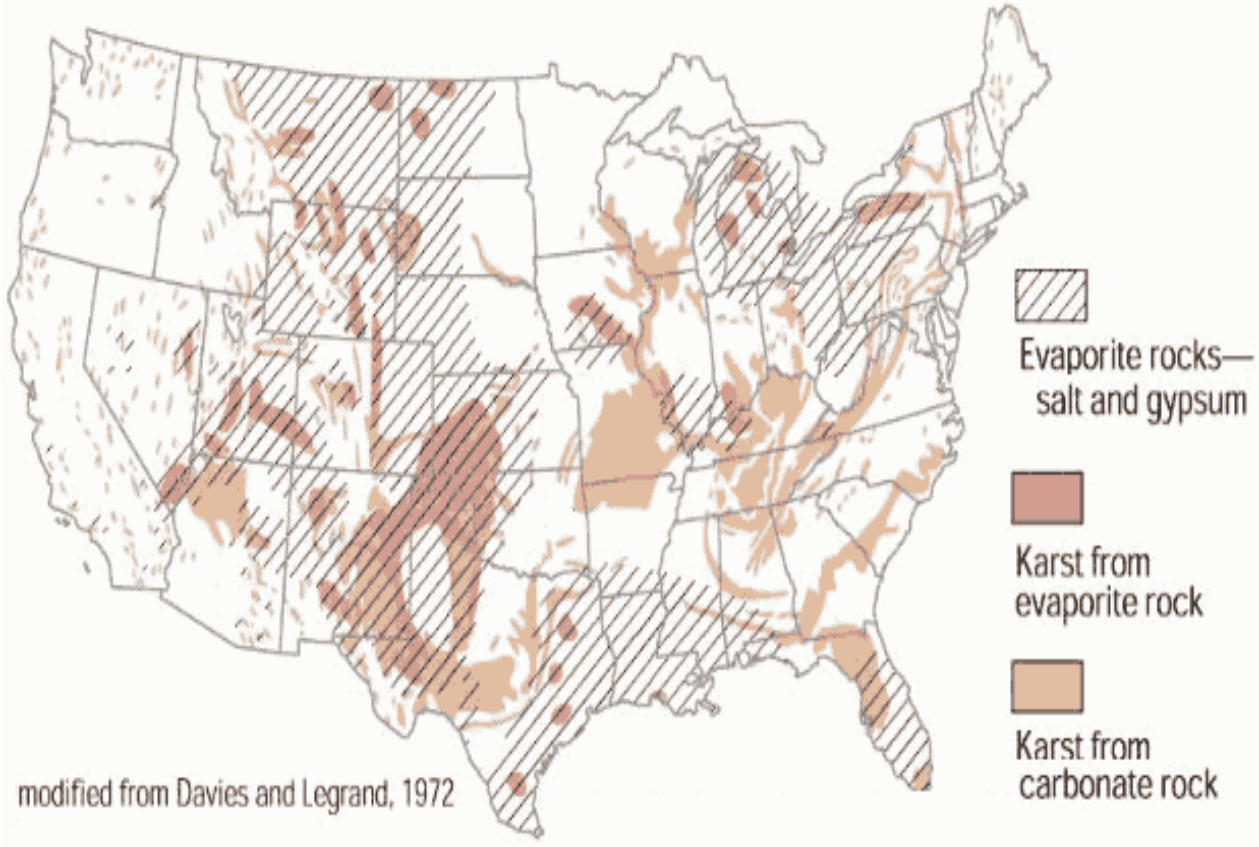
LANDLSIDE VIEWER

Developed by NCGS



GEOLOGICAL - SINKHOLE

- Not as common in the western part of the state, but possible
  - Usually attributed to stormwater (Blowing Rock)
- Future occurrences are *possible*



GEOLOGICAL - EROSION

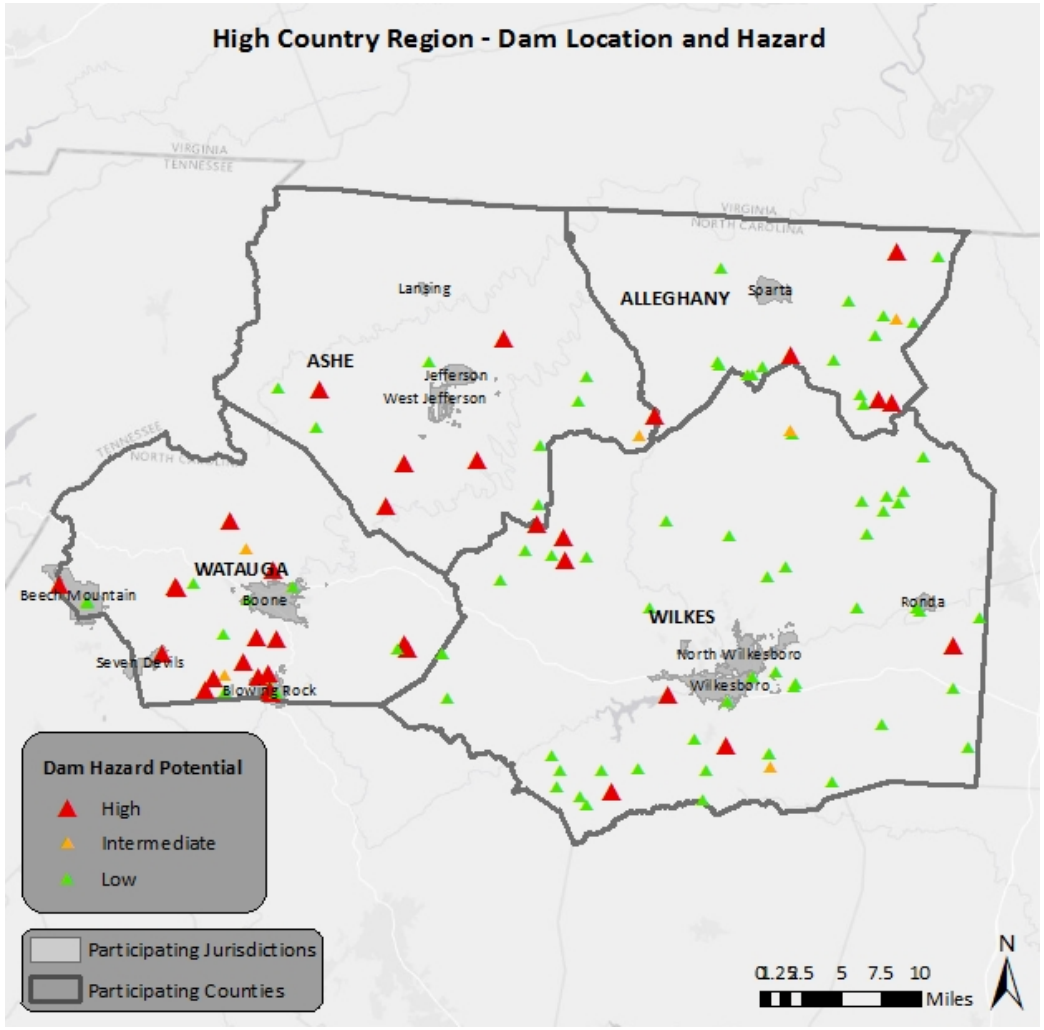
- Occurs along banks of rivers and streams
- Alleghany, Ashe, and Watauga counties erosion control measures
  - Bank stabilization measures
  - Erosion control requirements
- Typically caused by flash flooding events
- Future occurrences are *possible*

DAM AND LEVEE FAILURE

- 115 dams in the region
  - 33 are high hazard dams
- 3 significant breaches reported
- Future occurrences are *unlikely*

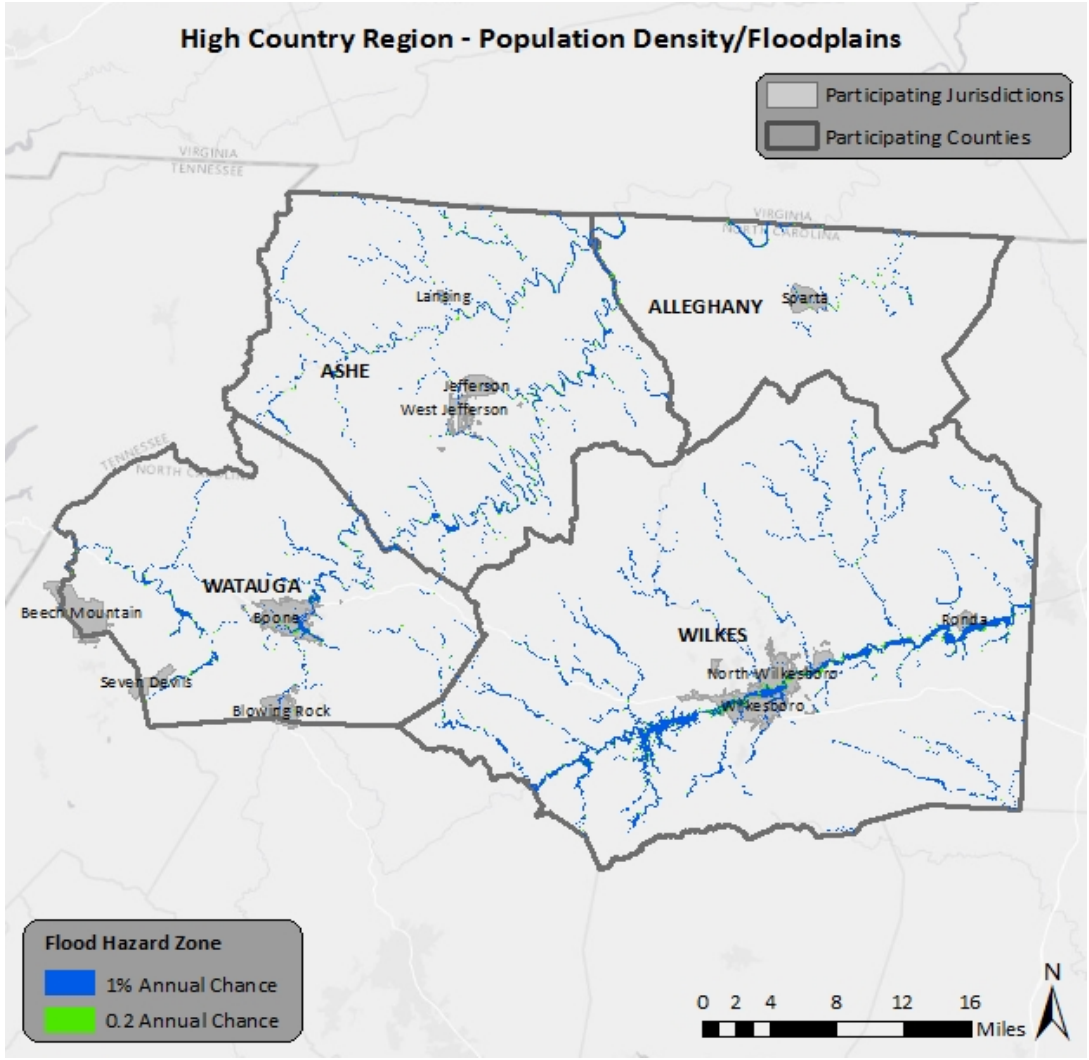
Location	Number of High Hazard Dams
Alleghany County	3
Ashe County	7
Watauga County	17
Wilkes County	6

Source: North Carolina Division of Energy, Mineral, and Land Resources



FLOOD

- NCEI indicates 271 flood events since 1993.
  - Over $26.2 million in property damage
  - No deaths or injuries reported
- NFIP Losses:
  - 266 reported losses since 1978
  - Approximately $4.8 million in claims
- Repetitive Loss:
  - 16 properties in High-Country Region as of 2019
  - 44 losses
  - $978,000 in total payments
- Future occurrences are *highly likely*



FLOOD EVENTS

Location	Number of Occurrences	Deaths	Injuries	Property Damage (2020)
Alleghany County	**27**	**0**	**0**	**$636,300**
Sparta	5	0	0	$500,000
Unincorporated Area	22	0	0	$136,300
Ashe County	**71**	**0**	**0**	**$1,311,250**
Jefferson	7	0	0	$52,000
Lansing	4	0	0	$5,000
West Jefferson	6	0	0	$4,000
Unincorporated Area	54	0	0	$1,250,250

FLOOD EVENTS, CONTINUED

Watauga County	**113**	**0**	**0**	**$20,581,000**
Beech Mountain	0	0	0	$0
Blowing Rock	4	0	0	$0
Boone	23	0	0	$2,465,000
Seven Devils	0	0	0	$0
Unincorporated Area	86	0	0	$18,116,000
Wilkes County	**60**	**0**	**0**	**$3,693,000**
North Wilkesboro	1	0	0	$20,000
Ronda	0	0	0	$0
Wilkesboro	2	0	0	$0
Unincorporated Area	57	0	0	$3,673,000
High County Region Total	**271**	**0**	**0**	**$26,221,550**

FLOOD – NFIP STATS – ALLEGHANY COUNTY

Location	Flood Losses	Claims Payments
Alleghany County	**7**	**$52,685**
Sparta	1	$1,255
Unincorporated Area	6	$51,460

FLOOD VULNERABILITY – ALLEGHANY COUNTY

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Alleghany County	**34**	**33**	**$331,245**	**1**	**$608**	**0**	**$0**	**34**	**$331,853**
Sparta	15	14	$71,597	1	$608	0	$0	15	$72,205
Unincorporated Area	19	19	$259,648	0	$0	0	$0	19	$259,648

FLOOD – NFIP STATS – ASHE COUNTY

Location	Flood Losses	Claims Payments
Ashe County	**92**	**$651,016**
Jefferson	4	$8,618
Lansing	1	$24,194
West Jefferson	14	$198,579
Unincorporated Area	73	$419,625

FLOOD VULNERABILITY – ASHE COUNTY

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Ashe County	**707**	**581**	**$5,331,788**	**111**	**$2,576,565**	**15**	**$341,221**	**707**	**$8,249,575**
Lansing	28	15	$202,194	11	$307,239	2	$107,094	28	$616,527
Jefferson	9	4	$75,305	5	$148,980	0	$0	9	$224,285
West Jefferson	43	7	$57,087	33	$1,239,880	3	$41,536	43	$1,338,504
Unincorporated Area	627	555	$4,997,202	62	$880,466	10	$192,591	627	$6,070,259

FLOOD – NFIP STATS – WATAUGA COUNTY

Location	Flood Losses	Claims Payments
Watauga County	**252**	**$2,937,385**
Beech Mountain	4	$0
Blowing Rock	11	$198,087
Boone	79	$1,368,894
Seven Devils	0	$0
Unincorporated Area	158	$1,370,404

FLOOD VULNERABILITY – WATAUGA COUNTY

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Watauga County	**541**	**870**	**$15,975,816**	**113**	**$6,494,565**	**19**	**$3,026,987**	**1,002**	**$25,497,367**
Beech Mountain	0	0	$0	0	$0	0	$0	0	$0
Blowing Rock	13	6	$60,120	9	$255,766	0	$0	15	$315,886
Boone	186	253	$9,886,776	72	$4,887,406	7	$1,321,624	332	$16,095,806
Seven Devils	0	0	$0	0	$0	0	$0	0	$0
Unincorporated Area	342	611	$6,028,920	32	$1,351,393	12	$1,705,363	655	$9,085,675

FLOOD – NFIP STATS – WILKES COUNTY

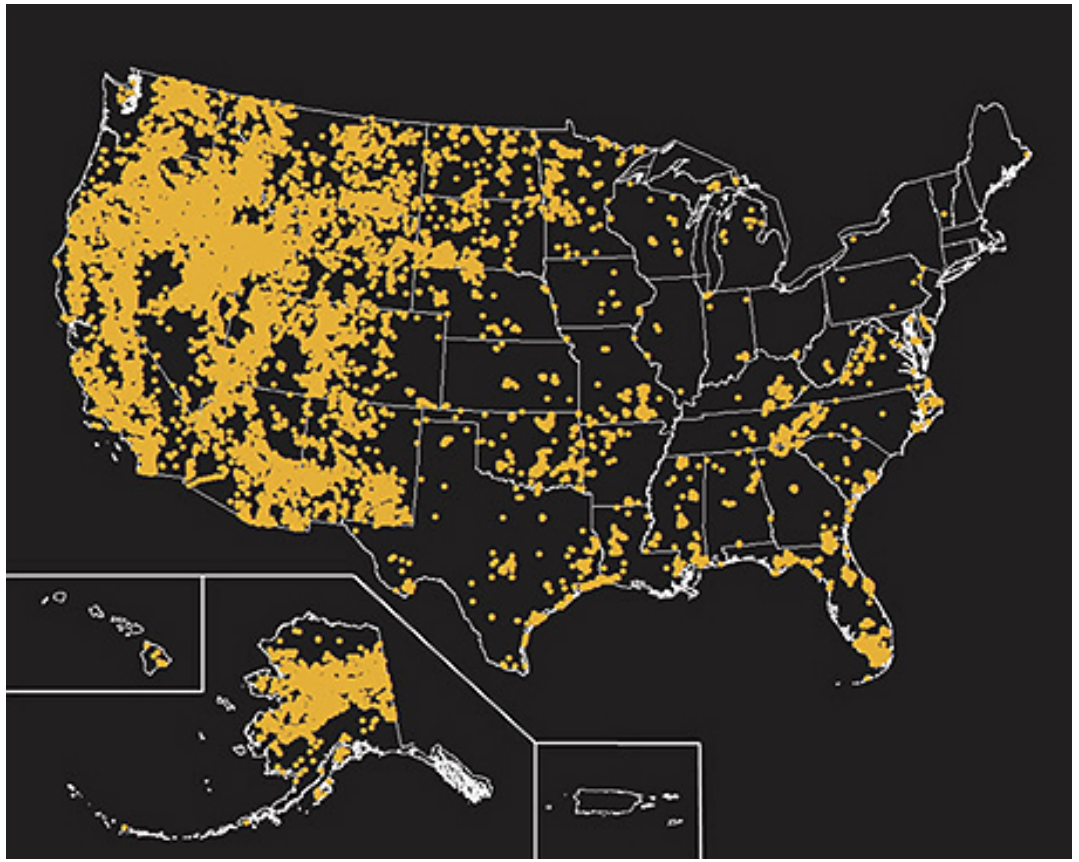
Location	Flood Losses	Claims Payments
Wilkes County	**16**	**$444,739**
North Wilkesboro	0	$0
Ronda	*	*
Wilkesboro	12	$440,550
Unincorporated Area	4	$4,189

FLOOD VULNERABILITY – WILKES COUNTY

Location	Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
		Number	Damages	Number	Damages	Number	Damages	Number	Damages
Wilkes County	**421**	**285**	**$2,000,897**	**121**	**$7,100,185**	**16**	**$1,336,892**	**422**	**$10,437,976**
North Wilkesboro	65	6	$23,449	59	$3,230,933	4	$192,563	69	$3,446,946
Ronda	2	1	$35,854	1	$3,671	0	$0	2	$39,526
Wilkesboro	45	11	$65,047	24	$3,150,343	7	$618,528	42	$3,833,919
Unincorporated Area	309	267	$1,876,547	37	$715,238	5	$525,801	309	$3,117,585

Wildfire Vulnerability

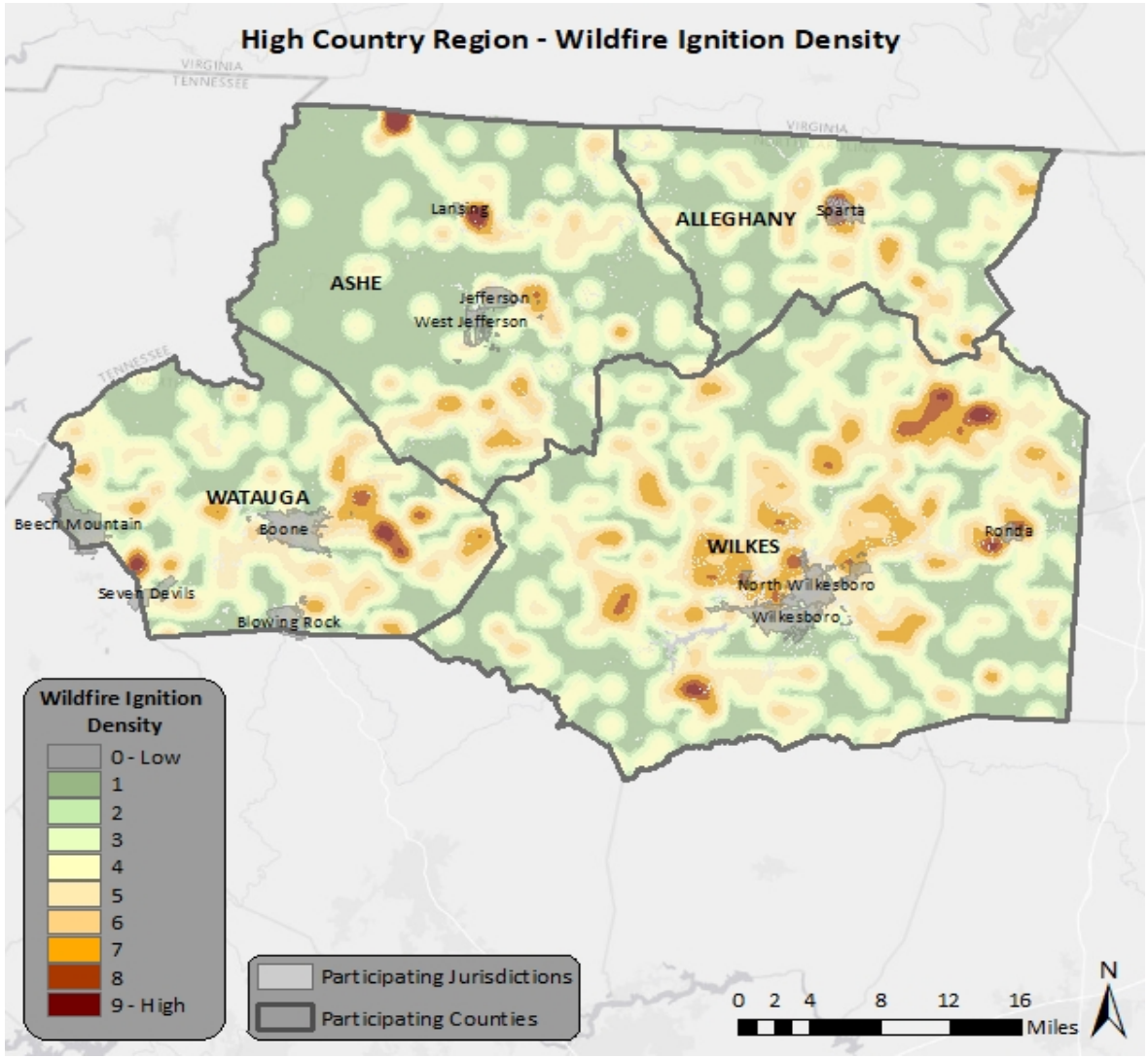
- Map represents fires > 250 acres
- Relative Risk of Wildfire
  - Larger fires possible
- 10-year averages (2008-2017)
  - 64,565 Wildfires
  - 6,571,242 Acres
  - National Interagency Fire Center



WILDFIRE, CONTINUED

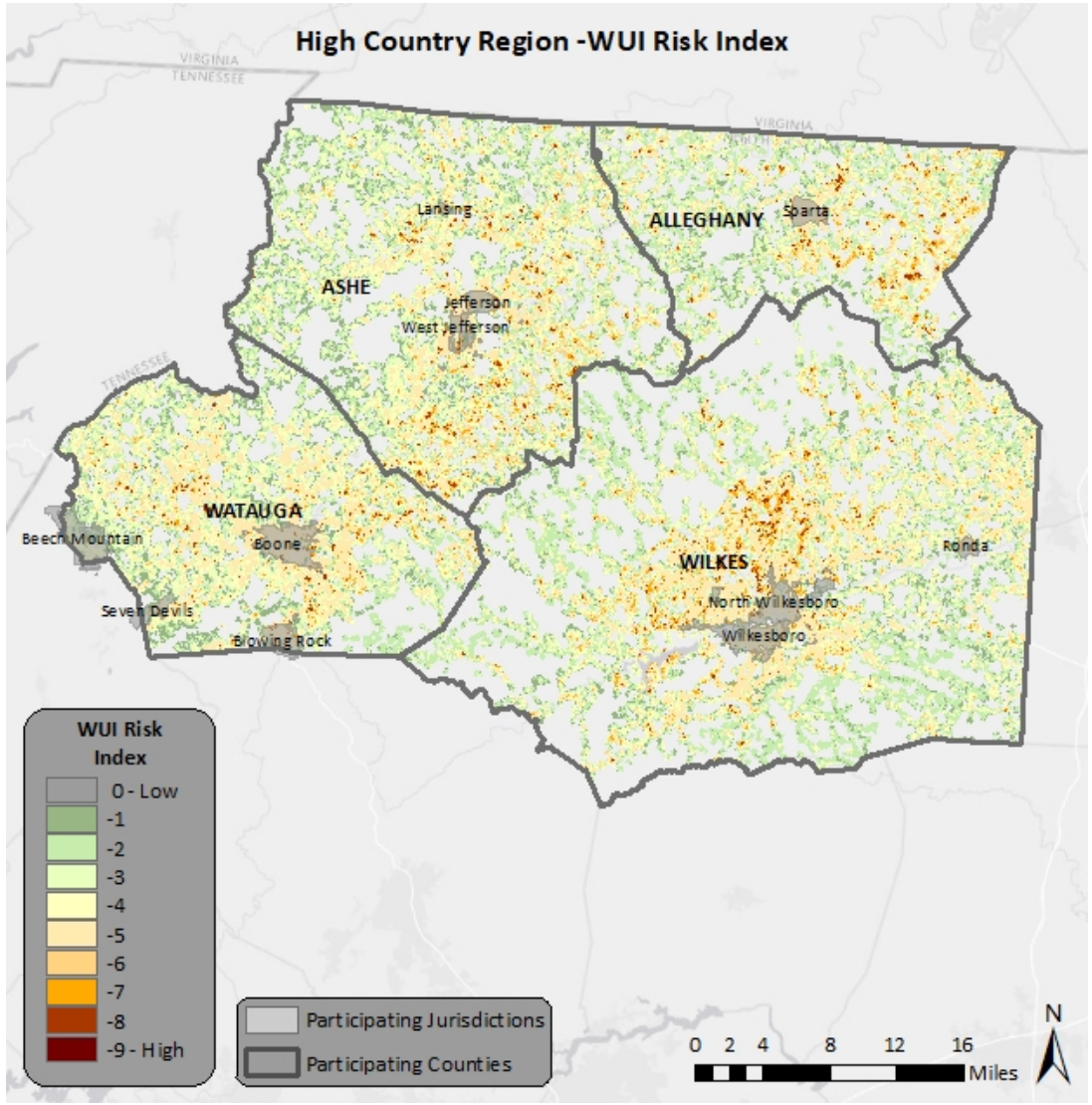
- Wildfire Ignition Density
  - Likelihood of wildfire igniting in an area

Southern Wildfire Risk Assessment



WILDFIRE, CONTINUED

- Wildfire Urban Interface Risk Index
  - Rating of potential impact of wildfire on people and their homes
- Future occurrences are *likely*



INFECTIOUS DISEASE

- Hazard first assessed in NCHMP 2018
- Obviously a hazard of great concern currently
- Increasing risk/vulnerability with increasing population
- Other historical occurrences include vector-borne diseases (Zika) and influenza

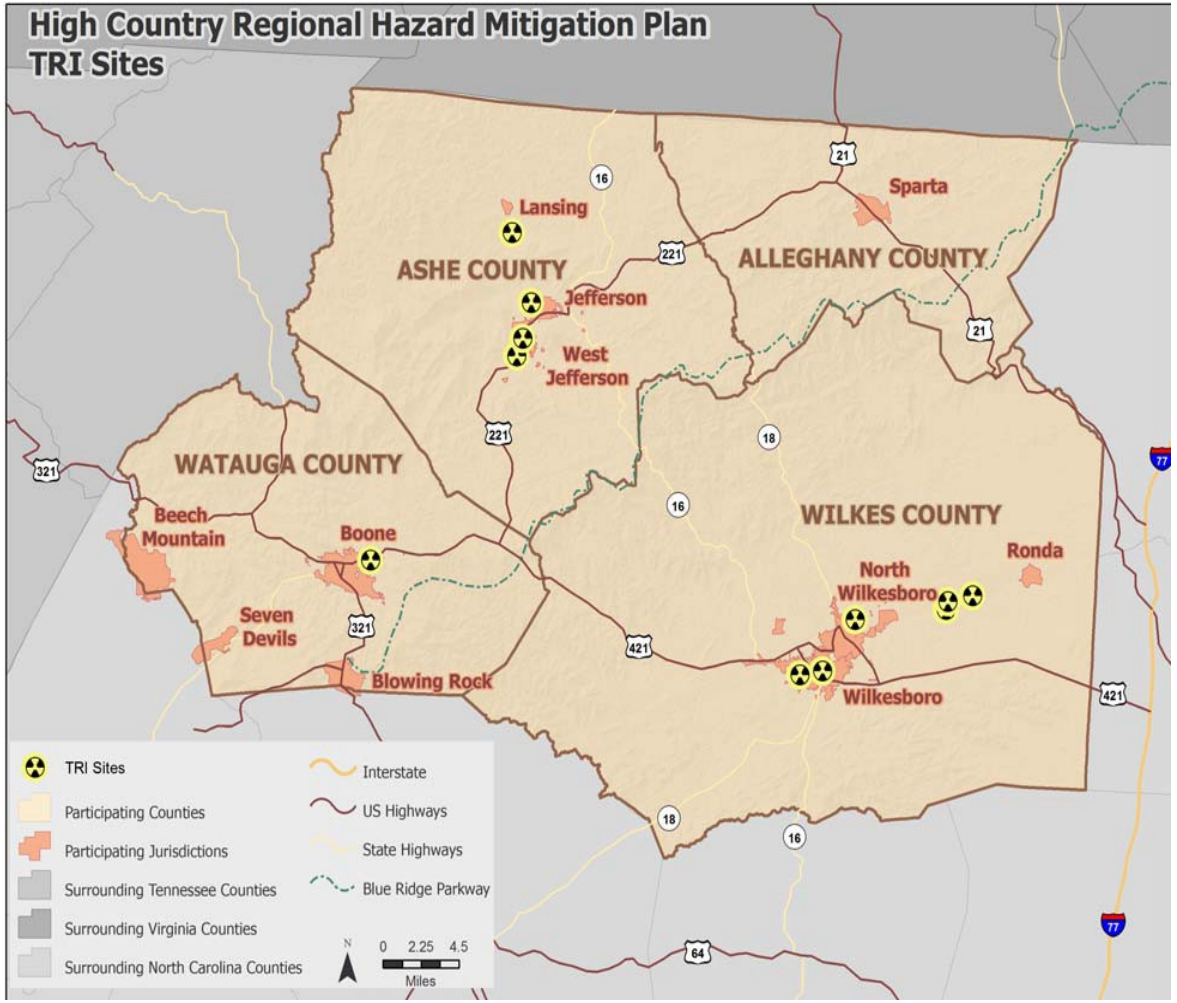
INFECTIOUS DISEASE, CONTINUED

- One disaster declaration in the region
  - COVID-19 Pandemic on March 24, 2020
- NC DHHS reported 21,724 cases in region as of Oct 13, 2021

Location	Number of Cases	Number of Deaths
Alleghany County	1,586	5
Ashe County	3,357	46
Watauga County	6,431	35
Wilkes County	10,350	173
High Country Region Total	**21,724**	**259**

HAZARDOUS SUBSTANCES

- 8 TRI Facilities in the region as of 2019
  - *EPA*
- 39 serious events reported since 1970
  - *PHMSA*
- Future occurrences are *possible*



HAZARDOUS SUBSTANCES EVENTS

Location	Incidents Reported	Injuries	Deaths	Costs
Alleghany County	**1**	**0**	**0**	**$62,600**
Sparta	0	0	0	$0
Unincorporated Area	1	0	0	$62,600
Ashe County	**6**	**0**	**0**	**$585,539**
Jefferson	1	0	0	$0
Lansing	0	0	0	$0
West Jefferson	3	0	0	$22,042
Unincorporated Area	2	0	0	$563,497

HAZARDOUS SUBSTANCES EVENTS, CONTINUED

Watauga County	**17**	**0**	**0**	**$65,945**
Beech Mountain	0	0	0	$0
Blowing Rock	0	0	0	$0
Boone	13	0	0	$50,515
Seven Devils	0	0	0	$0
Unincorporated Area	4	0	0	$15,430
Wilkes County	**15**	**0**	**0**	**$20,342**
North Wilkesboro	6	0	0	$19,392
Ronda	0	0	0	$0
Wilkesboro	7	0	0	$100
Unincorporated Area	2	0	0	$850
High County Region Total	**39**	**0**	**0**	**$734,426**

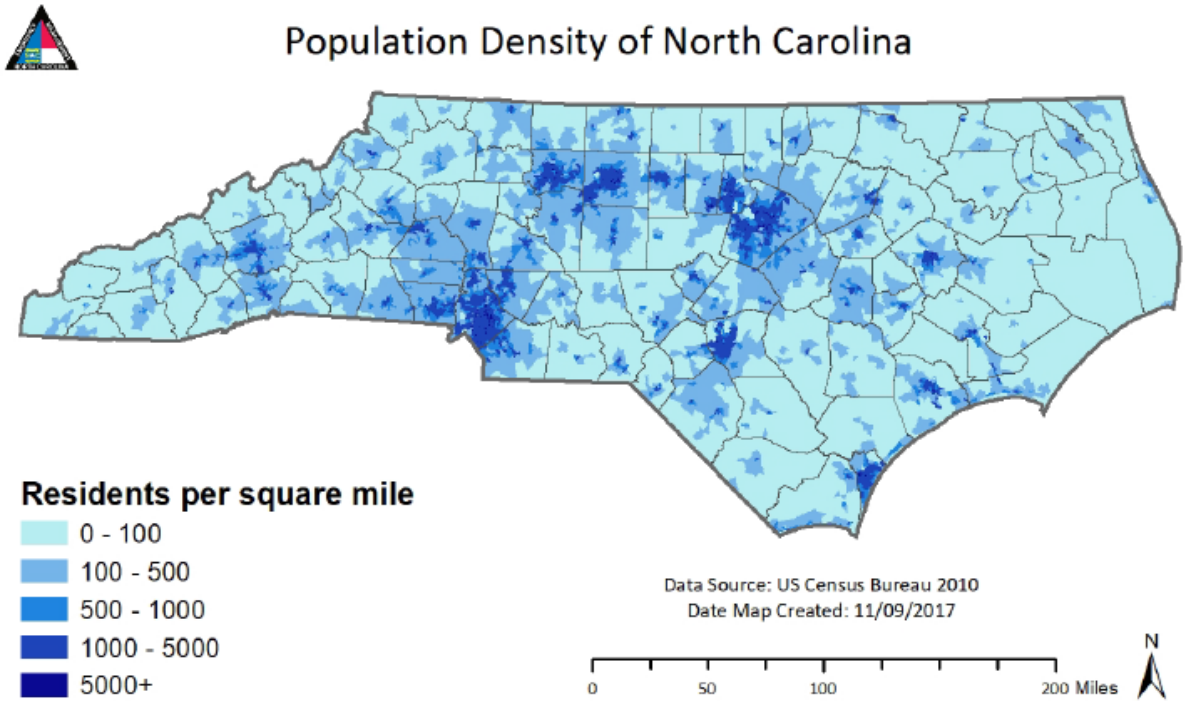
TERROR THREAT

- Examples
  - Assassinations/Armed Attack
  - Kidnapping
  - Hijacking
  - Bomb Scares and Bombing
  - Cyber Attack
  - Chemical Agent
  - Biological Agent
  - Nuclear Bomb
  - Radiological Agent
- No reported events
- Future occurrences are *unlikely*

Threat Level	Description
SEVERE	Severe Risk of Terrorist Attacks
HIGH	High Risk of Terrorist Attacks
ELEVATED	Significant Risk of Terrorist Attacks
GUARDED	General Risk of Terrorist Attacks
LOW	Low Risk of Terrorist Attacks

TERROR THREAT, CONTINUED

All areas are vulnerable to terrorism, but terror threats tend to target more densely populated areas



U.S. Department of Homeland Security Critical Infrastructure Sectors	
Areas of Assembly	Energy
Agriculture and Food	Government Facilities
Banking and Finance	Healthcare and Public Health
Chemical	Information Technology
Commercial Facilities	National Monuments and Icons
Communications	Nuclear Reactors, Materials, and Waste
Critical Manufacturing	Postal and Shipping
Dams	Transportation Systems
Defense Industrial Base	Water
Emergency Services	

CYBER

- NC Department of Information Technology specializes in cybersecurity
- “Non-payment/non – delivery” highest number of cybercrimes in NC
- Future occurrences are *possible*

Crime Type by Victim Count			
Crime Type	*Victim Count*	*Crime Type*	*Victim Count*
419/Overpayment	614	Health Care Related	10
Advanced Fee	384	IPR/Copyright and Counterfeit	58
Auction	442	Identity Theft	345
BEC/EAC	254	Investment	28
Charity	10	Lottery/Sweepstakes	119
Civil Matter	28	Malware/Scareware	62
Confidence Fraud/Romance	326	Misrepresentation	102
Corporate Data Breach	74	No Lead Value	121
Credit Card Fraud	274	Non-payment/Non-Delivery	1,844
Crimes Against Children	19	Other	218
Criminal Forums	0	Personal Data Breach	569
Denial of Service	28	Phishing/Vishing/Smishing/Pharming	399
Employment	467	Ransomware	67
Extortion	468	Re-shipping	25
Gambling	1	Real Estate/Rental	280
Government Impersonation	319	Tech Support	298
Hacktivist	2	Terrorism	6
Harassment/Threats of Violence	364	Virus	29
Descriptors*			
Social Media	455	Virtual Currency	38

Source: FBI Cybercrime Compliant Center, 2016

ELECTROMAGNETIC PULSE

- Included as the State Plan as a hazard
- Densely populated areas may be more prone to damages from an EMP
- No reports of EMP occurrences in the region
- Future occurrences are *unlikely*

PRIORITY RISK INDEX (PRI)

Qualitative method to “rank” identified hazards based on:

- Probability (30%)
- Impact (30%)
- Spatial Extent (20%)
- Warning Time (10%)
- Duration (10%)

Highest possible PRI value = 4.0

High-Country Region Highest Value = 3.1

PRI EXPLAINED

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Probability	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1 and 10% annual probability	2	
	Likely	Between 10 and 100% annual probability	3	
	Highly Likely	100% annual probability	4	
Impact	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	

PRI EXPLAINED, CONTINUED

PRI Category	Degree of Risk			Assigned Weighting Factor
	Level	Criteria	Index Value	
Spatial Extent	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1 and 10% of area affected	2	
	Moderate	Between 10 and 50% of area affected	3	
	Large	Between 50 and 100% of area affected	4	
Warning Time	More than 24 hours	Self explanatory	1	10%
	12 to 24 hours	Self explanatory	2	
	6 to 12 hours	Self explanatory	3	
	Less than 6 hours	Self explanatory	4	
Duration	Less than 6 hours	Self explanatory	1	10%
	Less than 24 hours	Self explanatory	2	
	Less than one week	Self explanatory	3	
	More than one week	Self explanatory	4	

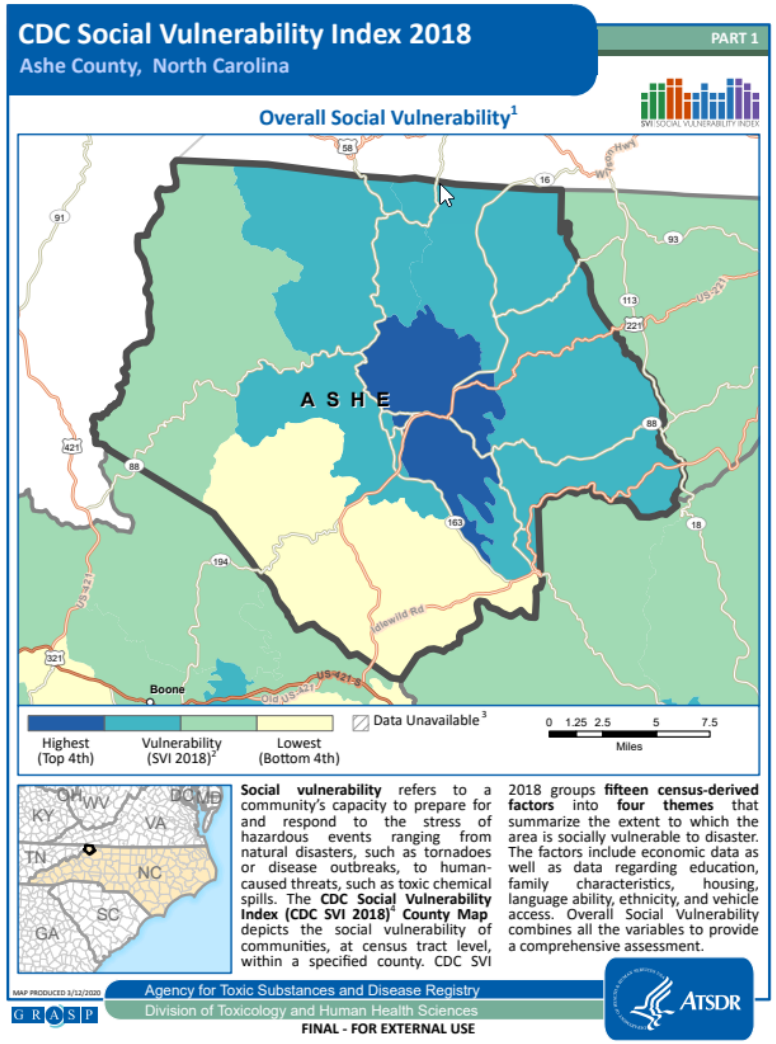
PRI RESULTS

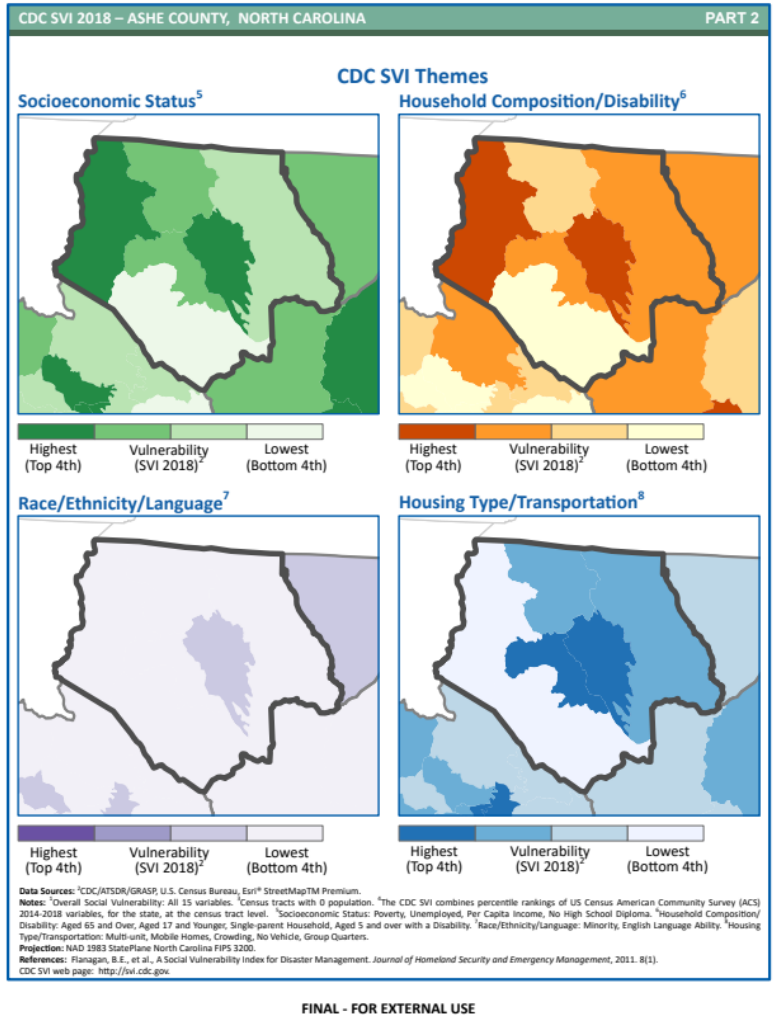
Hazard	Sub hazard(s) Assessed	Category/Degree of Risk					
		Probability	Impact	Spatial Extent	Warning Time	Duration	PRI Score
Natural Hazards							
Drought		Likely	Minor	Large	More than 24 hours	More than 1 week	2.5
Hurricane and Coastal Hazards		Possible	Limited	Large	More than 24 hours	Less than 24 hours	2.6
Tornadoes/ Thunderstorms	Hailstorm, Lightning	Highly Likely	Limited	Moderate	6 to 12 hours	Less than 6 hours	2.8
Severe Winter Weather		Likely	Critical	Large	More than 24 hours	Less than 1 week	3.1
Earthquakes		Likely	Minor	Moderate	Less than 6 hours	Less than 6 hours	2
Geological	Landslide, Sinkholes, Erosion	Highly Likely	Limited	Small	Less than 6 hours	Less than 6 hours	2.4
Dam Failure		Unlikely	Critical	Moderate	Less than 6 hours	Less than 24 hours	2.3
Flooding		Likely	Critical	Small	6 to 12 hours	Less than 1 week	2.7
Other Hazards							
Wildfires		Likely	Minor	Small	Less than 6 hours	Less than 1 week	2.4
Infectious Disease		Unlikely	Limited	Moderate	More than 24 hours	More than 1 week	2.0
Technological Hazards							
Hazardous Substances		Possible	Limited	Small	Less than 6 hours	Less than 24 hours	1.9
Terrorism		Unlikely	Critical	Moderate	Less than 6 hours	More than 1 week	2.6
Cyber		Possible	Minor	Moderate	Less than 6 hours	Less than 1 week	2.1
Electromagnetic Pulse		Unlikely	Limited	Large	Less than 6 hours	More than 1 week	2.5

CONCLUSIONS ON HAZARDS RISK

HIGH RISK	Severe Winter Weather Flooding Hurricane and Coastal Hazards
MODERATE RISK	Tornadoes/Thunderstorms Drought Hazardous Substances Geological (Landslide) Infectious Disease Wildfire Dam Failure Earthquake Cyber
LOW RISK	Terrorism Electromagnetic Pulse

SOCIAL VULNERABILITY





CAPABILITY ASSESSMENT

- Measures community capability to implement hazard mitigation activities

- Identifies and targets gaps, conflicts and opportunities with existing local plans, programs, policies, etc.

- Identifies mitigation measures already in place or underway

** Coupled with the Risk Assessment, the Capability Assessment helps to form the foundation for identifying Mitigation Actions*

CAPABILITY ASSESSMENT, CONTINUED

Capability Assessment Survey

- Measures existing capabilities
  - Planning and regulatory
  - Administrative and technical
  - Fiscal
  - Political

CAPABILITY INDICATORS

- **National Flood Insurance Program (NFIP) Participation**
- **Community Rating System (CRS) Participation**
- **Building Code Effectiveness Grading Schedule (BCEGS)**
- **Local Capability Assessment Survey**
  - Inventory and evaluation of existing plans, policies, programs and ordinances
  - Measures administrative, technical, fiscal and political capability
  - Includes self-assessment of local capabilities

CAPABILITY ASSESSMENT, CONTINUED

- All jurisdictions currently participate in the NFIP
- Watauga County and Boone participate in CRS
  - May want to consider as mitigation action
  - Most beneficial to areas with many NFIP policies

CAPABILITY ASSESSMENT, CONTINUED

Plan Policy, Program or Ordinance	Percentage*
Hazard Mitigation Plan	100%
Disaster Recovery Plan	32%
Comprehensive Land Use Plan	100%
Floodplain Management Plan	50%
Stormwater Management Plan	56%
Emergency Operations Plan	100%
Continuity of Operations Plan	56%

*** Percentage of jurisdictions with item in place / under development**

CAPABILITY ASSESSMENT, CONTINUED

Plan Policy, Program or Ordinance	Percentage*
Capital Improvements Plan	56%
Historic Preservation Plan	22%
Zoning Ordinance	100%
Subdivision Ordinance	94%
Flood Damage Prevention Ordinance	100%
Post-Disaster Redevelopment Plan	28%
Building Code	100%
Fire Code	100%

*** Percentage of jurisdictions with item in place / under development**

CAPABILITY ASSESSMENT, CONTINUED

- Planning and Regulatory Capability
  - Most jurisdictions are in Moderate or High range
- Administrative and Technical Capability
  - Variation between the jurisdictions (mainly with respect to planners, grant writers, etc.)
  - About 63% of jurisdictions have staff skilled in GIS
  - Nearly all jurisdictions have emergency manager and floodplain manager

CAPABILITY ASSESSMENT, CONTINUED

- Fiscal Capability
  - Most jurisdictions in the Moderate range
  - 100% have partnering arrangements or intergovernmental agreements

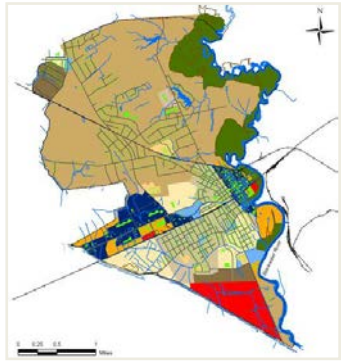
CONCLUSIONS ON HAZARD RISK

	Low Vulnerability	Moderate Vulnerability	High Vulnerability
High Capability	Best Case Scenario		
Moderate Capability			
Limited Capability			Worst Case Scenario

Mitigation Strategy Development

THINK OF MITIGATION IN THIS WAY…

1) We want to mitigate hazard impacts on the existing development in our communities
   - Houses, businesses, infrastructure, critical facilities, etc.
2) We want to ensure that future development is conducted in a way that doesn't increase our vulnerability
   - Best done by having good plans, policies and procedures in place



MITIGATION TECHNIQUES

Prevention	Property Protection	Natural Resource Protection	Structural Projects	Emergency Services	Public Education/ Awareness
Planning and zoning	Acquisition	Floodplain protection	Reservoirs	Warning systems	Outreach projects
Building codes	Relocation	Watershed management	Dams, levees, dikes	Emergency response equipment	Speaker series/ demonstration events
Open space preservation	Building elevation	Riparian buffers	Floodwalls	Shelter Operations	Hazard map information
Floodplain regulations	Critical facilities protection	Forest management	Stormwater diversions	Evacuation planning and management	Real estate disclosure
Stormwater management regulations	Retrofitting	Erosion and sediment control	Detention/ retention basins	Emergency response training and exercises	Library materials
Drainage system maintenance	Safe rooms, shutters, shatter-resistant glass	Wetland preservation and restoration	Channel modification	Sandbagging for flood protection	School children educational programs
Capital improvements programming	Insurance	Habitat preservation	Storm sewers	Temporary shutters	Hazard expositions
Setbacks					

FEMA MITIGATION FUNDING

FEMA

Step 1: Review Regional Mitigation Goals

	Goal
Goal #1	Enhance existing, or design new, county policies that will reduce the potentially damaging effects of hazards without hindering other community goals such as: preserving environmentally sensitive areas, maintaining a stable and growing business community and providing infrastructure that accommodates future growth.
Goal #2	Increase resiliency in the region by protecting the most vulnerable populations, buildings and critical facilities through the implementation of cost-effective and technically feasible mitigation actions.
Goal #3	Increase internal capabilities of local governments in the region to mitigate the effects of natural hazards.
Goal #4	Decrease the region's vulnerability to future hazard events.
Goal #5	Protect public health, safety and welfare by increasing public awareness of existing hazards and by fostering both individual and public responsibility in mitigating risks due to those hazards and by ensuring that emergency services are adequate to protect life and safety.

MITIGATION STRATEGY, CONTINUED

Step 2: Update Mitigation Actions

- Provide status update for existing mitigation actions (completed, deleted, deferred)

MITIGATION STRATEGY, CONTINUED

EXAMPLE from Previous Update

Action #	Description	Hazard(s) Addressed	Priority	Lead Agency/ Responsibility	Potential Funding Source	Target Completion Date	Status
P-13	Comprehensive review of existing emergency response plans to continuously update and revise response plans.	All	Moderate	County Emergency Management	N/A	2018	In progress. Plan and advisory committee in development phase.

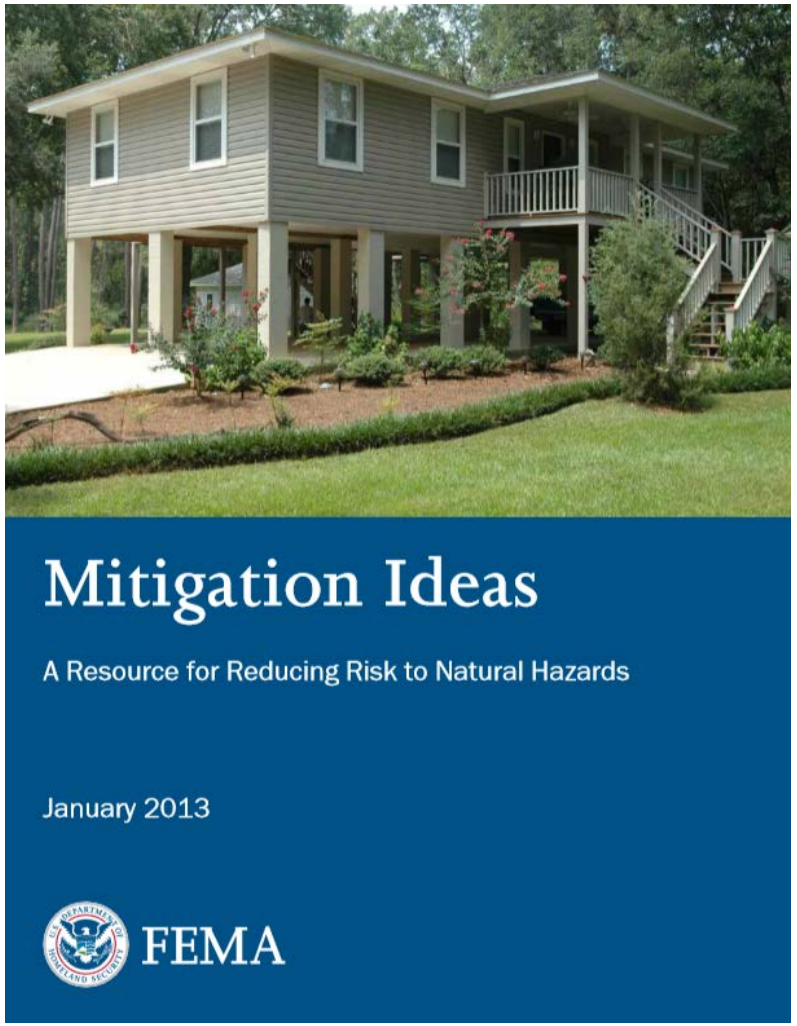
Step 3: Identification of New Actions

- Identify and discuss a full range of possible mitigation projects/available mitigation techniques
  - Consistent with mitigation goals and other community objectives
  - Based on hazard risk and local capability
- Critical facilities that need retrofitting/relocated
- Projects/activities to reduce hazard impacts
- Alleviate repetitive flood losses
- Others? (Emergency Services, Prevention, Natural Resource Protection, Property Protection, Structural Projects, Public Education)

MITIGATION STRATEGY, CONTINUED

In General…

- Strengthen and Protect Critical Facilities
- Educate Public
  - Seasonal hazard awareness weeks
  - Encourage household preparedness (www.ready.gov)
- Identify pre-existing structures/rooms for sheltering
- Discourage future building in known hazard areas
  - Flood prone areas are often great for parks!
  - Create regulations to prevent development or require more stringent building standards



MITIGATION STRATEGY, CONTINUED

Mitigate repetitive loss properties

Location	Number of Properties	Types of Properties	Number of Losses	Building Payments	Content Payments	Total Payments	Average Payment
Alleghany County	**1**		**2**	**$42,168**	**$9,292**	**$51,460**	**$25,730**
Sparta	0	--	0	$0	$0	$0	$0
Unincorporated Area	1	Single family	2	$42,168	$9,292	$51,460	$25,730
Ashe County	**7**		**12**	**$58,212**	**$56,314**	**$114,526**	**$8,180**
Jefferson	0	--	0	$0	$0	$0	$0
Lansing	0	--	0	$0	$0	$0	$0
West Jefferson	1	nonresidential	2	$3,769	$440	$4,209	$2,401
Unincorporated Area	6	4 nonresidential, 2 single family	12	$54,443	$55,874	$110,317	$9,193
Watauga County	**17**		**47**	**$966,822**	**$294,521**	**$1,261,343**	**$26,837**
Beech Mountain	0	--	0	$0	$0	$0	$0
Blowing Rock	0	--	0	$0	$0	$0	$0
Boone	11	4 nonresidential, 3 single family, 2 multi-family, 2 other residential	29	$763,473	$133,678	$8897,151	$30,936
Seven Devils	0	--	0	$0	$0	$0	$0
Unincorporated Area	6	3 nonresidential, 1 multi-family, 2 single family	18	$203,348	$160,843	$364,192	$20,233
Wilkes County	**1**		**5**	**$37,378**	**$36,061**	**$73,440**	**$14,688**
North Wilkesboro	0	--	0	$0	$0	$0	$0
Ronda	0	--	0	$0	$0	$0	$0
Wilkesboro	1	nonresidential	0	$0	$0	$0	$0
Unincorporated Area	0	--	5	$37,378	$36,061	$73,440	$14,688
HIGH COUNTRY REGION TOTAL	**22**	**8 single family, 3 multi-family, 2 other residential, 13**	**66**	**$1,104,579**	**$396,189**	**$1,500,769**	**$22,739**

MITIGATION STRATEGY, CONTINUED

Potential Actions to Mitigate Winter Weather

Buildings and infrastructure can be protected from the impacts of winter storms with the following regulations:

- Adopting the International Building Code (IBC) and International Residential Code (IRC).
- Ensuring the development and enforcement of building codes for roof snow loads.
- Discouraging flat roofs in areas that experience heavy snows.
- Adding building insulation to walls and attics.
- As buildings are modified, using new technology to create or increase structural stability.
- Retrofitting public buildings to withstand snow loads and prevent roof collapse.

MITIGATION STRATEGY, CONTINUED

Potential Actions to Mitigate Winter Weather

Power lines can be protected from the impacts of winter storms with the following techniques:

- Establishing standards for all utilities regarding tree pruning around lines.
- Burying overhead power lines.
- Using designed-failure mode for power line design to allow lines to fall or fail in small sections rather than as a complete system to enable faster restoration.
- Installing redundancies and loopfeeds.

MITIGATION STRATEGY, CONTINUED

Potential Actions to Mitigate Winter Weather

Public awareness of severe winter storms can be improved through the following efforts:

- Informing the public about severe winter weather impacts.
- Producing and distributing family and traveler emergency preparedness information about severe winter weather hazards.
- Including safety strategies for severe weather in driver education classes and materials.
- Encouraging homeowners to install carbon monoxide monitors and alarms.
- Educating citizens that all fuel-burning equipment should be vented to the outside.

Protect vulnerable populations from the impacts of severe winter storms through the following efforts:

- Identifying specific at-risk populations that may be exceptionally vulnerable in the event of long-term power outages.
- Organizing outreach to vulnerable populations, including establishing and promoting accessible heating centers in the community.

MITIGATION STRATEGY, CONTINUED

Potential Actions to Mitigate Flooding

Local planning and regulatory efforts can be improved by:

- Designating a local floodplain manager and/or CRS coordinator who achieves CFM certification.
- Establishing watershed-based planning initiatives to address the flood hazard with neighboring jurisdictions.
- Limiting the percentage of allowable impervious surface within developed parcels.
- Adding or increasing “freeboard” requirements (feet above base flood elevation) in the flood damage ordinance.

MITIGATION STRATEGY, CONTINUED

Potential Actions to Mitigate Flooding

Structure and Infrastructure Projects can be conducted safely by:

- Removing existing structures from flood hazard areas
- Installing, re-routing, or increasing the capacity of a storm drainage system.
- Conducting regular maintenance for drainage systems and flood control substances

Natural Systems can be protected through:

- Protecting and preserving wetlands to help prevent flooding in other areas.
- Developing an open space acquisition, reuse, and preservation plan targeting hazard areas.

MITIGATION STRATEGY, CONTINUED

Potential Actions to Mitigate High Wind/Thunderstorm/Tornado

- Strengthen building codes
  - Tie-down requirements for manufactured housing
  - Require structural bracing, straps/clips, anchor bolts, etc.
- Protect power lines/traffic signals
  - Schedule regular inspections of utility poles to ensure quality
  - Mast arms for traffic lights
- Retrofit buildings/facilities
  - Anchor roof-mounted ventilation and heat/AC units
  - Use load path connectors to strengthen structure
- Safe rooms
  - Require in new schools, nursing homes
  - Encourage construction in shopping malls, fairgrounds, manufactured home parks

MITIGATION ACTION PLAN

EXAMPLE

ACTION #PP-13

Evaluate safety and security of critical services (public and private) and facilities – roads, bridges, water, sewer, electricity, etc. – and critical facilities – fire, rescue, medical, etc.

Category:	Property Protection
Hazard Addressed:	Flood
Priority:	High
Potential Funding Sources:	Local
Lead Agency/Department:	Board of Commissioners, Emergency Management, WSACC, Power and Gas Companies, Carolinas Medical Center, NCDOT
Target Completion Date:	2026
Implementation Status (2021):	Deferred. This action will be revisited during the 2026 update of the hazard mitigation plan.

PUBLIC SURVEY RESULTS

PUBLIC SURVEY RESULTS

- As of October 27, 202 public responses for the region
  - Most from Watauga County (61), Beech Mountain (60) and Boone (41)
  - Most disasters experienced: Flooding, hurricanes, winter weather/ice storms
  - Highest threat: Severe Thunderstorms/High Wind (27.7%)
  - Second highest threat: Severe Winter Weather/Ice Storms (26.2%)
  - Internet is the most effective way to receive information

PUBLIC SURVEY RESULTS, CONTINUED

- Other hazards mentioned: tree falling/tree removal, electrical wires, crime, power outages
- 77.7 % interested in making home or neighborhood more resistant to hazards
- 71.3% of responses said they do NOT know what office to contact regarding risk reduction
- Examples of steps taken to make home/neighborhood more resistant to disasters:
  - Tree trimming, tree removal
  - Drainage improvements
  - Generators

PUBLIC SURVEY RESULTS, CONTINUED

What are some steps your local government could take to reduce or eliminate the risk of future hazard damages?

- Better management of development
- Better coordination with App State / tourism agencies mainly from an public education perspective
- Better stormwater management / planning
- More and better communication with public (although many indicated communication has gotten much better

PUBLIC SURVEY RESULTS, CONTINUED

Community's response to important mitigation techniques:

- Emergency Services: 84.7%
- Natural Resources Protection: 83.6%
- Prevention: 78.7%
- Public Education and Awareness: 59.4%
- Structural Projects: 58.4%
- Property Protection: 40.6%

PLAN MAINTENANCE

- Monitoring and reporting
- Evaluating and updating
- Implementation mechanisms
- Continued public involvement

NEXT STEPS

- Online/Virtual Public Meeting – DATE TBD
- Provide updates for existing Mitigation Actions
  - Due: Nov 30, 2021
- Provide “new” Mitigation Actions
  - Due: Nov 30, 2021
- Complete draft of plan to be delivered by ESP
  - Due: December 28, 2021
  - Submitted to NCEM and to FEMA
- Current Plan Expires: December 28, 2022

QUESTIONS, ISSUES OR CONCERNS

- Nathan Slaughter
  - (919) 415-2726
  - nslaughter@espassociates.com

Meeting Summary

Total Number of Participants	8
Meeting Title	High Country Regional Hazard Mitigation Plan Kickoff
Meeting Start Time	4/29/2021, 9:51:14 AM
Meeting End Time	4/29/2021, 10:49:32 AM
Meeting Id	19adb8f5-a211-4d68-b5a0-928ca9826fb7

Full Name	Join Time	Leave Time	Duration	Email	Role	Participant ID (UPN)
Nathan Slaughter	4/29/2021, 9:51:14 AM	4/29/2021, 10:46:39 AM	55m 24s	nslaughter@espassociates.com	Organizer	
Patty Gambill	4/29/2021, 9:51:23 AM	4/29/2021, 10:46:32 AM	55m 8s	Patty.Gambill@ashecountygov.com	Presenter	
"\"\\\"\\\\\\\\"Karen Hamby (Guest)\\\\\\\\"\\\"\""	4/29/2021, 9:56:07 AM	4/29/2021, 10:49:32 AM	53m 24s		Presenter	
13366517300	4/29/2021, 9:56:38 AM	4/29/2021, 10:46:34 AM	49m 55s		Attendee	
Baker, Carl	4/29/2021, 9:57:40 AM	4/29/2021, 10:46:38 AM	48m 57s	cbaker@ncem.nccrimecontrol.org	Presenter	
Russell Greene (Guest)	4/29/2021, 9:58:38 AM	4/29/2021, 10:46:37 AM	47m 59s		Presenter	
13366571994	4/29/2021, 10:01:45 AM	4/29/2021, 10:03:31 AM	1m 45s		Attendee	
13366571994	4/29/2021, 10:10:24 AM	4/29/2021, 10:46:30 AM	36m 5s		Attendee	
Mello, John	4/29/2021, 10:03:31 AM	4/29/2021, 10:46:35 AM	43m 4s	jmello@ncem.nccrimecontrol.org	Presenter	

Meeting Summary

Total Number of Participants	25
Meeting Title	High Country Regional HMP Update: Mitigation Strategy Workshop
Meeting Start Time	10/28/2021, 9:52:22 AM
Meeting End Time	10/28/2021, 11:36:19 AM
Meeting Id	a3447627-3159-4869-a6e0-8f6d8dd02dc0

Full Name	Join Time	Leave Time	Duration	Email	Role	Participant ID (UPN)
Nathan Slaughter	10/28/2021, 9:52:22 AM	10/28/2021, 11:33:45 AM	1h 41m	nslaughter@espassociates.com	Organizer	nslaughter@espassociates.com
Marrone, Edwardine	10/28/2021, 9:55:04 AM	10/28/2021, 11:33:21 AM	1h 38m	0274059419@FEMA.DHS.GOV	Presenter	0274059419@FEMA.DHS.GOV
Patty Gambill	10/28/2021, 9:55:04 AM	10/28/2021, 11:33:15 AM	1h 38m	Patty.Gambill@ashecountygov.com	Presenter	Patty.Gambill@ashecountygov.com
Hamby, Karen (NCEM)	10/28/2021, 9:55:23 AM	10/28/2021, 11:33:09 AM	1h 37m	Karen.Hamby@ncdps.gov	Presenter	Karen.Hamby@ncdps.gov
Andrew Olive	10/28/2021, 9:55:26 AM	10/28/2021, 11:33:50 AM	1h 38m	aolive@espassociates.com	Presenter	aolive@espassociates.com
Baker, Carl (NCEM)	10/28/2021, 9:56:17 AM	10/28/2021, 11:33:28 AM	1h 37m	carl.baker@ncdps.gov	Presenter	carl.baker@ncdps.gov
Will Holt (Guest)	10/28/2021, 9:56:25 AM	10/28/2021, 10:12:56 AM	16m 31s		Presenter	
Crew, John (NCEM)	10/28/2021, 9:58:03 AM	10/28/2021, 11:33:15 AM	1h 35m	John.Crew@ncdps.gov	Presenter	John.Crew@ncdps.gov
Charity Shatley (Guest)	10/28/2021, 9:58:22 AM	10/28/2021, 11:33:12 AM	1h 34m		Presenter	
Brantley Price	10/28/2021, 9:58:27 AM	10/28/2021, 11:33:14 AM	1h 34m	admin@townofwj.com	Presenter	admin@townofwj.com
Greene, Russell (NCEM)	10/28/2021, 9:58:41 AM	10/28/2021, 11:33:24 AM	1h 34m	RUSSELL.GREENE@ncdps.gov	Presenter	RUSSELL.GREENE@ncdps.gov
Seth Norris (Guest)	10/28/2021, 9:58:58 AM	10/28/2021, 11:18:31 AM	1h 19m		Presenter	
Mello, John (NCEM)	10/28/2021, 9:59:25 AM	10/28/2021, 11:33:22 AM	1h 33m	John.Mello@ncdps.gov	Presenter	John.Mello@ncdps.gov
Daniel Roten (Guest)	10/28/2021, 9:59:43 AM	10/28/2021, 11:36:19 AM	1h 36m		Presenter	
Wesley Barker	10/28/2021, 10:00:15 AM	10/28/2021, 11:33:18 AM	1h 33m	wesley.barker@ashecountygov.com	Presenter	wesley.barker@ashecountygov.com
Mack Powers (Guest)	10/28/2021, 10:01:08 AM	10/28/2021, 11:33:22 AM	1h 32m		Presenter	
Josh Steelman (Guest)	10/28/2021, 10:01:45 AM	10/28/2021, 10:24:33 AM	22m 48s		Presenter	
John Ward - Boone Town Manager (Guest)	10/28/2021, 10:17:46 AM	10/28/2021, 10:58:51 AM	41m 5s		Presenter	
William A. Holt	10/28/2021, 10:18:07 AM	10/28/2021, 10:23:46 AM	5m 39s	williama0278@live.BeaufortCCC.edu	Presenter	williama0278@live.BeaufortCCC.edu
Will Holt (Guest)	10/28/2021, 10:25:18 AM	10/28/2021, 11:33:12 AM	1h 7m		Presenter	
Josh Steelman (Guest)	10/28/2021, 10:25:48 AM	10/28/2021, 10:50:01 AM	24m 12s		Presenter	
Josh Steelman (Guest)	10/28/2021, 10:48:22 AM	10/28/2021, 11:00:38 AM	12m 16s		Presenter	
John Ward - Boone Town Manager (Guest)	10/28/2021, 10:59:19 AM	10/28/2021, 11:34:02 AM	34m 42s		Presenter	
Josh Steelman (Guest)	10/28/2021, 11:03:59 AM	10/28/2021, 11:23:42 AM	19m 42s		Presenter	
Seth Norris	10/28/2021, 11:19:05 AM	10/28/2021, 11:32:47 AM	13m 41s		Presenter	

Neighboring Jurisdictions to the High Country Region

State	Neighboring Jurisdiction	Name	Position	Email Address
NC	Avery County	Paul Buchanan	EM Director	paul.buchanan@averycounty.gov
NC	Caldwell County	Vic Misenheime	EM Coordinat	vmisenheimer@caldwellcountync.org
NC	Alexander County	Garrett Huffma	Em Director	ghuffman@alexandercountync.gov
NC	Iredell County	Kent Greene	EM Director	kent.greene@co.iredell.nc.us
NC	Yadkin County	Keith Vestal	EM Director	kvestal@yadkincountync.gov
NC	Surry County	Eric Southern	EM Director	southerner@co.surry.nc.us
VA	Grayson County	Paul Hoyle	EM Director	phoyle@graysoncountyva.gov
TN	Johnson County		EM	ema@johnsoncountytn.gov

Nathan Slaughter

From: Nathan Slaughter
Sent: Monday, January 10, 2022 9:28 AM
To: paul.buchanan@averycounty.gov; vmisenheimer@caldwellcountync.org; ghuffman@alexandercountync.gov; kent.greene@co.iredell.nc.us; kvestal@yadkincountync.gov; southerner@co.surry.nc.us; phoyle@graysoncountyva.gov; ema@johnsoncountytn.gov
Subject: NOTIFICATION: High Country NC Regional Hazard Mitigation Plan

Importance: Low

Good morning

You are receiving this email because a neighboring County (Alleghany, Avery, Watauga and/or Wilkes County NC), along with the municipalities within those counties and other participating partners, are now working to update the region's multi-jurisdictional *Hazard Mitigation Plan* as required by the Federal Emergency Management Agency (FEMA). The purpose of this plan is to identify and assess the region's hazard risks and determine strategies for how to best minimize or manage those risks. Upon completion, the plan will represent a comprehensive update to the multi-jurisdictional *Hazard Mitigation Plan* for the four-county region.

You are being notified of this planning process for two purposes:

1. FEMA requires that neighboring jurisdictions be provided an opportunity to be involved in the planning process.

2. You may want to contribute information to these jurisdictions to consider as they update their hazard mitigation plan.

I serve as the Project Manager for the update of the plan. Please let me know if you would like to contribute information, be invited to any upcoming meetings in the development of the plan or if you would like to receive a copy of the draft plan.

Should you have any questions about the *High Country Regional Hazard Mitigation Plan*, please do not hesitate to contact me. Thank you for your time!

Nathan Slaughter, AICP, CFM
Department Manager – Hazard Mitigation
ESP Associates, Inc.
2200 Gateway Centre Boulevard – Suite 216
Morrisville, NC 27560
www.espassociates.com

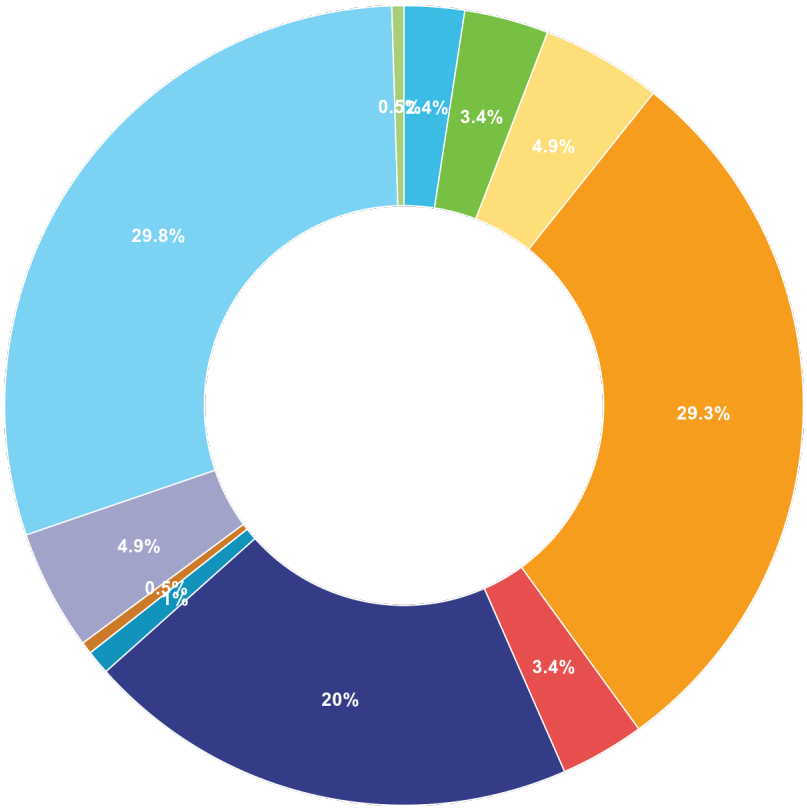
nslaughter@espassociates.com
919.415.2726 | Direct
919.678.1070 | Office
919.244.9536 | Cell

surveyplanet

High Country Regional Hazard Mitigation Plan - Public Survey

Please take my survey - thanks!

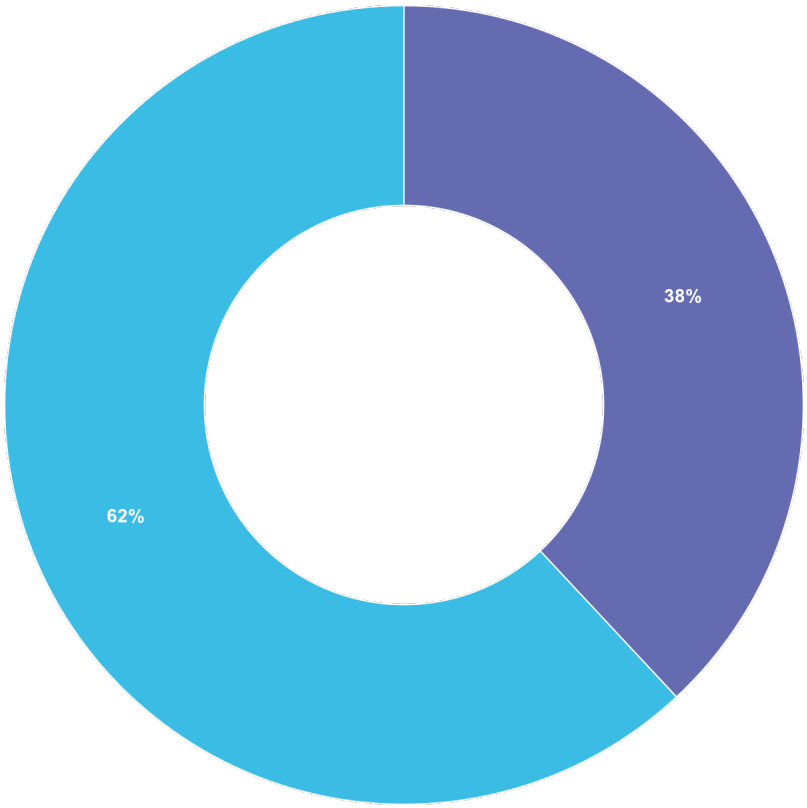
Q1 1\. Where do you live?*



Answered: 205 **Unanswered:** 0

Choice	Total
Sparta	0
Lansing	5
Jefferson	7
West Jefferson	10
Beech Mountain	60
Blowing Rock	7
Boone	41
Seven Devils	2
North Wilkesboro	0
Ronda	0
Wilkesboro	1
Unincorporated Alleghany County	0
Unincorporated Ashe County	10
Unincorporated Watauga County	61
Unincorporated Wilkes County	1

Q2 2\. Have you ever experienced or been impacted by a disaster in Alleghany, Ashe, Watauga, or Wilkes County?*



Answered: 205 **Unanswered:** 0

	Choice	Total
●	Yes	78
●	No	127

Q3 3\. If "Yes," please explain

Saturday, November 13, 2021, 1:27 AM UTC

Flooding and Earthquake

Wednesday, October 6, 2021, 10:16 PM UTC

I've lived here my whole life (35 next month) so my experiences run the gamete. Hurricanes Katrina & Ivan, many snow storms, many floods, many severe thunderstorms, winds, extremely low temps, etc.

Sunday, October 3, 2021, 4:51 AM UTC

Snowstorms like the blizzards of ‘93 and 2017

Friday, October 1, 2021, 12:49 PM UTC

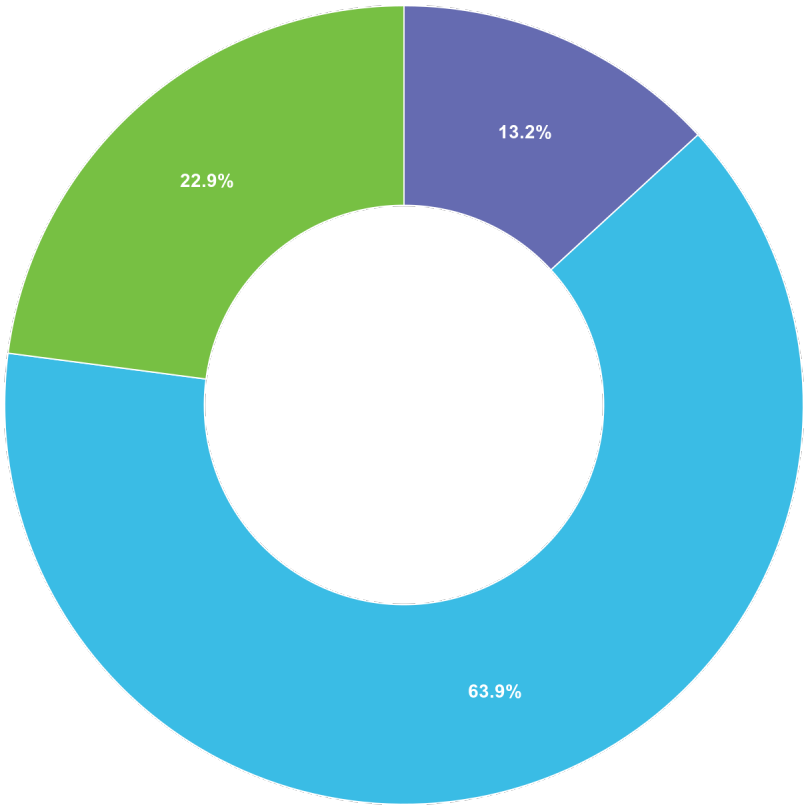
Road and bridge flooding after a storm

Thursday, September 30, 2021, 3:03 AM UTC

Severe flooding causing very large sink holes

Answered: 80 **Unanswered:** 125

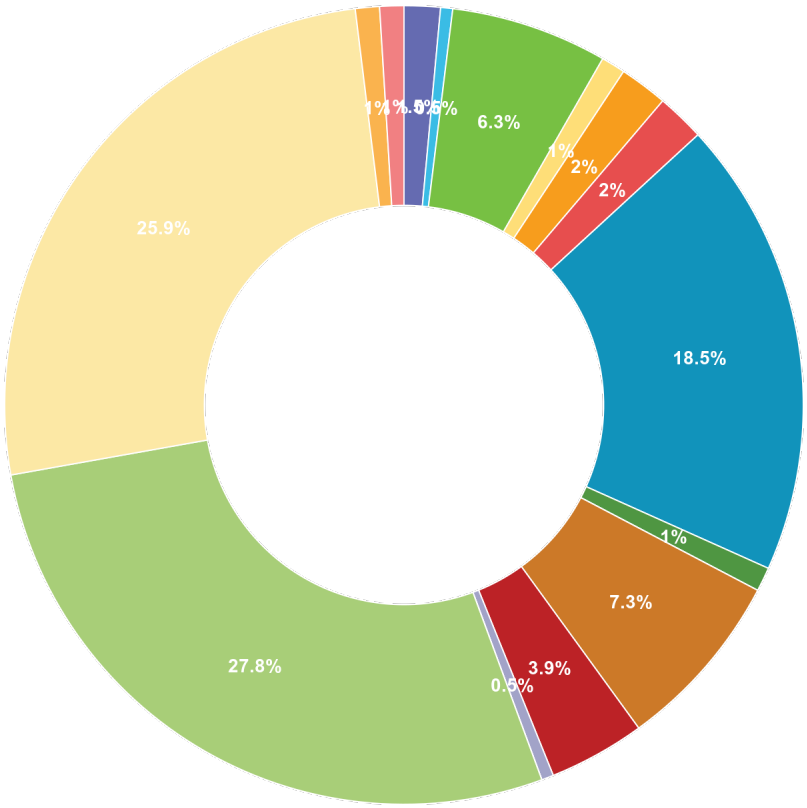
Q4 4\. How concerned are you about the possibility of your community being impacted by a disaster?*



Answered: 205 **Unanswered:** 0

	Choice	Total
	Extremely concerned	27
	Somewhat concerned	131
	Not concerned	47

Q5 5\. Please select the **one** hazard you think is the highest threat to your neighborhood:*

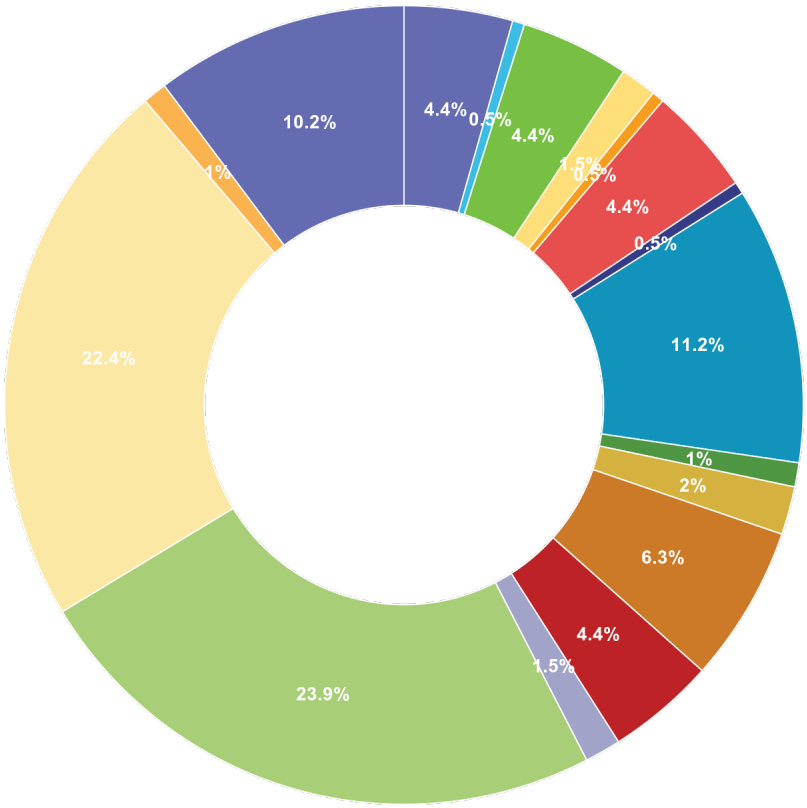


Answered: 205 **Unanswered:** 0

	Choice	Total
	Cyber Attack	3
	Dam Failure	1
	Drought	13
	Earthquakes	2
	Electromagnetic Pulse (EMP)	4
	Erosion	4
	Excessive Heat	0
	Flooding	38
	Hazardous Substances	2
	Hurricane and Coastal Hazards	0

Choice	Total
Infectious Disease	15
Landslides	8
Lightning	1
Radiological Emergency	0
Severe Thunderstorms/High Winds	57
Severe Winter Weather	53
Terrorism	2
Tornadoes	2

Q6 6\. Please select the **one** hazard you think is the second highest threat to your neighborhood:*



Answered: 205 **Unanswered:** 0

	Choice	Total
	Cyber Attack	9
	Dam Failure	1
	Drought	9
	Earthquake	3
	Electromagnetic Pulse (EMP)	1
	Erosion	9
	Excessive Heat	1
	Flooding	23
	Hazardous Substances	2
	Hurricane and Coastal Hazards	4

Choice	Total
Infectious Disease	13
Landslides	9
Lightning	3
Radiological Emergency	0
Severe Thunderstorms/High Wind	49
Severe Winter Weather	46
Terrorism	2
Tornado	0
Wildfire	21

Q7 7.Are there any other hazards that you feel pose a wide-scale threat to your community? If so, please explain:

Saturday, November 13, 2021, 1:27 AM UTC

Trash - abandoned cars, personal trash

Wednesday, October 6, 2021, 10:16 PM UTC

Those who are unprepared panicking in a disaster situation.

Sunday, October 3, 2021, 4:51 AM UTC

Impact of overgrowth and poor infrastructure by the county commissioners

---

Friday, October 1, 2021, 12:49 PM UTC

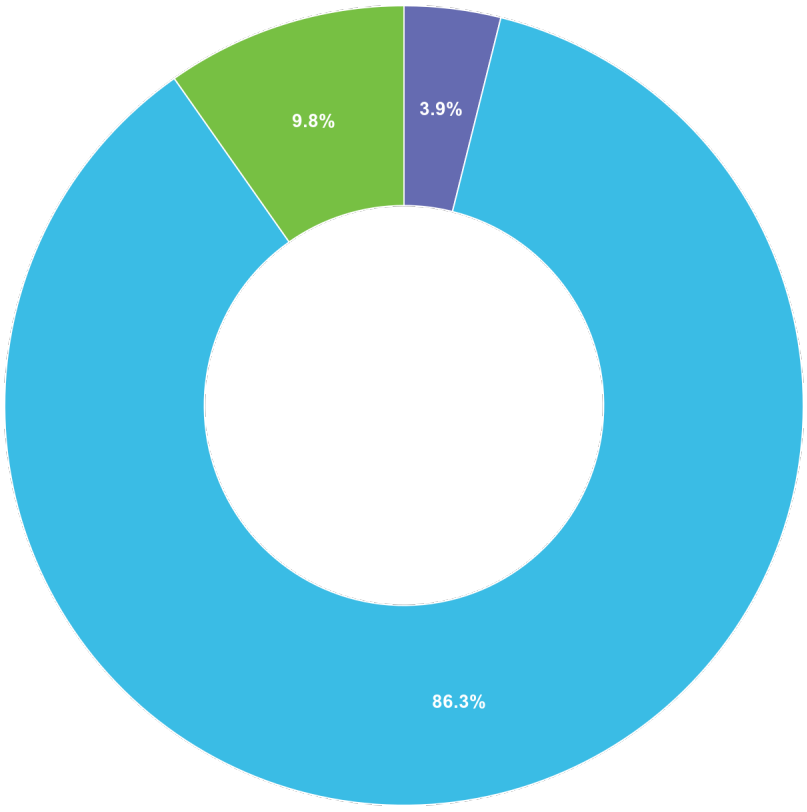
Covid-19

Wednesday, September 29, 2021, 10:34 PM UTC

Yes people dumping trash and hazardous material in creek, which flows into the New River. When you report it on certain ones the county does nothing. Bakers Grading also run machinery in the creeks and get away with it. Critcher Bros dump dead cattle without burying them.

Answered: 99 **Unanswered:** 106

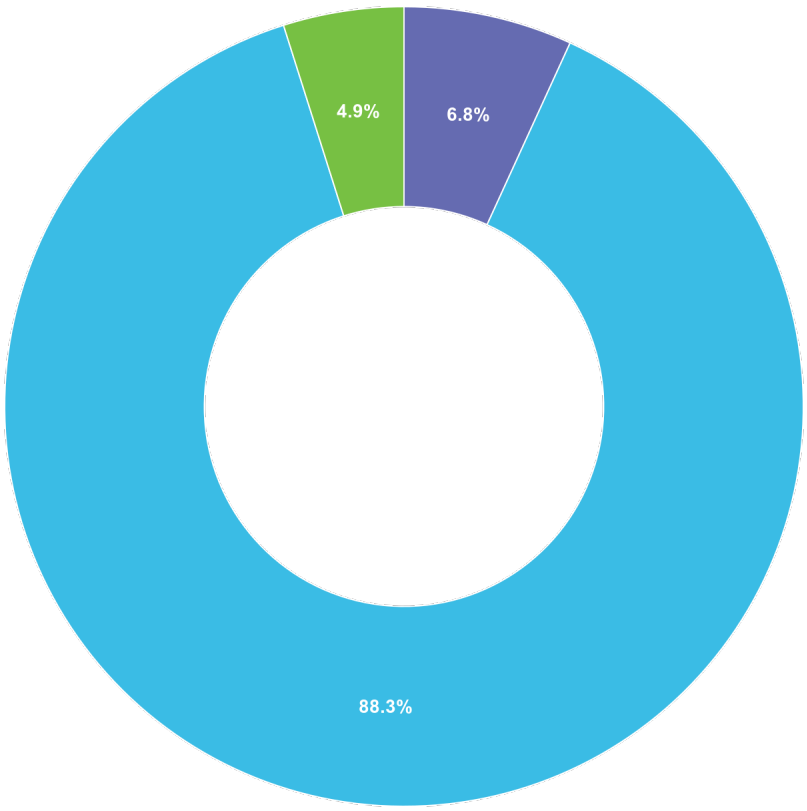
Q8 8\. Is your home located in a floodplain?*



Answered: 205 **Unanswered:** 0

Choice	Total
Yes	8
No	177
I'm not sure	20

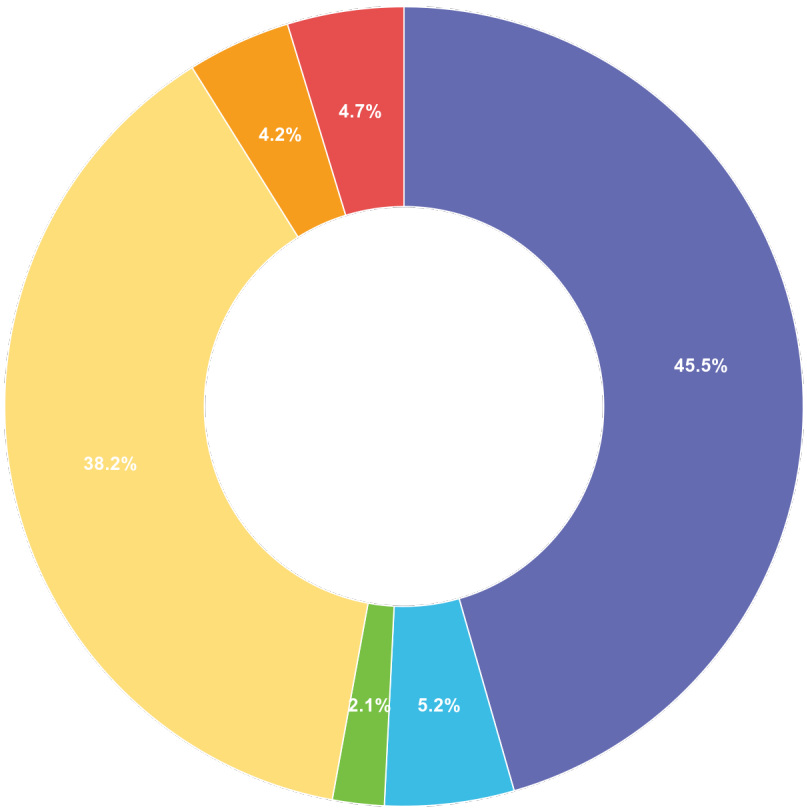
Q9 9\. Do you have flood insurance?*



Answered: 205 **Unanswered:** 0

Choice	Total
Yes	14
No	181
I'm not sure	10

Q10 10\. If you do not have flood insurance, why not?



Answered: 191 **Unanswered:** 14

Choice	Total
Not located in floodplain	87
Too expensive	10
Not necessary because it never floods	4
Not necessary because I am elevated or otherwise protected	73
Never really considered it	8
Other	9

Q11 11\. If "Other," please explain:

Thursday, September 30, 2021, 3:03 AM UTC

I've been told having flood insurance doesn't automatically cover you for flood damage. There are other variables that have to be met.

Tuesday, September 28, 2021, 2:46 PM UTC

Have had flood insurance and it didn't pay enough for what it cost.

Tuesday, September 28, 2021, 1:27 PM UTC

I have flood insurance.

Tuesday, September 28, 2021, 12:06 PM UTC

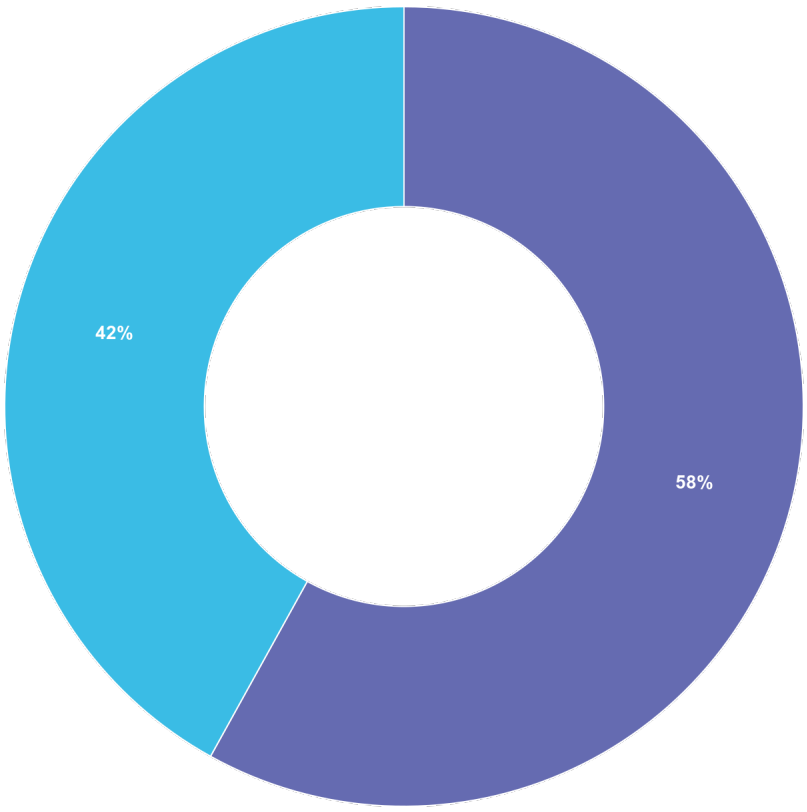
I'm located on top of a mountain. Everything flows downhill from here. Seriously.

Monday, September 27, 2021, 8:42 PM UTC

I rent and my renters insurance covers flood damage.

Answered: 17 **Unanswered:** 188

Q12 12\. Have you taken any steps to make your home or neighborhood more resistant to hazards?*



Answered: 205 **Unanswered:** 0

Choice	Total
Yes	119
No	86

Q13 13\. If "Yes," please explain:

Wednesday, October 6, 2021, 10:16 PM UTC

We always keep extra potable water, non perishables, solar radio, flashlights, blankets, extra clothing, and a small supply of necessary & must often used medicines in our first aid kit. We also own firearms and know how to use them to hunt and protect our family. We also have a wood burning stove with a flat surface for preparing food/ boiling water if needed.

Sunday, October 3, 2021, 8:05 PM UTC

Fire extinguishers and alarms

Sunday, October 3, 2021, 4:51 AM UTC

I don’t allow tourists in my yard

Thursday, September 30, 2021, 3:03 AM UTC

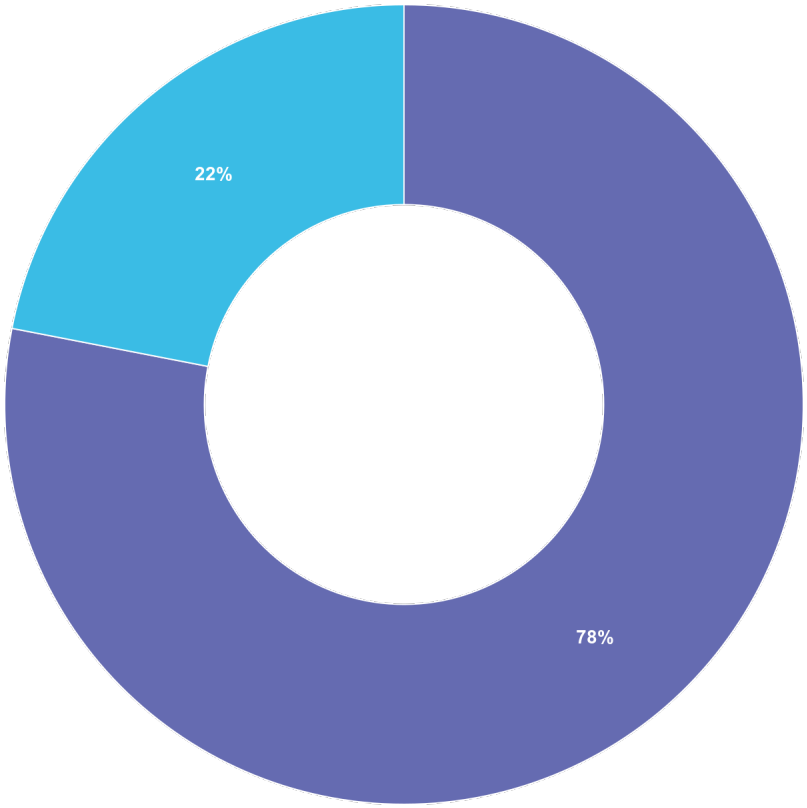
Re-grading the land to divert the water.

Thursday, September 30, 2021, 12:10 AM UTC

My home has French drains. I spent time digging additional drainage in the yard to keep water flowing away from the home. I'm not as susceptible to flooding but during storms with large amounts of rain there's still a considerable amount of water that passes through my yard from higher elevations.

Answered: 107 **Unanswered:** 98

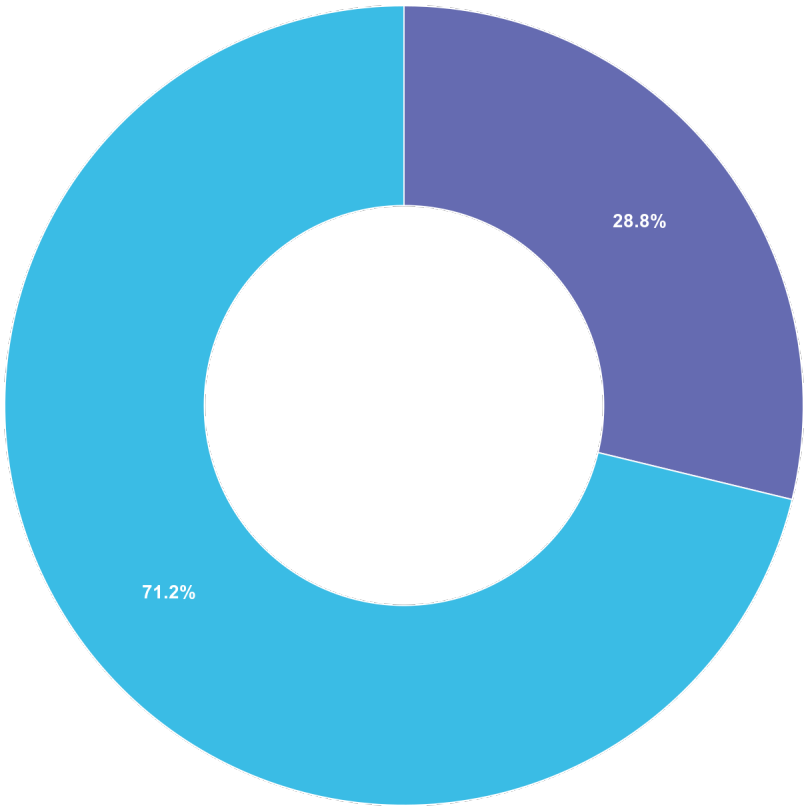
Q14 14\. Are you interested in making your home or neighborhood more resistant to hazards?*



Answered: 205 **Unanswered:** 0

Choice	Total
Yes	160
No	45

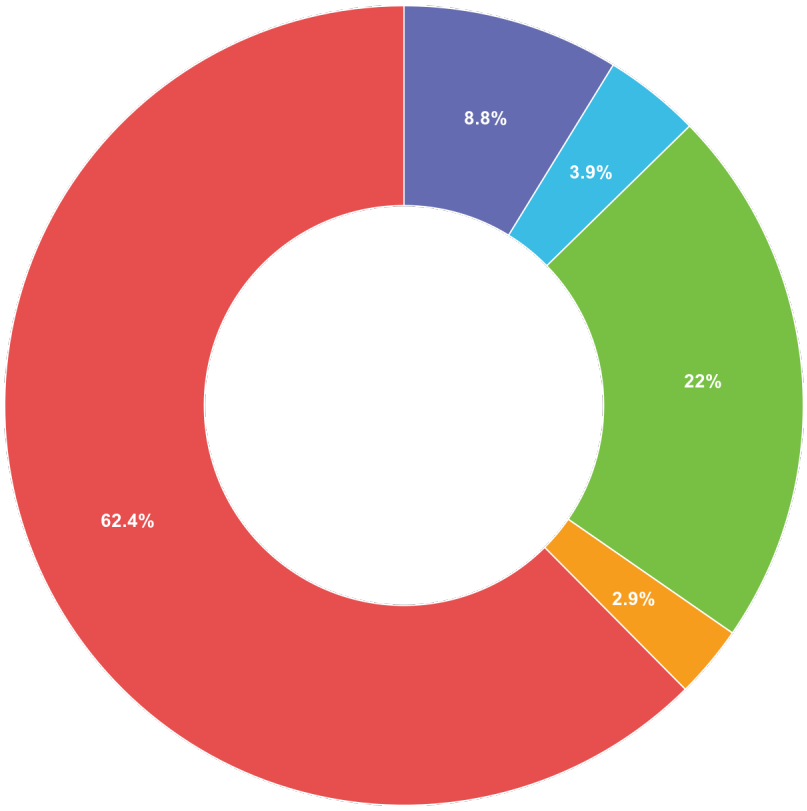
Q15 15\. Do you know what office to contact to find out more information about how to reduce your risks to hazards in you area?*



Answered: 205 **Unanswered:** 0

Choice	Total
Yes	59
No	146

Q16 16\. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?*



Answered: 205 **Unanswered:** 0

Choice	Total
Newspaper	18
Radio	8
Mail	45
School Meetings	0
Television	6
Internet (including social media)	128

Q17 17\. Are there any other ways you prefer to receive information? If so, please explain:

Saturday, November 13, 2021, 1:27 AM UTC

Email

Wednesday, October 6, 2021, 10:16 PM UTC

Reading books, email, newspaper

Sunday, October 3, 2021, 8:05 PM UTC

Email, billboards

Tuesday, September 28, 2021, 8:20 PM UTC

email

Tuesday, September 28, 2021, 3:34 PM UTC

High Country Press, social media

Answered: 72 **Unanswered:** 133

Q18 18\. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?

Saturday, November 13, 2021, 1:27 AM UTC

Clean up the abandoned car issues in Ashe County … car deterioration leaks fluids into the ground water - enforce the rules that exist re: cars, trash. Create more convenience center locations making them more accessible to more people!!!

Thursday, November 11, 2021, 10:04 PM UTC

Flood control management

Wednesday, October 6, 2021, 10:16 PM UTC

Make sure the college and part time residents are exposed to the specific and widely varied threats that are specific to this area and how to prepare for them as well as deal with them if something goes wrong. I have found most people renting a home in our neighborhood for vacation reach out to us, the neighbors, as they are unaware of what agency to contact, have no experience dealing with problems that may arise (for example if it snows, and haven't educated themselves prior to traveling. That's fine; we're happy to help, but with 4 young boys, in a true emergency it could create an unnecessary strain on resources, time, etc if they're not prepared at all and haven't the foggiest idea of what is needed.

Monday, October 4, 2021, 1:55 AM UTC

I don't believe there are any.

Sunday, October 3, 2021, 4:51 AM UTC

Force App state university to lower the student intake rate and slow down the over growth in our town and communities

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Answered: 128 **Unanswered:** 77

Q19 19\. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important? If so, please explain:

Wednesday, October 6, 2021, 10:16 PM UTC

Education & information often and consistently.

Friday, October 1, 2021, 12:49 PM UTC

This survey should be in multiple languages. A big part of the community isn’t able to share their opinion because it’s only in English.

Wednesday, September 29, 2021, 10:34 PM UTC

Hold those that break these laws responsible.

Wednesday, September 29, 2021, 12:21 AM UTC

I think the Cottages development should be severely penalized for repeated wastewater discharges

---

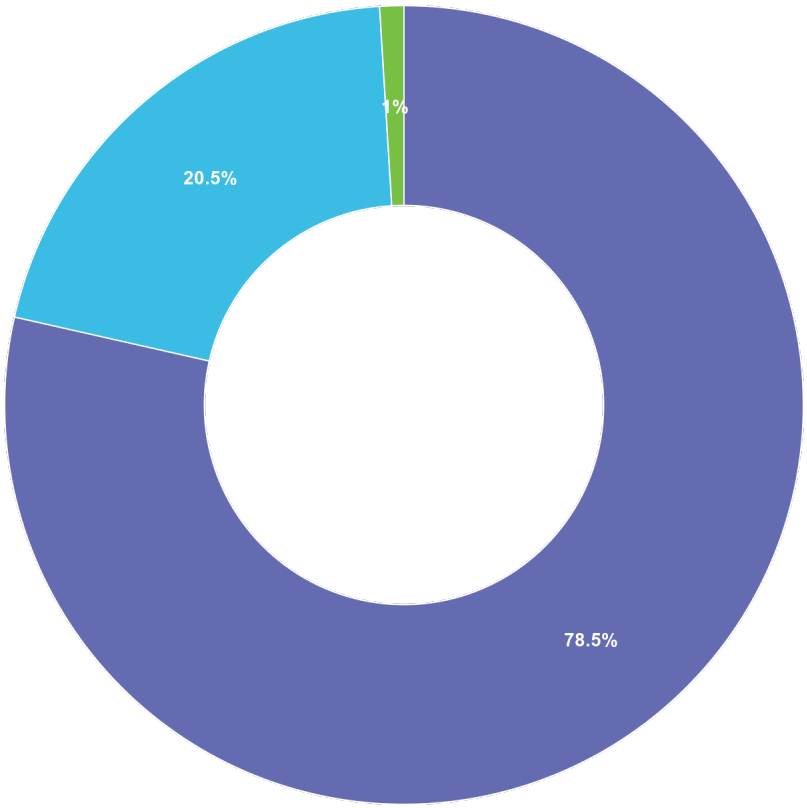
Tuesday, September 28, 2021, 8:51 PM UTC

NCDOT should be more responsive to rural communities during large weather events instead of focusing on tourism traffic.

Answered: 54 **Unanswered:** 151

Q20 A number of community-wide activities can reduce our risk from hazards. In general these activities fall into one of the following six broad categories. In the next six questions, please tell us how important you think each one is for your community to consider pursuing.

20\. **Prevention** - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.*



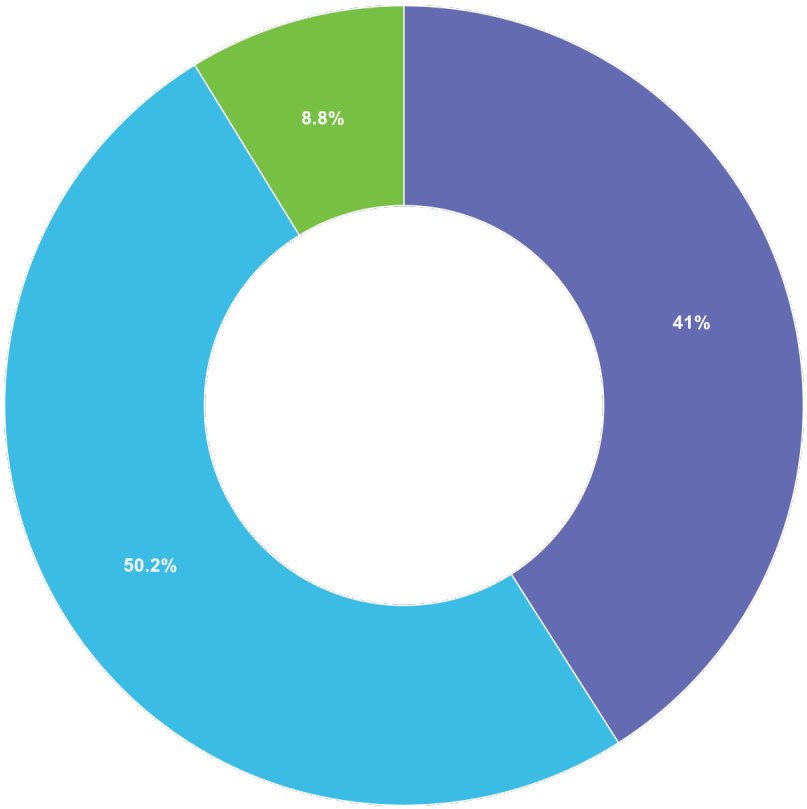
Answered: 205 **Unanswered:** 0

	Choice	Total
●	Very important	161
●	Somewhat important	42
●	Not important	2

Q21 21\. **Property Protection** - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area.

(Examples include acquisition, relocation, elevation, structural retrofits, and storm

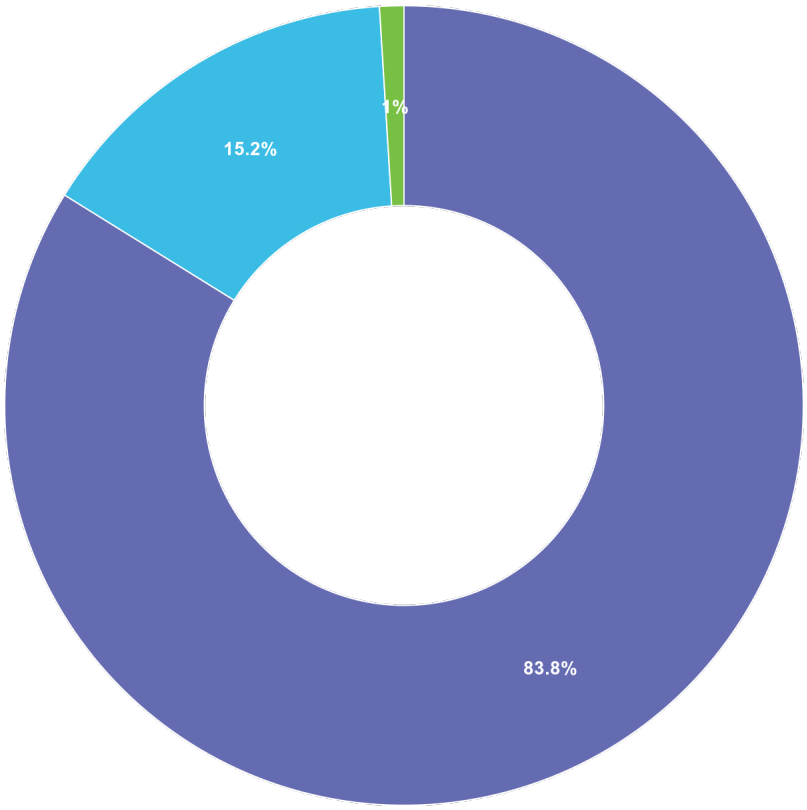
shutters.)*



Answered: 205 **Unanswered:** 0

	Choice	Total
	Very important	84
	Somewhat important	103
	Not important	18

Q22 22\. **Natural Resource Protection** - Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. (Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.)

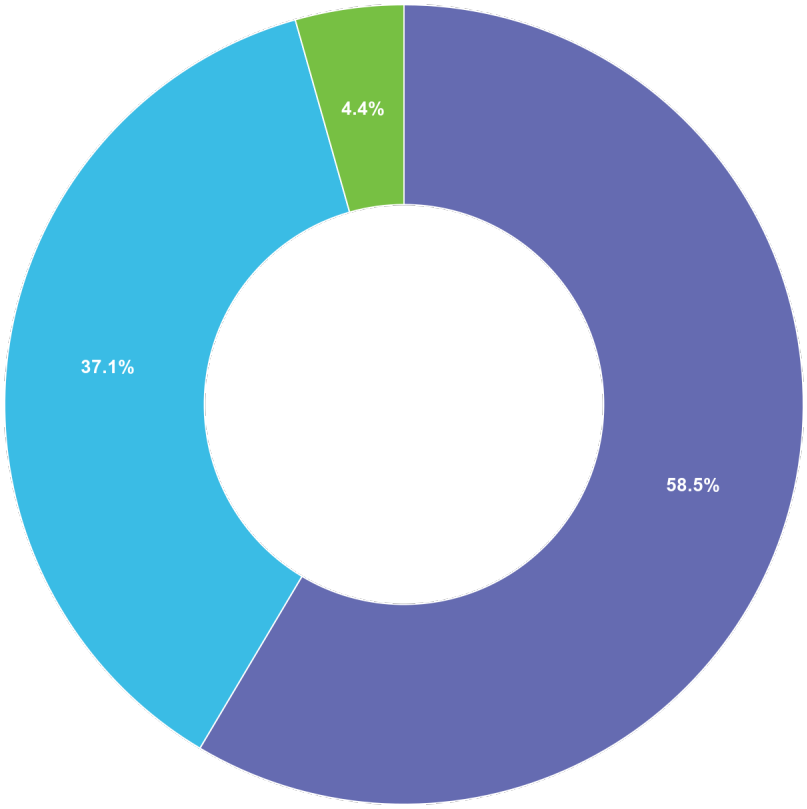


Answered: 204 **Unanswered:** 1

Choice	Total
Very important	171
Somewhat important	31
Not important	2

Q23 23\. **Structural Projects** - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard.

(Examples include dams, levees, detention/retention basins, channel modification, retaining walls and storm sewers.)*



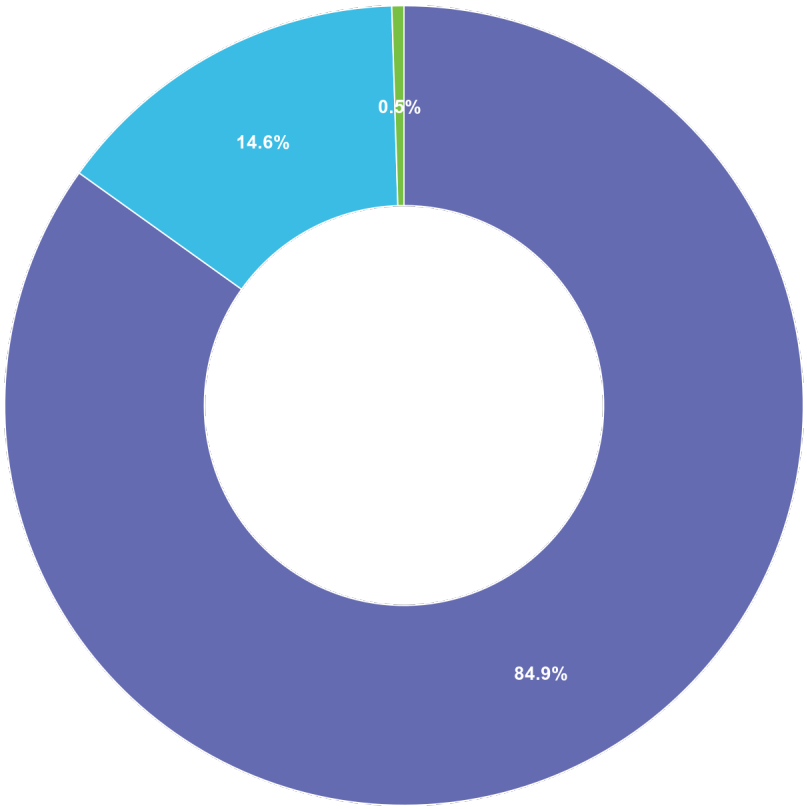
Answered: 205 **Unanswered:** 0

Choice	Total
Very important	120
Somewhat important	76

Choice	Total
Not important	9

Q24 24\. **Emergency Services -** Actions that protect people and property during and immediately after a hazard event.

(Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.)*

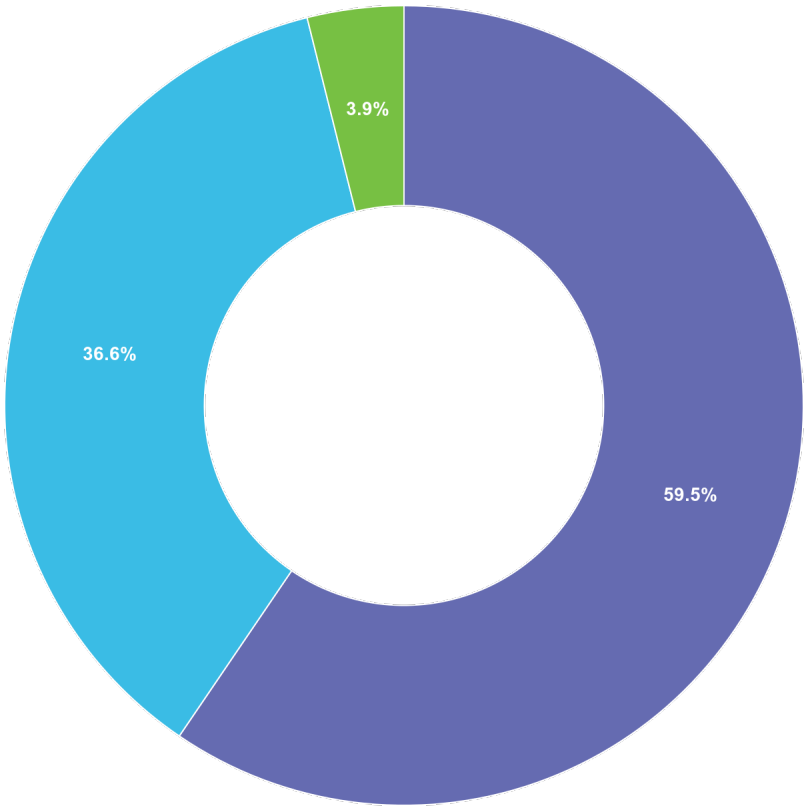


Answered: 205 **Unanswered:** 0

Choice	Total
Very important	174
Somehwat important	30
Not important	1

Q25 25\. **Public Education and Awareness** - Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property.

(Examples include outreach projects, school education programs, library materials and demonstration events.)*



Answered: 205 **Unanswered:** 0

Choice	Total
Very important	122
Somehwat important	75
Not important	8

Q26 This survey may be submitted anonymously; however, if you provide us with your name and contact information below, we will have the ability to follow up with you to learn more about your ideas or concerns (Optional)

Saturday, November 13, 2021, 1:27 AM UTC

Nancy Sullivan
1025 Wellington Rd
Winston-Salem, NC 27106 - mailing address
AND
352 Bart Hurley Rd Lansing - no mail

Wednesday, October 6, 2021, 10:16 PM UTC

Sally Hicks
Mamabearhicks86@gmail.com
(828)-266-8238

Friday, October 1, 2021, 12:49 PM UTC

Kelly Pierson, Kelly.L.Ingram@gmail.com

Thursday, September 30, 2021, 3:03 AM UTC

Holly Townsend

Hbjtensi@skybest.com

Wednesday, September 29, 2021, 10:34 PM UTC

Debbie Holman

3272 Dick Phillips Road

West Jefferson, NC 28694

336-620-6083

Answered: 45 **Unanswered:** 160

APPENDIX E
COMPLETED MITIGATION ACTIONS

Alleghany County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
Prevention								
P-1	Locate additional food drop areas throughout the county.	Winter Storm	Moderate	County Mapping Coordinator; County Emergency Management Coordinator	Unknown	State; Federal	Completed	Completed. Five designated PODS for Alleghany County as well as CRDP for the main distribution location.
P-2	Urge local television and radio stations to notify citizens as far in advance of any storm paths that may be located in.	Severe Storm; Winter Storm; Hurricane	Moderate	County Emergency Management Coordinator	Unknown	Local; State	Completed	Ongoing. Local television and radio stations have improved early warning systems, but need to strive to improve radars and announce storm paths as soon as possible.
P-4	Locate and develop emergency water supplies for local volunteer fire departments throughout the county.	Drought; Wildfire	Moderate	County Fire Commissioner; County Mapping Coordinator	Unknown	Local; State; Federal	Completed	Completed. Fire Departments have published ads in local newspaper promoting dry hydrants. Also have several certified water points and signage marking their location.
P-5	Participate in the revision of the Alleghany County Flood Maps with the North Carolina Floodplain Mapping Section.	Flood	Moderate	Town of Sparta; County Planner; County Mapping	Unknown	Local; State; Federal	Completed	Completed. The maps have been updated and the county continues to make the public more aware of the new maps.
Property Protection								
PP-1	Provide back-up hookup and transfer switches at all emergency shelters.	Flood; Winter Storm; Tornado	Moderate	County School Superintendent	Unknown	Federal	Completed	Completed. Action completed in November of 2011.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
Emergency Services								
ES-1	Purchase additional 4-wheel drive vehicles that will deliver supplies to citizens stranded during a severe winter storm event.	Winter Storm	Moderate	County Emergency Management Coordinator; County Sheriff's Department	Unknown	Local; State; Federal	Update as necessary	Completed. The Sheriff's Office, Emergency Management, Hospital, Rescue, Sparta Police, and EMS have all purchased 4-wheel drive vehicles that are available during emergency situations.
ES-2	Set up a volunteer network for the transportation of hospital workers to and from the Alleghany County Memorial Hospital.	Winter Storm	Moderate	Alleghany Memorial Hospital; County Emergency Management Coordinator	Unknown	Local; State; Federal	Update as necessary	Completed. Sherriff's Office and Hospital personnel coordinate this transportation for the staff.

Town of Sparta Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
Prevention								
P-1	Participate in the revision of the Alleghany County Flood Maps with the North Carolina Floodplain Mapping Section.	Flood	Moderate	Town of Sparta; County Planner; County Mapping	Unknown	Local; State; Federal	Completed	Completed. Still making the public more aware of the new maps.
Emergency Services								
ES-1	Purchase additional 4-wheel drive vehicles that will deliver supplies to citizens stranded during a severe winter storm event.	Winter Storm	Moderate	County Emergency Management Coordinator; County Sheriff's Department	Unknown	Local; State; Federal	Completed	Completed. The Sheriff's Office, Emergency Management, Hospital, Rescue, Sparta Police, and EMS have all purchased 4-wheel drive vehicles that are available during emergency situations.

Ashe County Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
Prevention								
P-1	Develop procedure for recording damage assessment information such as type of hazard, location or hazard occurrence, when it occurred, death or injury, property damaged, narrative description of damage (not just $ value) for local use in hazard mitigation and land use planning.	All	Moderate	County Emergency Management	Unknown	Staff Time	Completed	Completed.
P-2	Set up centralized, coordinated permitting process, including effective filing/permitting system to ensure compliance with floodplain regulations.	All	Moderate	County Planning; County Building Inspections	Unknown	Staff Time	Completed	Completed. New coordinated process in effect, still reviewing to see if it is effective.
P-3	Count building improvements cumulatively (maintain permit history so when cumulative improvements equal 50 percent of building value, or substantial improvement, building must be brought up to flood protection standards for now construction).	All	Moderate	County Planning; County Building Inspections	Unknown	Staff Time	Completed	Completed. Handled through flood permit system. Old flood permits are reviewed and calculated towards the 50 percent of building value.
P-4	Continued enforcement of all codes as they apply to protection from hazards. Employing new Code Enforcement Officer to enforce code and restrictions especially for construction in flood-prone areas so that all construction meets required flood protection measures.	All	High	County Planning	Unknown	Staff Time	Completed	Completed. In December 2004, the County appointed a code enforcement officer to assist with ordinance enforcement.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
P-7	Generally identify areas that flood.	Flood	High	County Emergency Management	Unknown	Staff Time	Completed	Completed. A database was developed listing flood prone areas by fire department district. This information is used to generate status reports during EOC activation such as bridge and road closures and to identify and evacuate citizens from areas that may become isolated.
P-9	Identify community floodplain management activities that are in compliance with the National Flood Insurance Program and the Community Rating standards.	Flood	Moderate	County Floodplain Manager	Unknown	Staff Time	Completed	Completed. Through the enforcement of the flood damage prevention ordinance requirements, including regulating new construction in special flood hazard areas, and the support and implementation in the joint FEMA/NC Technical Community Partnership map modernization initiative.
P-11	Use GIS to identify undeveloped parcels located within the floodplain.	Flood	Moderate	County Tax Mapping	Unknown	Staff Time	Completed	Completed. The Tax Mapping Department created a separate GIS layer that allows parcels along the floodplain to be quickly located and listed.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
P-12	The Town of Lansing has obtained flood-prone land within the city limits. This property is being transformed into a small recreation with a walking trail.	Flood	High	Town of Lansing Board of Alderman	Unknown	Staff Time	Completed	Completed. The County Health Council was awarded a Fit Community grant to promote healthy lifestyles. The grant included funds for a paved walking trail at the Lansing Creeper Trail Park, a park formed by the Town to promote preservation of flood-prone areas.
P-13	Strengthen floodplain regulations to current standards by reviewing and evaluating the latest reports and data.	Flood	Low	County Floodplain Manager	Unknown	Staff Time	Completed	Completed. A draft revision of the County Flood Damage Prevention Ordinance was submitted to the County Planning Board for review in June 2008. It was presented to the County Board of Commissioners for adoption in the summer of 2009. The ordinance is intended to ensure that county residents will be in compliance with the new floodplain maps and remain eligible for flood insurance. It also strengthens existing regulations.
P-17	Continue to require and maintain FEMA elevation certificates for permits for new buildings or improvements to buildings on lots including any portion of the 100-year floodplain.	Flood	High	County Floodplain Manager	Unknown	Staff Time	Completed	Floodplain permits and elevation certificates are required for ever structure constructed within the 100-year floodplain.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
P-18	Require residential construction to meet latest wind-resistance standards; encourage replacement of double-wide garage doors to improve wind resistance.	Tornado; Hurricane; Severe Storm	High	County Building Inspections	Unknown	Staff Time	Completed	All construction is required to meet the most current NC Building Code Standards on wind-resistance.
P-19	Enforce sign ordinances limiting height or size of signs which states that all signs must be installed according to design requirements in accordance with velocity and working stress.	Tornado; Hurricane; Severe Storm	High	Town Administration; County Building Inspections	Unknown	Staff Time	Completed	Completed and ongoing through sign ordinance enforcement. In January 2008, the County Board of Commissioners adopted a Sign Control Ordinance to address these and other issues.
P-20	Ensure that all new mobile homes are securely tied down in accordance with "High Wind Zones" of the NC State Building Code.	Tornado; Hurricane; Severe Storm	High	County Building Inspections	Unknown	Staff Time	Completed	All mobile homes are required to be tied down in accordance with NC State Building Code
P-21	Encourage property owners to plant trees away from utility lines and buildings.	Tornado; Hurricane; Severe Storm	Low	Blue Ridge Electric Membership Corporation	Unknown	Staff Time	Completed	Completed and ongoing. Blue Ridge Electric's Vegetation Management (Maintenance of Right-of-Way) program recommends low growing trees for planting under utility lines. They also educate the public on the importance of the maintenance program which involves actively removing the tree and large shrub growths within utility line right-of-way's.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
P-22	Encourage or require the conservation of water as necessary.	Drought	High	County Emergency Management	Unknown	Staff Time	Completed	Conservation measure techniques are issued to the public when needed.
P-29	Ensure the Ashe County Building Inspection Office mitigates these hazards by following the North Carolina Building and Residential Codes which in some instance require the classification and investigation of soil by a registered design professional.	Earthquake	High	County Building Inspections	Unknown	Staff Time	Completed	Structures are inspected during construction to ensure adherence to NC Building Codes.
Property Protection								
PP-3	Identify all government facilities and buildings located in floodplains.	Flood	Moderate	County Tax Mapping	Unknown	Staff Time	Completed	Completed. The County has a critical facility list that details hazards and vulnerability of all facilities, including floodplain hazards.
Structural Projects								
PP-3	Develop a plan to seek funding for drainpipes throughout the Town of Lansing, to eliminate problems with erosion.	Erosion	Moderate	Town of Lansing Board of Alderman	Unknown	Staff Time	Completed	Completed. Using a Hurricane Ivan Public Assistance Grant, the Town of Lansing completed a storm water drain repair (damage to sewer—2005) that has helped eliminate erosion issues. The Greater Lansing Area Development Committee (GLAD) sponsored a program that reconstructed the sidewalks in Lansing and installed storm water drains under the new sidewalks.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
PP-11	Using Small Town Economic Prosperity Demonstration Program (STEP) planning grants, the Town of Lansing will develop a plan for improvements to the town's infrastructure.	All	High	Town of Lansing Administration	Unknown	Staff Time	Completed	Completed
Emergency Services								
ES-1	Update Emergency operations plan.	All	High	County Emergency Management	Unknown	Staff Time	Completed; Annual reviews	The EOP was approved on March 20, 2017 and is reviewed annually and updated as needed.
ES-5	Track winter storms via North Carolina Division of Emergency Management and the National Weather Service by the means of conference calls and electronic communication. Keep emergency services organizations and the public updated on the storm.	Winter Storm	High	County Emergency Management	Unknown	Staff Time	Completed	Weather information is tracked and broadcast to the public via email and social media as well as traditional media types.
ES-8	Ensure that the existing community warning systems are adequate.	Tornado; Hurricane; Severe Storm	High	County Emergency Management	Unknown	Staff Time	Completed	Completed and ongoing. The County purchased an emergency notification system, Everbridge, which is a high volume, high speed communication service available for broad based emergency notifications. The high telephone calling system is capable of delivering emergency message directly to regular

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
								telephones, pages, cell phones, computers, and faxes at homes and businesses across the County. It can also be tailored for special notices to responders and other select groups.
ES-9	Explore and seek access to all potential sources of information and communication of early fire detection.	Wildfire	High	County Fire Departments	Unknown	Staff Time	Completed	Completed and ongoing. The County purchased an emergency notification system, Everbridge, which is a high volume, high speed communication service available for broad based emergency notifications. This high telephone calling system is capable of delivering emergency messages directly to regular phones, pagers, cell phones, computers, and faxes at homes and businesses across the County. It can also be tailed for special notices to responders and other selected groups.
ES-10	Ensure fire hydrants are functioning properly.	Wildfire	High	Town Maintenance Departments; Town Fire Departments	Unknown	Staff Time	Completed	Municipal fire departments and maintenance crews have made fire hydrant evaluations a part of their regular training and preparedness program.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
ES-11	Maintain a standard for house numbering and ensure that house numbers are visible from the roadside.	Wildfire	High	County Building Inspections	Unknown	Staff Time	Completed	Completed and ongoing. The County E-911 Service Ordinance outlines requirements for house numbering standards. The ordinance is enforced and maintained through the combined efforts of the Building Inspections Office and the E-911 Addressing Coordinator.
ES-12	Coordinate fire-fighting response with other communities.	Wildfire	Moderate	County Fire Departments	Unknown	Staff Time	Completed	Each fire department has mutual aid agreements in place with adjacent jurisdictions.
Public Education and Awareness								
PEA-3	Explore the possibility of developing an internet-based emergency information website.	All	Moderate	County Emergency Management	Unknown	Staff Time	Completed	Completed. The County Emergency Management website contains a link that is only operable during emergencies. The link will provide information supplied by the EOC during an emergency. The County also uses Everbridge internet-based emergency alert system which enables broad-based, multi-media dissemination of emergency information.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
PEA-4	Design a public information/education program to target mobile home/manufactured home residents explaining the hazards such as high wind events, flooding and alternative shelters in a storm/high wind event/flood.	All	Low	County Emergency Management	Unknown	Staff Time	Completed	Completed. A series of articles and letter to the editor that addressed a variety of natural hazards along with specific preparation methods for each were published in the local newspaper.
PEA-5	Explore the possibility of developing an internet-based emergency information website (for flood hazard mitigation information).	Flood	Moderate	County Emergency Management	Unknown	Staff Time	Completed	Completed.
PEA-7	Educate the public about Hazard Mitigation Planning Grants for residential/commercial relocation of structures within the floodplain.	Flood	Moderate	County Floodplain Manager	Unknown	Staff Time	Completed	Completed. Newspaper articles on this subject were published to inform the public.
Action #	**Description**	**Hazard(s) Addressed**	**Relative Priority**	**Lead Agency/ Department**	**Estimated Cost**	**Potential Funding Sources**	**Implementation Schedule**	**Implementation Status (2012)**
PEA-10	Explore the possibility of developing an internet-based emergency information website.	Tornado; Hurricane; Severe Storm	Moderate	County Emergency Management	Unknown	Staff Time	Completed	Completed. The County Emergency Management website contains a link that is only operable during emergencies. The link will provide information supplied by the EOC during an emergency. The County also uses Everbridge internet-based emergency alert system which enables broad-based, multi-media dissemination of emergency information.
PEA-11	Publish a special section in the local newspaper with emergency information (on tornadoes, hurricanes, wind and severe thunderstorms). Include telephone numbers of local emergency service organizations.	Tornado; Hurricane; Severe Storm	Moderate	County Emergency Management	Unknown	Staff Time	Completed	Competed. On December 13, 2007, an article ran in the local paper informing the public of an update to County and emergency phone numbers.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
PEA-16	Explore the possibility of developing an internet-based emergency information website.	Wildfire	Moderate	County Emergency Management	Unknown	Staff Time	Completed	Completed. The County Emergency Management website contains a link that is only operable during emergencies. The link will provide information supplied by the EOC during an emergency. The County also uses Everbridge internet-based emergency alert system which enables broad-based, multi-media dissemination of emergency information.
PEA-18	Defensible space education for development in forested areas. Defensible space may be defined as an area around your home/structure (also outbuildings, drives, and roadways) that provides room for firefighters to safely fight the fire.	Wildfire	Low	US Forestry Service	Unknown	Staff Time	Completed	Completed. Local NC Forest Service staff provides educational workshops to local citizen groups and conduct wildfire hazard evaluations of local communities. They also provide materials on the NC Firewise Program.

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)

PEA-24	Explore the possibility of developing an internet-based emergency information website (on earthquakes).	Earthquake	Moderate	County Emergency Management	Unknown	Staff Time	Completed	Completed. The County Emergency Management website contains a link that is only operable during emergencies. The link will provide information supplied by the EOC during an emergency. The County also uses Everbridge internet-based emergency alert system which enables broad-based, multi-media dissemination of emergency information.

Town of Jefferson Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
Prevention								
P-1	Identify potential mitigation activities, based on damage assessment, and prioritize locations for mitigation.	Flood	Moderate	Town Administration	Unknown	Staff Time	Completed	Completed.
Property Protection								
PP-1	Elevate vulnerable equipment, electrical controls, and other equipment at waste water treatment plans, potable water treatment plants, and pump stations.	Flood	Moderate	Town Maintenance	Unknown	Staff Time	Completed	Completed.
PP-2	For sewer lines in the floodplain, fasten and seal manhole covers to prevent floodwater infiltration.	Flood	Moderate	Town Maintenance	Unknown	Staff Time	Completed	Completed.

Town of Lansing Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
Prevention								
P-1	Identify potential mitigation activities, based on damage assessment, and prioritize locations for mitigation.	Flood	Moderate	Town Board of Alderman	Unknown	Staff Time	Completed	Completed.
P-2	The Town of Lansing has obtained flood-prone land within the city limits. This property is being transformed into a small recreation area with a walking trail.	Flood	High	Town Board of Alderman	Unknown	Staff Time	Completed	Completed. The County Health Council was awarded a Fit Community Grant to promote healthy lifestyles. The grant included funds for a paved walking trail at the Lasing Creeper Trail Park, a park formed by the Town to promote preservation of flood-prone areas.
Property Protection								
PP-3	Develop a plan to seek funding for drainpipes through the Town of Lansing, to eliminate problems with erosion.	Erosion	Moderate	Town Emergency Management	Unknown	Staff Time	Completed	Completed. Using a Hurricane Ivan Public Assistance Grant, the Town of Lansing completed a storm sewer water drain repair (damage to sewer—2005) that has helped eliminate erosion issues. The Greater Lansing Area Development Committee (GLAD) sponsored a program that reconstructed the sidewalks in Lansing and installed storm water drains under the new sidewalks (2008).

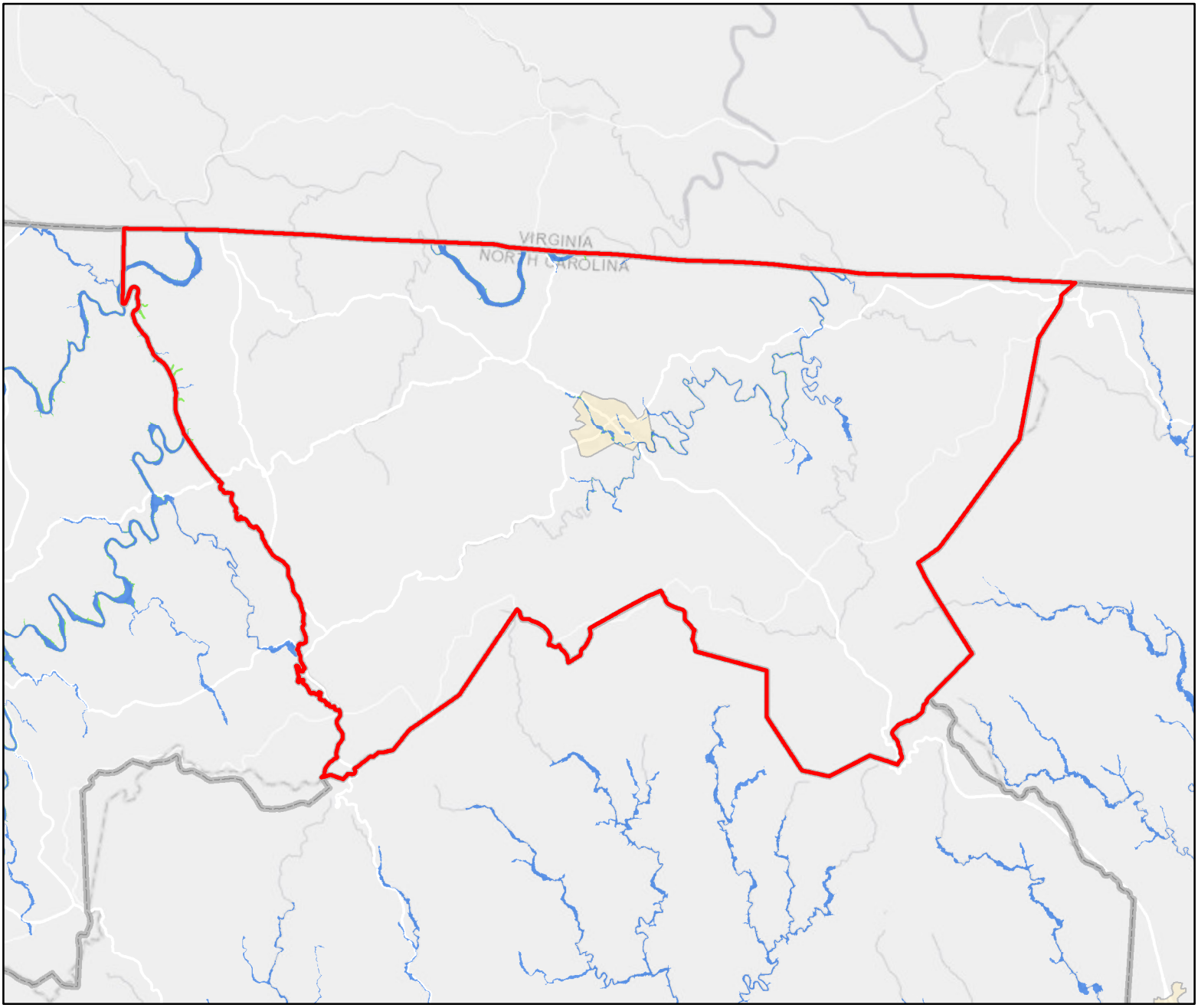
Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
PP-4	Elevate vulnerable equipment, electrical controls, and other equipment at waste water treatment plants, potable water treatment plants, and pump stations.	Flood	High	Town Board of Alderman	Unknown	Staff Time	Completed	Completed.
PP-5	Town of Lansing will protect government documents and critical information from flood damage by elevating all critical documents, records, files at facilities in floodplains.	Flood	High	Town Board of Alderman	Unknown	Staff Time	Completed	Completed.
PP-6	For sewer lines in the floodplain, fasten and seal manhole covers to prevent floodwater infiltration.	Flood	High	Town Board of Alderman	Unknown	Staff Time	Completed	Completed.

Town of West Jefferson Completed Mitigation Actions

Action #	Description	Hazard(s) Addressed	Relative Priority	Lead Agency/ Department	Estimated Cost	Potential Funding Sources	Implementation Schedule	Implementation Status (2012)
Prevention								
P-1	Identify potential mitigation activities, based on damage assessment, and prioritize locations for mitigation.	Flood	High	Town	Unknown	Staff Time	Completed	Completed.
Property Protection								
PP-1	Elevate vulnerable equipment, electrical controls, and other equipment at waste water treatment plants, potable water treatment plants, and pump stations.	Flood	High	Town Maintenance	Unknown	Staff Time	Completed	Completed.
PP-2	For sewer lines in the floodplain, fasten and seal manhole covers to prevent floodwater infiltration.	Flood	High	Town Maintenance	Unknown	Staff Time	Completed	Completed.

Appendix F Flood Hazard Maps

Alleghany County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

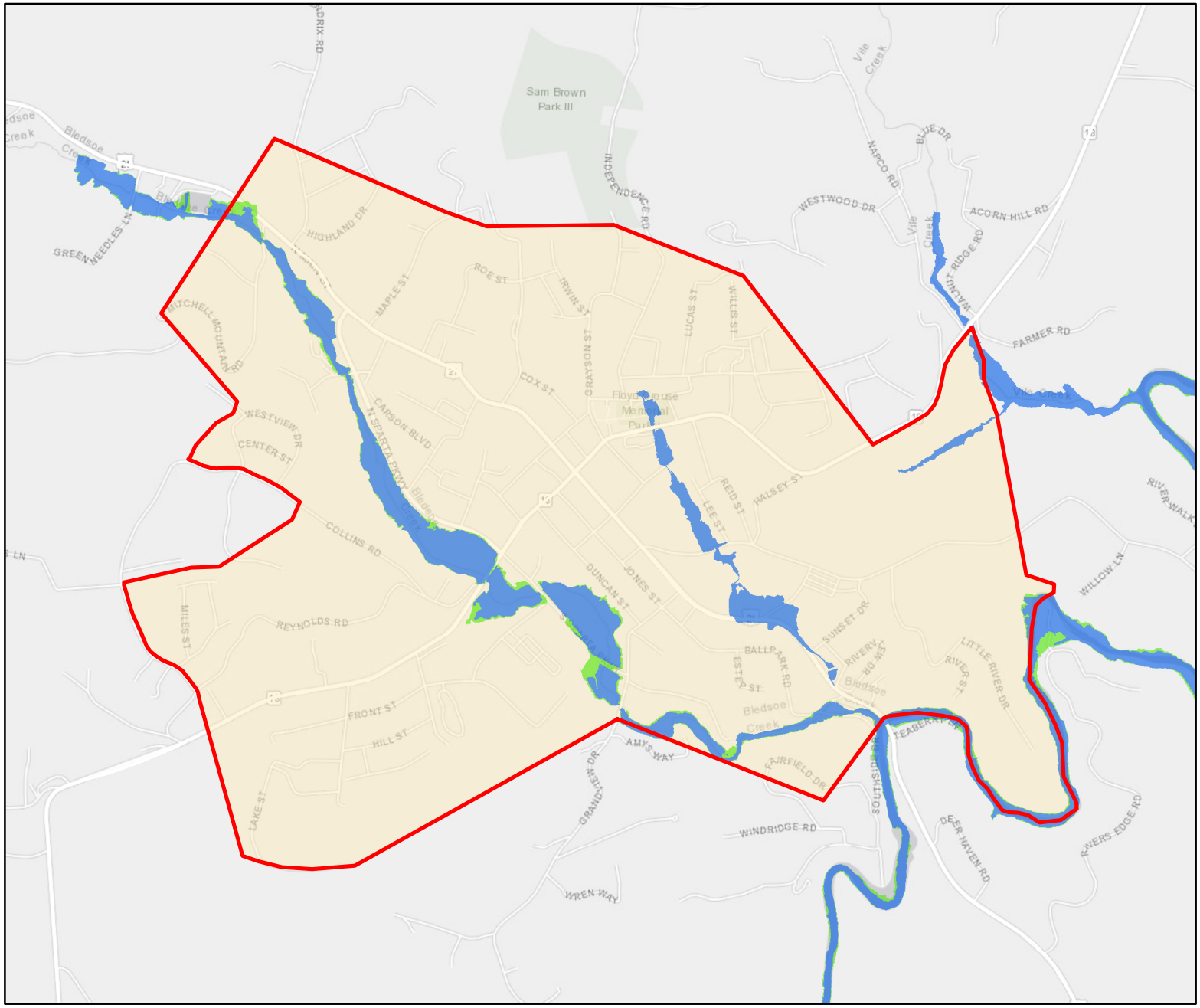
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 2.25 4.5 9 Miles

N

Sparta - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

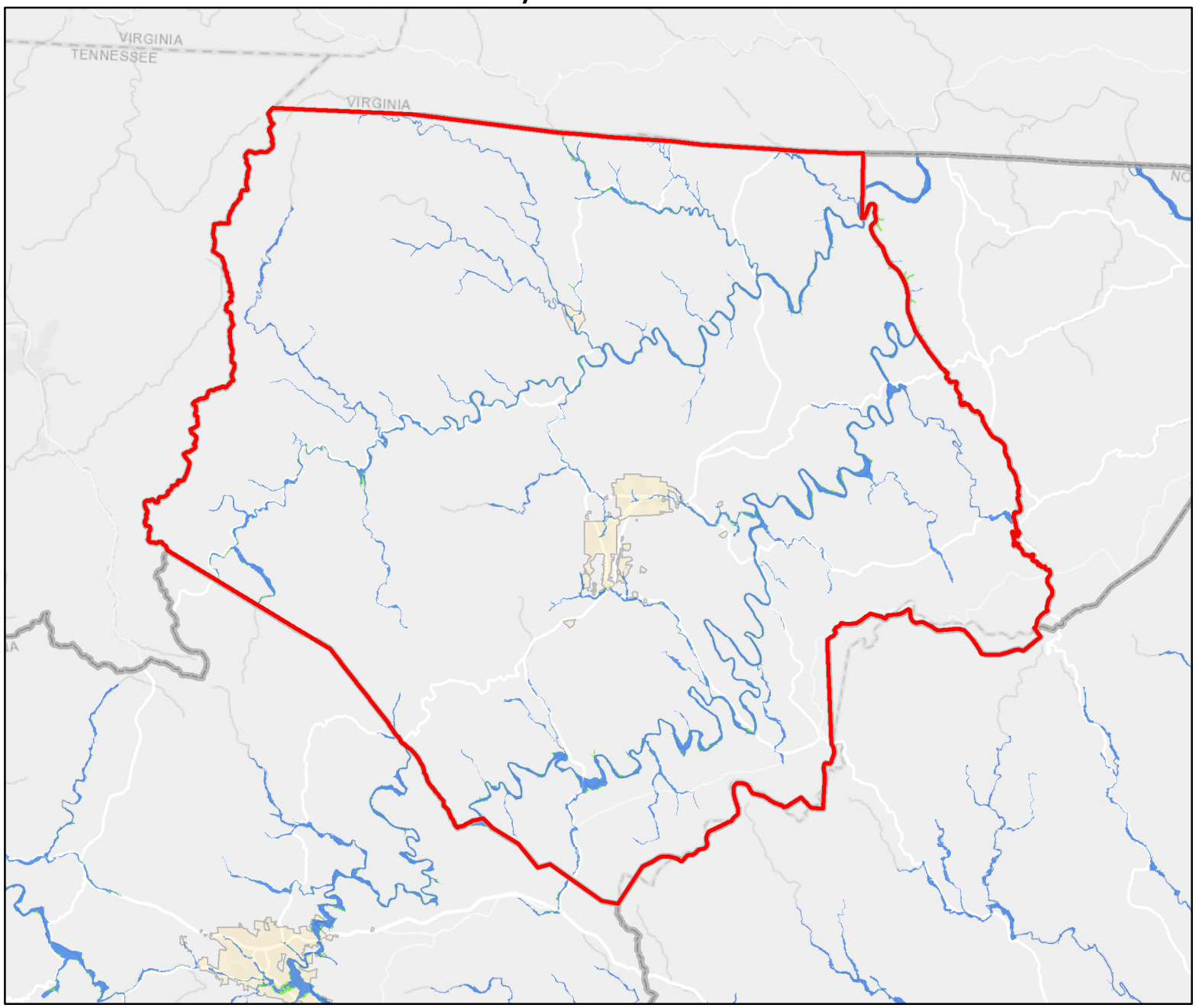
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.2 0.4 0.8 Miles

N

Ashe County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

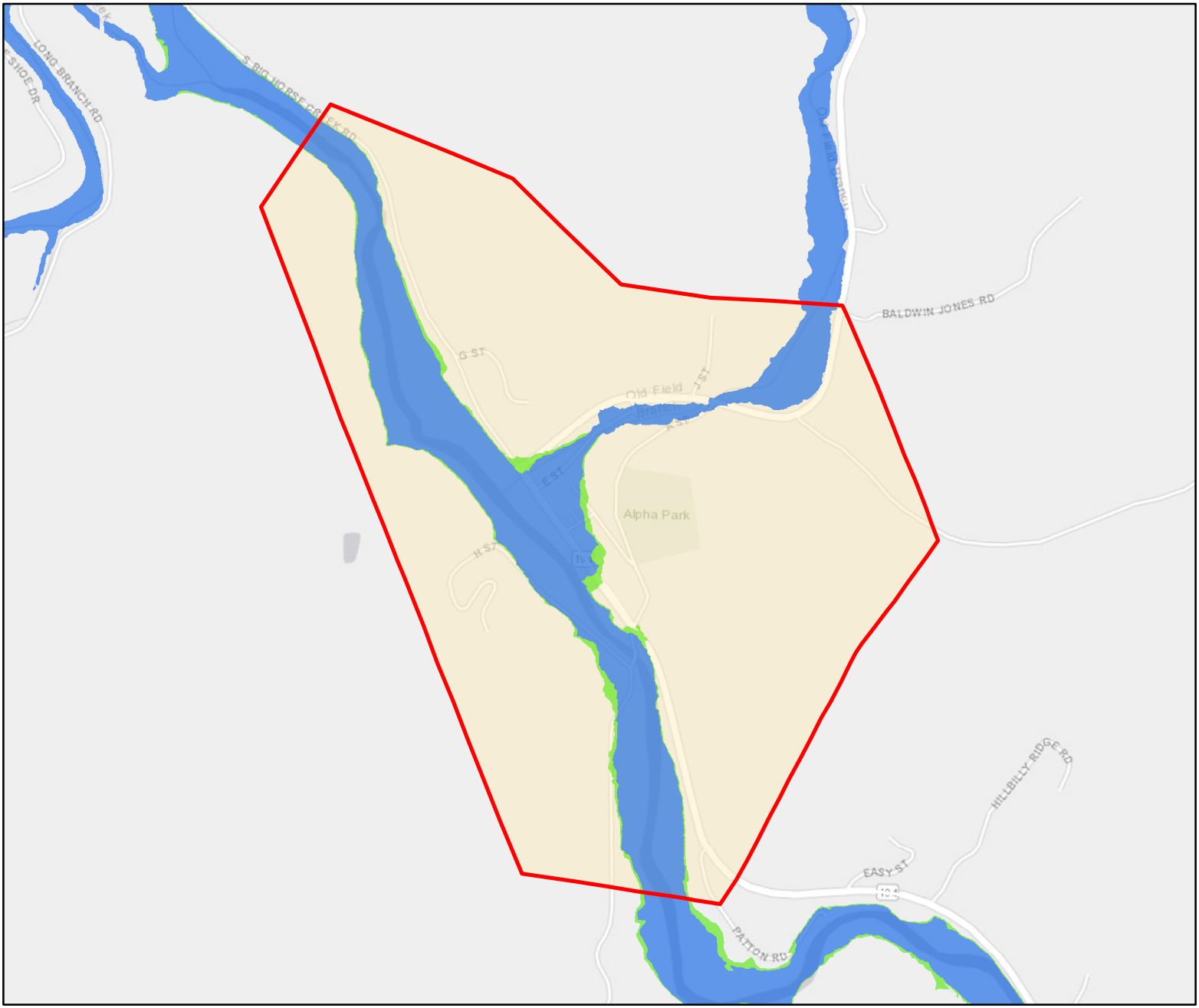
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 2.5 5 10 Miles

N

Lansing - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

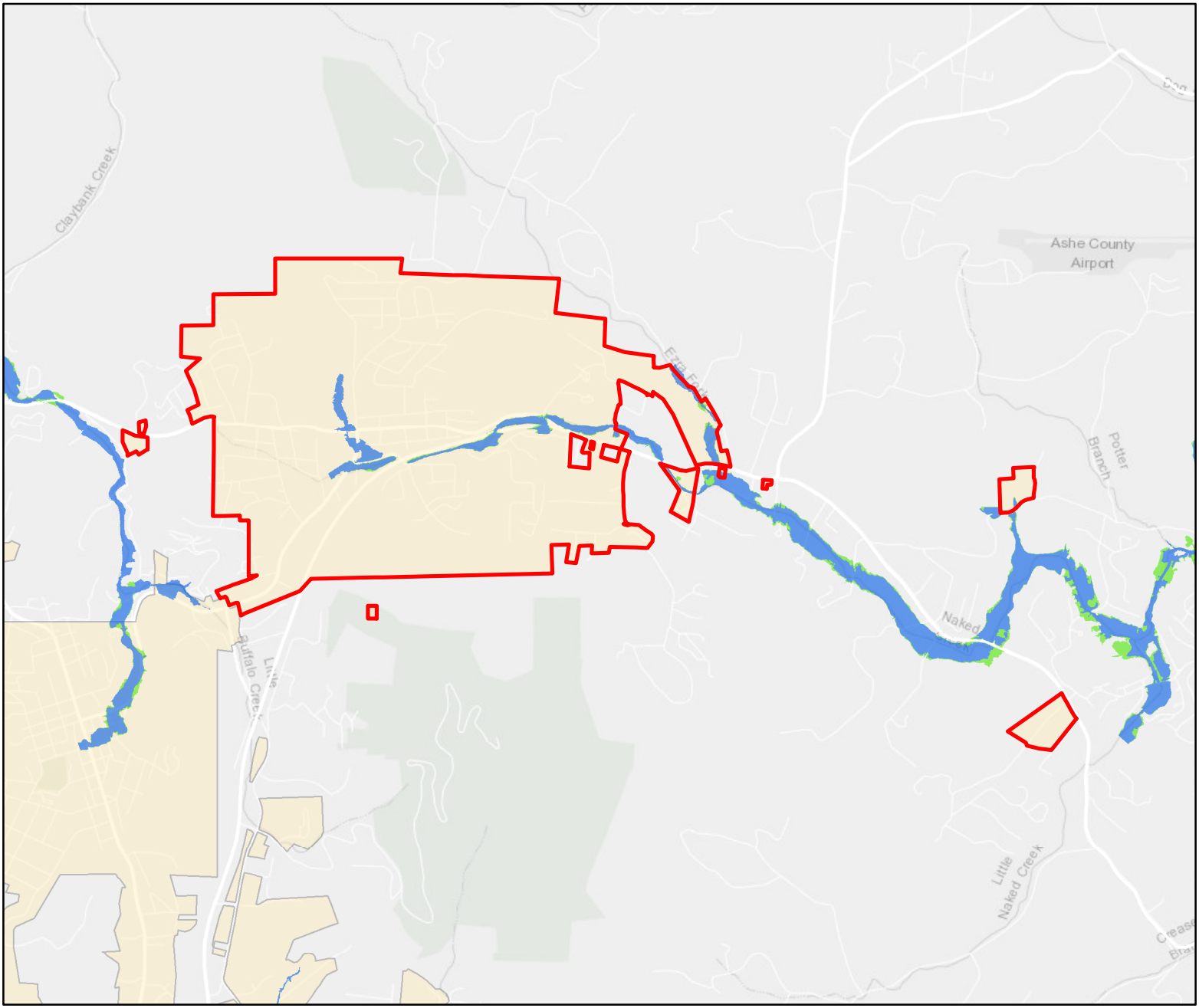
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.075 0.15 0.3 Miles

N

Jefferson - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

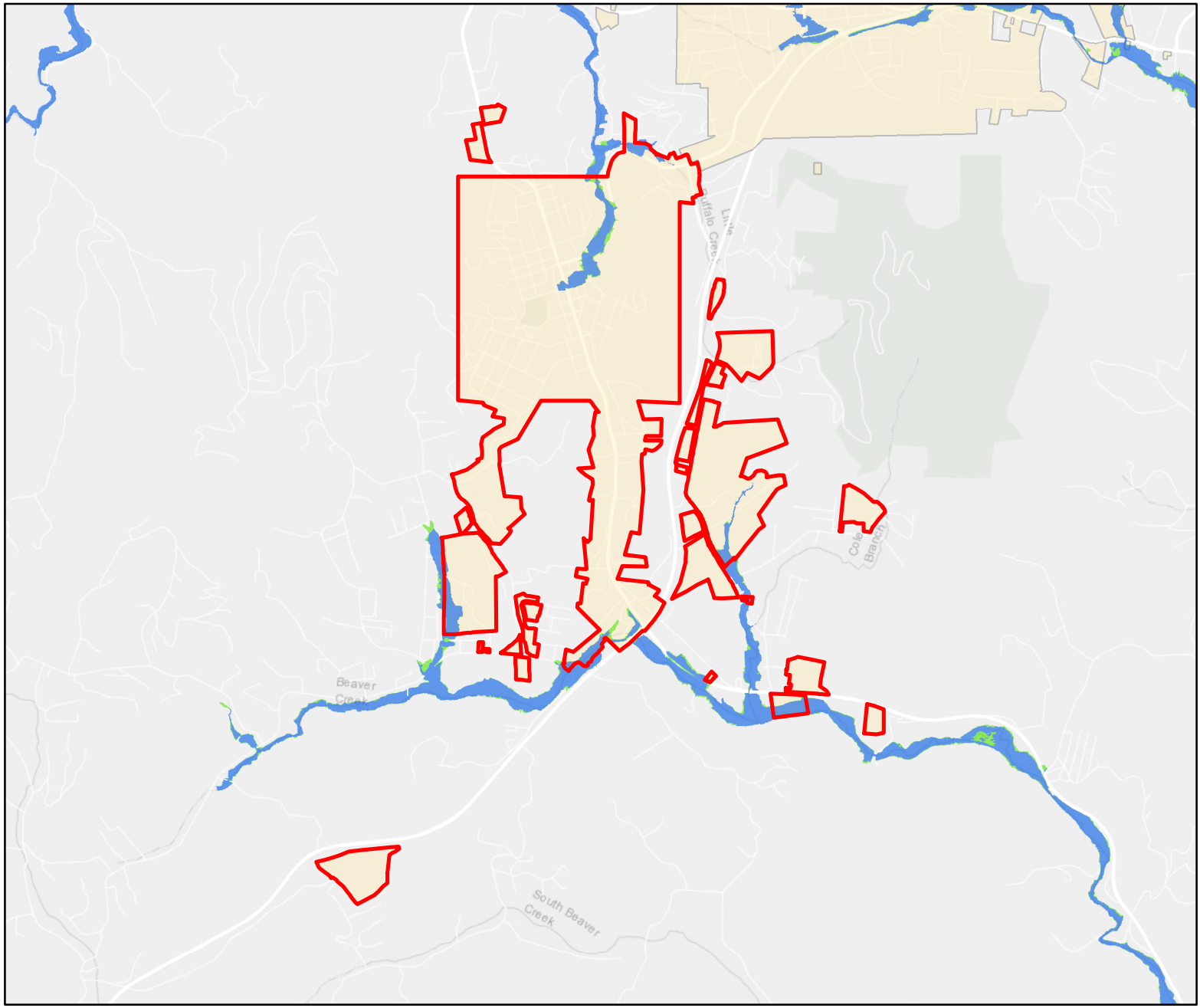
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.35 0.7 1.4 Miles

N

West Jefferson - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

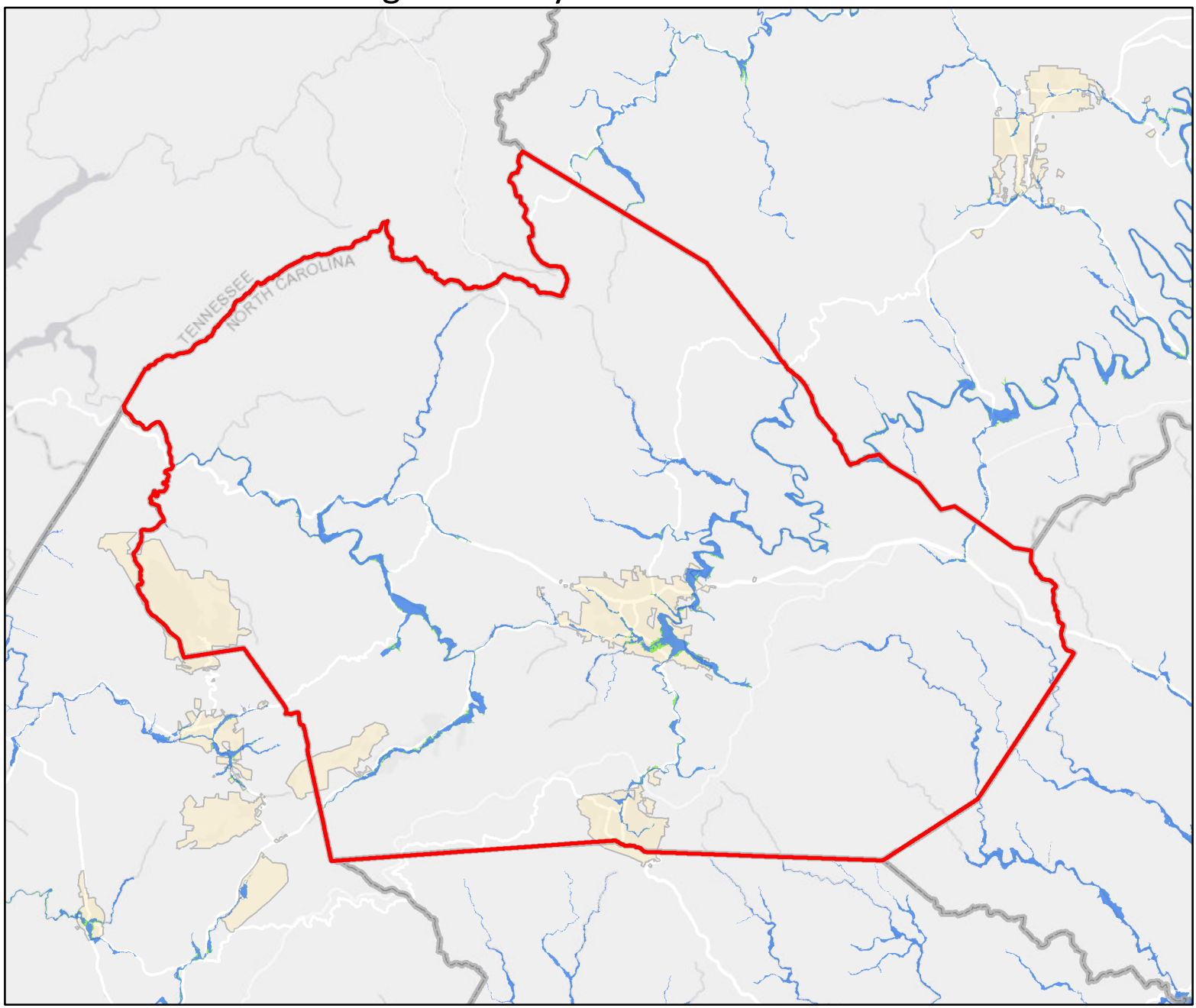
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.375 0.75 1.5 Miles

N

Watagua County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

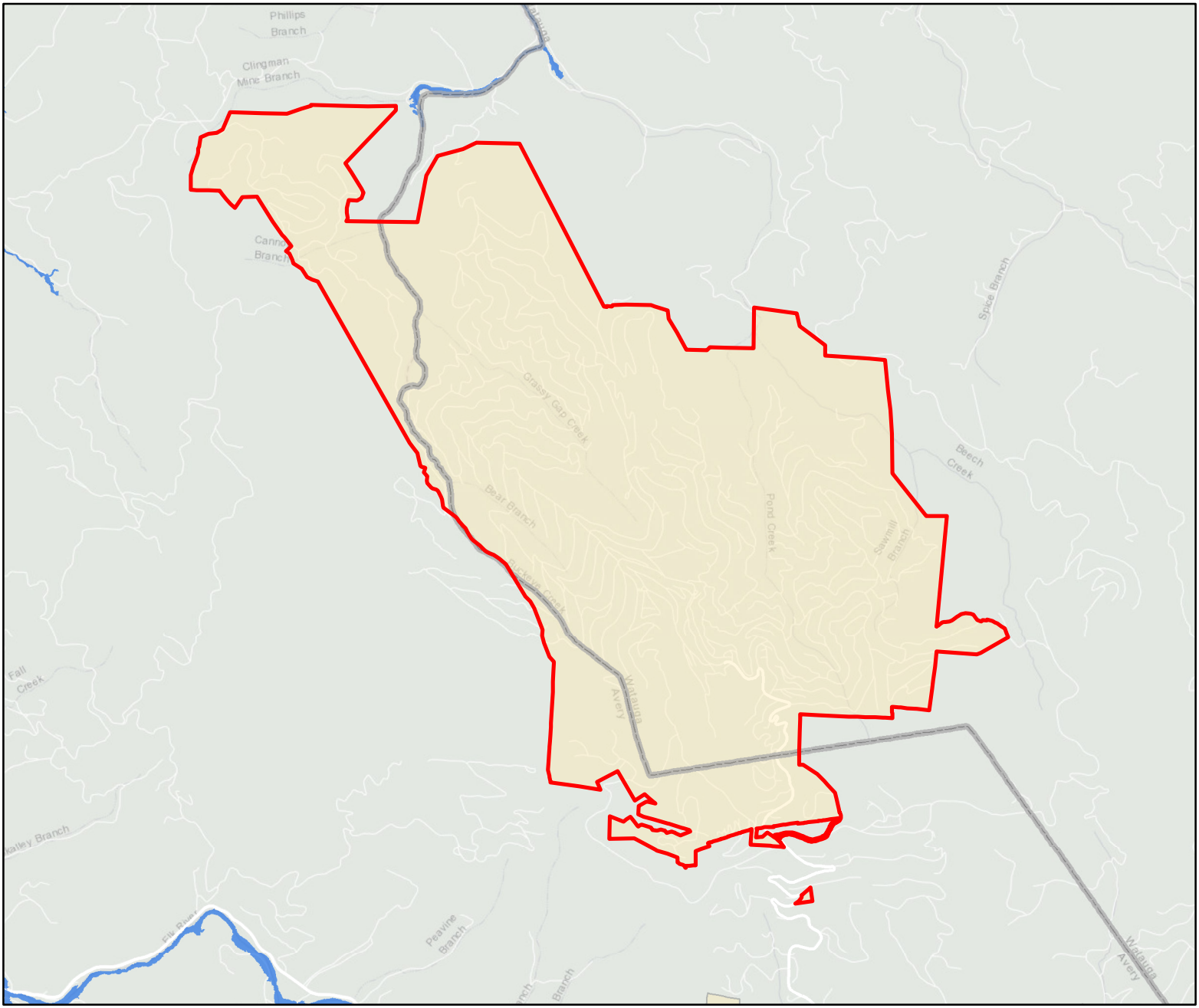
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 2.25 4.5 9 Miles

N

Beech Mountain - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

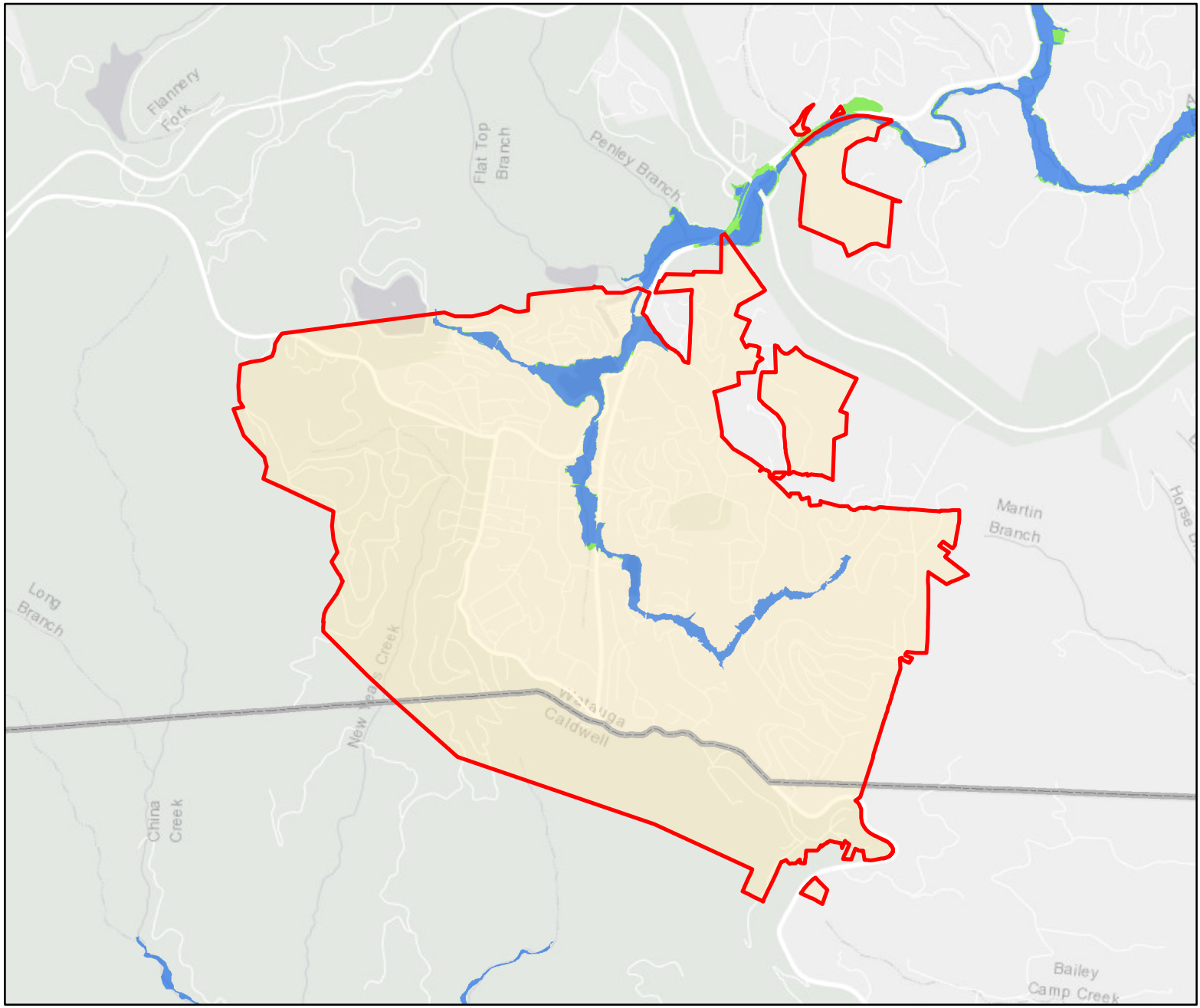
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.45 0.9 1.8 Miles

N

Blowing Rock - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

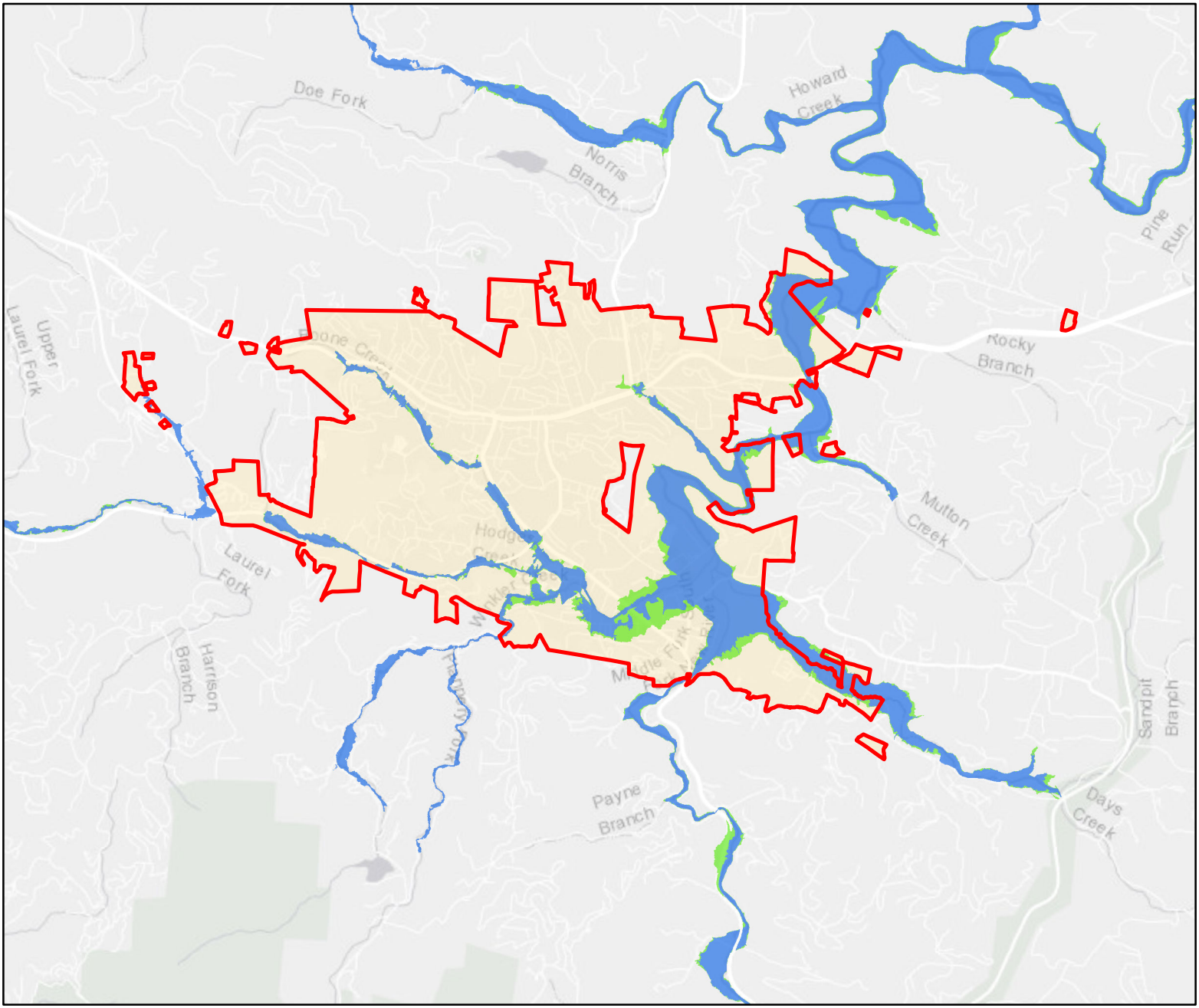
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.3 0.6 1.2 Miles

N

Boone - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

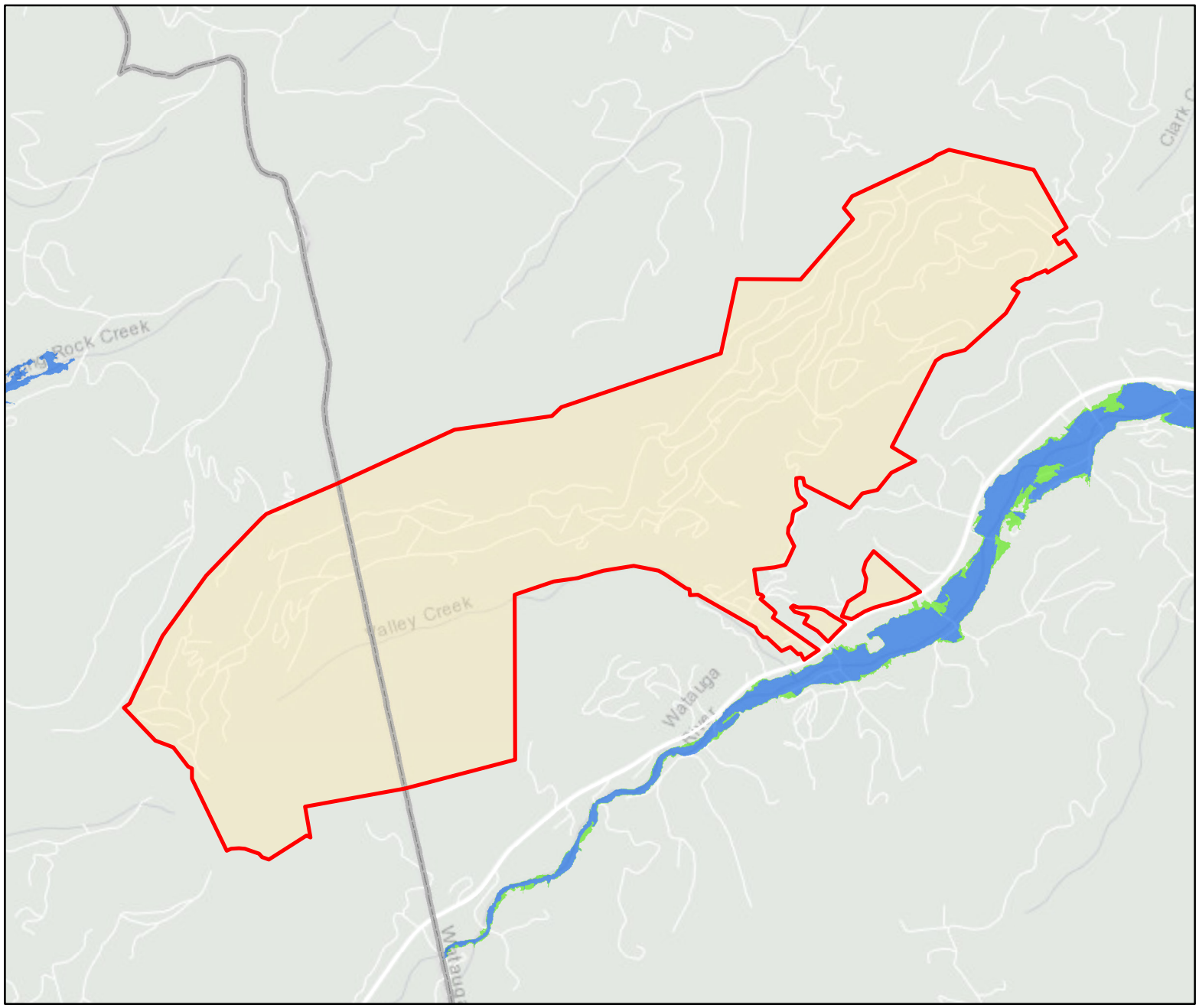
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.5 1 2 Miles

N

Seven Devils - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

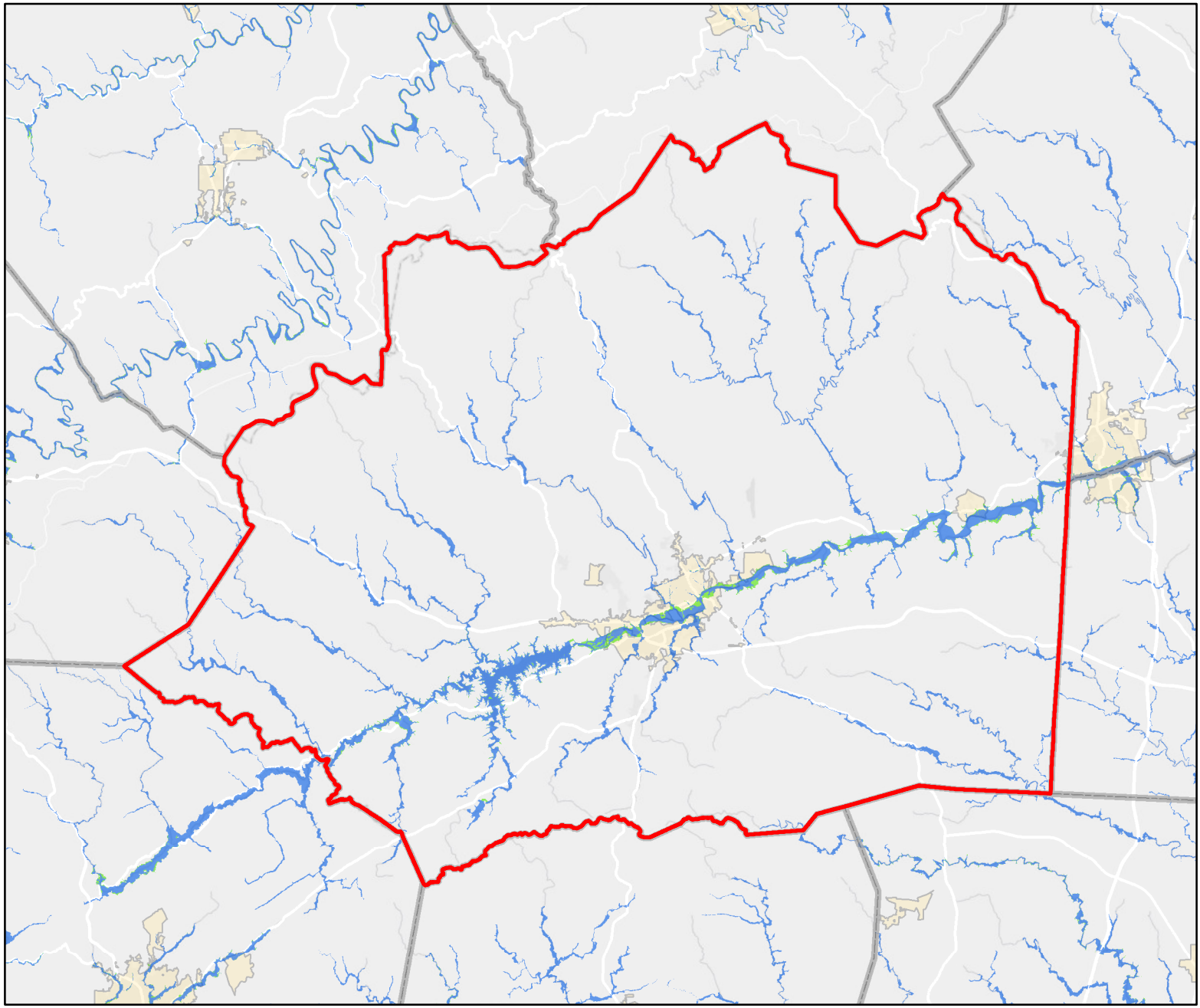
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.25 0.5 1 Miles

N

Wilkes County - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

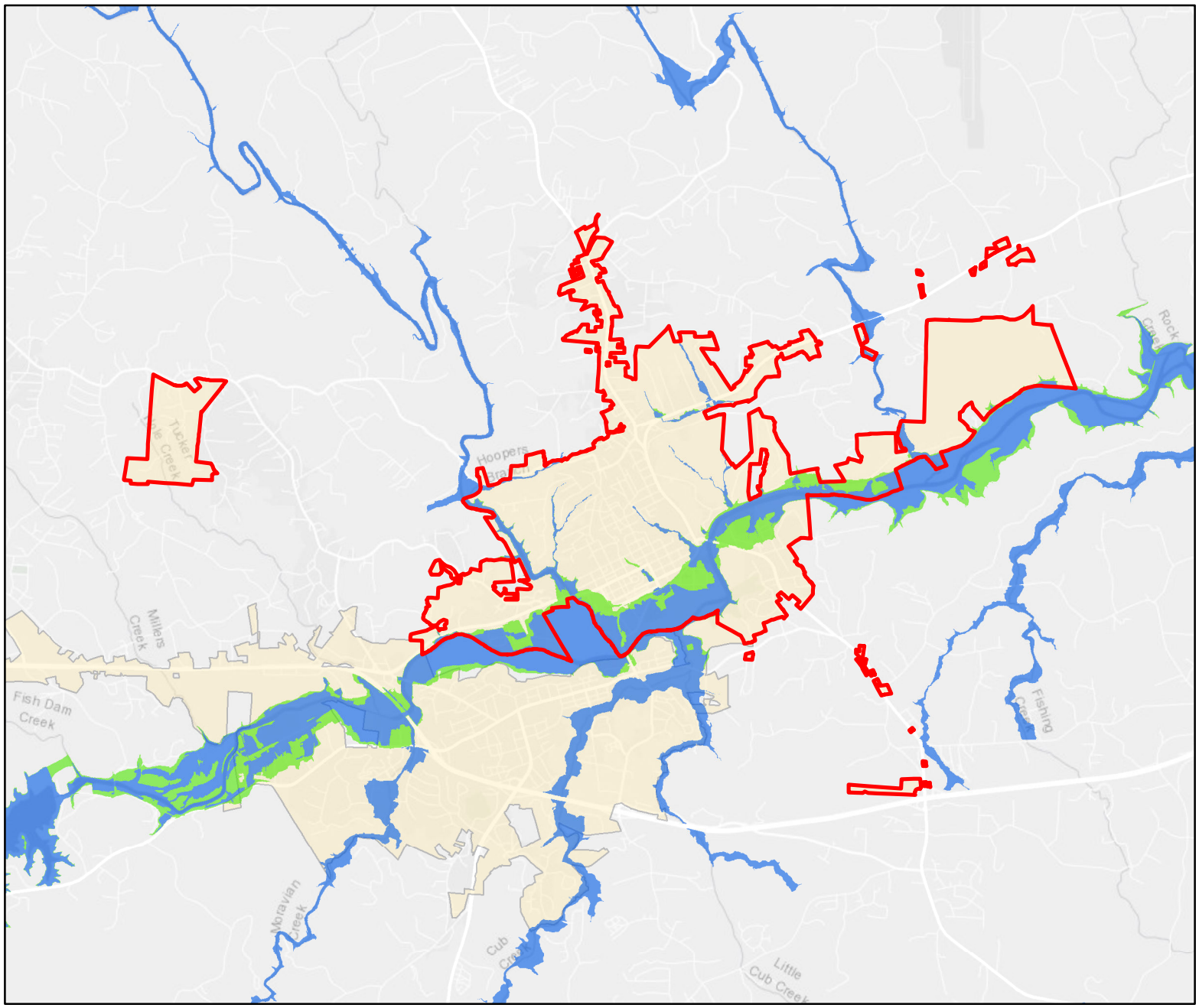
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 3.5 7 14 Miles

N

North Wilkesboro - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

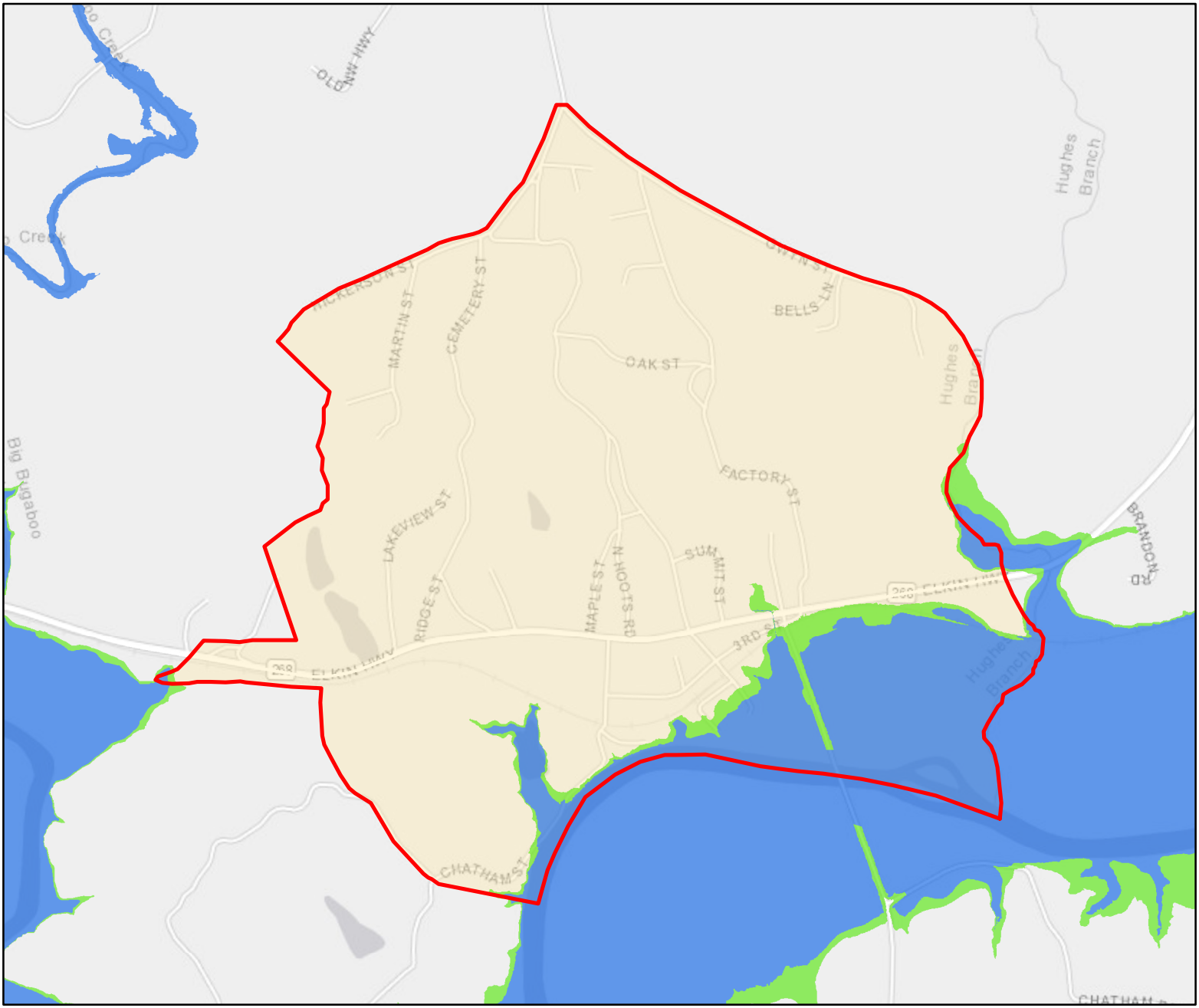
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.5 1 2 Miles

N

Ronda - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

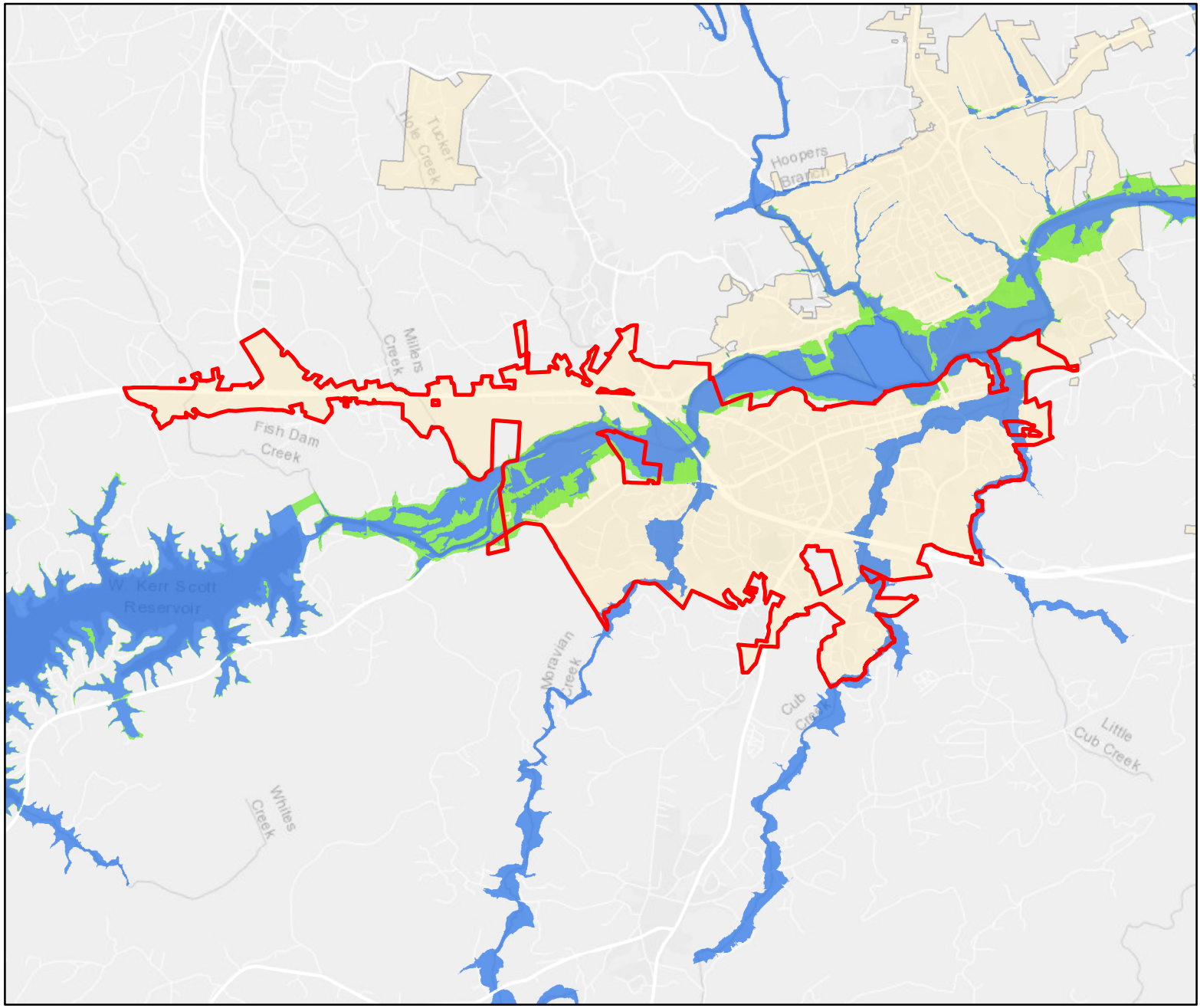
- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.125 0.25 0.5 Miles

N

Wilkesboro - Flood Hazard Areas



Legend

- County Boundary
- Municipal Boundary
- Major Roads

Flood Zone

- 100 Year Flood Zone
- 500 Year Flood Zone
- Coastal Flood Zone

Data Source: North Carolina Floodplain Mapping Program

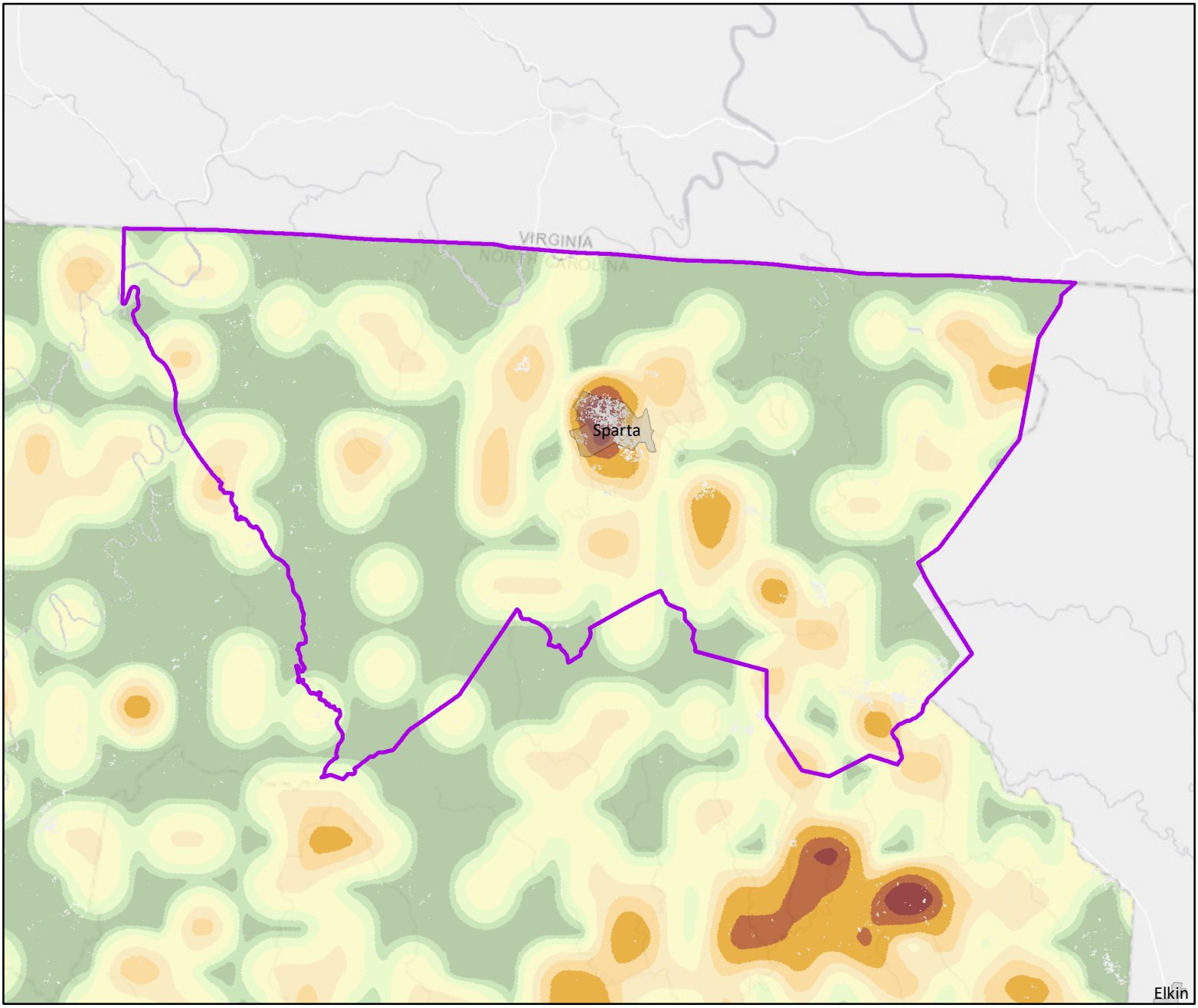
0 0.5 1 2 Miles

N

Appendix G
Wildfire Hazard Maps

This section of the Plan includes Wildfire Ignition Density, Wildfire Events and Wildland Urban Interface maps for each participating County and municipality in the High Country Region.

Alleghany County - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

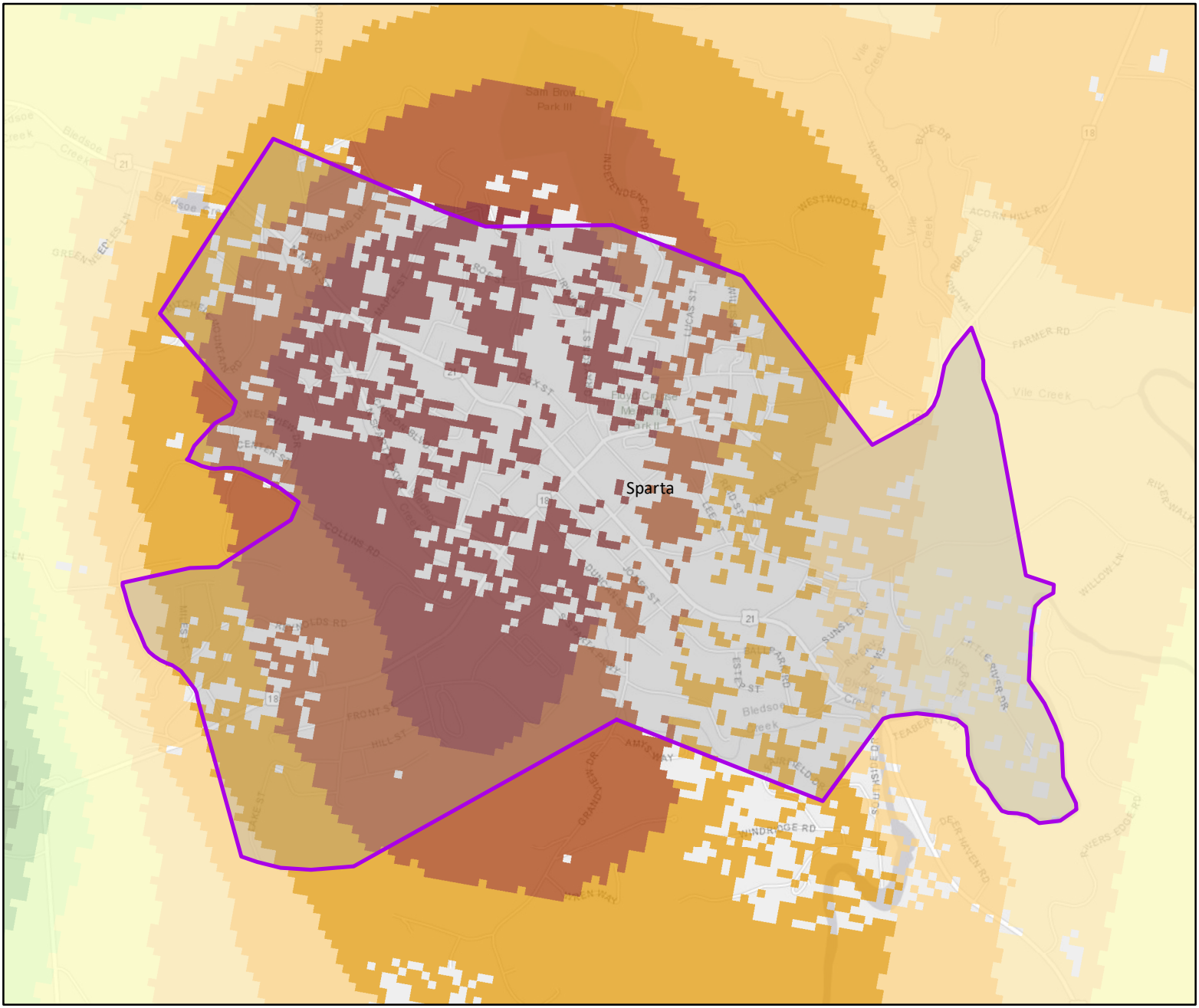
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 2.25 4.5 9 Miles

N

Sparta - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

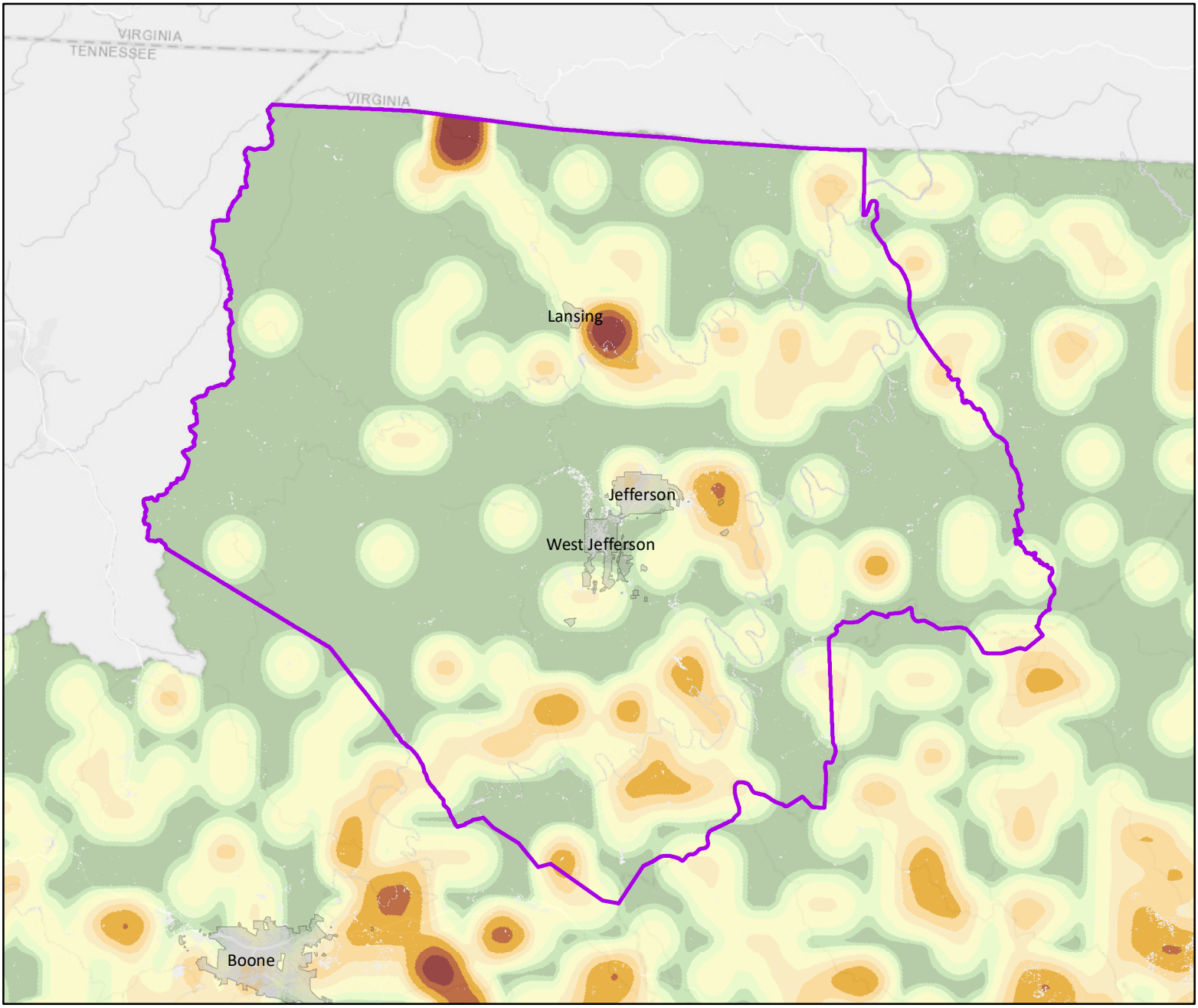
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

Ashe County - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

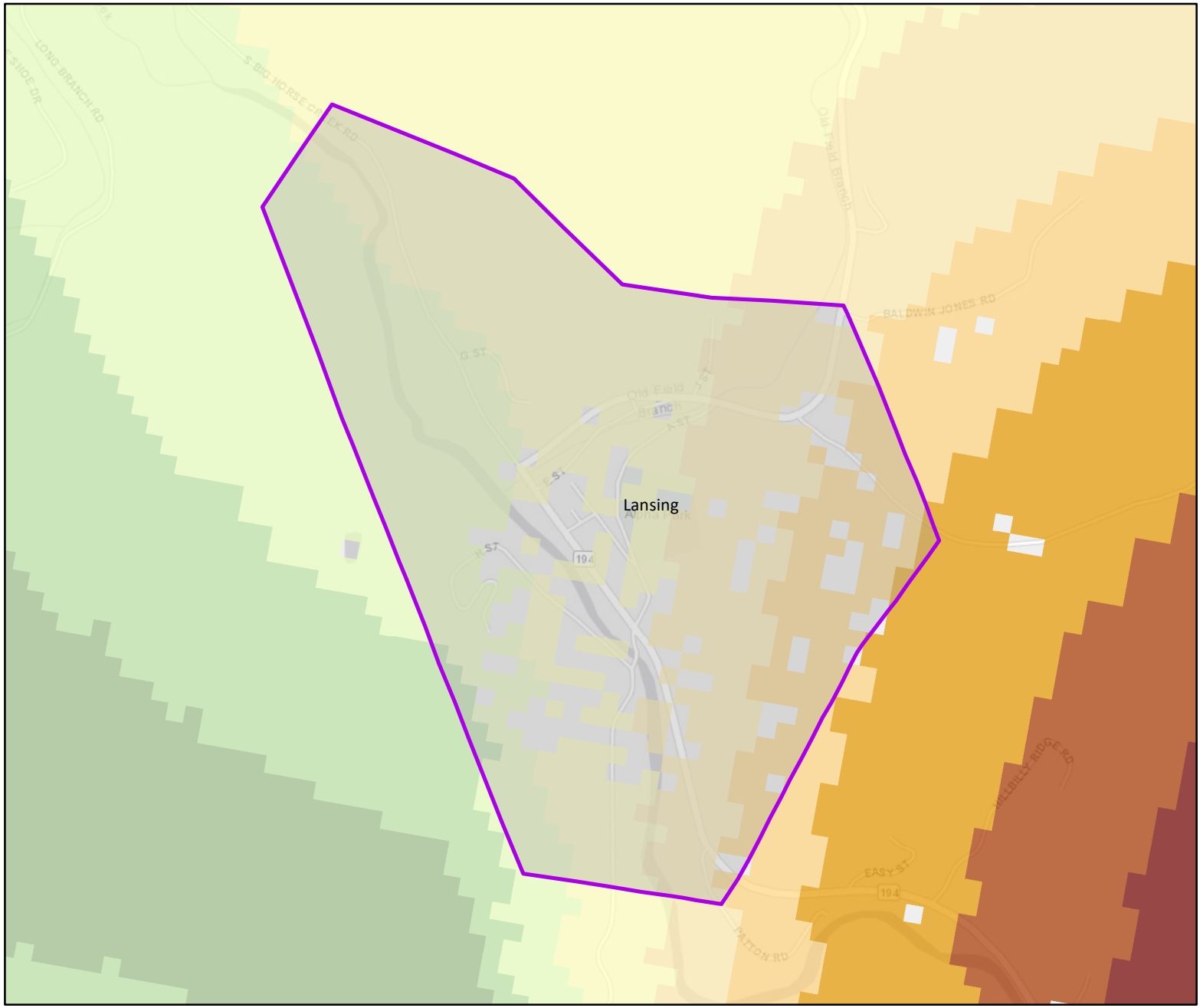
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.5 5 10 Miles

N

Lansing - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

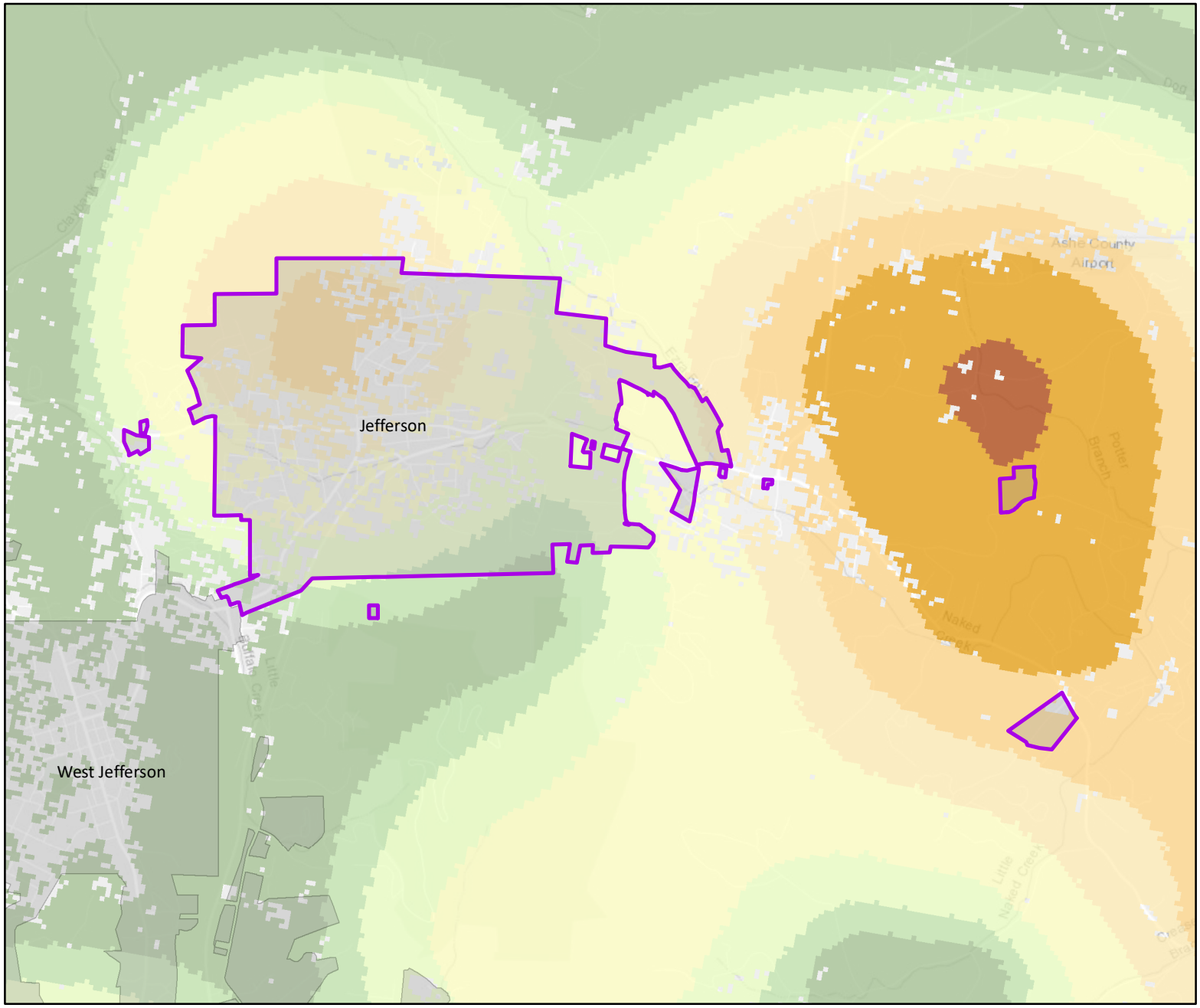
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.075 0.15 0.3 Miles

N

Jefferson - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

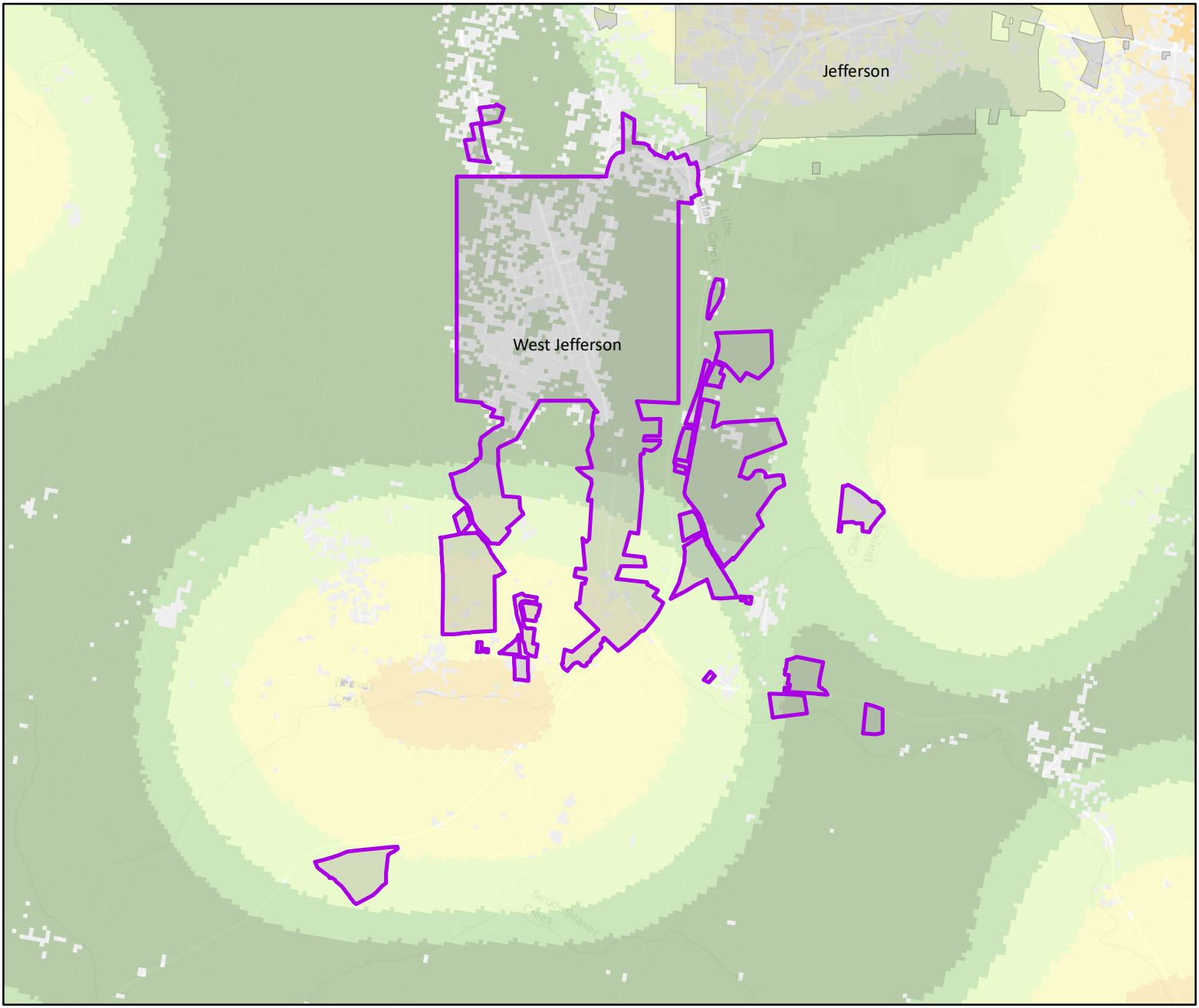
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.35 0.7 1.4 Miles

N

West Jefferson - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

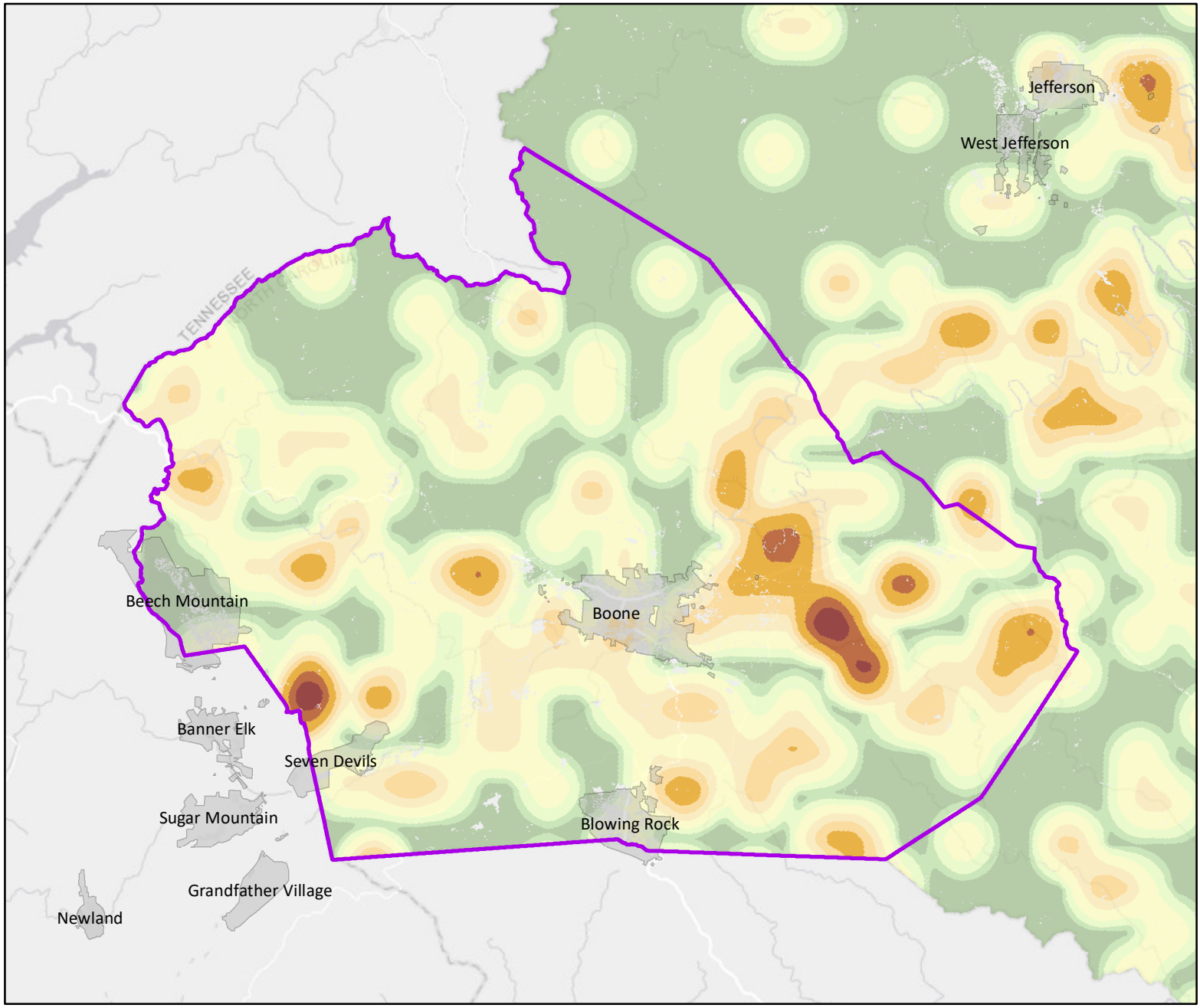
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.375 0.75 1.5 Miles

N

Watagua County - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

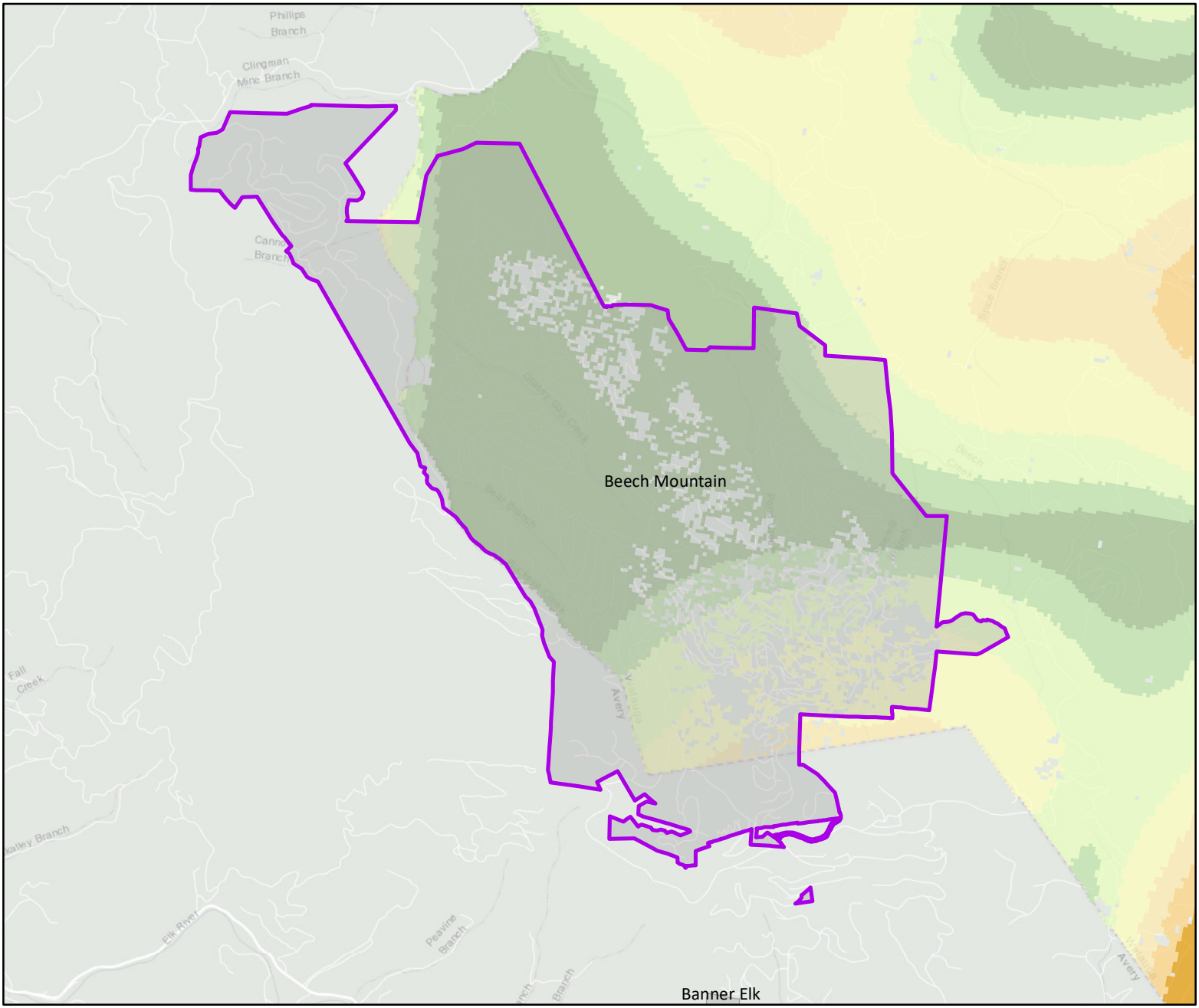
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 2.25 4.5 9 Miles

N

Beech Mountain - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

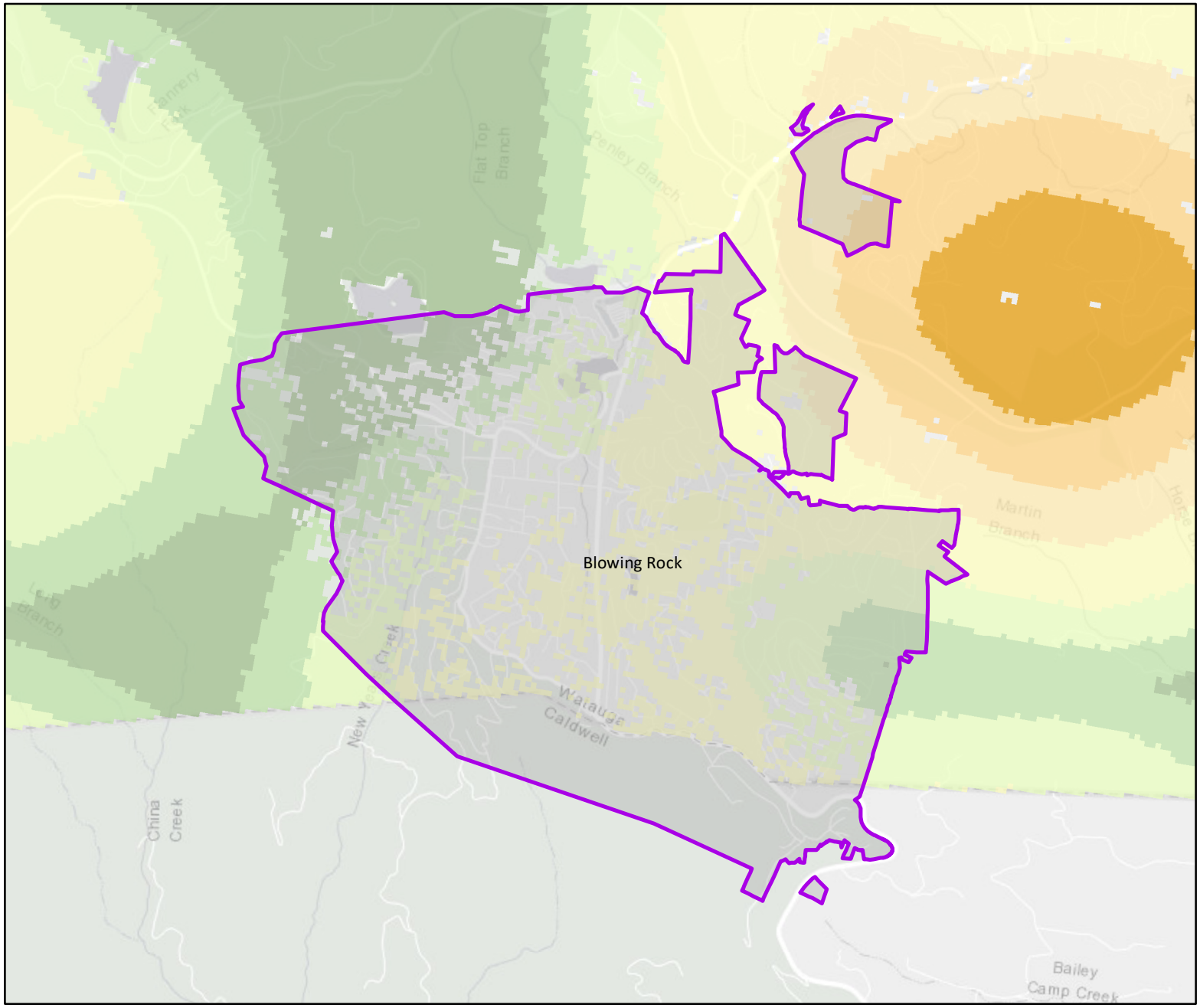
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.45 0.9 1.8 Miles

N

Blowing Rock - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

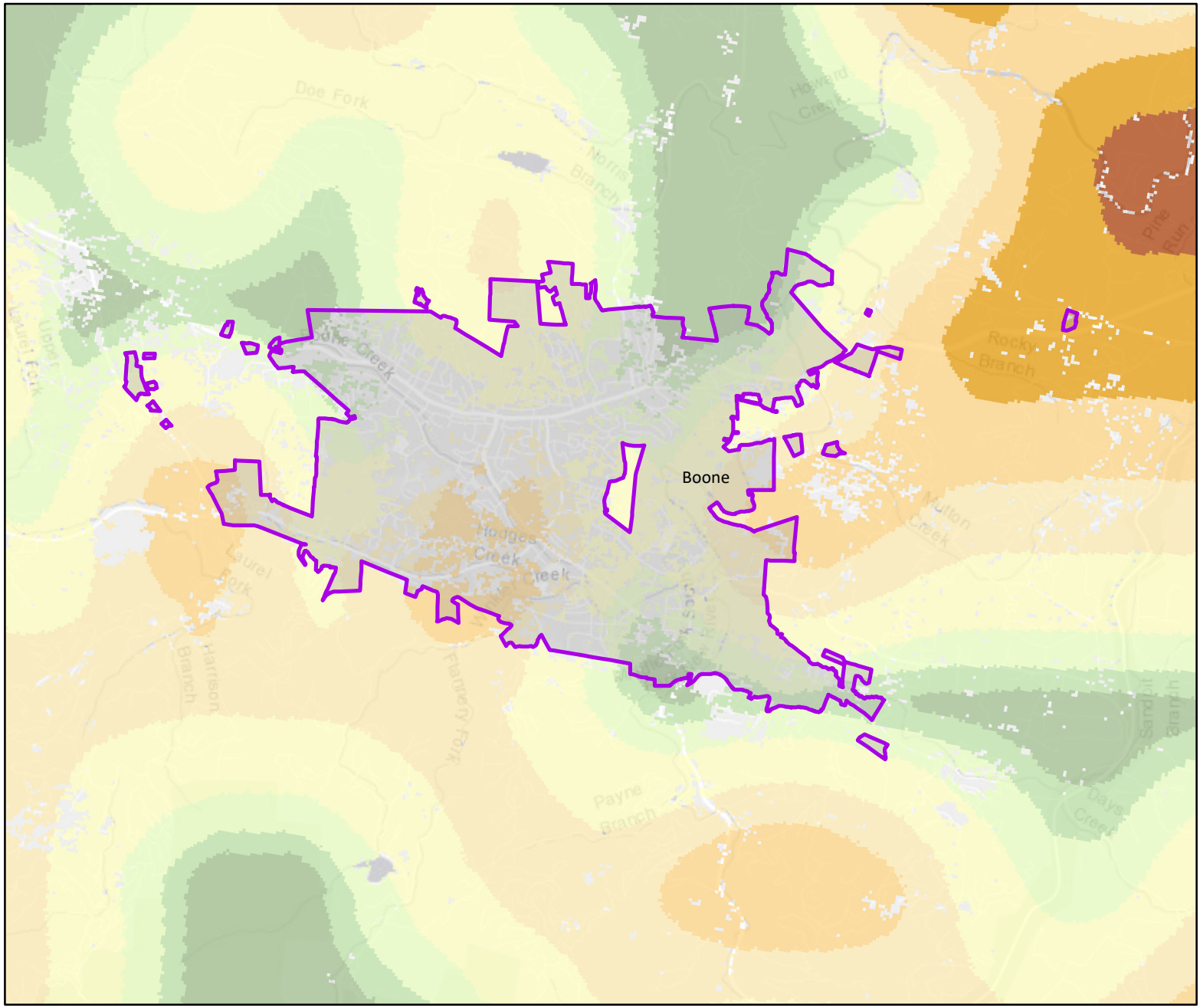
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.3 0.6 1.2 Miles

N

Boone - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

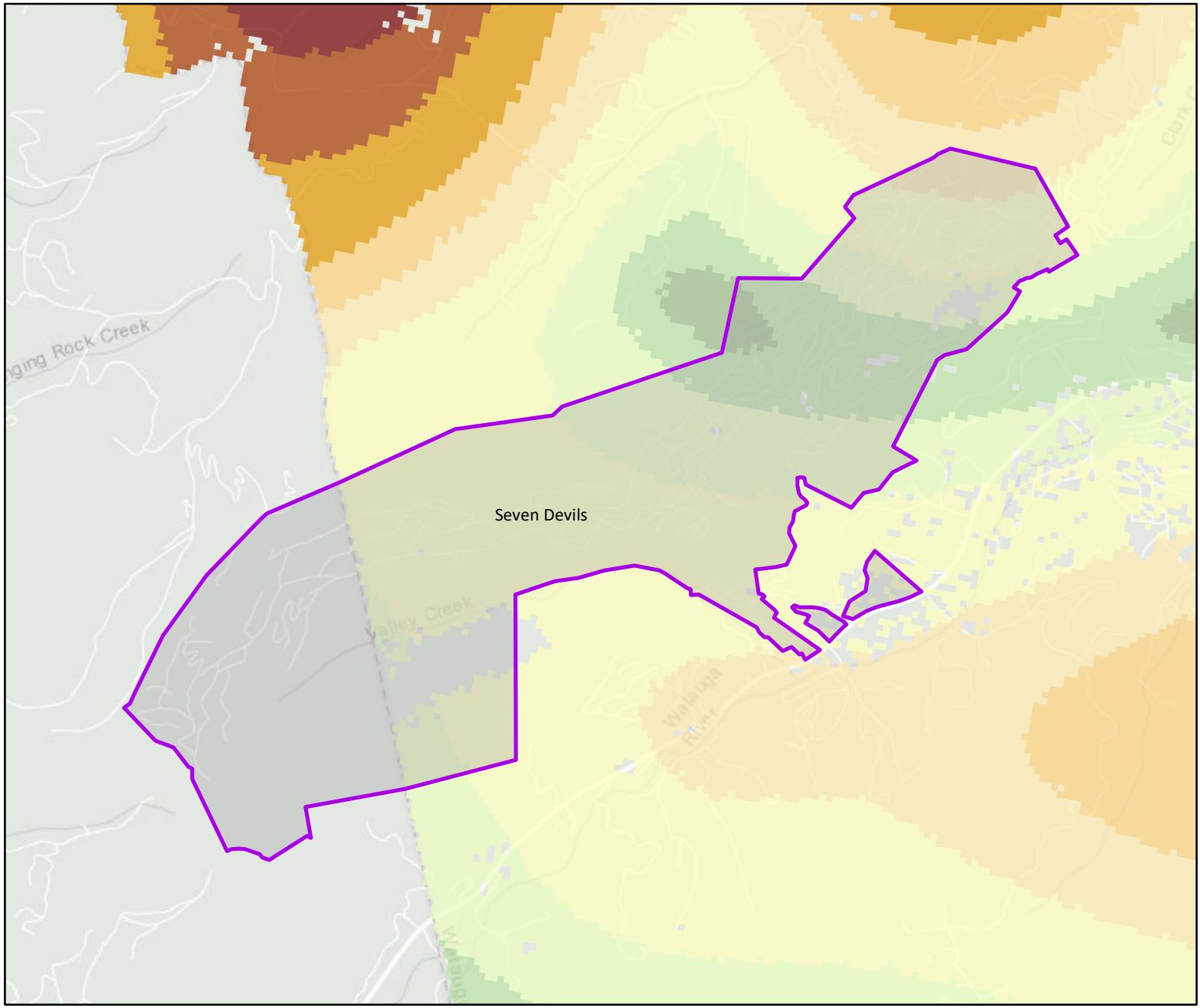
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Seven Devils - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

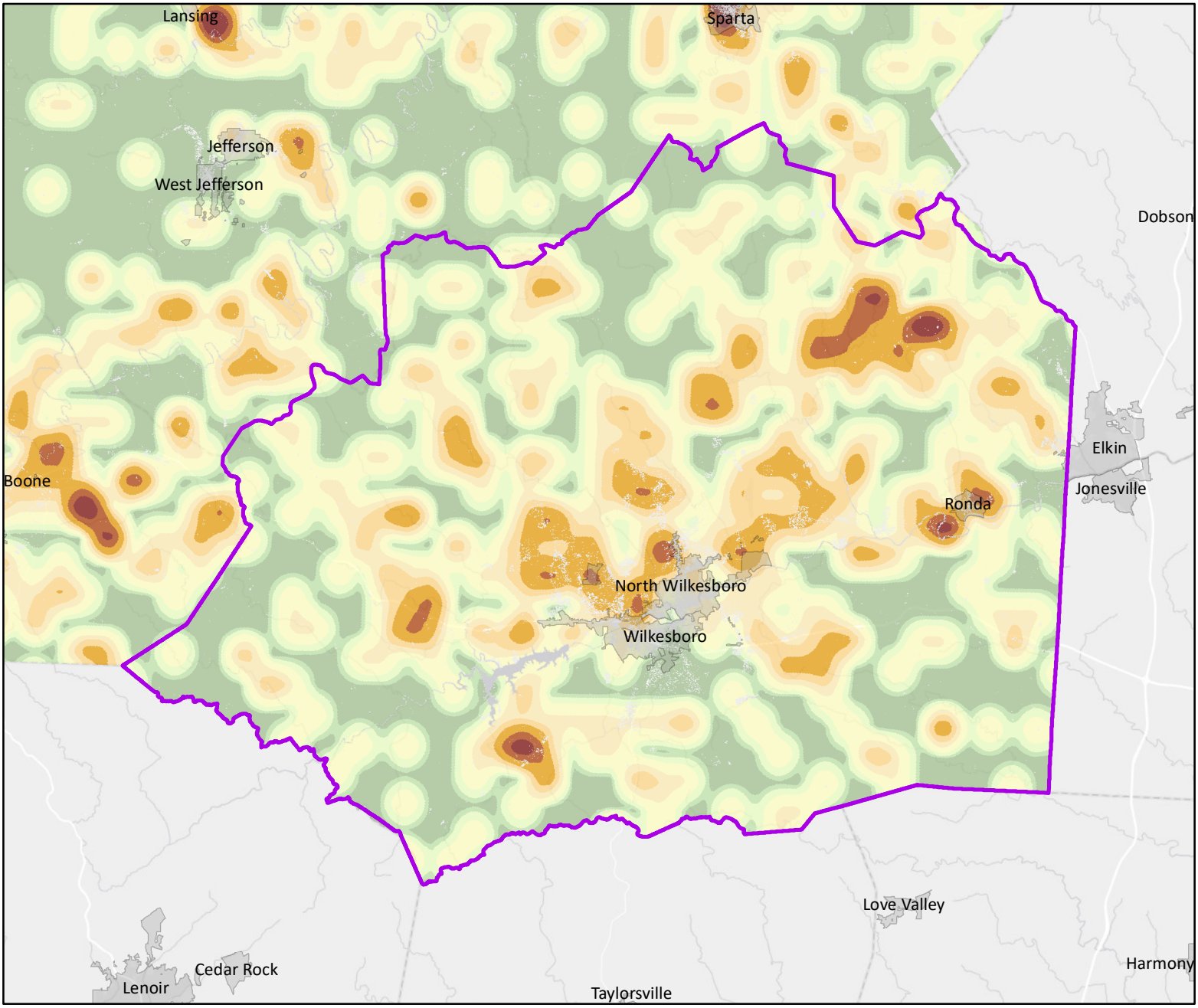
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.25 0.5 1 Miles

N

Wilkes County - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

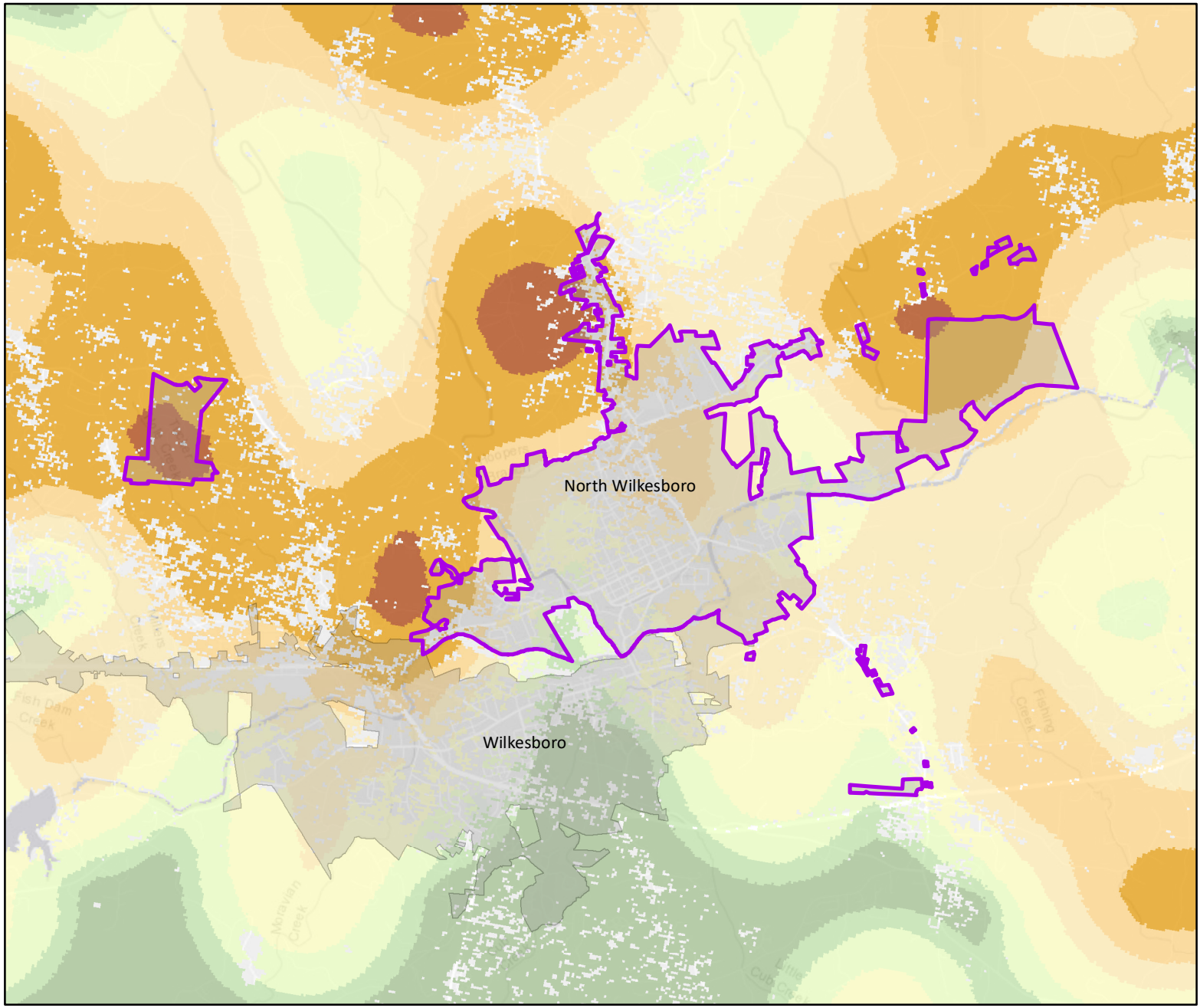
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3.5 7 14 Miles

N

North Wilkesboro - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

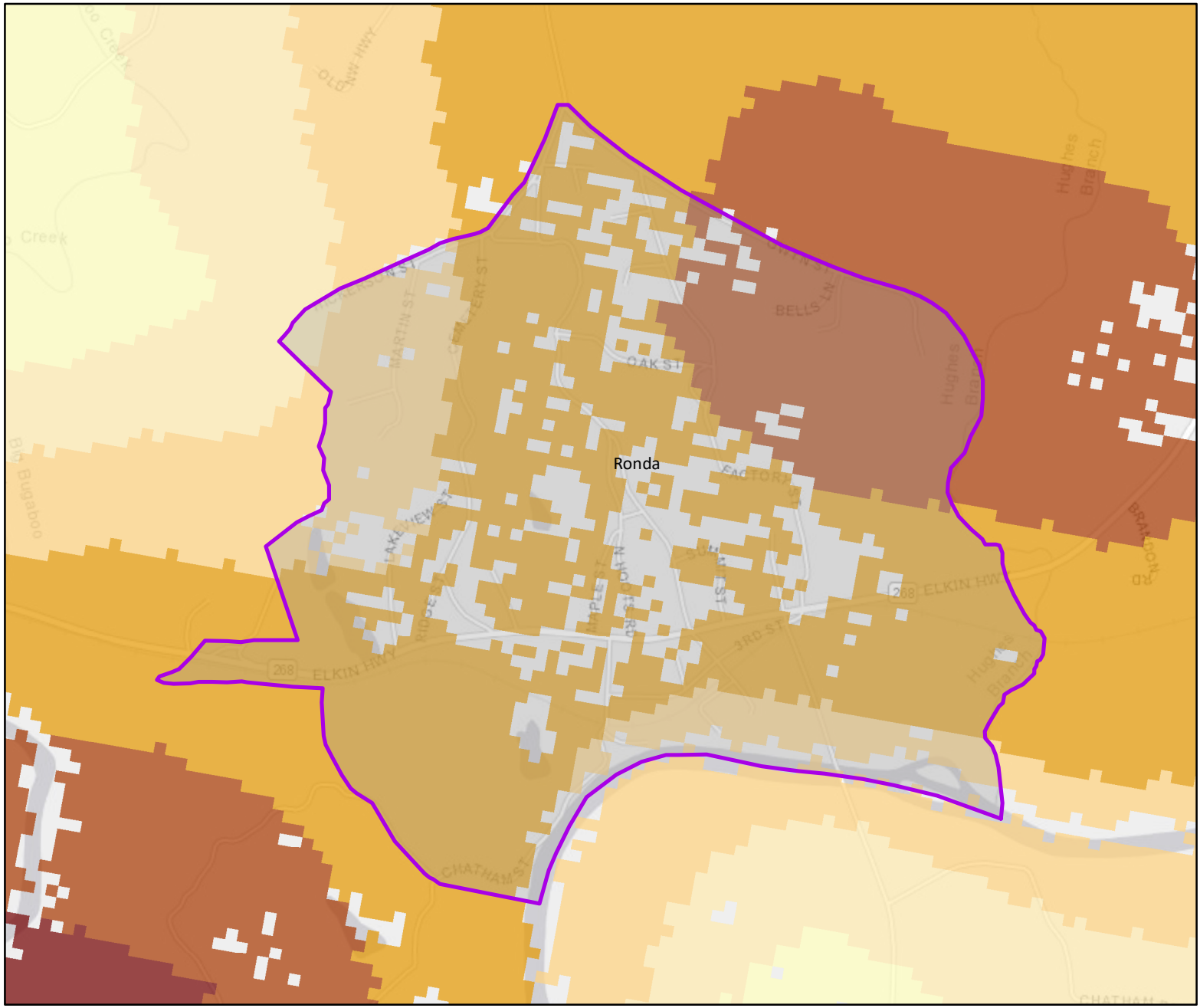
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Ronda - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

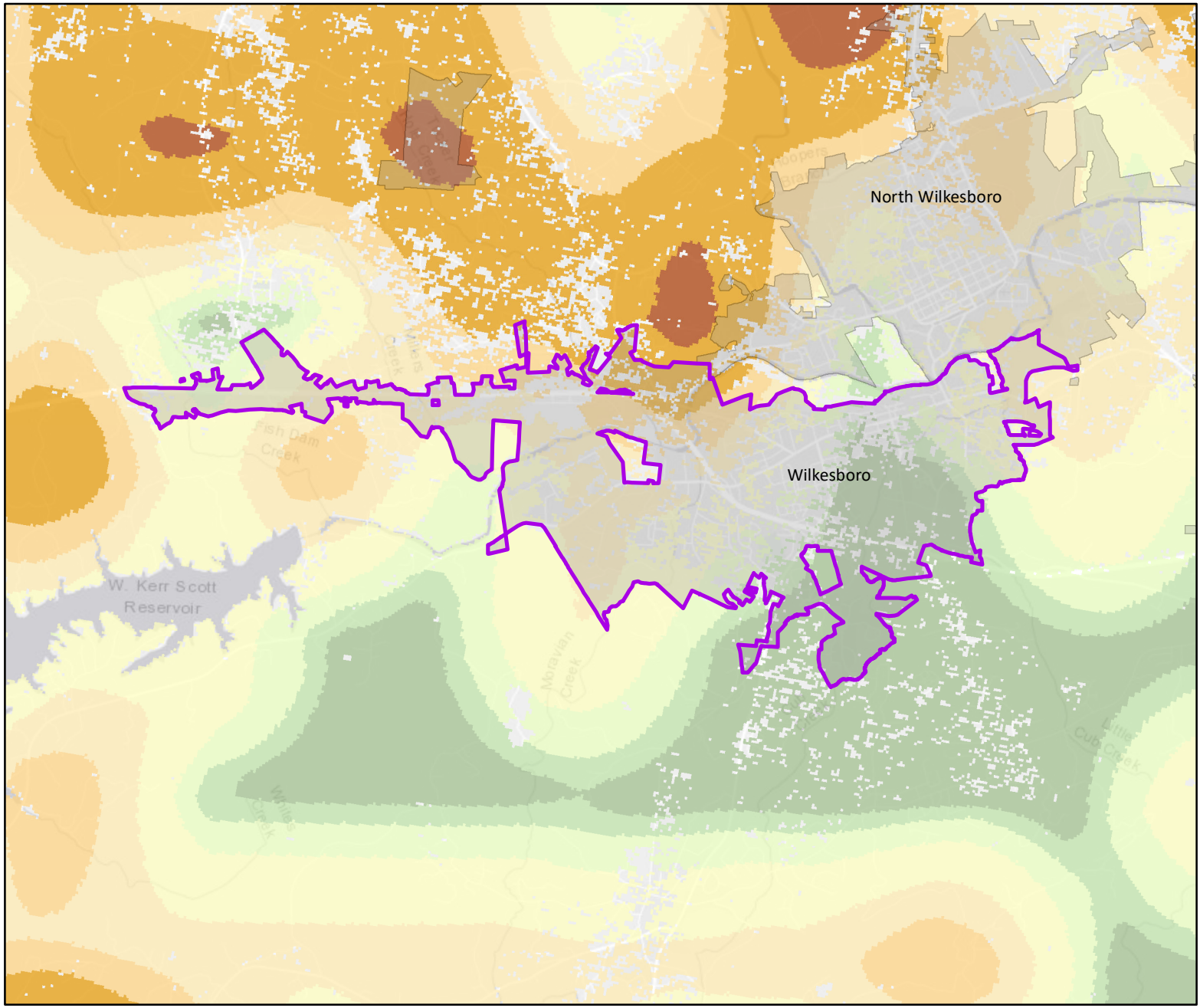
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.125 0.25 0.5 Miles

N

Wilkesboro - Wildfire Ignition Density



Legend

Municipal Boundary

County Boundary

Wildfire Ignition Density Index

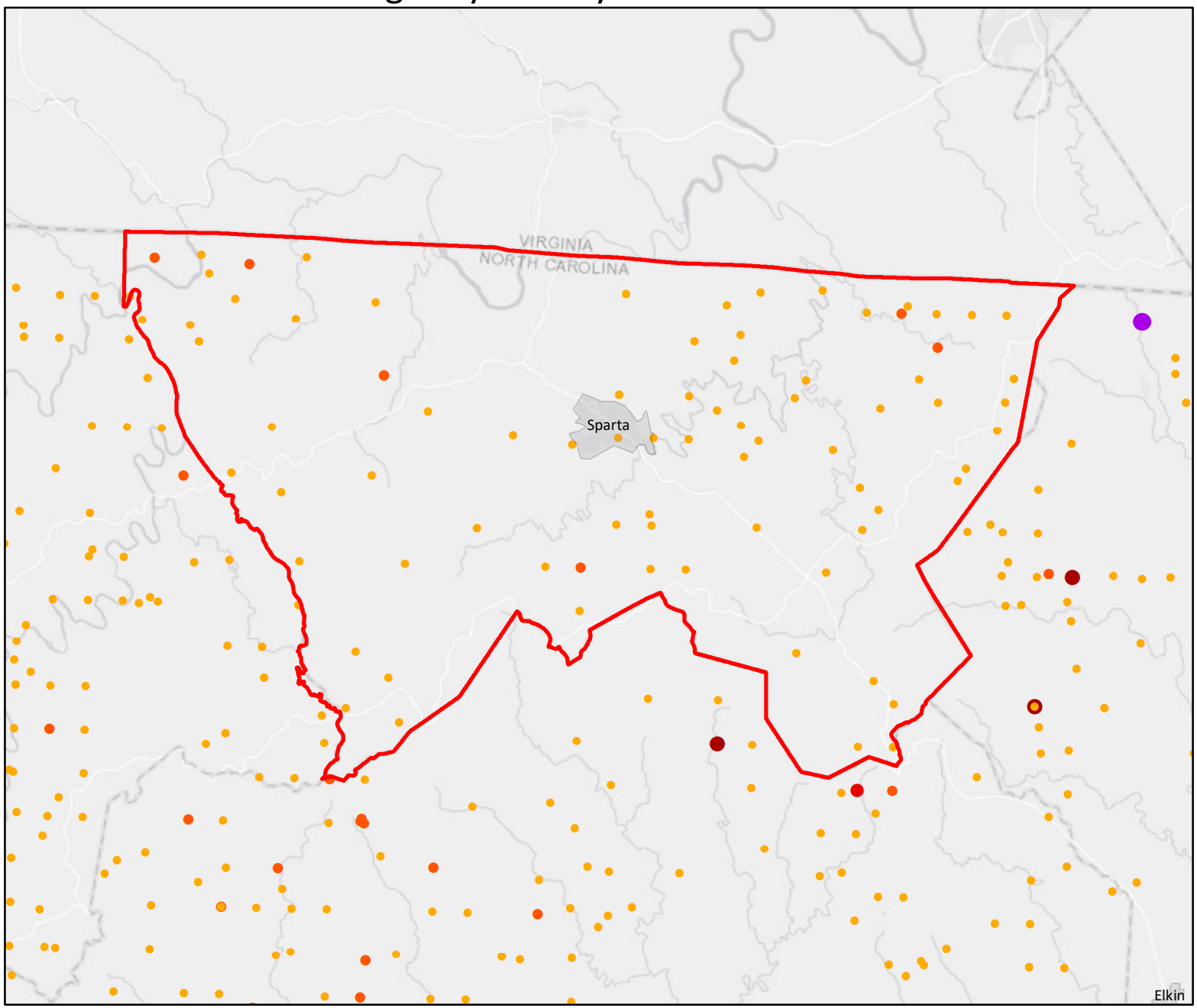
0 1 2 3 4 5 6 7 8 9

Data Source: SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Alleghany County - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

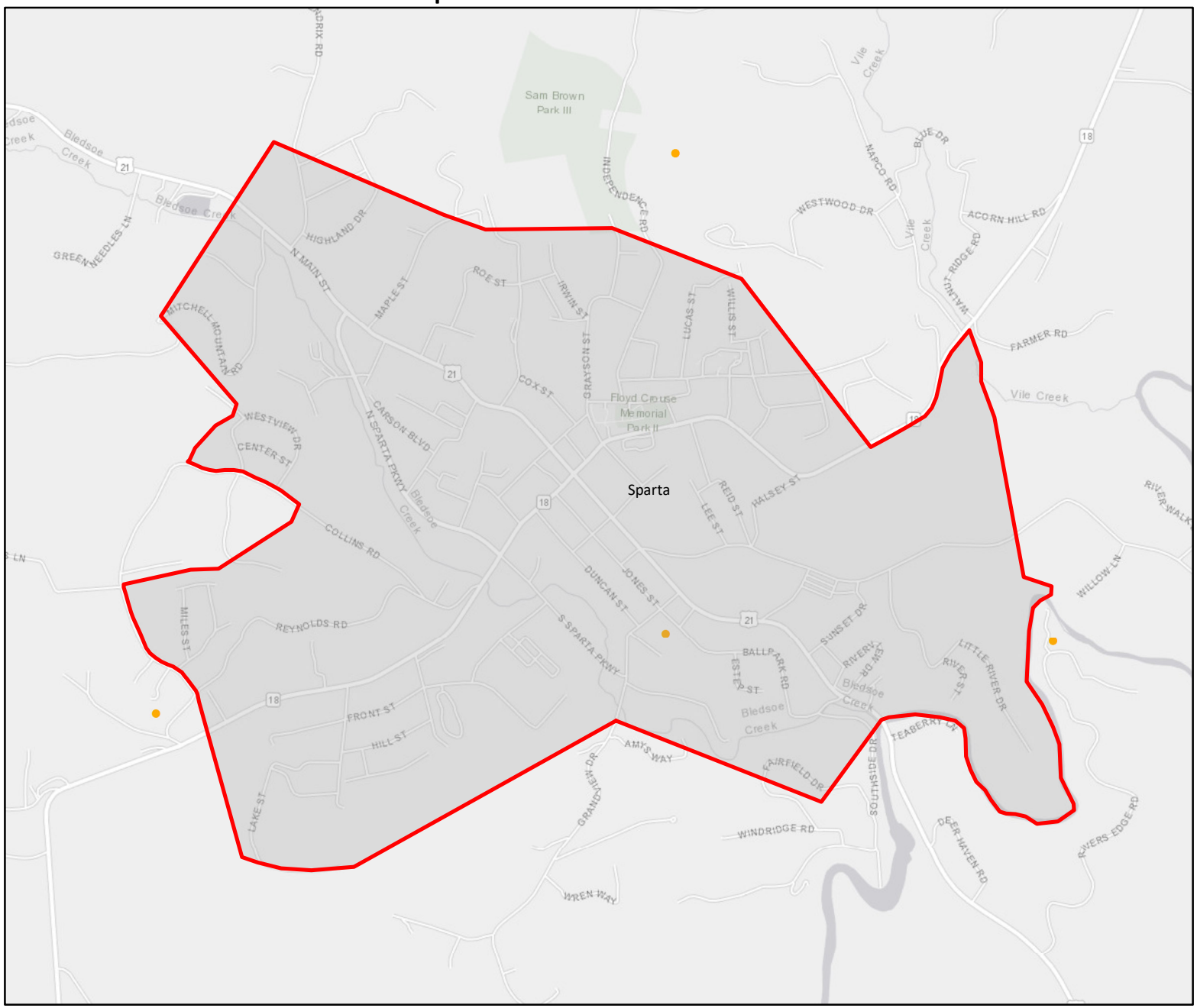
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.25 4.5 9 Miles

N

Sparta - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

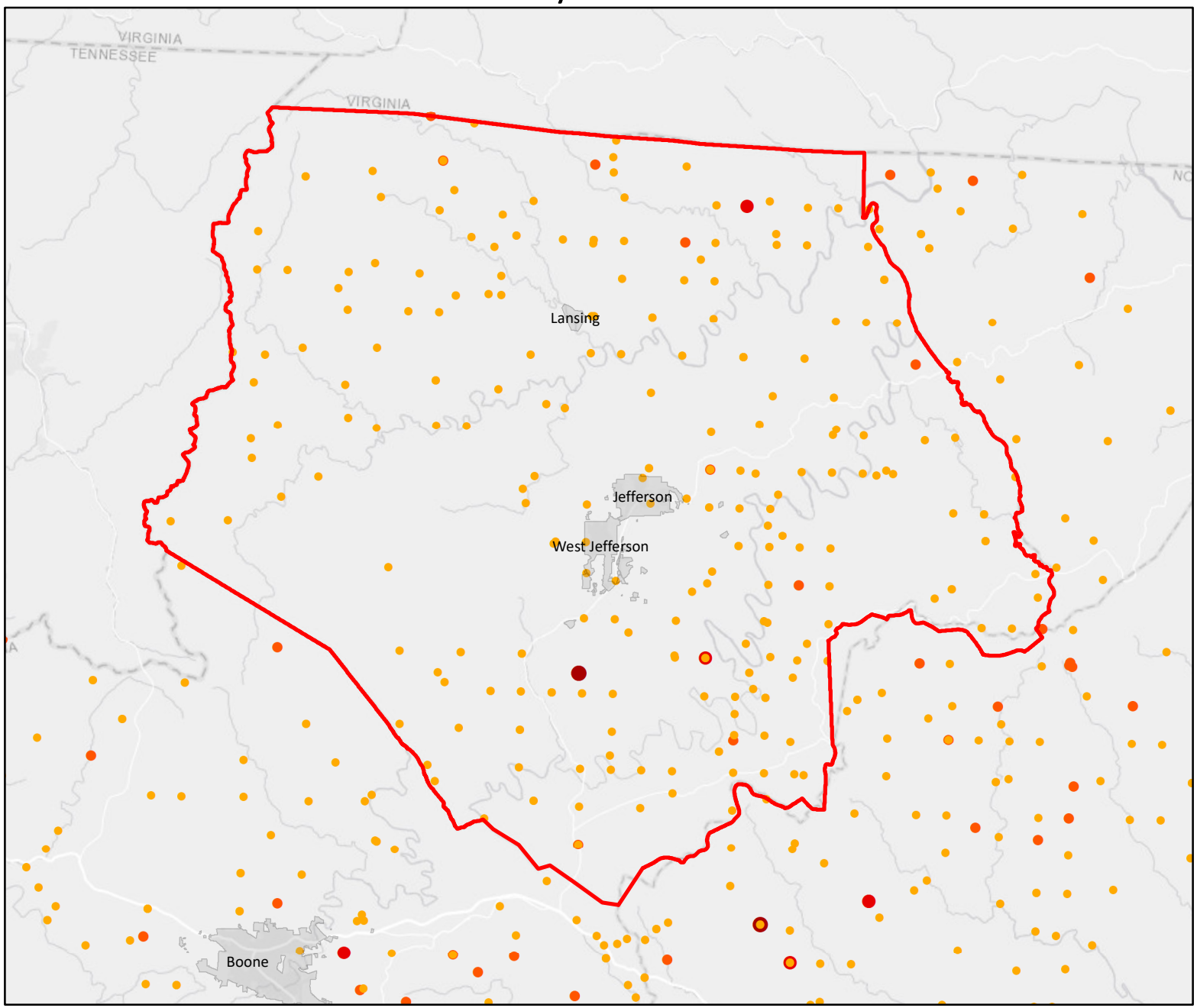
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

Ashe County - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

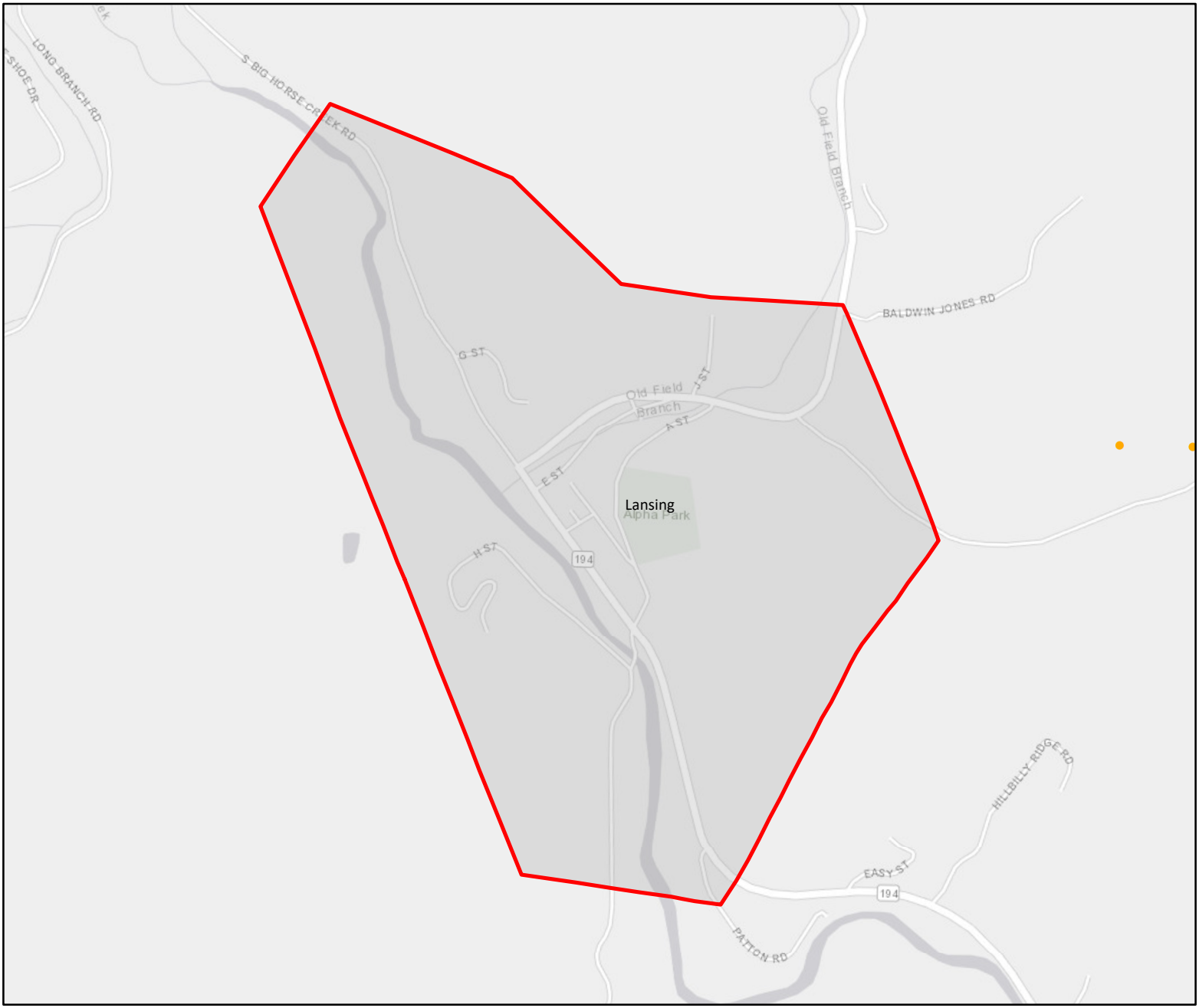
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.5 5 10 Miles

N

Lansing - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

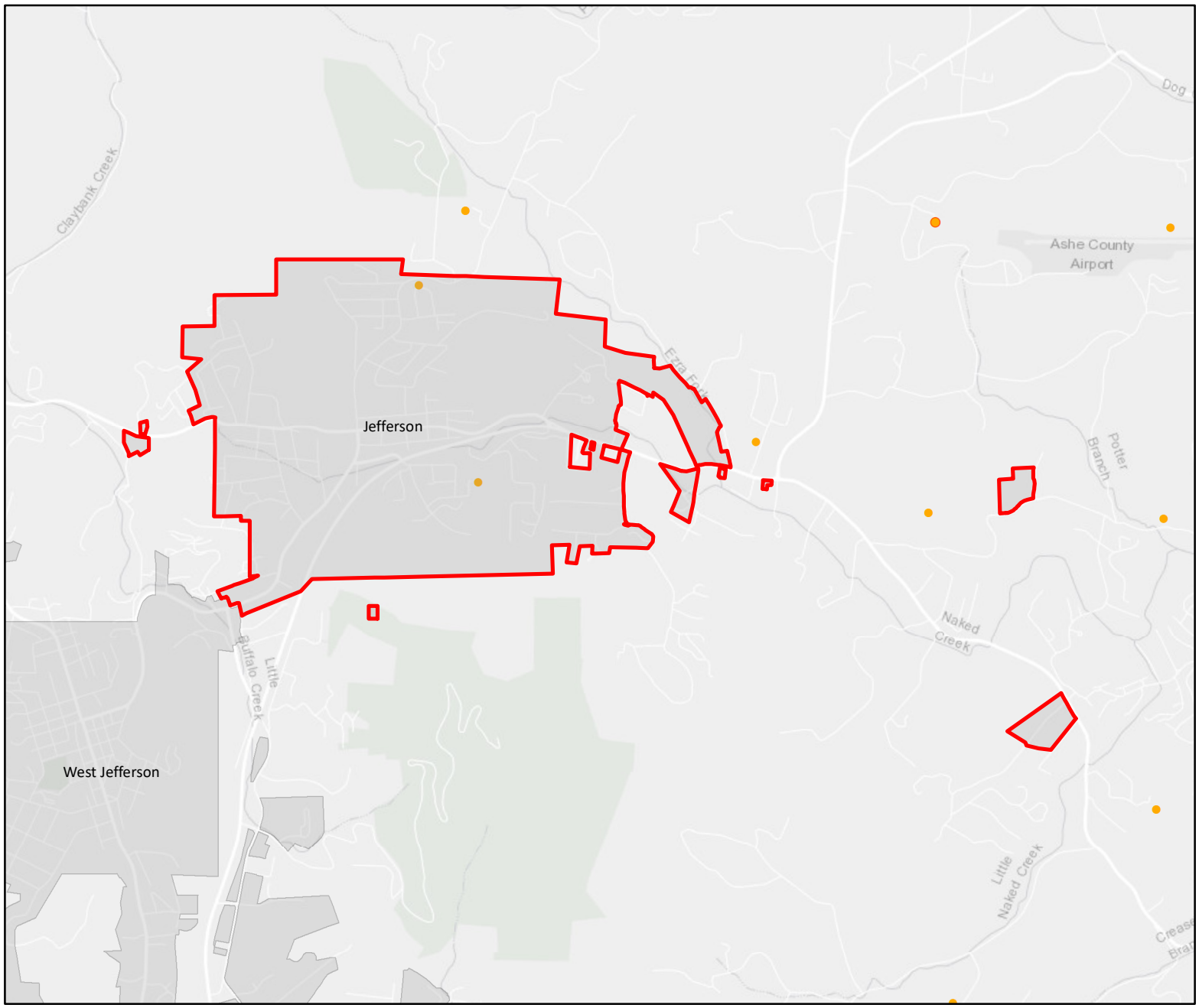
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.075 0.15 0.3 Miles

N

Jefferson - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

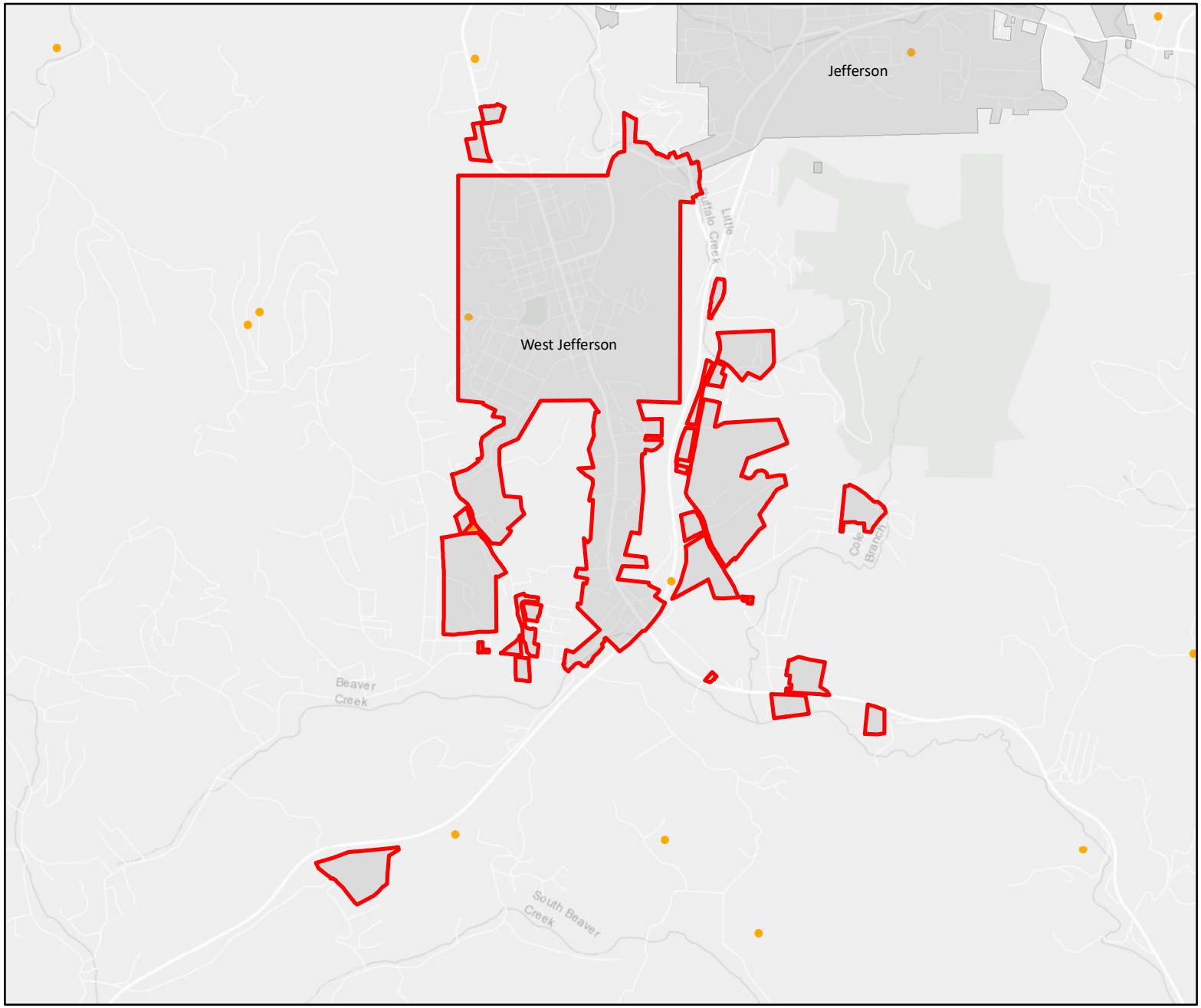
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.35 0.7 1.4 Miles

N

West Jefferson - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

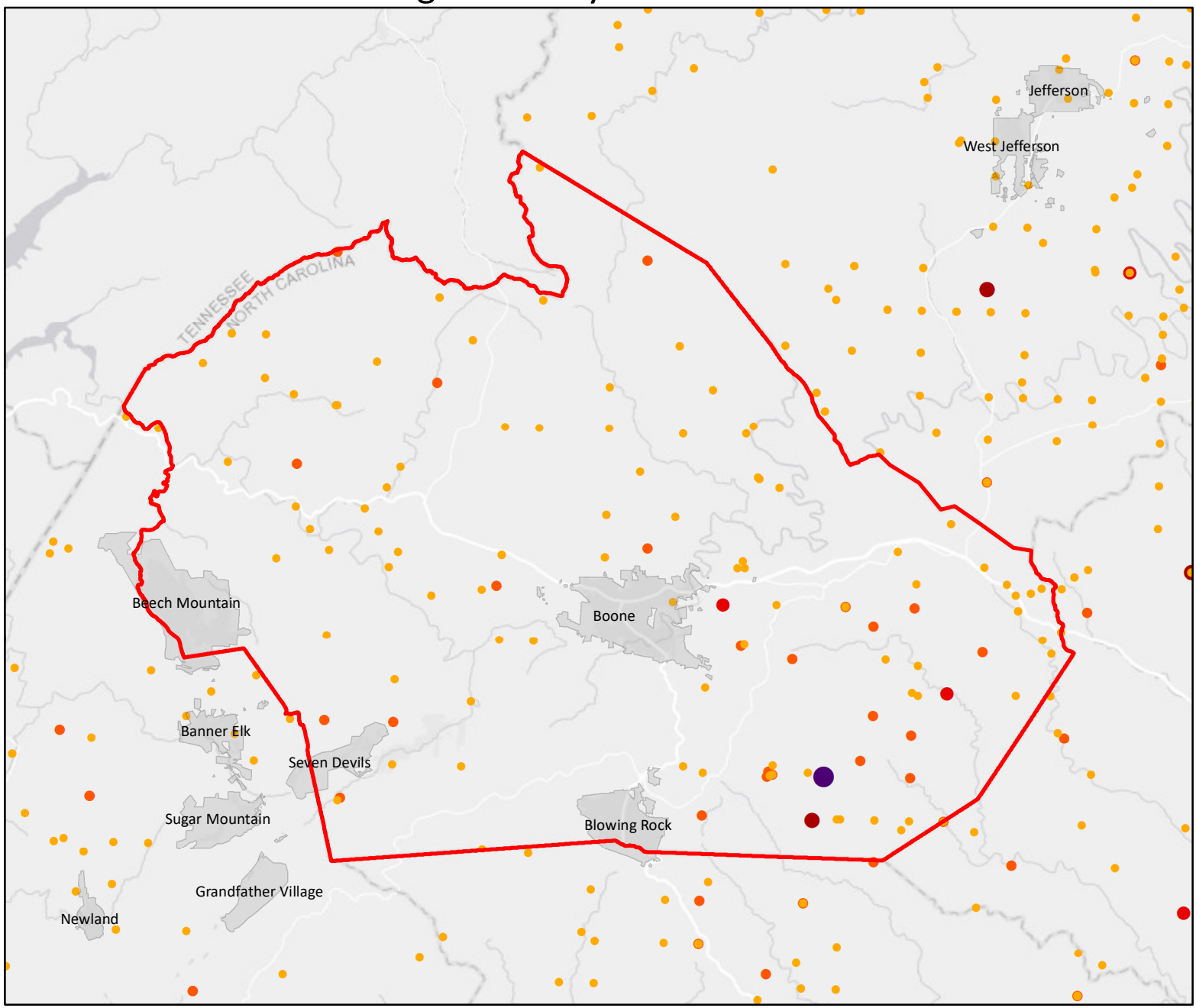
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.375 0.75 1.5 Miles

N

Watagua County - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

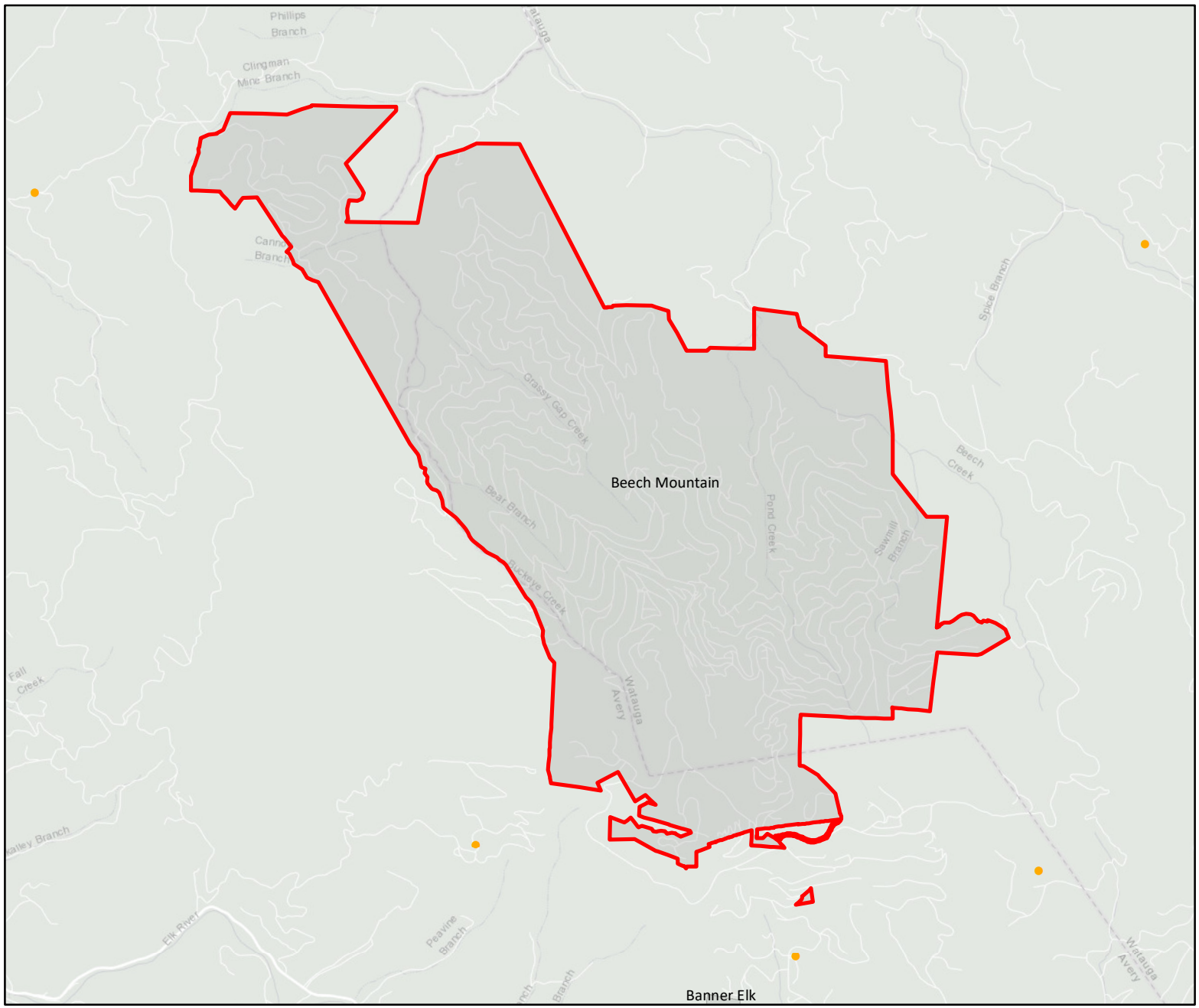
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.25 4.5 9 Miles

N

Beech Mountain - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

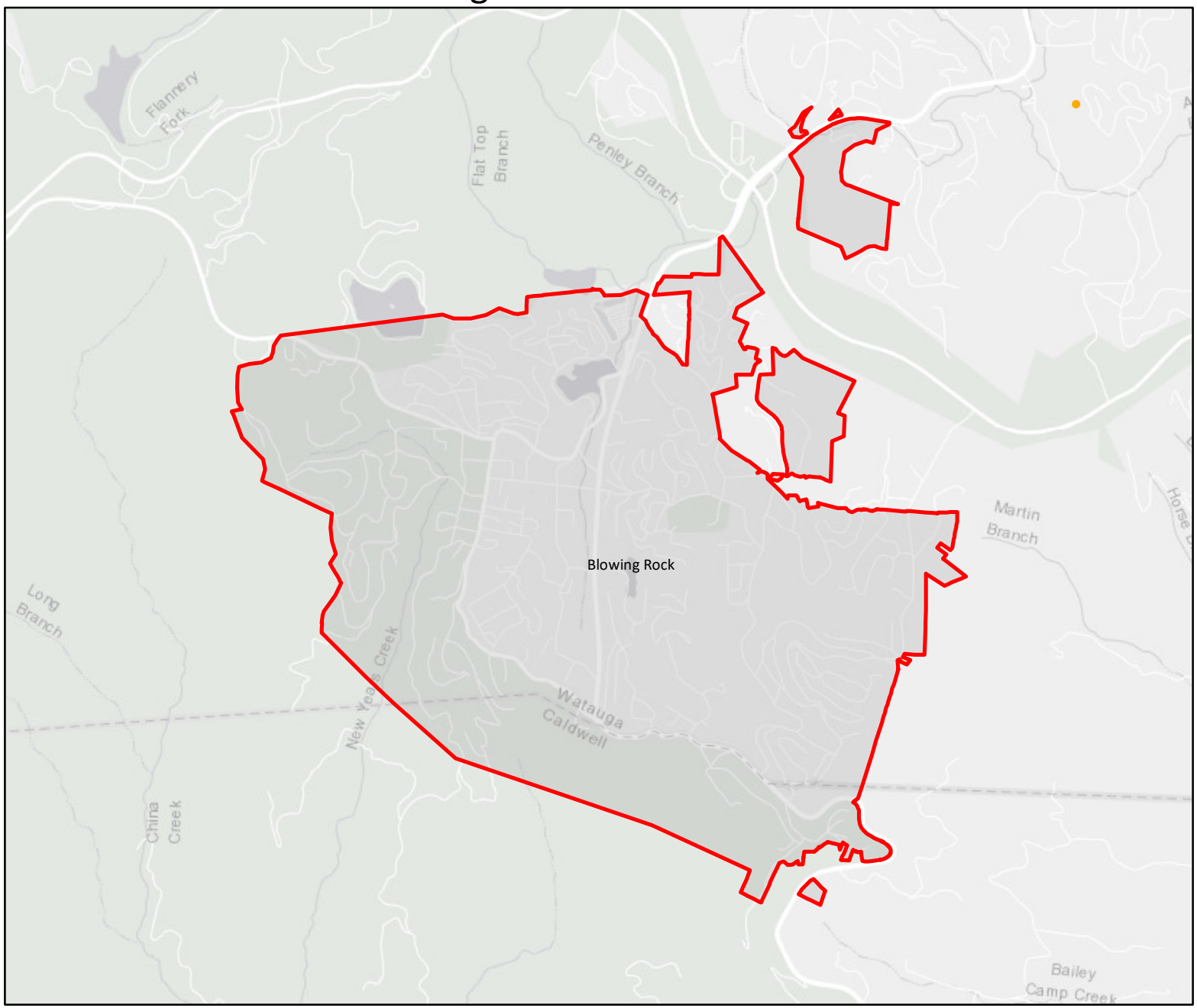
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.425 0.85 1.7 Miles

N

Blowing Rock - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

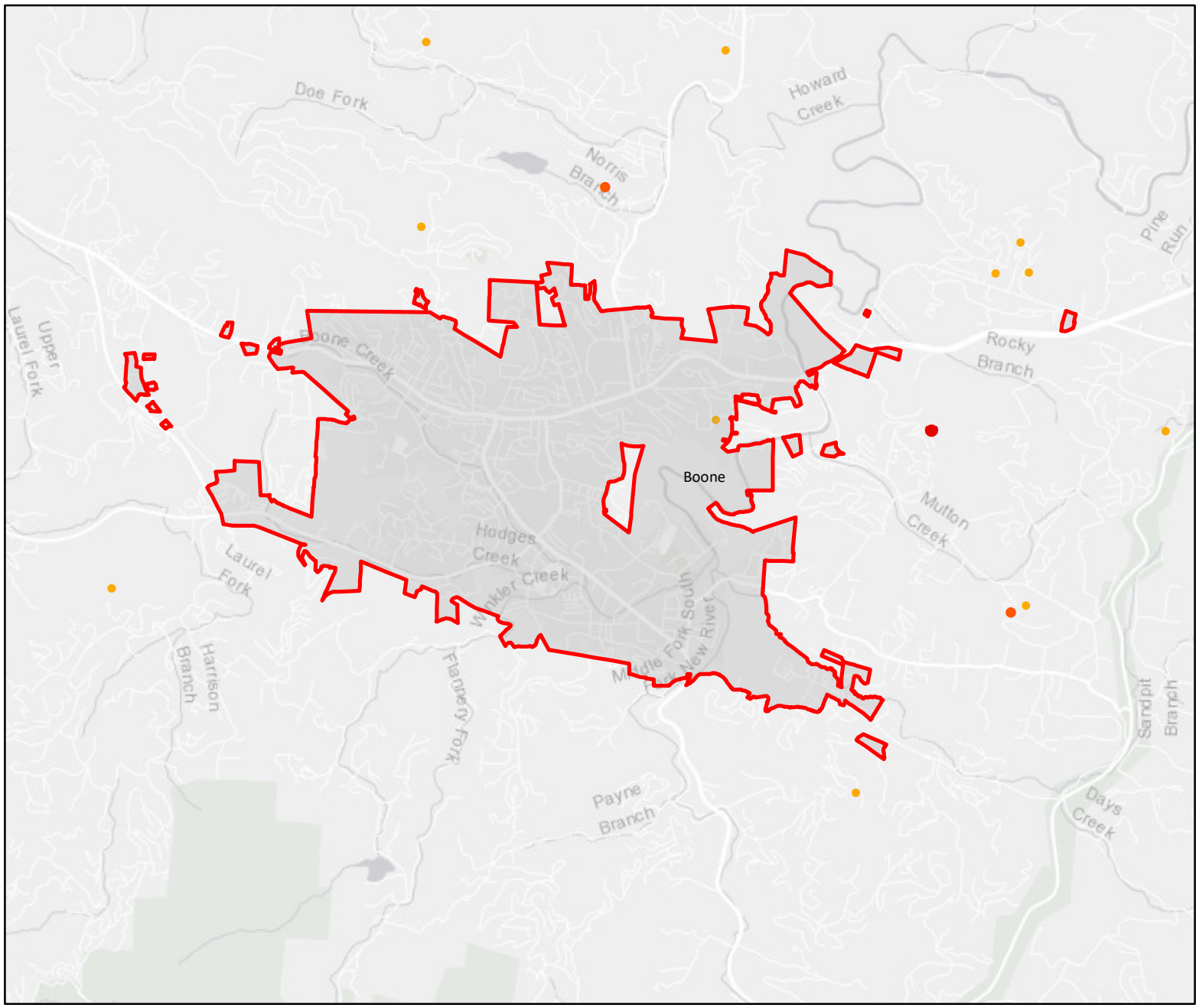
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.3 0.6 1.2 Miles

N

Boone - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

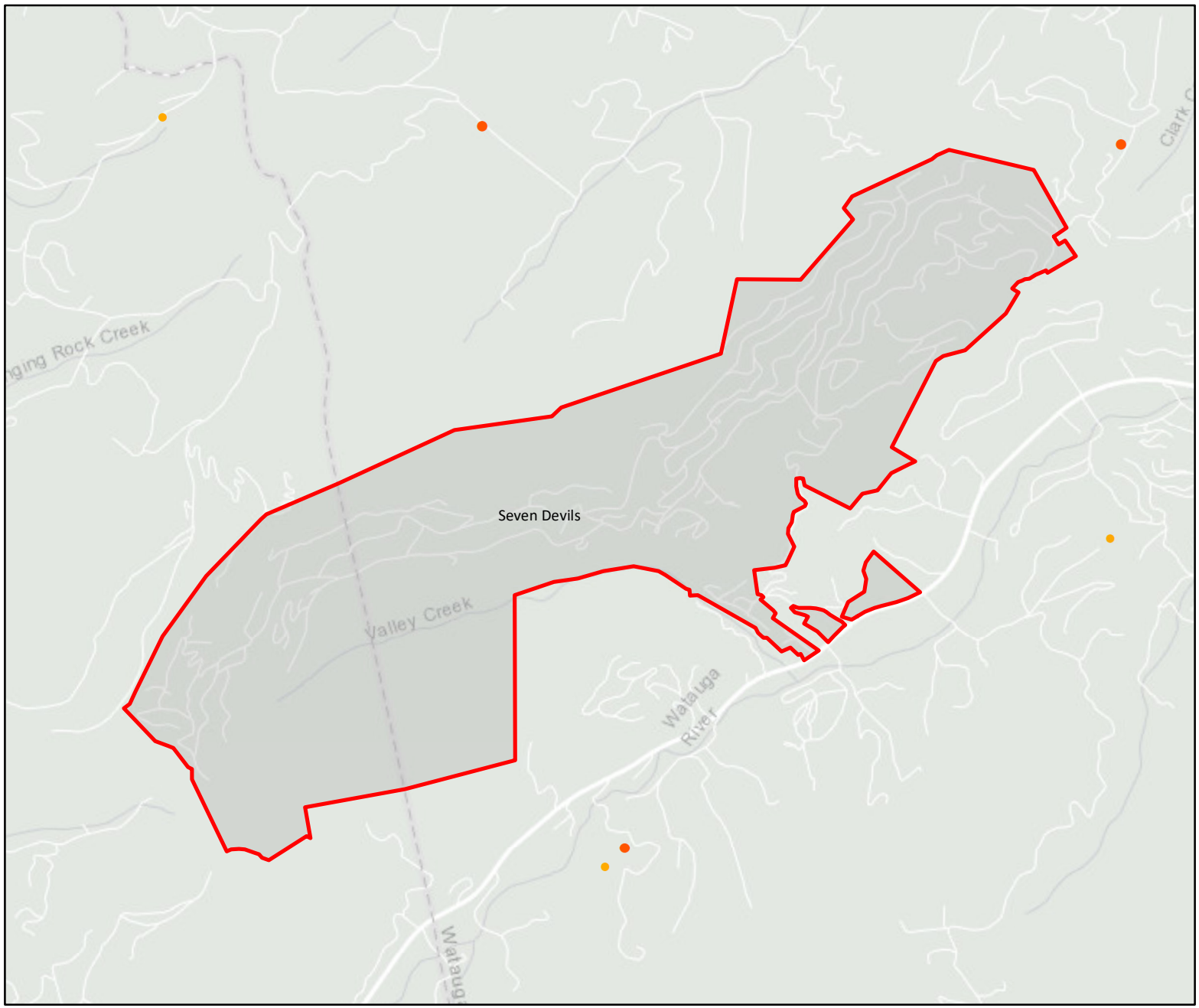
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Seven Devils - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

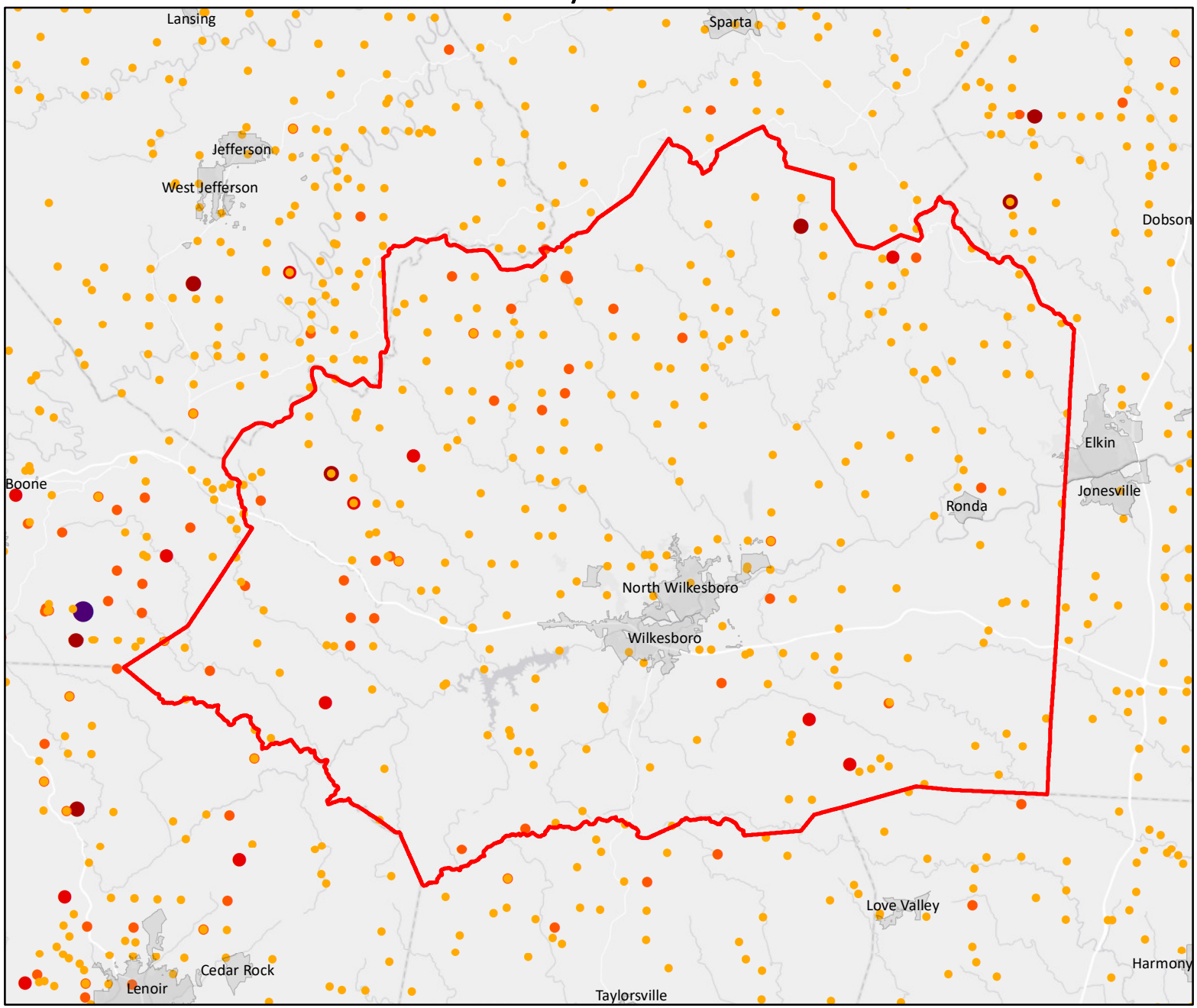
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.25 0.5 1 Miles

N

Wilkes County - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

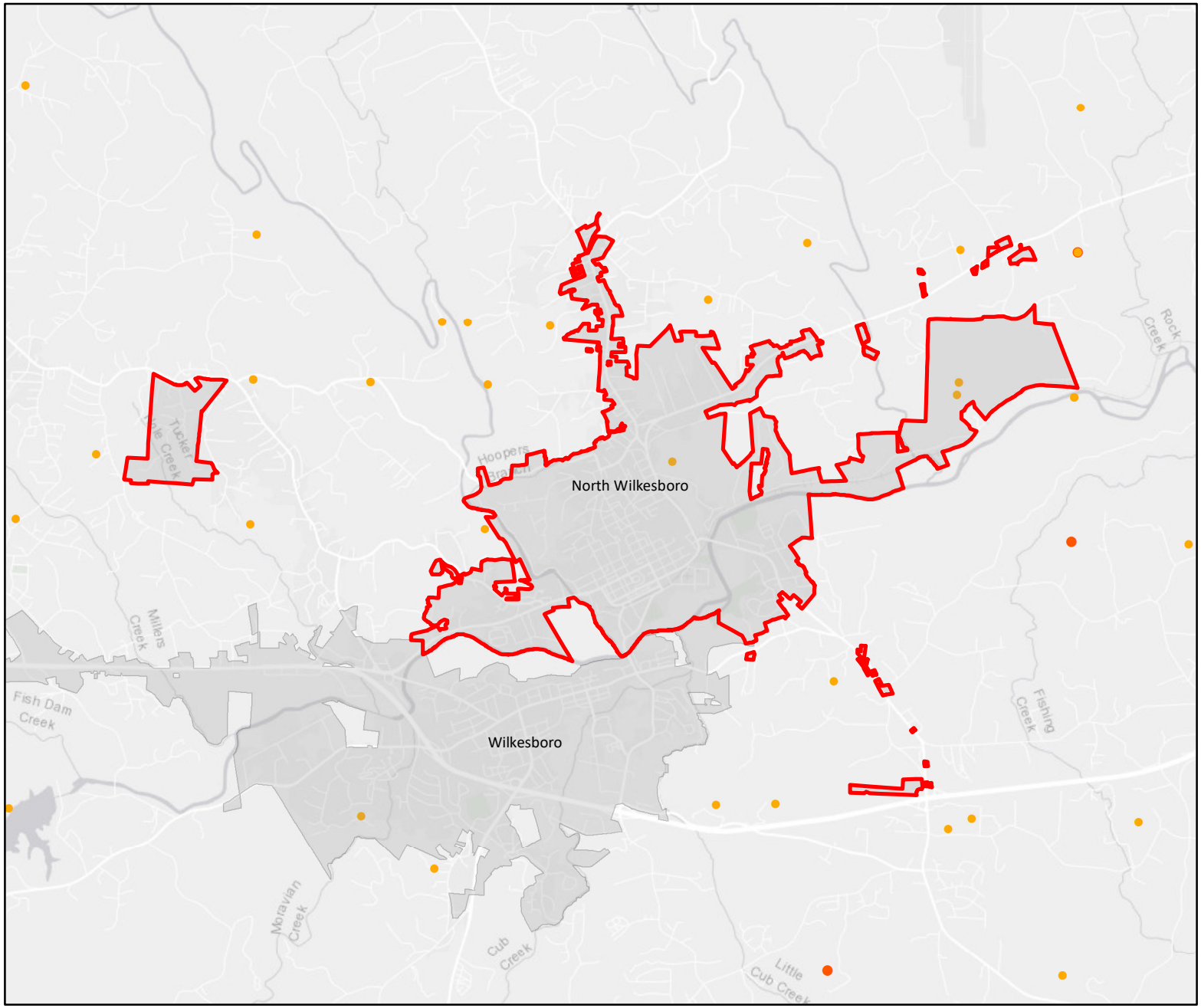
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3.5 7 14 Miles

N

North Wilkesboro - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

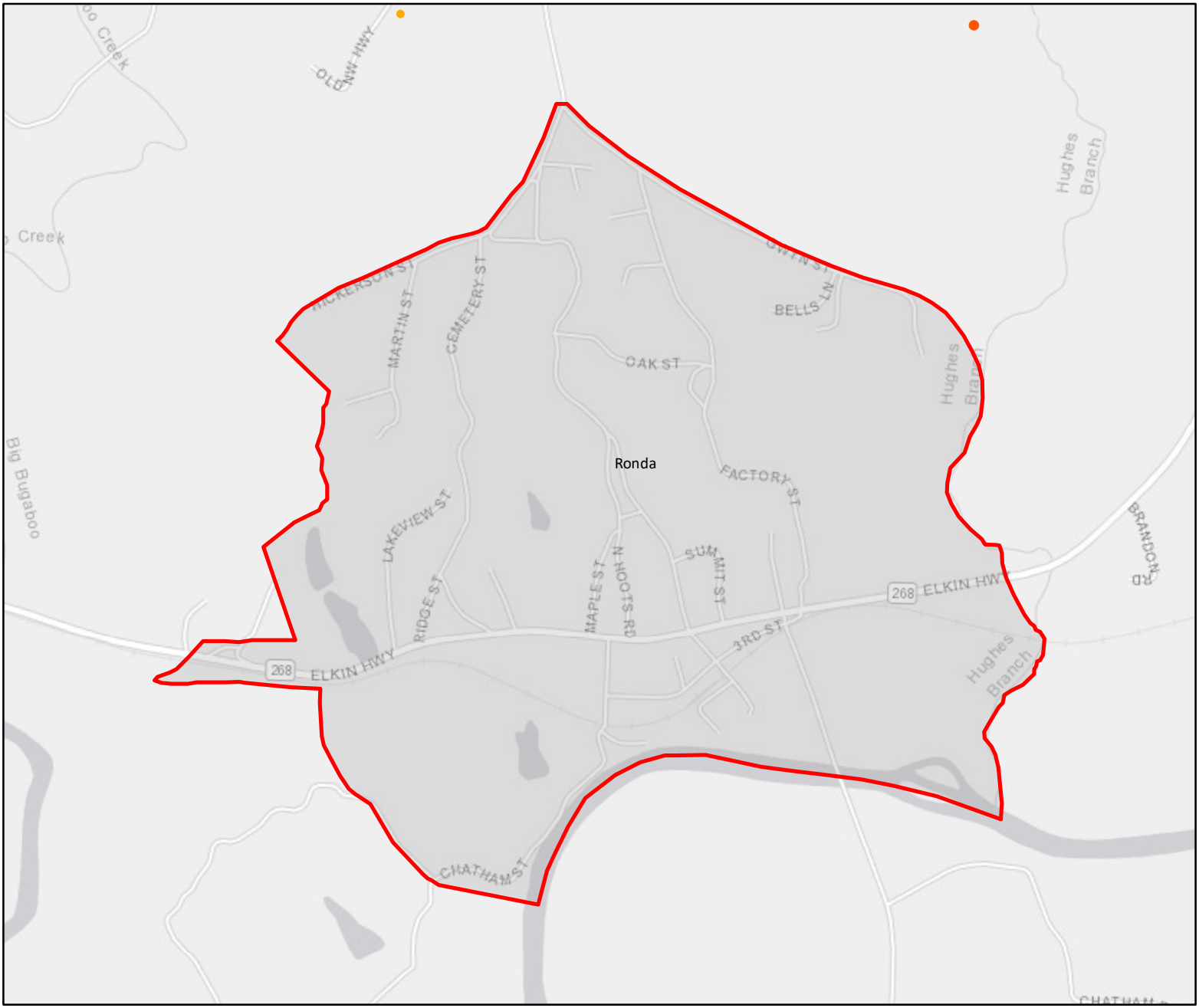
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Ronda - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

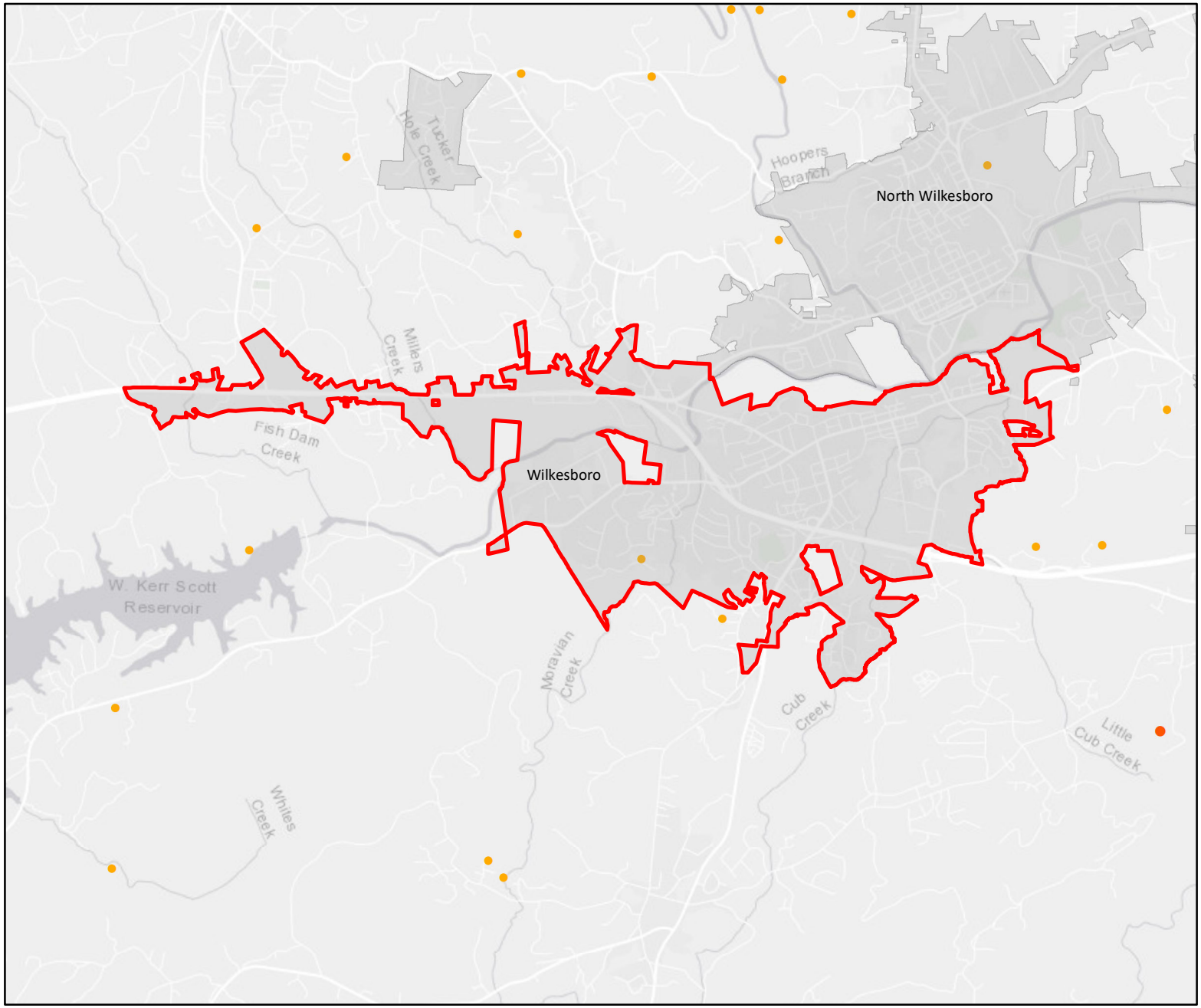
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.125 0.25 0.5 Miles

N

Wilkesboro - Wildfire Events



Legend

- Municipal Boundary
- County Boundary

Acres Impacted

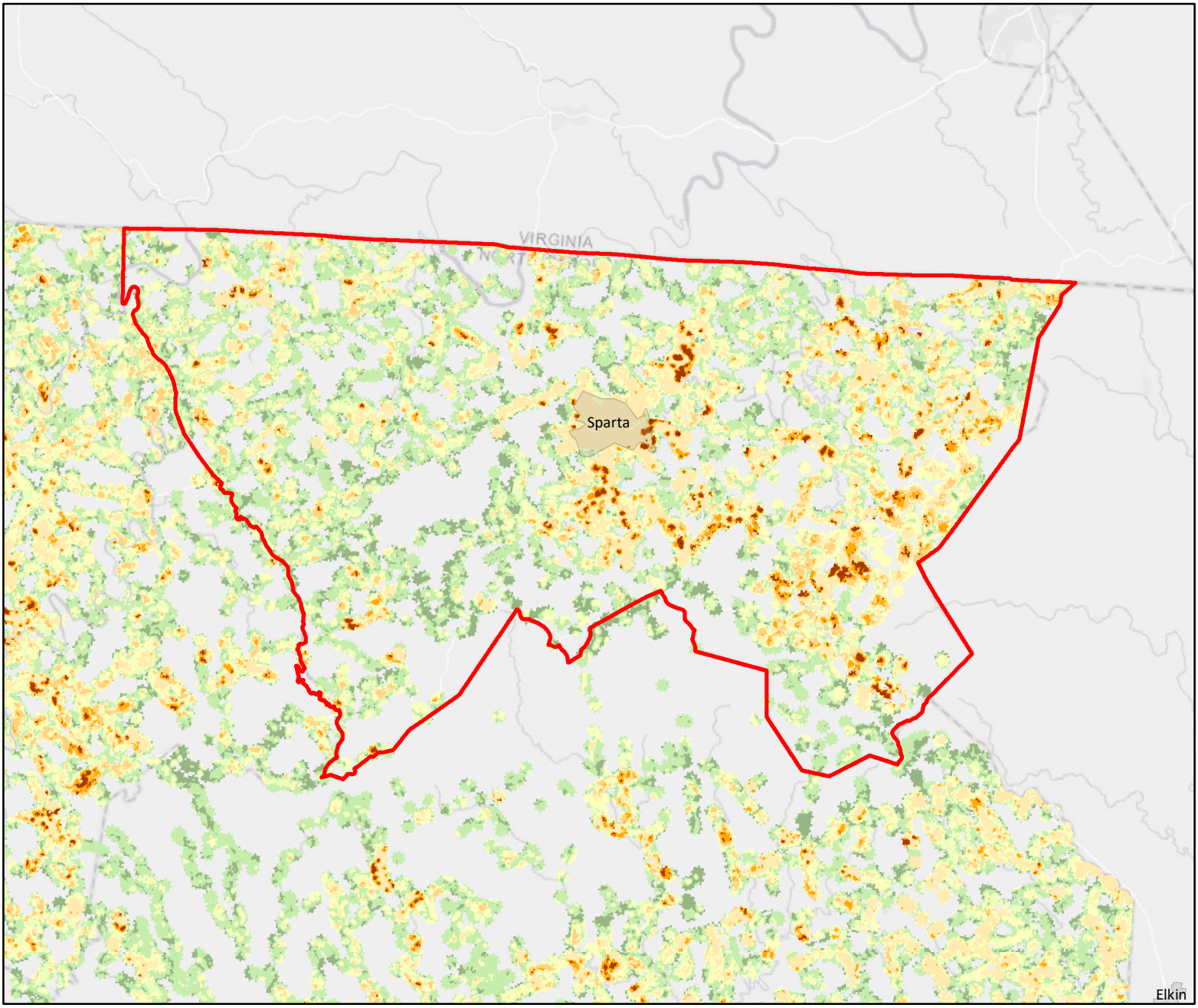
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Alleghany County - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

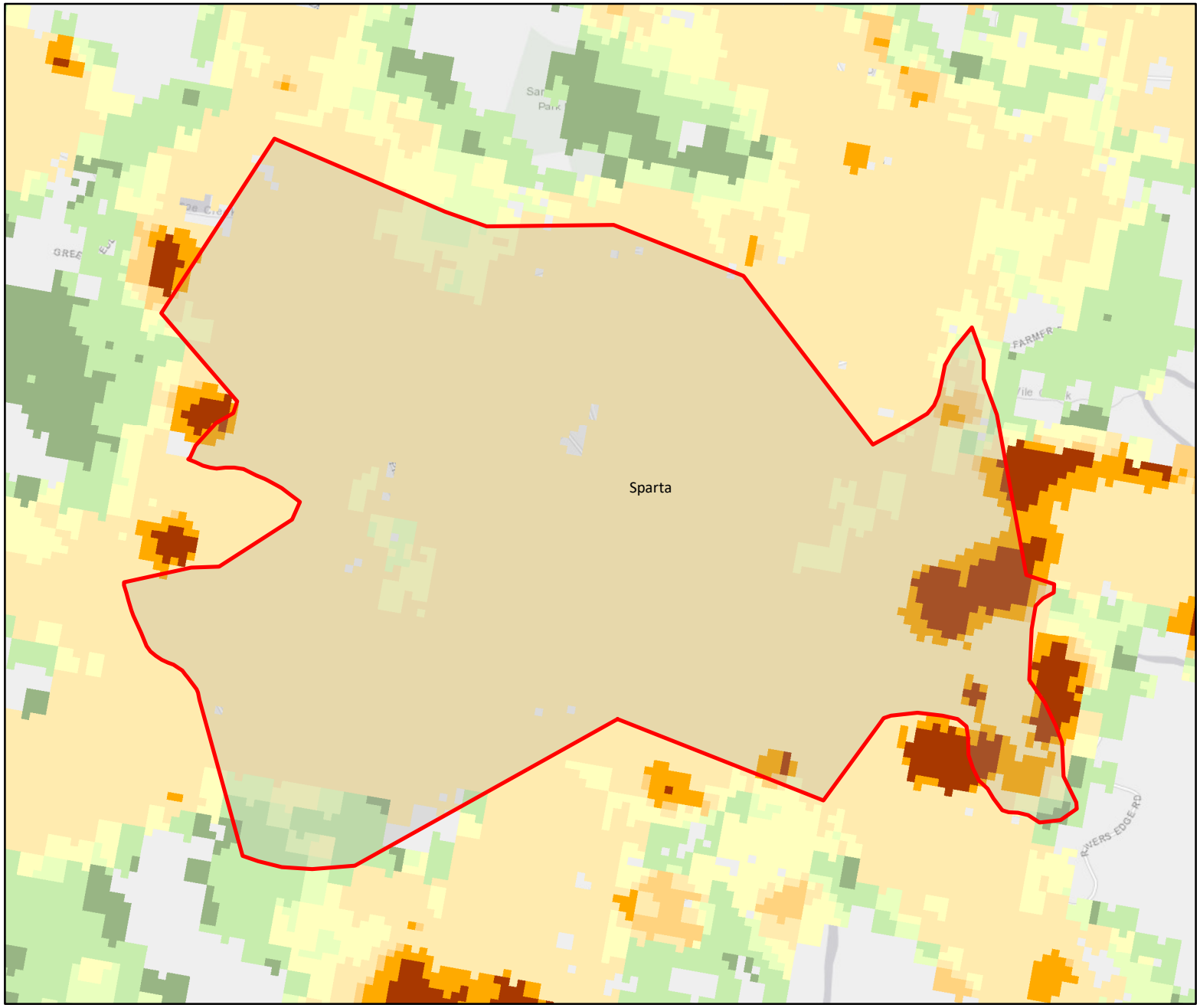
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.25 4.5 9 Miles

N

Sparta - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

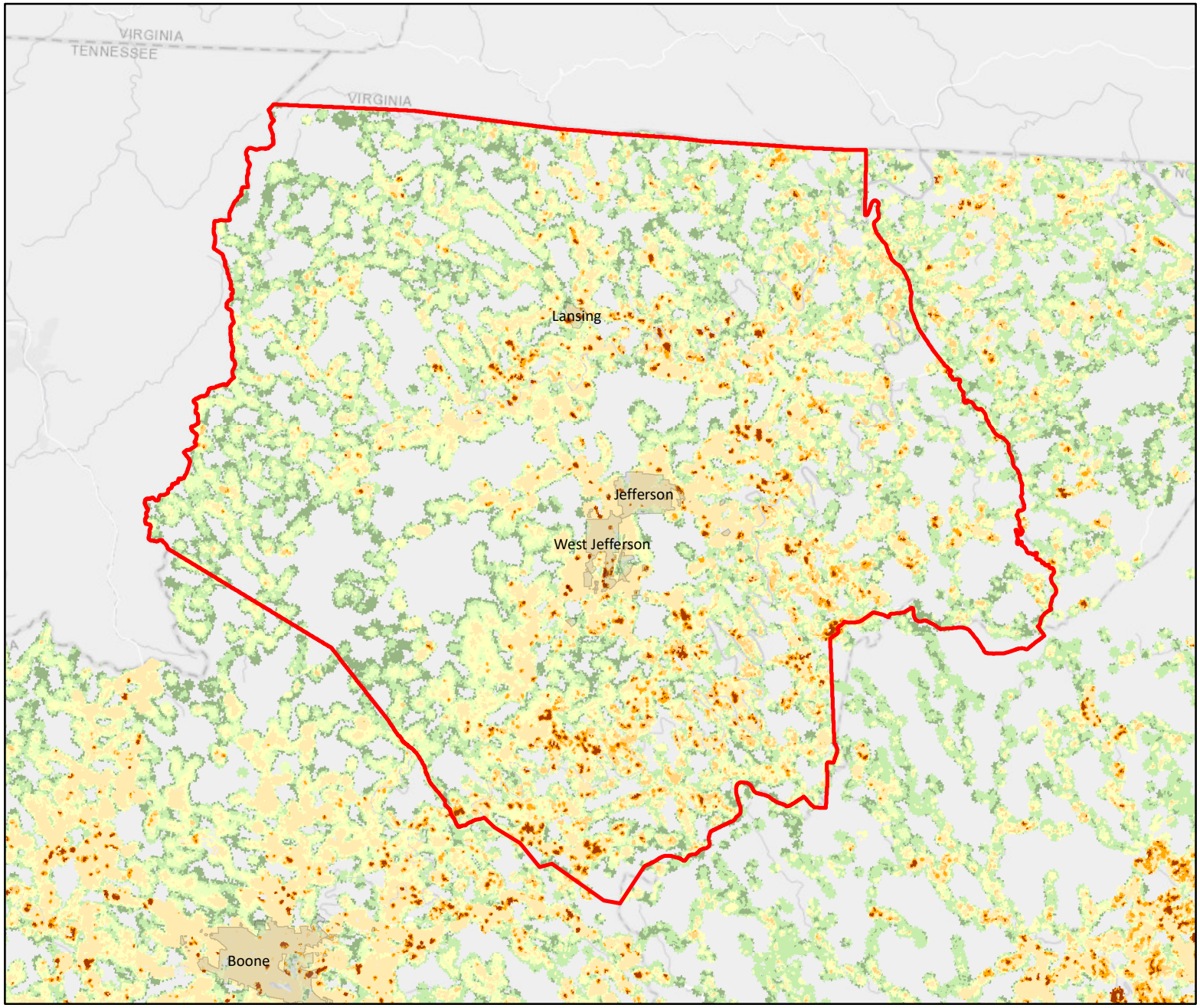
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

Ashe County - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

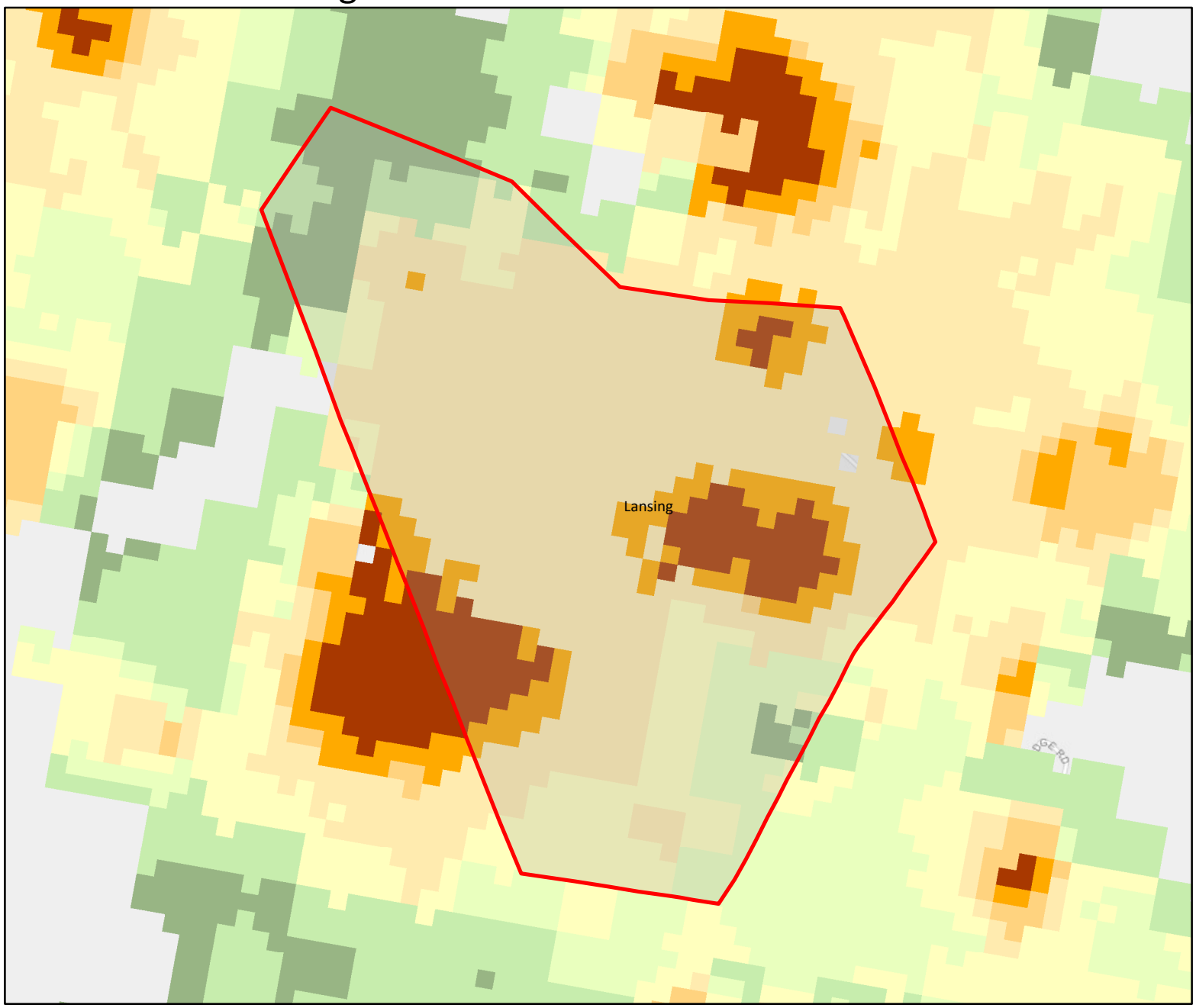
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.5 5 10 Miles

N

Lansing - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

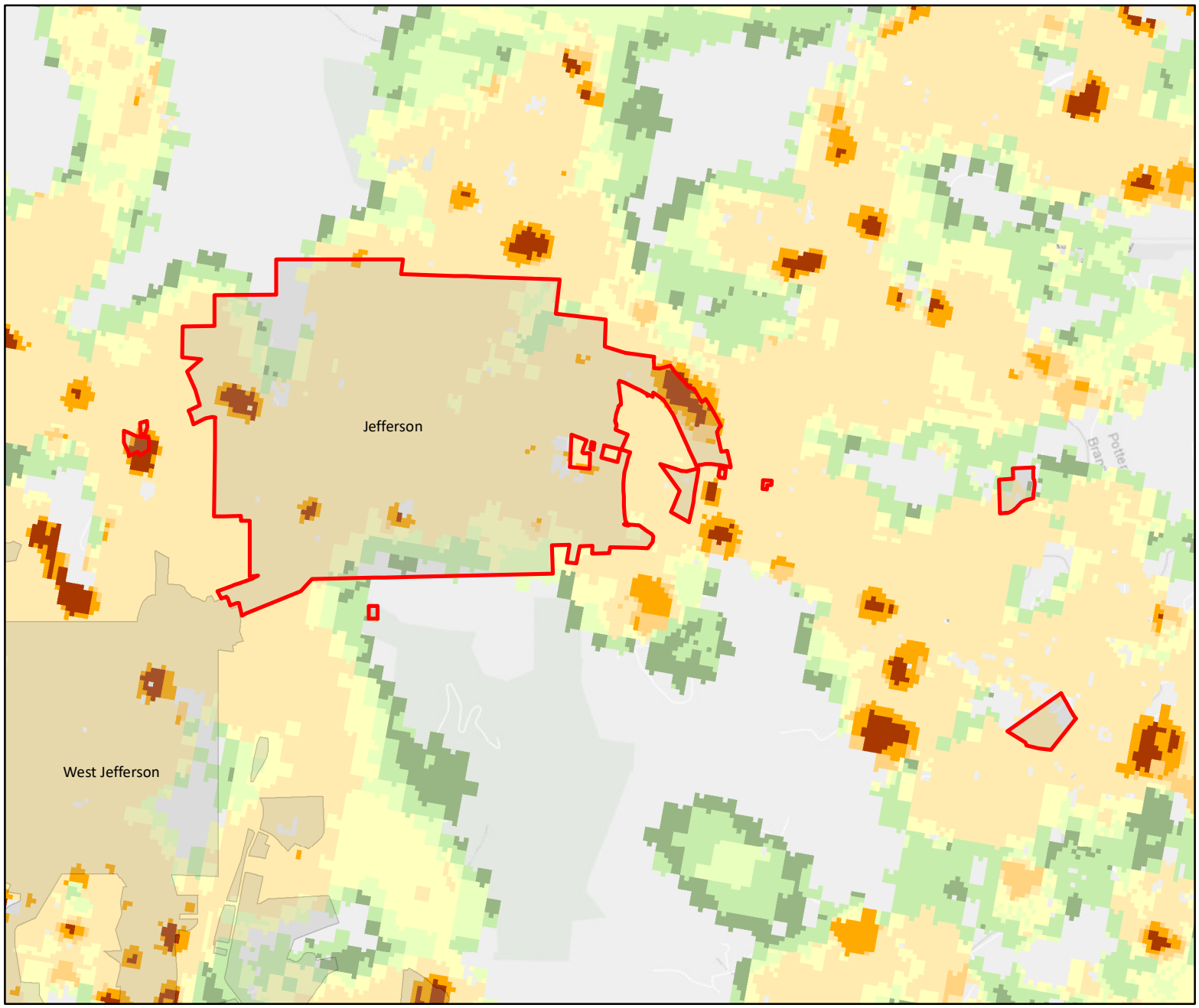
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.075 0.15 0.3 Miles

N

Jefferson - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

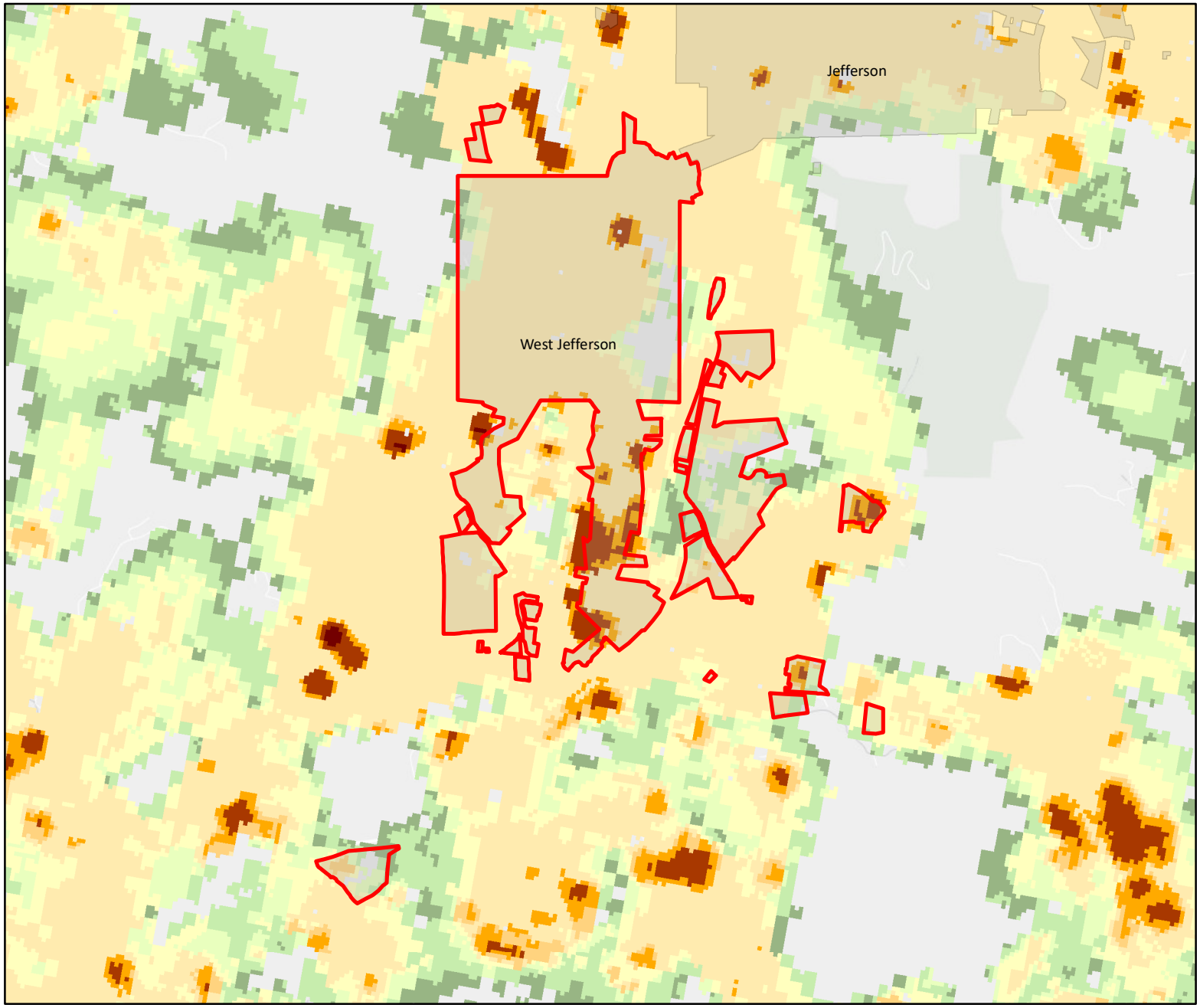
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.35 0.7 1.4 Miles

N

West Jefferson - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

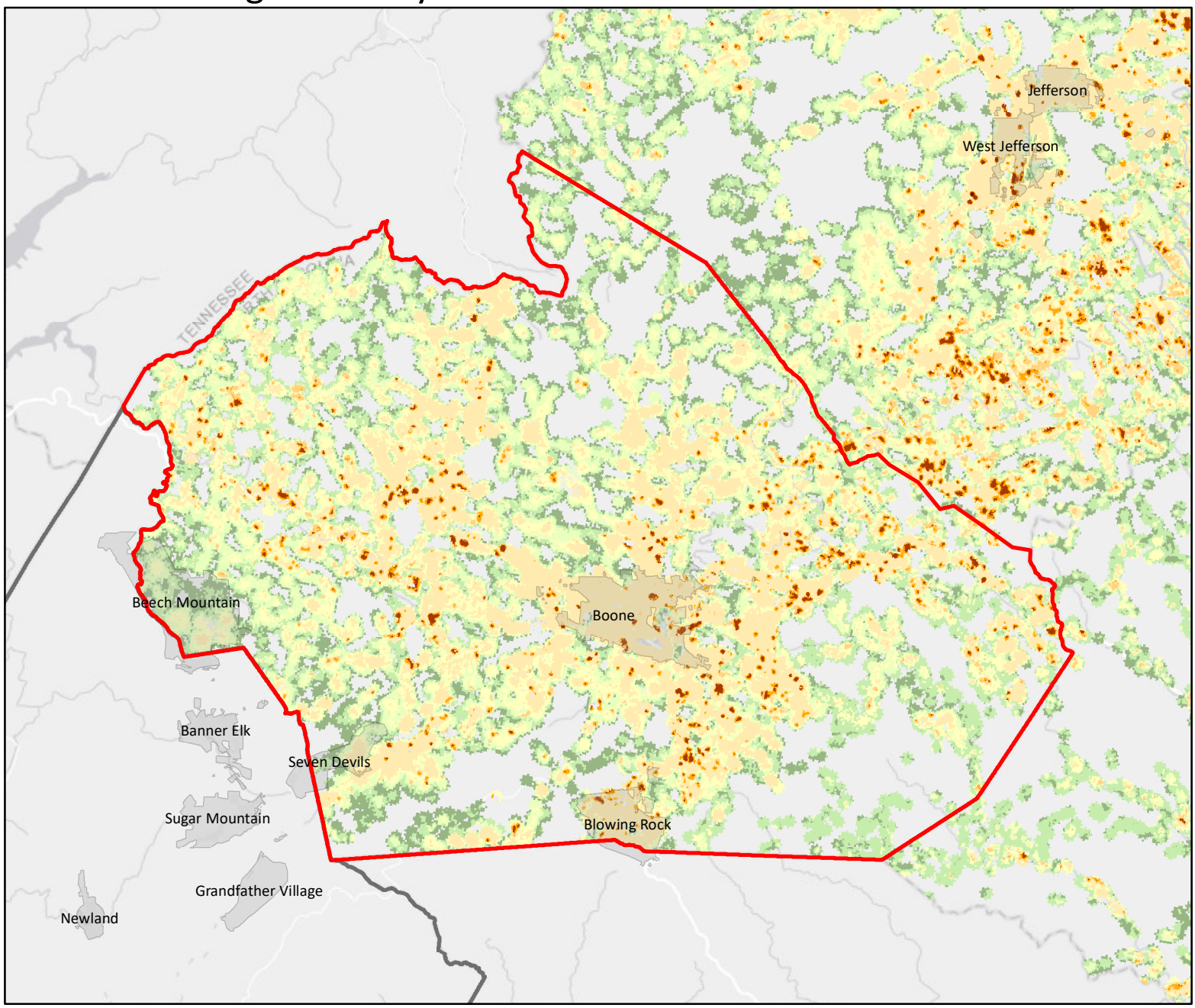
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.375 0.75 1.5 Miles

N

Watagua County - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

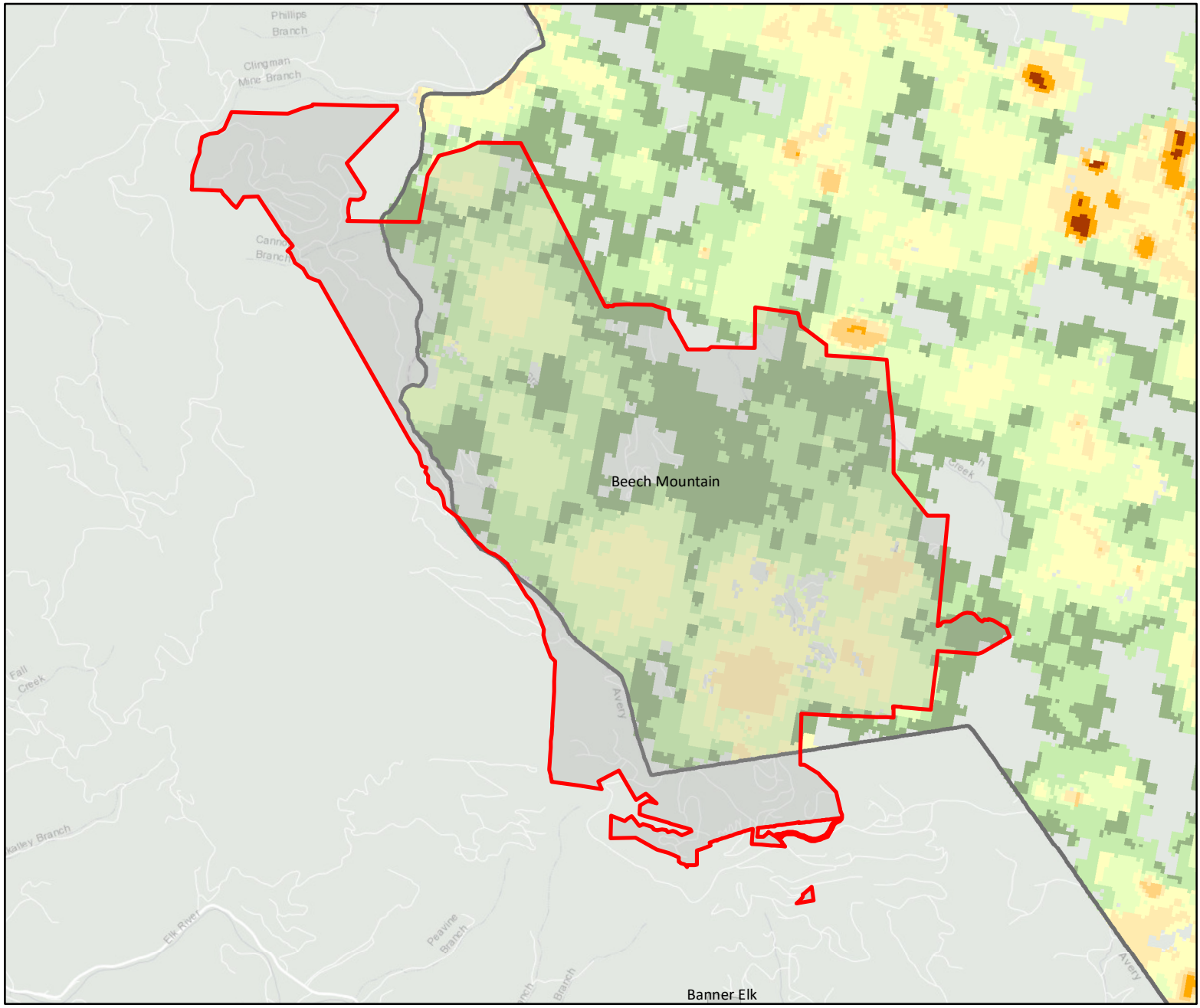
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.25 4.5 9 Miles

N

Beech Mountain - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

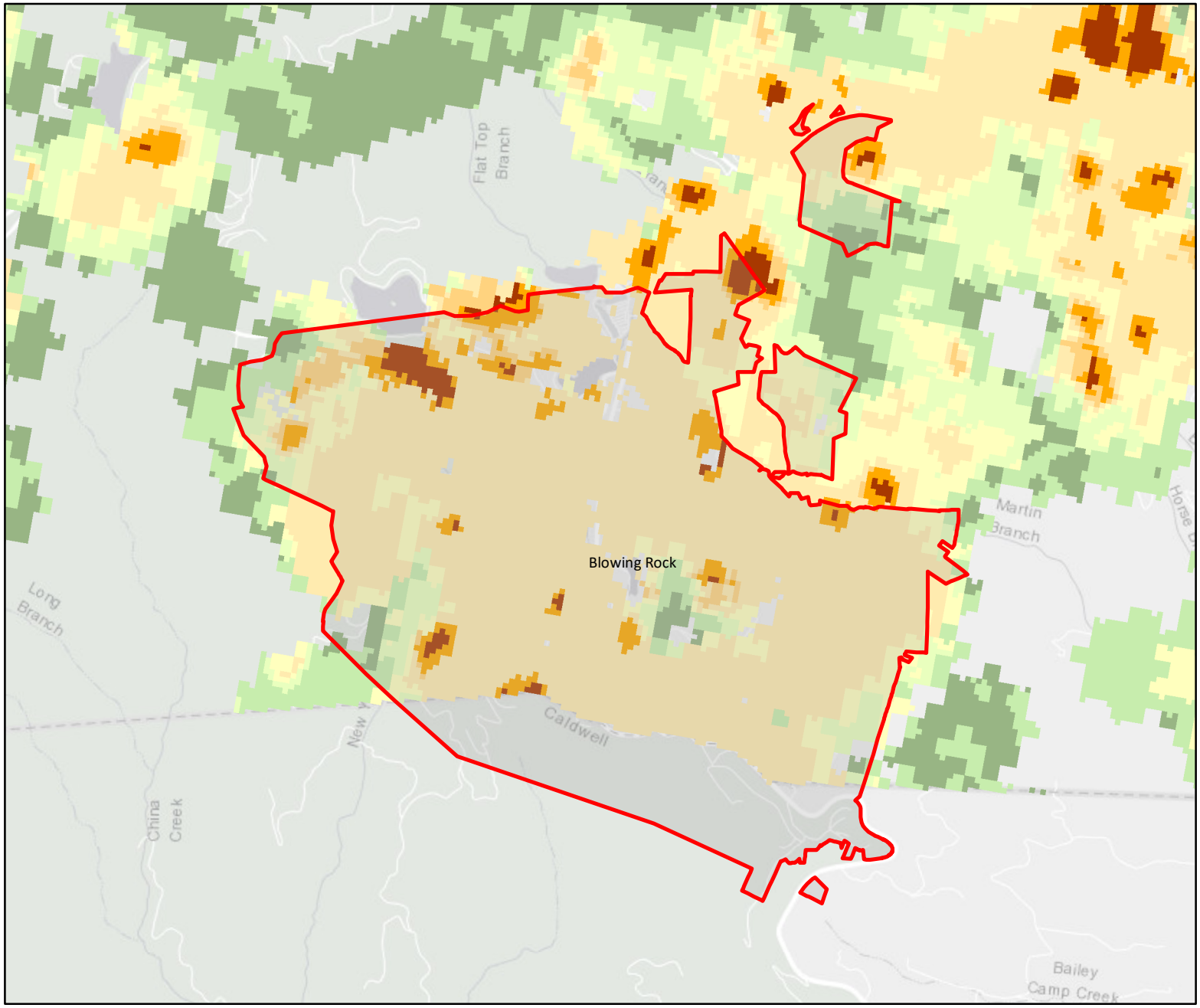
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.45 0.9 1.8 Miles

N

Blowing Rock - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

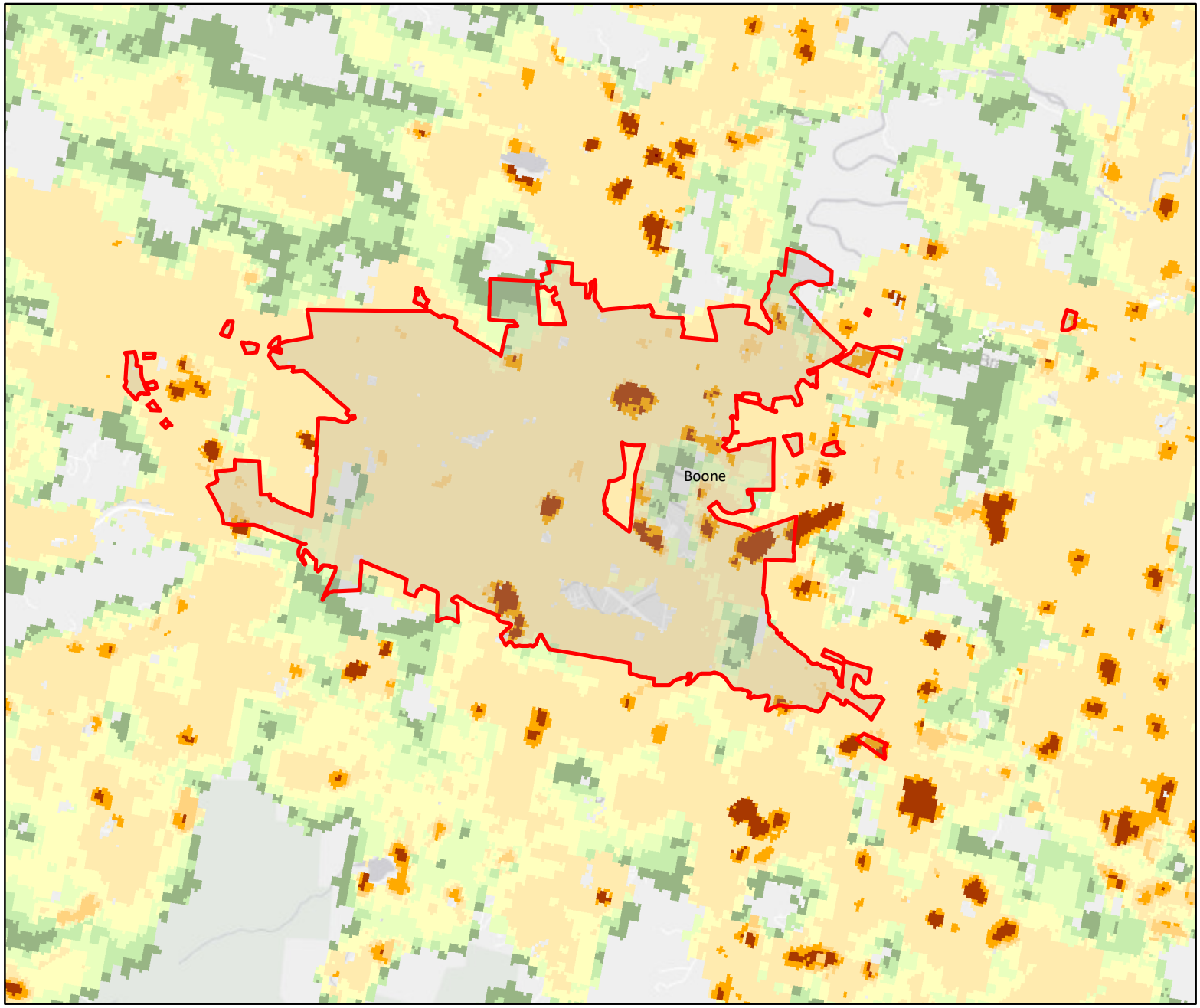
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.3 0.6 1.2 Miles

N

Boone - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

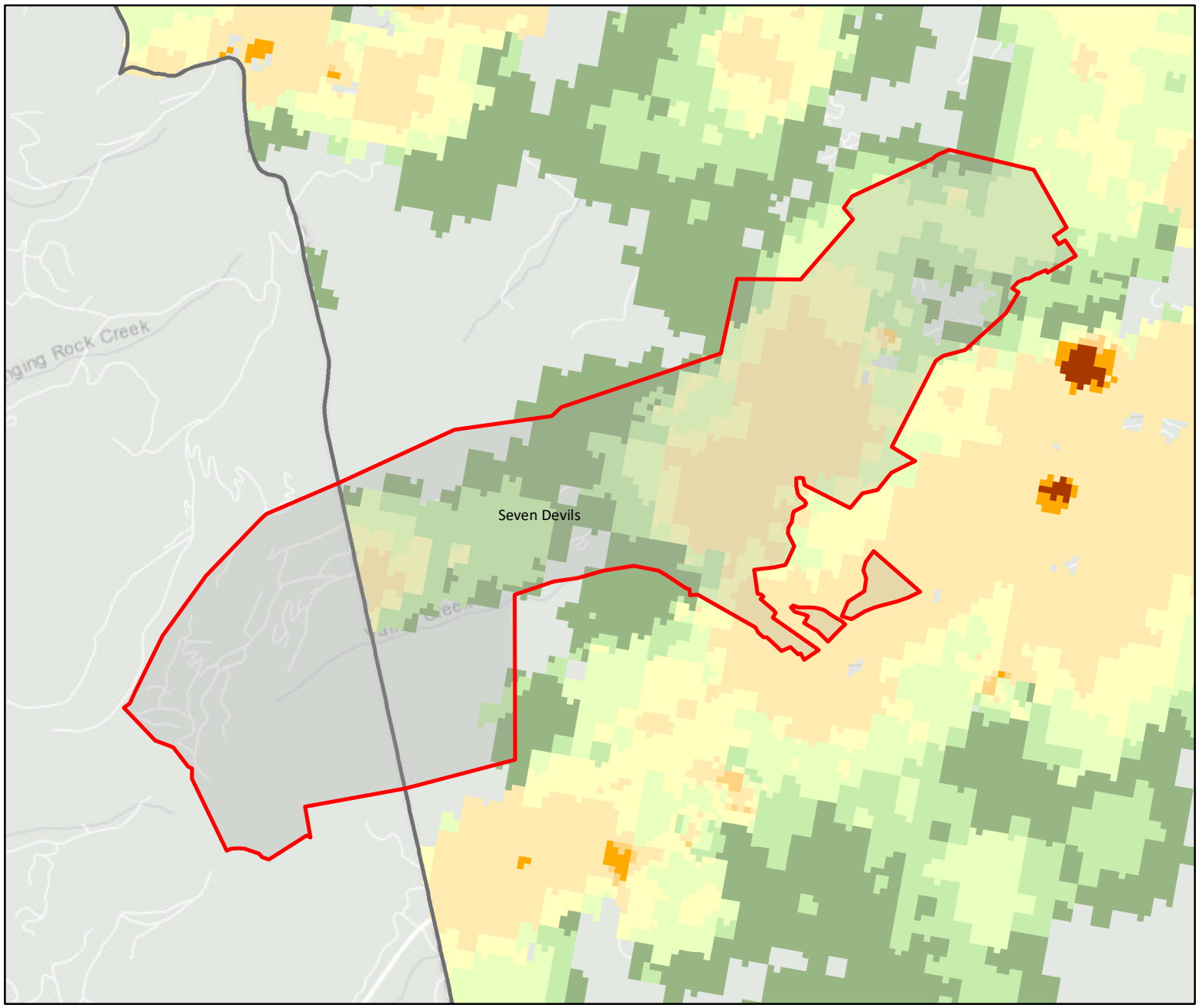
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Seven Devils - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

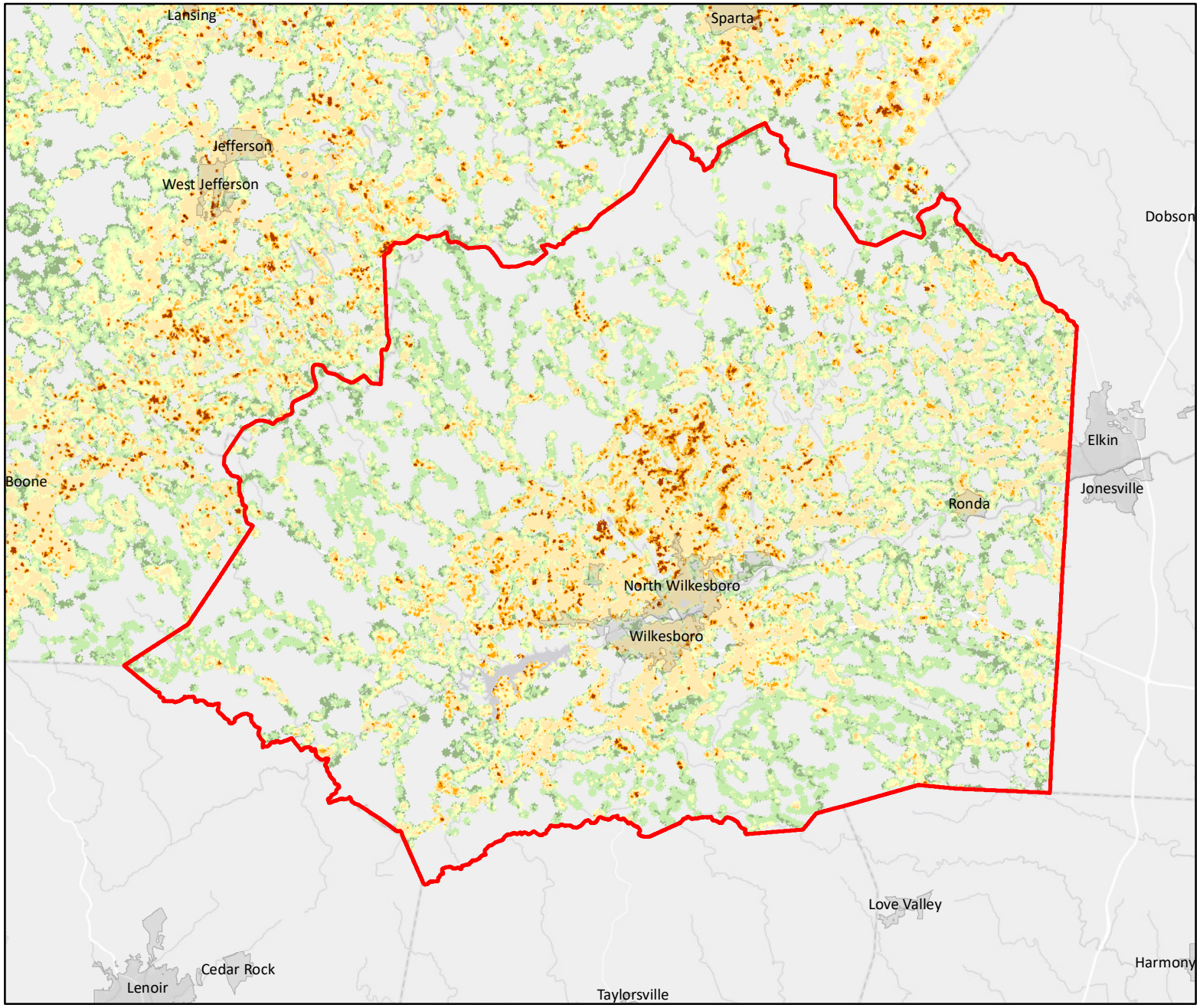
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.25 0.5 1 Miles

N

Wilkes County - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

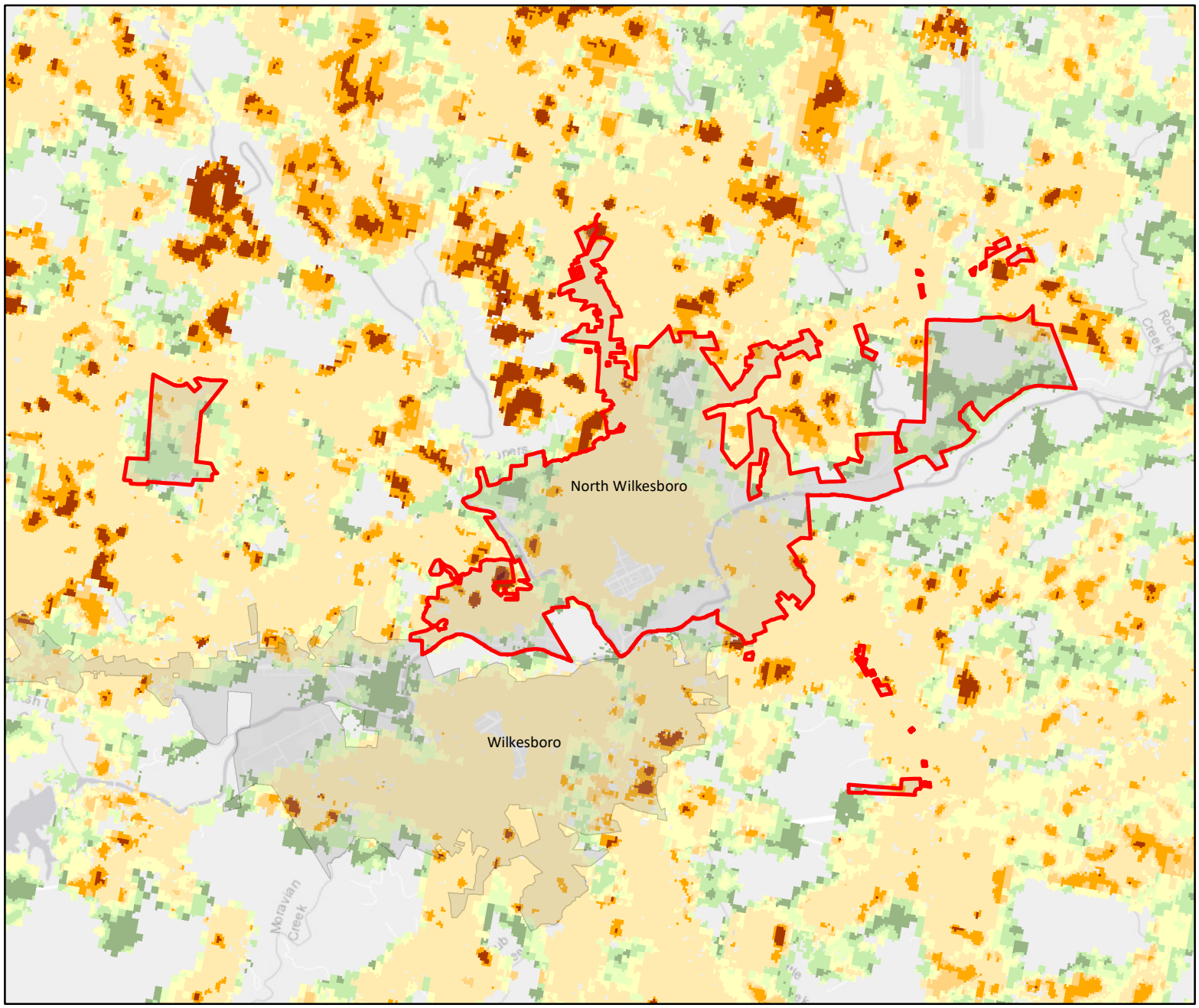
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3.5 7 14 Miles

N

North Wilkesboro - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

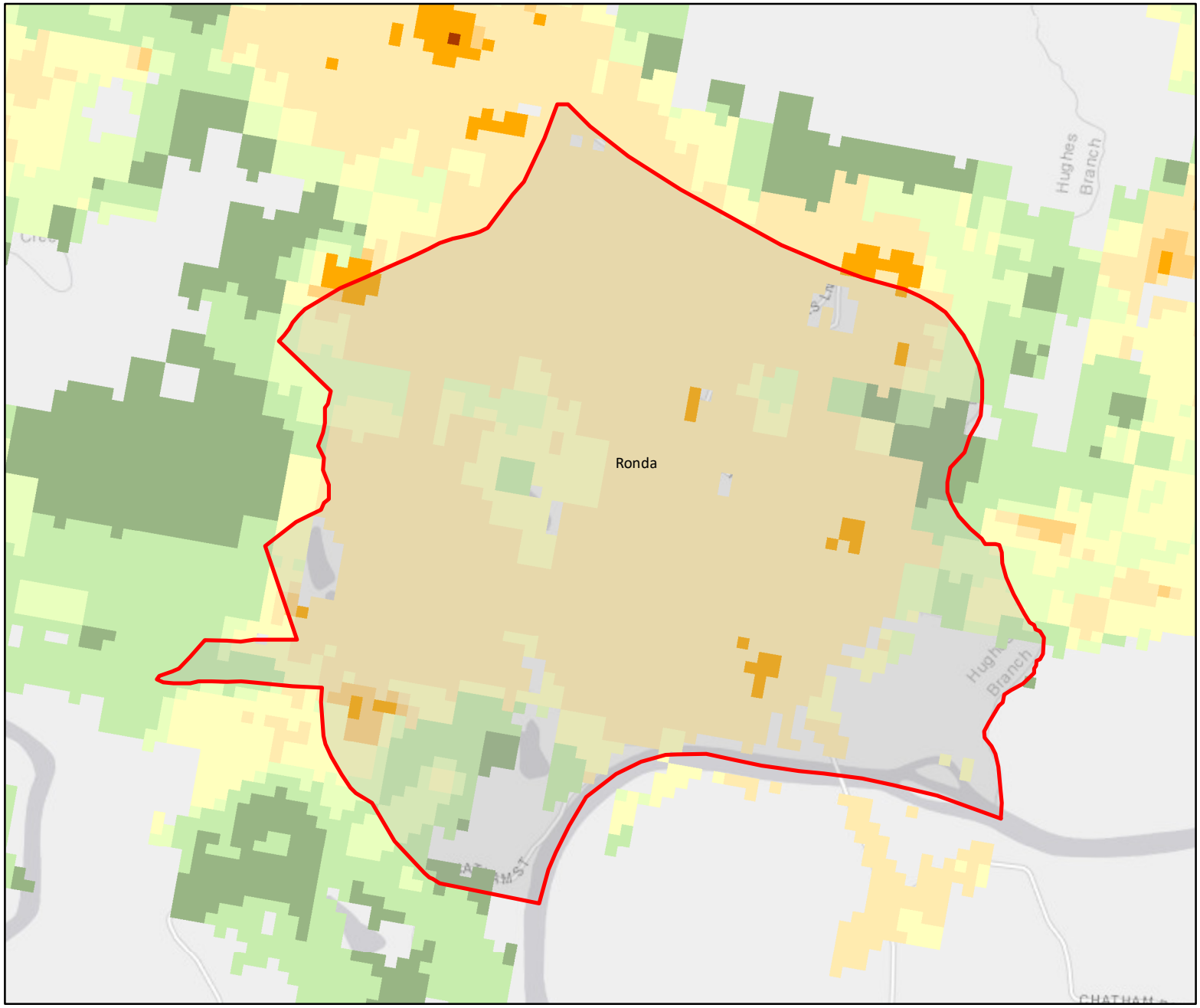
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Ronda - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

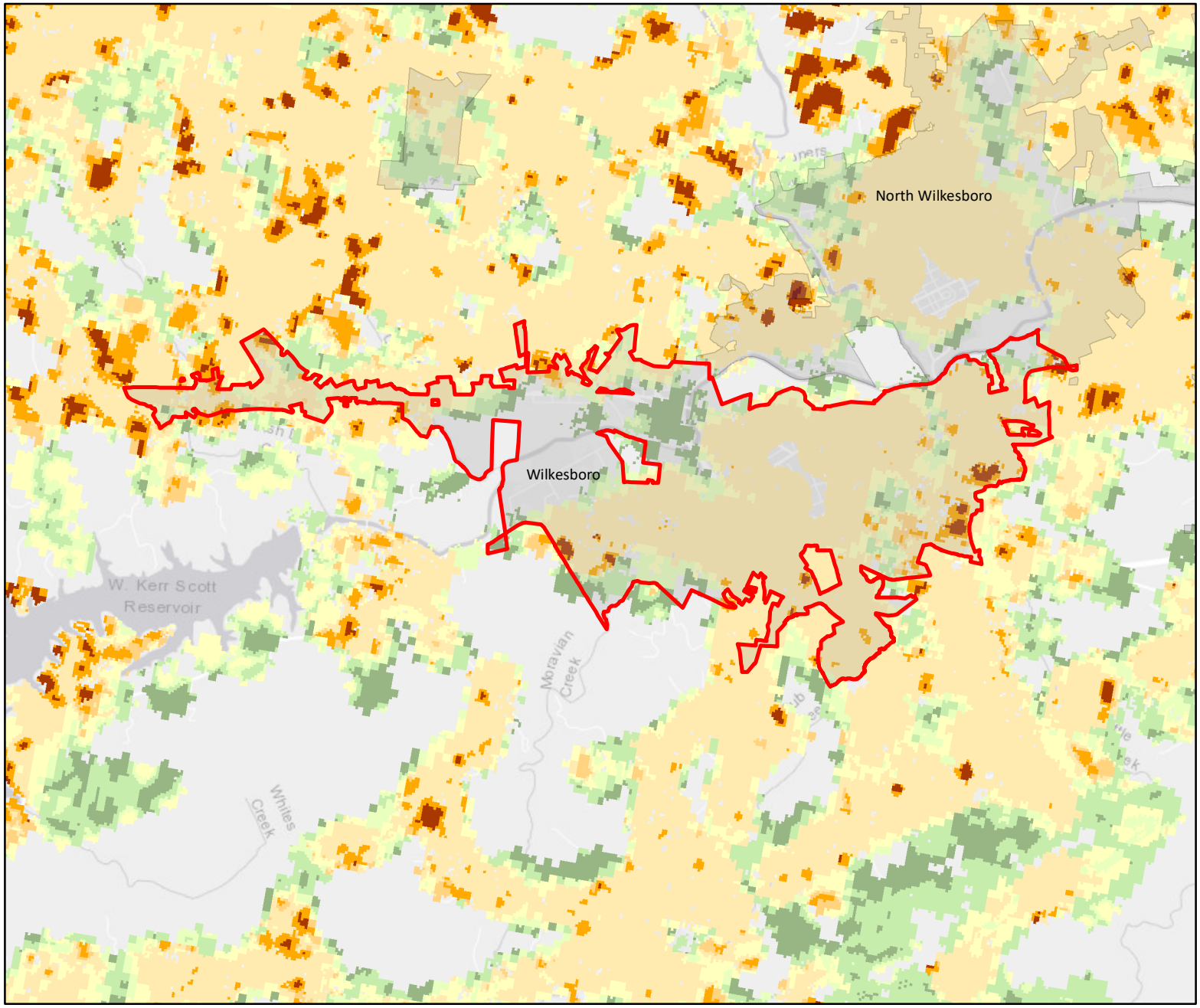
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.125 0.25 0.5 Miles

N

Wilkesboro - Wildland Urban Interface Risk Index



Legend

Municipal Boundary

County Boundary

WUI Risk Index

0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

Appendix H:
NCEI Storm Event Data

This section of the Plan includes the historic storm event data as reported to the National Centers for Environmental Information.

- H.1 – Blizzard
- H.2 – Cold/ Wind Chill
- H.3 – Drought
- H.4 – Flood
- H.5 – Hail
- H.6 – Ice Storm
- H.7 – Lightning
- H.8 – Thunderstorm Wind

TABLE H.1: BLIZZARD (2000-2019)

Date	Description
2/10/2010	Blizzard conditions developed during the 10th in the higher elevations. Gusts to near 70 mph were reported with near zero visibility at times. Temperatures were in the teens creating low wind chills as well. Dangerous driving conditions resulted, with considerable blowing and drifting of snow.
2/26/2010	Heavy upslope snow combined with winds gusting 40 to 60 MPH caused blizzard conditions across the high terrain. Further east near Boone and in the lower elevations near blizzard conditions were common, but lighter snow kept visibilities a little higher. Total accumulations of 8 to 9 inches were common across the higher elevations, where blizzard conditions were likely met.

TABLE H.2: COLD/WIND CHILL (2000-2019)

Date	Description
1/7/2014	Wind chill temperatures were observed in the -19°F to -26°F range at several locations throughout Alleghany County during the early morning hours of January 7th, 2014.
2/15/2015	Dangerously low wind chills readings of -20°F to -26°F were observed during this time frame from the Boone AWOS (KTNB).
2/19/2015	A recorded a wind chill of -31°F at 7:29 am EST. A wind chill reading of -30°F was recorded 1ESE of Boone at 8:35 am EST and the Boone AWOS (KTNB) recorded a wind chill of -20°F at 9:04 am EST.
1/5/2018	Wind chill temperatures fell to -20°F or below at multiple locations on the 5th into the 6th.

TABLE H.3: DROUGHT EVENTS (2000-2019)

Date	Description
Alleghany County	
8/14/2007	Drought conditions worsened across the northwest mountains of North Carolina, east into the foothills and piedmont. August 14th, saw 8 counties in northwest North Carolina enter into severe drought status (D2). This severe drought continued through the end of August.
9/1/2007	Drought conditions worsened across the northwest mountains of North Carolina, east into the foothills and piedmont. September 18th, saw nine counties in northwest North Carolina enter into extreme drought status (D3). This extreme drought continued through the end of September. Crop damage estimated from county extension offices.
10/1/2007	The county began the month at the Extreme (D3) Category of drought and continued that way until October 30th. The severity of the drought was lowered to the Severe (D2) Category at this time. Primary losses were pasture grasses and Christmas trees. Crop damage amounts are estimates.
11/1/2007	Severe drought conditions persisted across the county through the month of November.
12/1/2007	Severe (D2) drought conditions worsened to extreme (D3) drought conditions in portions of Alleghany county in December.
1/1/2008	An Extreme (D3) drought was in place at the beginning of the month across the far southern part of the county. A Severe (D2) drought was in place elsewhere. On January 15, all of the county was classified as Severe (D2) drought.
2/1/2008	Severe to extreme drought conditions persisted for the entire month across the county. The extreme conditions were mainly confined to the southern portion of the county.
3/1/2008	Severe (D2) drought conditions improved to the moderate (D1) category.
4/1/2008	The county began the month only at the Moderate (D1) category of drought severity, but increased the morning of the 1st to the Severe (D2) category in the southern part of the county. It remained only at this level one week before falling again to the Moderate (D1) level on the 8th.
6/10/2008	A Moderate (D1) drought began the month across the county; however, on June 10th, a Severe (D2) drought had returned to cover the entire county. This category of drought continued through the end of the month.
7/1/2008	A Severe (D2) Drought continued across the entire county during the month.

Date	Description
8/1/2008	Severe drought conditions persisted for the month, with extreme drought conditions pushing into the southern part of the county by mid-August.
	Ashe County
8/14/2007	The counties farmers were hardest hit by failed hay crops. The county was about 800,000 round bales short.
9/1/2007	Hay, corn, bean and tobacco production was down fifty to sixty percent due to the extreme drought.
10/1/2007	The county entered the month in the Extreme (D3) Category of drought. The severity was increased to the Exceptional (D4) Category on October 2nd. This level of severity continued until October 30th when it was downgraded to Severe (D2).
11/1/2007	Drought conditions worsened from late October to the end of November across the county. Most of the county went from severe drought to extreme drought. In the extreme western part of the county, conditions went from extreme to exceptional. Burn bans were issued due to the dry conditions.
12/1/2007	Extreme (D3) drought conditions persisted in December.
1/1/2008	An Extreme (D3) drought was in place at the beginning of the month across the county. This level of drought magnitude lasted through the month.
2/1/2008	Severe to extreme drought conditions persisted for the entire month across the county. Most of the county remained in extreme conditions through the month.
3/1/2008	Extreme (D3) drought with severe (D2) drought conditions across the northern tip improved to severe (D2) drought status by 25th. Conditions slowly improved by the end of the month to moderate (D1) drought conditions with just severe (D2) drought conditions remaining across the southern edge.
4/1/2008	Most of the county began the month in a Severe Drought (D2). On the morning of the 8th, the drought category was decreased to Moderate (D1).
5/27/2008	Severe drought conditions (D2) crept back into the southern half of Ashe County by the end of May.
6/10/2008	A Moderate (D1) drought began the month across the southern half of the county with Abnormally Dry (D0) continues in the north. On June 10th, the entire county returned to a Severe (D2) drought. This category of drought continued through the end of the month.
7/1/2008	A Severe (D2) Drought continued across the entire county during the month.
8/1/2008	Severe drought conditions persisted early in the month, and worsened to extreme drought conditions by the middle of the month for the southern half of the county.
9/1/2008	Severe drought (D2) conditions continued for all but the northeast one-quarter of Ashe County through the month of September.
10/1/2008	A Severe (D2) drought continued across the county during October.
11/1/2008	Severe drought conditions remained in place over the extreme western portion of Ashe County during the entire month of November.
12/1/2008	Severe drought (D2) conditions continued into December over the western portions of the county. Sufficient rainfall early in the month subsided the drought to moderate category by December 16th.
	Watauga County
6/12/2007	A moderate drought, which began on June 12th and lasted through the end of the month, resulted in significant losses to hay and to Christmas tree farmers. Ten to twenty percent of all Christmas trees planted in Watauga County were lost.
8/14/2007	Voluntary water restrictions were requested due to the severe drought.
9/1/2007	Drought conditions worsened across the northwest mountains of North Carolina, east into the foothills and piedmont. September 18th, saw nine counties in northwest North Carolina enter into extreme drought status (D3). This extreme drought continued through the end of September. Crop damage estimated from county extension offices.
10/1/2007	The county began the month at the Extreme (D3) Category of drought. This level of severity was increased on October 2nd to the Exceptional (D4) Category. This level of severity continued through the end of the month.
11/1/2007	Drought conditions worsened during the month of November. About half of the county went from extreme drought to exceptional drought by the end of the month. The western half of the county had exceptional drought conditions with extreme drought conditions covering the eastern half. Water restrictions were established in the town of

Date	Description
	Boone, and a burn ban was also in effect for much of the month. The Christmas tree industry reported that mature trees managed the dry conditions, but seedlings were damaged or dead.
12/1/2007	Extreme (D3) to Exceptional (D4) drought conditions persisted through December.
1/1/2008	Drought conditions continued across the county the entire month. An Extreme (D3) drought was across the northeast part of the county. An Exceptional (D4) drought existed elsewhere.
2/1/2008	Extreme to exceptional drought conditions persisted for most of the month across the county. The exceptional conditions improved over the southern half of the county to extreme on February 26th.
3/1/2008	Extreme (D3) drought improved to severe (D2) drought status after several rain events.
4/1/2008	Most of the county began the month under a Severe (D2) drought. On the morning of the 8th, the drought conditions were improved to Moderate (D1) levels.
5/13/2008	Severe drought conditions (D2) crept back into the extreme southeastern portion of the county by mid-May. With lack of widespread rainfall, the entire county dropped into severe drought conditions by the end of the month.
6/1/2008	A Severe (D2) drought began the month for the entire county. On June 10th, the southern quarter of the county worsened to an Extreme (D3) drought. On June 21st, the expanse of the Extreme (D3) drought had spread north to include the southern half of the county. This category of drought continued through the end of the month.
7/1/2008	During the entire month, an Extreme (D3) Drought continued across the southern half of the county with a Severe (D2) Drought across the northern half of the county.
8/1/2008	Extreme drought conditions continued for the county through the month of August.
9/1/2008	Severe drought (D2) conditions continued for the county through the month of September.
10/1/2008	A Severe (D2) drought continued across the county during October.
11/1/2008	Severe drought conditions remained in place over the western half of Watauga County during the entire month of November.
12/1/2008	Severe drought (D2) conditions continued into December over the western portions of the county. Sufficient rainfall early in the month subsided the drought to moderate category by December 16th.
11/15/2016	The town of Boone enacted Stage 2 water restrictions and a burn ban on November 17th due to the dry conditions. The town uses the South Fork of the New River for water supply and stages were very low due to the dry conditions.
12/1/2016	The weekly USDM issuance of December 8th (valid through the 6th) showed a one-category improvement in Watauga County, returning back to D1 or Moderate Drought. Boone, by far the largest town in the county, lifted mandatory Stage 2 water restrictions in mid-December in response to the improved water situation. Stage 1 voluntary restrictions remained in place.
10/1/2019	Severe drought (D2) was shown across most of southwest Watauga County on the U.S. Drought Monitor from October 1 to October 15th. Impacts were primarily agricultural and included pasture losses and reduced hay cuttings.
Wilkes County	
8/14/2007	Drought conditions worsened across the northwest mountains of North Carolina, east into the foothills and piedmont. August 14th, saw 8 counties in northwest North Carolina enter into severe drought status (D2). This severe drought continued through the end of August.
9/1/2007	Apple production was down twenty to thirty percent due to the drought.
10/1/2007	The county began the month in the Extreme (D3) Category of drought. This level of severity continued until October 30th when it was downgraded to the Severe (D2) Category. Primary losses included pasture grasses, hay, and corn silage and grain. Crop damage values are estimates.
11/1/2007	The county experienced severe drought conditions early in November, with extreme drought conditions developing by the end of the month, mainly across the southwestern half of the county.
12/1/2007	Exceptional (D4) drought conditions persisted across much of Wilkes County through the middle and end of December, with Extreme (D3) for the remainder of the month.
1/1/2008	The month began with an Exceptional (D4) across the southern part of the county with an Extreme (D3) drought elsewhere. By January 15, most of the county was in an Extreme (D3) drought except for the far north where conditions had improved to a Moderate (D2) drought.

Date	Description
2/1/2008	Severe to exceptional drought conditions persisted for most of the month across the county. The exceptional conditions were confined to the extreme southwestern portion of the county. These conditions improved to extreme on February 26th.
3/1/2008	Extreme (D3) drought with severe (D2) drought conditions in the northeast corner improved to severe (D2) drought conditions with moderate (D1) conditions in the northeast corner.
4/1/2008	The southern third of the county started the month under a Severe (D2) drought. By the morning of the 1st, the Severe (D2) drought had expanded north to include the entire county. On the 8th, conditions improved a little across the county with only the southern third of the county under a Severe (D2) drought with the rest of the county having a Moderate (D1) drought. This level of drought severity continued through the end of the month.
5/1/2008	Severe drought conditions (D2) along the extreme southern portion of the county pushed north to cover the entire county by the end of the month. Meanwhile, the southern portion of the county dropped into the extreme drought category (D3) during the latter half of the month.
6/1/2008	During the entire month of June, an Extreme (D3) Drought continued across the southern half of the county, with a Severe (D2) Drought across the northern half of the county.
7/1/2008	During the entire month, an Extreme (D3) Drought continued across the southern half of the county with a Severe (D2) Drought across the northern half of the county.
8/1/2008	Extreme drought conditions continued for the county through the month of August.
9/1/2008	Severe drought (D2) conditions covered all but the northeast one-quarter of Wilkes county at the beginning of September. By the end of the month, only the extreme southwest portion of Wilkes county was in a severe drought.
10/1/2008	A Severe (D2) drought continued across the county through the 28th before improving slightly to a Moderate (D1) drought.
10/1/2019	Severe drought (D2) was shown across southern Wilkes County on the U.S. Drought Monitor from October 8th to October 22nd. Impacts were primarily agricultural and included pasture losses and reduced hay cuttings.

TABLE H.4: FLOOD EVENTS (2000-2020)

Date	Description
	Alleghany County
2/22/2003	Heavy rain on the 22nd caused small stream and urban flooding across Ashe, Alleghany, Surry, and Rockingham counties.
11/19/2003	Moderate to heavy rain late on the 18th and on the 19th resulted in flash flooding and small stream flooding. Runoff from heavy rain resulted in the flooding of numerous creeks, some of which flooded roads across Wilkes, Watauga, Alleghany, and Ashe counties.
9/8/2004	The remnants of Tropical Depression Frances brought flooding rains to portions of Northwest North Carolina from late in the evening on the 7th through the 8th. Rainfall totals averaged 4 to 6 inches...with amounts higher in portions of the mountains. In Watauga County, the Watauga River flooded, leading to evacuations of homes in the Foscoe area. The headwaters of the New River, including the Middle and East Fork also flooded. A mud slide destroyed one home in the Bamboo area. In Alleghany County, creeks and streams overflowed their banks and flooded 1150 acres of farmland resulting in crop damage.
9/5/2011	A period of prolonged heavy rain, totaling three to four inches, produced flooding along Brush Creek with the water crossing Scenic Valley Road.
9/5/2011	A prolonged period of heavy rain, totaling three to four inches, produced flooding along the Little River. The flood waters crossed Rifle Range Road. Damage values are estimated.
9/5/2011	Prolonged heavy rainfall, totaling around three to four inches, caused a tributary of the New River to flood with water flooding a portion of Farmers Fish Camp Road.
7/27/2013	Minor flooding along Brush Creek in Scenic Valley Road with a few inches of water on the road.
9/17/2018	A spotter reported water of 2 to 3-foot depth over Garvey Bridge Road near Rivercamp USA campground in Piney Creek. Flooding may have been from the South Fork of the New River which was above flood stage at the Jefferson gage upstream.
2/6/2020	Numerous roads were flooded and at least 15 gravel roads incurred significant damage as a result of the flooding.

4/13/2020	River camp next to the South Fork of the New River flooded and the bridge at Kings Creek Rd. was covered over with water. The South Fork New River gage at Jefferson (JFRN7) upstream crested at 9.89 feet (10,400 cfs). This was above the minor flood stage of 8 feet and the 11th highest crest on record, with data as far back as 1916. Per USGS studies this was between a 5- and 10-year recurrence interval (0.2 to 0.1 annual chance flood).
5/21/2020	The South Fork of the New River was reported to be flooding over the bridge on Kings Creek Road near the intersection with Garvey Bridge Road. The roadway was impassable due to deep flowing water. The river gage on South Fork of the New River near Jefferson (JFRN7) was near 8.92 feet at the time of the report which was right at the crest. Minor flood stage is 8 feet. Several other roads near the river were also flooded including part of Farmers Fish Camp Road with several feet of water.
Ashe County	
2/22/2003	Heavy rain on the 22nd caused small stream and urban flooding across Ashe, Alleghany, Surry, and Rockingham counties.
11/19/2003	Moderate to heavy rain late on the 18th and on the 19th resulted in flash flooding and small stream flooding. Runoff from heavy rain resulted in the flooding of numerous creeks, some of which flooded roads across Wilkes, Watauga, Alleghany, and Ashe counties.
9/8/2004	The remnants of Tropical Depression Frances brought flooding rains to portions of Northwest North Carolina from late in the evening on the 7th through the 8th. Rainfall totals averaged 4 to 6 inches...with amounts higher in portions of the mountains. In Ashe County, small streams and creeks flooded during the early morning of the 8th. Subsequently, the rainfall and runoff lead to the South Fork of the New River flooding later that morning. Several roads were flooded in the Fleetwood and Crumpler areas. Several homes along the South Fork of the New River were isolated as roads were flooded.
5/5/2013	The New River was flowing over a bridge near the intersection of Ed Little Road and Highway 88W.
7/3/2013	Cole Creek was out of its banks at Mt. Jefferson Road and Oakwood Road. Water was seen approaching buildings at Greenfield Camp Ground. Water reached depths of 5 to 6 feet. A gage measured 1.71 since 7 AM.
7/3/2013	Highway 221 was closed between Jefferson and West Jefferson due to water over 6 inches deep on the highway.
7/27/2013	The low water crossing on Boggs Road and Methodist Camp Road were flooded by the South Fork of the New River.
9/6/2014	Water was flowing over a low-water crossing on Teaberry Road in the community of Lansing.
4/19/2015	Several roads were closed by flood waters in the county including Doggett Road in West Jefferson.
10/3/2015	Generally minor flooding was reported at several locations across the county. On Boggs Rd Bridge at 10:31 AM (EST) at lower end of the road. A culvert near Hardee (US 221 business) stopped up around 12:22 PM and 4-lanes flooded. At 12:49 PM the river bridge on Clifton Rd flooded. At 3:25 PM the river bridge between Railroad Grade Rd. and Liberty Grove Church Rd. was completely under water. Most of the low water bridges were flooded as usually happens during a minor flood event according to the Emergency Manager.
12/2/2015	Helton Creek was reported to be flooding a portion of Helton Road.
9/16/2018	The South Fork of the New River near Jefferson (JFRN7) crested at 9.43 feet (Minor flood stage is 8 ft.) in the early morning of the 17th. Several roads are affected at this stage. This was the highest stage since January 31, 2013 at this gage. The discharge of 9460 cfs was approximately a 5 to 10-year event (0.2 to 0.1 annual chance) per USGS. Several roads close to the New River were flooded and damaged according to NC DOT officials.
2/23/2019	Numerous roads were closed across the county but further details were not provided. The South Fork New River at Jefferson (JFRN7) crested at 6.89 feet, which is above the Action Stage of 5 feet, but below the Minor Flood stage of 8 feet.
6/9/2019	The South Fork New River near Jefferson (JFRN7) crested the afternoon of June 9th at 10.44 feet (11,600 cfs), the 7th highest level on record (nearly continuous data since 1925) and highest since September 2004 (remains of Hurricane Frances). This was also very close to the 10-year recurrence interval (0.10 annual chance flood). Several roads near the river were flooded and blocked.
2/6/2020	At least 34 gravel roads were damaged by floodwaters and number of paved roads as well. Damages were estimated at $139,000.
11/19/2003	Moderate to heavy rain late on the 18th and on the 19th resulted in flash flooding and small stream flooding. Runoff from heavy rain resulted in the flooding of numerous creeks, some of which flooded roads across Wilkes, Watauga, Alleghany, and Ashe counties.

9/7/2004	The remnants of Tropical Depression Frances brought flooding rains to portions of Northwest North Carolina from late in the evening on the 7th through the 8th. Rainfall totals averaged 4 to 6 inches...with amounts higher in portions of the mountains. In Ashe County, small streams and creeks flooded during the early morning of the 8th. Subsequently, the rainfall and runoff lead to the South Fork of the New River flooding later that morning. Several roads were flooded in the Fleetwood and Crumpler areas. Several homes along the South Fork of the New River were isolated as roads were flooded.
9/18/2004	Damaging gradient winds in the early morning hours of 18 Nov 2004 behind the exiting remnants of hurricane Ivan downed numerous trees and power lines. 2000 people were without power in Ashe Co. Locally heavy rain around the Foscoe area of Watauga Co. prompted flooding of small streams and mudslides...which caused damage to several homes.
Watauga County	
4/3/2000	Heavy rain during the evening of the 3rd and early morning of the 4th caused street flooding in Boone, and also flooded Kraut Creek in Boone.
3/6/2011	Heavy rain produced flooding on several roads throughout the county. Some roads were closed with a water depth of two feet. One such location was Watauga River Road. Dewitt Barnett Road near Valle Crucis was covered with water three feet deep. Mud, rocks and gravel supporting part of the new four-lane section of U.S. Hwy 321 between Blowing Rock and Lenoir gave way in a massive mudslide early Sunday evening and dumped an estimated 30-foot long pile of debris on Kirby Mountain Road below.
9/6/2011	Prolonged heavy rain, totaling three to four inches, caused Laurel Fork to flood some low water crossings near Shulls Mill.
9/6/2011	Prolonged heavy rain, totaling three to four inches, produced flooding along Brushy Fork that crossed low water bridges in Valle Crucis.
9/18/2012	A prolonged period of heavy rain caused water to stand on a few roads along the Watauga River. Some roads were closed including Guy Ford, Dewitt Barnett, Hubert Thomas and Watauga River Roads. A 24-hour rainfall report of 6.46 inches was received from Boone, NC.
5/5/2013	Heavy rain caused a bridge on Bamboo Road to become flooded.
5/5/2013	Heavy rain caused a portion of Beech Mountain Parkway and Laurel Creek Road to flood.
5/6/2013	Portions of Charlie Thompson Road were closed due to flooding.
5/6/2013	Several roads were closed across the county due to widespread heavy rain and flooding. In one instance, portions of Watauga River Road were closed due to flooding of the Watauga River. A motorist attempting to cross Deerfield Road was rescued by the Boone Fire Department. Rainfall at the Watauga Medical Center was measured at 4.53 inches.
9/7/2014	Heavy rain caused the Aho Branch Creek to overflow its banks and flow over Aho Road.
9/7/2014	Heavy rainfall caused the East Fork and the South Fork of the New River to flood in the Boone area, causing many roadways to be closed due to water flowing over them. During the evening, Deerfield Road at the Moose Lodge was flooded, as well as Deerfield Road between State Farm Road and Blairmont Drive. Casey Lane was flooded and impassible. Bamboo Road was flooded and closed between Candy Lane and Kellwood Drive. Flooding was also observed in the parking lot of the Boone Mall.
4/19/2015	A number of roads were closed across the county for much of the day due to flooding from the persistent rainfall. Several low-water crossings on the Watauga River were flooded to a considerable depth including DeWitt Barnett Road and Guy Ford Road. Along the South Fork of the New River a low-water crossing at Roby Green road was flooded. Watauga River Road near Romminger was also closed by flooding from the river.
9/29/2015	Flooding was reported over a portion of Bamboo Road.
9/29/2015	The Watauga River flooded a portion of Aldridge Road at the intersection of Berry Road. The river gage at Sugar Grove (SGWN7) crested at 7.07 feet (Minor Flood Stage = 6 ft) at around 615 PM.
10/3/2015	The typical flood prone areas did become covered for a time on Saturday 10/3. Dewitt Barnett Road bridge in Valle Crucis, near the airport/Kellwood, Moose Lodge/golf course area on Deerfield Road, portions of Roby Greene Road and Watauga River Road were some of the impacted areas, along with the Boone Mall parking lot. The first reports of flooding there came in around 11am. The gage at Watauga River Sugar Grove (SGWN7) crested at 5.87 feet (just below Minor Flood Stage of 6 feet) at 13:30 EST.

3/31/2017	Several roads were closed by high water including the low water bridge across the Watauga River at Dewitt Barnett Road in Valle Crucis. The Watauga River at Sugar Grove (SGWN7) crested above Minor flood stage, cresting early on the 31st at 7.32 feet (Minor FS = 7 feet).
5/1/2017	Several roads were reported closed due to flooding around Boone including the Boone Mall parking lot, Boone Heights Drive at Hidden Shadows Drive, and Bamboo Roads near the Boone Airport and Deerfield Road near the Moose Lodge.
5/5/2017	The Watauga River gage at Sugar Grove (SGWN7) rose briefly above Minor flood stage of 6 feet, cresting at 6.39 feet early on the 5th. Several low water bridges and roads near the river were flooded.
10/23/2017	Persistent rainfall caused flooding on numerous streams and rivers across Watauga County. The Watauga River at Sugar Grove (SGWN7) crested at 11.72 feet (Moderate flood stage - 10 feet) and the highest reading since July of 2013. The flood peak discharge of 7040 cfs fell midway between a 2- and 5-year recurrence interval (0.5 to 0.2 annual exceedance probability) according to USGS reports. The Watauga River IFLOWS gauge at Foscoe (FOSN7) crested at 8.86 feet, the highest since January 2013. Several roads and low water bridges were flooded by the Watauga River. The Middle Fork of the New River at Boone IFLOWS gauge (NERN7) crested at 12.58 feet (Minor flood stage is 12 feet), which was the highest on record but over a fairly short period of data (2010-2017).
1/12/2018	The Watauga River at Sugar Grove (SGWN7) USGS gauge crested at 7.04 feet (Minor flood stage - 6 ft.) early on the 12th. Several low-water bridges and roads near the river were flooded and closed.
4/15/2018	The Watauga River at Sugar Grove (SGWN7) rose very rapidly, cresting at 10.39 feet, well above the Minor Flood Stage of 6 feet. Several low water bridges were flooded roads near the river were also flooded and closed.
4/24/2018	The Watauga River at Sugar Grove (SGWN7) crested at 7.32 feet, just over the Minor flood stage of 6 feet. Several low water bridges and roads near the river were flooded.
5/29/2018	Bamboo Road near the Boone Airport and an assisted living center was flooded.
12/28/2018	Roby Greene Road in Boone was closed due to flooding.
6/8/2019	The Watauga River flooded along much of its course from Shulls Mill to Sugar Grove with several low water bridges flooded and other roads near the river. Several people were rescued from a car stranded in flood waters from the Watauga River in the Shulls Mill area. Several buildings in the Valle Crucis area received some flooding. The Watauga River at Sugar Grove (SGWN7) crested at 15.40 feet, just short of Moderate Flood Stage (16 feet) on the afternoon of the 9th, the highest level since the May 2018 flood and 2nd highest since 2004. According to USGS data it was approximately a 5-year recurrence interval (0.20 annual chance flood). The IFLOWS stream gage upstream near Foscoe (FOSN7) crested at 11.48 feet (Minor Flood Stage - 9 ft.), which was the 2nd highest in the fairly brief history at this gage (since about 2010).
6/9/2019	There was significant flooding across parts of Watauga County with several roads closed. Substantial damage occurred to road and culvert infrastructure across parts of the county. A mudslide occurred on Route 421 near Mt. Zion Road.
2/6/2020	Numerous roads were flooded across Watauga County with substantial damage to several roads and stabilization stone needed for up to eighteen gravel roads. The Watauga River at Sugar Grove (SGWN7) crested at 8.40 feet, above the flood stage of 6 feet, early on the 7th, covering several low water bridges and affecting roads along the river.
4/13/2020	The Watauga River at Sugar Grove (SGWN7) crested at 10.24 feet, above the flood stage of 6 feet early on April 13th, covering several low water bridges and flooding roads along the river.
5/20/2020	The Watauga River flooded with the USGS gage at Sugar Grove (SGWN7) reaching a stage of 8.85 feet early on the 21st. Minor flood stage is 6 feet. Several low water bridges were closed and roads along the river affected.
Wilkes County	
3/20/2003	A period of very heavy rain produced flash flooding during the morning on the 20th. In Monroeton three cars were washed off of Route 158, in East Bend a portion of Route 67 was washed out, and many roads were closed due to flash flooding countywide across Caswell, Stokes, and Surry counties.
3/6/2011	The influence of multiple weather features coinciding lead to an average of three to five inches of rain falling over the area. Low pressure moved from Georgia northeast along a cold front across the region while an upper disturbance approached from the Great Lakes region. The combination of these features helped to stall the cold front and its associated precipitation over northwest North Carolina for an extended period of time.

8/10/2013	The Wilkes County 911 Center reported that a clogged culvert caused water to flow over Falls Road just east-northeast of Boomer. The road was temporarily closed.
8/10/2013	The Wilkes County 911 Center reported that water was flowing over County Club Road in southern Wilkesboro as a result of a clogged culvert. The road was temporarily closed.
8/4/2016	Water of unknown depth was reported flowing over the road near the intersection of Route 115 and Speedway Rd.
4/24/2017	A man was rescued from the top of a pickup truck on the flooded low water bridge over the Roaring River at the intersection of Arbor Grove Baptist Church Road and Cotton Mill Road. Water was at least 5 feet deep per photos of the scene. The truck was likely a total loss.
2/10/2018	Big Elkin Creek flooded parts Elkin City Park. The Elkin River at Elkin (ELKN7) crested at 17.35 feet, just below Minor flood stage of 18 feet.
10/11/2018	The Yadkin River at Wilkesboro (WKSN7) crested at 14.05 feet (11400 cfs) just above minor flood stage of 14 feet for the first time since August 1994 and the 6th highest since the completion of W. Kerr Scott Reservoir just upstream in 1962. A portion of Wilkesboro Avenue in North Wilkesboro was flooded by the Yadkin River for the first time in over 15 years according to news reports.
12/28/2018	A photo on Twitter from a viewer of WFMY showed creek flooding across parts of Congo Road and Buck Road.
12/28/2018	Flooding was reported near the intersection of Statesville and Speedway Roads.
12/28/2018	One foot of water was reported flowing across Cotton Mill Road.
12/28/2018	The Yadkin River at Elkin (ELKN7) reached Minor Flood stage of 19 feet late on the 28th, cresting at 19.23 feet short thereafter. One or two roads near the river are flooded at this stage.
6/9/2019	Elk Creek was reported flowing across NC Route 268 near Elk Creek Darby Road. The USGS gage at Elk Creek (EKVN7) in the upper Yadkin River basin in western Wilkes County crested at 9.41 feet in the mid-morning at of the 9th with a discharge of 11,000 cfs in the 50.9 mi2 basin. This was the highest stage/discharge since August 1994 at this gage (12.02 ft.) and the 3rd highest on record (continuous data since 1966). According to the most recent (2009) North Carolina USGS flood frequency study the recurrence interval at this gage was slightly above a 10-year event (.10 annual chance flood), although regional regression equations suggested a more unusual event. The automated rain gage co-located at the site measured over 12ï¿½ï¿½ï¿½ of rain in the 3-day period, and 11+ï¿½ï¿½ï¿½ in 2 days. Significant flooding was reported across parts of western Wilkes County with the worst occurring in the Elk Creek, Upper Reddies and Lewis Fork watersheds according to news reports.

TABLE H.5: HAIL EVENTS (2000-2020)

Location	Date	Size (mm)	Description
Alleghany County			
ROARING GAP	4/17/2002	0.88	Thunderstorms during the afternoon and evening of the 17th produced hail up to nickel size and dangerous lightning. Hail in Roaring Gap accumulated up to 6 inches.
SPARTA	7/2/2002	0.75	Thunderstorms during the afternoon of the 2nd produced damaging winds and hail up to dime size.
PINEY CREEK	7/2/2002	0.75	Thunderstorms during the afternoon of the 2nd produced damaging winds and hail up to dime size.
SPARTA	6/30/2003	0.75	Thunderstorms on the 30th produced up to nickel size hail.
ENNICE	5/22/2004	1	An isolated severe storm produced hail up to the size of quarters.
PINEY CREEK	5/23/2004	0.88	Severe thunderstorms downed a large tree and produced hail from penny to nickel size.
ENNICE	7/18/2004	0.75	Thunderstorms during the evening of the 18th produced penny sized hail in Ennice. Thunderstorms downed trees and produced nickel size hail near Dobson.
ENNICE	7/18/2004	0.75	Thunderstorms during the evening of the 18th produced penny sized hail in Ennice. Thunderstorms downed trees and produced nickel size hail near Dobson.
LAUREL SPGS	5/14/2006	0.88	Numerous thunderstorms formed late in the morning on the 14th, across the mountains of North Carolina, and spread east through the piedmont during the early afternoon. The

Location	Date	Size (mm)	Description
			severe thunderstorms produced mainly large hail, generally less than 1 inch in diameter, with golf ball sized hail falling in Reidsville. The only wind damage occurred in Rockingham County, 5 miles southeast of Reidsville, with one tree downed.
CHERRY LANE	10/5/2006	0.75	A backdoor cold front progressed south through the region on the afternoon and evening of October 5th. This front helped prompt showers and thunderstorms across the region with some of the storms reaching severe limits. Severe hail ranging from penny size to quarter size occurred.
ENNICE	6/11/2007	0.75	Severe thunderstorms produced wind damage and hail up to quarter size in northwest North Carolina.
ENNICE	6/12/2007	0.88	Severe thunderstorm produced nickel sized hail.
TWIN OAKS	6/29/2008	0.75	One severe thunderstorm produced hail the size of a penny 2 miles northwest of Sparta on June 29.
PINEY CREEK	8/2/2008	1	A cold front moving into the central and southern Appalachians provided the focus for severe thunderstorm development during the afternoon of August 2nd. Damaging winds, and hail up to the size of quarters occurred.
WHITEHEAD	6/9/2009	0.75	Hail was several inches deep.
GLADE VLY	4/9/2011	0.88	A high pressure centered over New England pushed a back door cold front to northwest North Carolina. At the same time a strong upper level low pressure system approached from the west during the afternoon of the 9th. This resulted in the development of severe thunderstorms which produced large hail.
TWIN OAKS	5/11/2011	1	Hail was reported on Highway 21 near the VA/NC state line.
TWIN OAKS	5/11/2011	0.75	Under a warm and unstable air mass, scattered thunderstorms developed over the mountains. A few of these storms produced large hail.
PINEY CREEK	5/26/2011	1	Piney Creek Fire Department reported the hail.
GLADE VLY	6/10/2011	0.88	Scattered storms developed during the afternoon heating of the day. A few of these storms produced damaging winds, and one produced large hail. One slow moving storm also caused isolated flash flooding.
ROARING GAP	6/10/2011	1	Scattered storms developed during the afternoon heating of the day. A few of these storms produced damaging winds, and one produced large hail. One slow moving storm also caused isolated flash flooding.
CHERRY LANE	6/10/2011	0.75	Scattered storms developed during the afternoon heating of the day. A few of these storms produced damaging winds, and one produced large hail. One slow moving storm also caused isolated flash flooding.
ENNICE	6/11/2011	1	Early morning convection developed along an outflow boundary in advance of an approaching cold front. By the afternoon, strong to severe storms occurred as increasing temperatures helped to destabilize the atmosphere even further. A mixture of damaging winds and large hail occurred.
BARRETT	6/11/2011	1	Early morning convection developed along an outflow boundary in advance of an approaching cold front. By the afternoon, strong to severe storms occurred as increasing temperatures helped to destabilize the atmosphere even further. A mixture of damaging winds and large hail occurred.
CHERRY LANE	6/11/2011	0.75	Early morning convection developed along an outflow boundary in advance of an approaching cold front. By the afternoon, strong to severe storms occurred as increasing temperatures helped to destabilize the atmosphere even further. A mixture of damaging winds and large hail occurred.
TOPIA	3/15/2012	1	One-inch hail was reported along Route 113 south of Piney Creek.
WHITEHEAD	3/23/2012	0.88	Pea to Nickel-sized hail fell for about 15 minutes, covering the ground.

Location	Date	Size (mm)	Description
BARRETT	3/24/2012	1.25	A large upper level low over the central U.S. began shifting east on the 23rd bringing several rounds of heavy rainfall and numerous severe thunderstorms. Rainfall was estimated at 2 to 2.5 inches in several hours across portions of western Surry County causing the flash flooding.
LAUREL SPGS	4/3/2012	0.75	The public observed penny-sized hail approximately five miles northeast of Glendale Springs.
BARRETT	6/30/2012	1	A passing upper level disturbance interacted with a very unstable atmosphere near the surface to generate isolated, large hail producing thunderstorms. Some of these were accompanied by damaging winds.
ROARING GAP	7/5/2012	0.88	Several upper level storm systems rotating around an upper high centered over the mid-Mississippi Valley helped to generate severe thunderstorms across the mountains. The convective activity was initiated out of the remains of a nocturnal Mesoscale Convective System (MCS) over the Ohio Valley that encountered increasing shear and instability as it moved into the southern Appalachians.
ROARING GAP	7/5/2012	0.88	Several upper level storm systems rotating around an upper high centered over the mid-Mississippi Valley helped to generate severe thunderstorms across the mountains. The convective activity was initiated out of the remains of a nocturnal Mesoscale Convective System (MCS) over the Ohio Valley that encountered increasing shear and instability as it moved into the southern Appalachians.
ROARING GAP	5/22/2013	0.75	Scattered strong to severe thunderstorms developed during the afternoon and evening due to strong instability associated with an approaching upper level trough and the associated cold front.
ROARING GAP	5/22/2013	0.75	Scattered strong to severe thunderstorms developed during the afternoon and evening due to strong instability associated with an approaching upper level trough and the associated cold front.
PINEY CREEK	5/2/2016	1	A cold front situated across the Ohio Valley and extending into New England early on May 2nd began sagging south into an unstable air-mass during the afternoon and early evening. Scattered severe storms formed along this boundary, impacting a large portion of the Mid-Atlantic region, producing large hail and damaging winds.
CHERRY LANE	5/2/2016	1	A cold front situated across the Ohio Valley and extending into New England early on May 2nd began sagging south into an unstable air-mass during the afternoon and early evening. Scattered severe storms formed along this boundary, impacting a large portion of the Mid-Atlantic region, producing large hail and damaging winds.
EDMONDS	6/13/2017	0.88	High pressure centered to the south of the region provided ample moisture and warmer than normal temperatures for mid-June. A pronounced upper-level storm system to the west of the region would be the trigger to induce afternoon thunderstorms through much of the region. Some of the storms became severe producing damaging winds and large hail.
EDMONDS	7/18/2017	1.25	Instability associated with the combination of a nearby upper level low pressure system and strong daytime heating triggered scattered thunderstorms that would intensify quickly in a weakly-capped atmosphere. Downdraft CAPE values were in the range of 800 to 1100 J/Kg across the region. These conditions allowed for the development of severe thunderstorms that produced large hail and damaging winds.
TWIN OAKS	5/21/2018	0.88	Little change to the air mass from the previous day provided the same conditions for thunderstorms to again form in the mountains this afternoon. The key difference from the previous day is that outflows from these storms were able to push east of the mountains triggering a few severe thunderstorms farther east.
GLADE VLY	8/1/2019	0.88	A slow-moving upper level storm system moving through the area, combined with weak steering flow aloft, and ample heat and humidity allowed for isolated slow-moving

Location	Date	Size (mm)	Description
			severe thunderstorms to develop across northern North Carolina. These storms caused some isolated wind damage and hail.
SPARTA	9/30/2019	0.88	Hail ranged from penny to nickel size.
Ashe County			
JEFFERSON	6/25/2001	1.5	Thunderstorms during the late afternoon and evening of the 25th produced flash flooding and hail up to one and a half inches in diameter. Heavy thunderstorm rains caused numerous streams in and around Jefferson to flood. Several roads were closed by flood waters.
TODD	4/28/2002	0.88	Thunderstorms on the 28th produced hail up to half dollar size.
TROUT	4/28/2002	0.88	Thunderstorms on the 28th produced hail up to half dollar size.
WARRENSVILLE	5/2/2003	1	Thunderstorms during the afternoon and evening hours on the 2nd produced hail up to half dollar size. Hail up to three quarters of an inch in diameter covered the ground in Dobson, East Bend, and 2 miles northeast of Reidsville.
JEFFERSON	5/14/2006	1	Numerous thunderstorms formed late in the morning on the 14th, across the mountains of North Carolina, and spread east through the piedmont during the early afternoon. The severe thunderstorms produced mainly large hail, generally less than 1 inch in diameter, with golf ball sized hail falling in Reidsville. The only wind damage occurred in Rockingham County, 5 miles southeast of Reidsville, with one tree downed.
WAGONER	5/14/2006	0.75	Numerous thunderstorms formed late in the morning on the 14th, across the mountains of North Carolina, and spread east through the piedmont during the early afternoon. The severe thunderstorms produced mainly large hail, generally less than 1 inch in diameter, with golf ball sized hail falling in Reidsville. The only wind damage occurred in Rockingham County, 5 miles southeast of Reidsville, with one tree downed.
IDLEWILD	5/14/2006	0.75	Numerous thunderstorms formed late in the morning on the 14th, across the mountains of North Carolina, and spread east through the piedmont during the early afternoon. The severe thunderstorms produced mainly large hail, generally less than 1 inch in diameter, with golf ball sized hail falling in Reidsville. The only wind damage occurred in Rockingham County, 5 miles southeast of Reidsville, with one tree downed.
NELLA	9/28/2006	0.88	
LANSING	3/28/2007	1.75	Thunderstorms during the afternoon associated with an upper short wave along a quasi-stationary boundary produced severe hail up to the size of a golf ball.
LANSING	3/28/2007	0.88	Thunderstorms during the afternoon associated with an upper short wave along a quasi-stationary boundary produced severe hail up to the size of a golf ball.
BALDWIN	6/24/2007	0.75	Severe thunderstorms caused wind damage and hail up to the size of a penny.
JEFFERSON	7/23/2007	0.75	Thunderstorms formed during the afternoon of the 23rd. Some of these storms reached severe levels producing penny size hail.
LANSING	7/23/2007	0.75	Thunderstorms formed during the afternoon of the 23rd. Some of these storms reached severe levels producing penny size hail.
ASHLAND	8/23/2007	0.88	Nickel size hail fell in Rock Creek.
JEFFERSON	8/24/2007	1	Hail up to the size of quarters fell for 20 minutes.
GLENDALE SPGS	6/7/2008	0.75	Outflow boundaries from earlier showers and thunderstorms interacted with a warm, moist and unstable air mass to trigger isolated severe thunderstorms. These storms produced a couple of reports of damaging winds and large hail on June 7.
GLENDALE SPGS	6/22/2008	1.75	An upper level area of low pressure moved across the region ahead of a weak upstream cold front. These features combined with an unstable air mass to produce widespread

Location	Date	Size (mm)	Description
			strong to severe thunderstorms that produced not only large hail but also included some wind damage on June 22.
GLENDALE SPGS	6/22/2008	0.88	An upper level area of low pressure moved across the region ahead of a weak upstream cold front. These features combined with an unstable air mass to produce widespread strong to severe thunderstorms that produced not only large hail but also included some wind damage on June 22.
GLENDALE SPGS	6/22/2008	0.75	An upper level area of low pressure moved across the region ahead of a weak upstream cold front. These features combined with an unstable air mass to produce widespread strong to severe thunderstorms that produced not only large hail but also included some wind damage on June 22.
APPLE GROVE	6/22/2008	0.88	An upper level area of low pressure moved across the region ahead of a weak upstream cold front. These features combined with an unstable air mass to produce widespread strong to severe thunderstorms that produced not only large hail but also included some wind damage on June 22.
LANSING	7/21/2008	0.75	The penny hail stripped leaves from trees.
CLIFTON	7/22/2008	0.75	A large outflow boundary from an overnight thunderstorm complex moved through the region during the morning and early afternoon hours of July 22. This prevented thunderstorm development until early evening when storms started developing. Meanwhile, a line of thunderstorms approached the area from the west. Outflow from the first storms generated scattered clusters of storms across the northwest NC and southwest VA Piedmont up to the Blue Ridge, while the more organized line of storms moved into the mountains.
JEFFERSON	8/2/2008	0.88	A cold front moving into the central and southern Appalachians provided the focus for severe thunderstorm development during the afternoon of August 2nd. Damaging winds, and hail up to the size of quarters occurred.
SCOTTVILLE	6/2/2009	1	A few severe afternoon thunderstorms developed later June 2nd in a warm, unstable air mass ahead of a slow-moving frontal boundary located north of the area. Numerous penny to quarter-size hail reports were received.
CRUMPLER	6/2/2009	0.88	A few severe afternoon thunderstorms developed later June 2nd in a warm, unstable air mass ahead of a slow-moving frontal boundary located north of the area. Numerous penny to quarter-size hail reports were received.
NATHANS CREEK	6/2/2009	0.75	A few severe afternoon thunderstorms developed later June 2nd in a warm, unstable air mass ahead of a slow-moving frontal boundary located north of the area. Numerous penny to quarter-size hail reports were received.
FLATWOOD	6/3/2009	0.75	A moderately unstable air mass and seasonably strong mid-level shear helped to produce multicellular storms on the afternoon of June 3rd which produced scattered pockets of damaging winds and some penny or larger size hail in the mountains and foothills.
JEFFERSON	6/9/2009	0.88	An area of low pressure aloft dropping southeast through the area triggered scattered severe thunderstorms during the afternoon of June 9th over the mountains with reports of hail, wind and heavy rain. Storms progressed into the Piedmont by the evening with wind damage reports from Caswell County.
GLENDALE SPGS	6/17/2009	0.75	Retreating high pressure off the east coast during the afternoon of June 17th maintained a weak cool air wedge over the eastern forecast area while low pressure in the Ohio Valley brought southwest flow to the western sections of the area. Strong shear along a warm front led to the development of a few severe thunderstorms. Heavy rainfall of up to 2 inches in a short period also produced some flash flooding and several mudslides across Ashe County.
TODD	8/5/2009	0.75	A moist and unstable air mass ahead of cold front, along with a strong upper disturbance, contributed to the development of organized thunderstorms on August 5th.

Location	Date	Size (mm)	Description
			A line of thunderstorms developed along the Blue Ridge, and pushed east into the Piedmont of North Carolina during the afternoon and evening. The storms mainly produced damaging winds, resulting in downed trees.
FLEETWOOD	2/28/2011	0.75	A cold front brought an abrupt end to record-setting temperatures in parts of the area and triggered some strong to severe storms across several counties. Most of the storms produced only penny-size hail but a few produced wind damage or severe hail.
LANSING	4/4/2011	1	A strong upper level wave and cold front moved across the region on the night of the 4th into early on the 5th of April. A line of heavy showers and thunderstorms accompanied this front. This line intensified as it approached the blue ridge and entered into an area of higher instability. This intensification allowed for the very strong winds aloft to mix down to the surface as the line began to form into a bow echo, resulting in areas of wind damage, mainly along and east of the Blue Ridge.
TUCKERDALE	4/9/2011	0.88	A high pressure centered over New England pushed a back door cold front to northwest North Carolina. At the same time a strong upper level low pressure system approached from the west during the afternoon of the 9th. This resulted in the development of severe thunderstorms which produced large hail.
TODD	4/9/2011	0.75	A high pressure centered over New England pushed a back door cold front to northwest North Carolina. At the same time a strong upper level low pressure system approached from the west during the afternoon of the 9th. This resulted in the development of severe thunderstorms which produced large hail.
FLEETWOOD	4/9/2011	1.75	A high pressure centered over New England pushed a back door cold front to northwest North Carolina. At the same time a strong upper level low pressure system approached from the west during the afternoon of the 9th. This resulted in the development of severe thunderstorms which produced large hail.
GLENDALE SPGS	5/3/2011	1.75	The hail was mostly dime to quarter sized, with a few golf-ball sized and lasted about 5 minutes.
SCOTTVILLE	5/3/2011	0.75	A strong cold front crossed the region in the late afternoon and evening hours of the 3rd with storms erupting across the North Carolina mountains and into the foothills.
CRUMPLER	5/11/2011	1	Under a warm and unstable air mass, scattered thunderstorms developed over the mountains. A few of these storms produced large hail.
BINA	5/11/2011	1	Under a warm and unstable air mass, scattered thunderstorms developed over the mountains. A few of these storms produced large hail.
TODD	5/22/2011	1.75	Scattered thunderstorms spread eastward from a strong mesoscale system over Kentucky and Tennessee in the early evening and continued for several hours. With moderate instability and sufficient vertical wind shear a few storms became intense enough to produce hail up to golf-ball size. A few storms also produced heavy rainfall of up to 2-4 inches over southwest Ashe and northern Watauga counties causing some mudslides and small stream flooding.
TODD	5/22/2011	1	Scattered thunderstorms spread eastward from a strong mesoscale system over Kentucky and Tennessee in the early evening and continued for several hours. With moderate instability and sufficient vertical wind shear a few storms became intense enough to produce hail up to golf-ball size. A few storms also produced heavy rainfall of up to 2-4 inches over southwest Ashe and northern Watauga counties causing some mudslides and small stream flooding.
FLEETWOOD	5/24/2011	0.75	Two distinct upper level storm systems passed through the area, one in the late morning, the second during the late afternoon and early evening. Each brought a round of active severe weather to the region. Enough time passed after the exit of the first for afternoon heating to play a factor just prior to the arrival of the second. The earlier storms were primarily hail, while the second round consisted of strong damaging winds. Precipitation was also heavy with radar estimated rainfall from eastern Watauga county

Location	Date	Size (mm)	Description
			through northern Wilkes county ranging from 1 to 3.5 inches in several hours with flooding reported near Millers Creek.
GLENDALE SPGS	5/24/2011	2	Two distinct upper level storm systems passed through the area, one in the late morning, the second during the late afternoon and early evening. Each brought a round of active severe weather to the region. Enough time passed after the exit of the first for afternoon heating to play a factor just prior to the arrival of the second. The earlier storms were primarily hail, while the second round consisted of strong damaging winds. Precipitation was also heavy with radar estimated rainfall from eastern Watauga county through northern Wilkes county ranging from 1 to 3.5 inches in several hours with flooding reported near Millers Creek.
TROUT	6/5/2011	0.88	Storms moved through the region in association with a cold front. Nickel size hail fell from one of the storms, and very heavy rain from another caused flash flooding.
ASHLAND	6/8/2011	0.75	Some storms formed near the crest of the Blue Ridge in North Carolina during the afternoon. One of these storms became strong and produced hail up the size of nickels.
ASHLAND	6/8/2011	0.88	Some storms formed near the crest of the Blue Ridge in North Carolina during the afternoon. One of these storms became strong and produced hail up the size of nickels.
ASHLAND	6/8/2011	0.88	Some storms formed near the crest of the Blue Ridge in North Carolina during the afternoon. One of these storms became strong and produced hail up the size of nickels.
FLEETWOOD	6/10/2011	0.75	Scattered storms developed during the afternoon heating of the day. A few of these storms produced damaging winds, and one produced large hail. One slow moving storm also caused isolated flash flooding.
CRESTON	6/21/2011	1	During the afternoon of the 21st, a thunderstorm complex headed south through eastern Kentucky. Convection along the eastern edge of this system helped to prompt additional development farther east. This process repeated itself through the evening hours leading to multiple thunderstorms moving through the region, with many of the storms producing damaging wind or large hail.
CRESTON	7/3/2011	1	Quarter size hail covered the ground near Creston.
TOLIVER	7/4/2011	1	A strong upper level wave moved across the area during the afternoon. The lift created by this wave combined with moderate to strong instability over the region produced widespread showers and thunderstorms. Enough dry air was present in the low and mid-levels to allow for strong downbursts of winds to occur with many of these storms. A few storms also produced large hail.
FIG	3/31/2012	1	Hail covered the ground.
WARRENSVILLE	5/3/2012	0.88	Nickel size hail was observed at the Ashe County Middle School.
WAGONER	8/1/2012	1	Multiple reports of quarter-sized hail were received from the public southeast of Jefferson near Wagoner and just northeast of Glendale Springs. Near Glendale Springs, hail, ranging in size from peas to quarters, fell for nearly an hour and accumulated to a depth of one to two inches in some spots.
TROUT	5/22/2013	1	Scattered strong to severe thunderstorms developed during the afternoon and evening due to strong instability associated with an approaching upper level trough and the associated cold front.
TROUT	4/9/2015	0.88	Dime to nickel size hail covered the ground in five minutes.
BINA	4/20/2015	1	Numerous showers and thunderstorms developed in advance of and with the passage of a cold front. Some of these storms increased to severe levels and produced hail ranging from quarter size to golf ball size. Other hail less than one-inch diameter fell.
WEST JEFFERSON	6/26/2015	0.88	Upper level clouds from a thunderstorm complex arriving during the morning of June 26th cleared across the mountains of North Carolina into southern Virginia by early afternoon, allowing strong surface heating to take place. The heating provided

Location	Date	Size (mm)	Description
			instability for the remnants of a strong thunderstorm complex arriving from eastern Tennessee and Kentucky to allow a few storms to pulse upward to severe levels.
BALDWIN	6/26/2015	1	Upper level clouds from a thunderstorm complex arriving during the morning of June 26th cleared across the mountains of North Carolina into southern Virginia by early afternoon, allowing strong surface heating to take place. The heating provided instability for the remnants of a strong thunderstorm complex arriving from eastern Tennessee and Kentucky to allow a few storms to pulse upward to severe levels.
TOLIVER	9/4/2015	1	A backdoor cold front made its way southward across the Piedmont during the evening, supported aloft by an upper level disturbance passing across the central Appalachians in the otherwise upper level ridging environment covering much of the southeast and mid-Atlantic states. The cold front and disturbance provided increased instability, allowing strong to severe thunderstorms to develop in the very warm moist air south of the cold front.
HEMLOCK	5/2/2016	1	A cold front situated across the Ohio Valley and extending into New England early on May 2nd began sagging south into an unstable air-mass during the afternoon and early evening. Scattered severe storms formed along this boundary, impacting a large portion of the Mid-Atlantic region, producing large hail and damaging winds.
WARRENSVILLE	5/10/2018	0.88	A cold front approaching from the west would prompt isolated convection in the mountains. As the front pushed the storms east of the Blue Ridge where higher instabilities existed, the storms became more organized producing damaging winds and large hail.
NELLA	8/30/2018	1	Hail up to the size of quarters fell about one mile north of Nella.
BALDWIN	7/31/2019	1.75	An upper level storm system and a weak surface boundary interacted with a moist and unstable air mass to form a few severe thunderstorms across northwest North Carolina. These storms brought down trees dropped large hail up to the size of golf balls.
ZIONVILLE	4/28/2002	0.75	Thunderstorms on the 28th produced hail up to half dollar size.
Watauga County			
VALLE CRUCIS	6/4/2002	0.75	Thunderstorms during the afternoon of the 4th produced hail up to dime size.
DEEP GAP	7/3/2002	0.88	Thunderstorm during the afternoon of the 3rd produced hail up to nickel size.
BOONE	4/30/2003	0.75	Thunderstorms during the afternoon and early evening hours on the 30th produced hail up to quarter size.
ZIONVILLE	5/2/2003	0.75	Thunderstorms during the afternoon and evening hours on the 2nd produced hail up to half dollar size. Hail up to three quarters of an inch in diameter covered the ground in Dobson, East Bend, and 2 miles northeast of Reidsville.
BLOWING ROCK	5/15/2003	1.25	An isolated severe thunderstorm during the afternoon hours of the 15th produced hail up to half dollar size.
BLOWING ROCK	6/30/2003	0.88	Thunderstorms on the 30th produced up to nickel size hail.
VALLE CRUCIS	8/3/2005	1.75	A severe thunderstorm dropped golf ball sized hail near Valle Crucis during the afternoon of the 3rd.
ZIONVILLE	5/14/2006	0.75	Penny sized hail covered the ground.
BOONE	5/14/2006	1	Numerous thunderstorms formed late in the morning on the 14th, across the mountains of North Carolina, and spread east through the piedmont during the early afternoon. The severe thunderstorms produced mainly large hail, generally less than 1 inch in diameter, with golf ball sized hail falling in Reidsville. The only wind damage occurred in Rockingham County, 5 miles southeast of Reidsville, with one tree downed.
TODD	7/19/2006	1	Thunderstorms began developing during the afternoon hours of the 19th due primarily to daytime heating in an already unstable atmosphere. Some of these increased to

Location	Date	Size (mm)	Description
			severe levels, producing damaging wind gusts. As evening arrived, severe storms continued to be a treat thanks to the approach and then arrival of a dying meso-scale convective complex that moved out of the Ohio Valley and into our region. Again, damaging wind gusts, and large hail resulted from these severe storms.
SANDS	7/19/2006	0.75	Thunderstorms began developing during the afternoon hours of the 19th due primarily to daytime heating in an already unstable atmosphere. Some of these increased to severe levels, producing damaging wind gusts. As evening arrived, severe storms continued to be a treat thanks to the approach and then arrival of a dying meso-scale convective complex that moved out of the Ohio Valley and into our region. Again, damaging wind gusts, and large hail resulted from these severe storms.
LOVILL	7/21/2006	0.75	
SILVERSTONE	6/24/2007	0.75	Severe thunderstorms caused wind damage and hail up to the size of a penny.
MATNEY	7/27/2007	1	An isolated thunderstorm formed over Beech Mountain in Watauga County North Carolina the afternoon of the 26th. Not only did this storm increase to severe levels with quarter size hail reported, it also produced very heavy rainfall (2 to 3 inches) in only a one-hour period. This rainfall caused fifteen gravel roads to wash out, and the main road leading into Beech Mountain was blocked by debris.
BOONE	5/11/2008	0.88	A closed upper low moved across the Ohio Valley, and a strong jet stream was in place to trigger isolated severe thunderstorms across portions of northwest North Carolina, during the afternoon of May 11th. These storms produced wind damage and hail up to the size of nickels.
KELLERSVILLE	6/9/2008	2.75	Hail up to the size of baseballs dented vehicle roofs and hoods, and smashed windshields. The hail accumulated to a depth of one inch. The town of Beech Mountain experienced an estimated $10,000 worth of hail damage just to city vehicles and property.
VALLE CRUCIS	6/9/2008	1	Severe thunderstorms, which produced hail as large as the size of a baseball, developed in portions of the northwest mountains of North Carolina. These storms developed where strong heating interacted with increasing low-level moisture in advance of an approaching cold front on June 9.
ROMINGER	6/9/2008	0.88	Severe thunderstorms, which produced hail as large as the size of a baseball, developed in portions of the northwest mountains of North Carolina. These storms developed where strong heating interacted with increasing low-level moisture in advance of an approaching cold front on June 9.
KELLERSVILLE	6/9/2008	1	Severe thunderstorms, which produced hail as large as the size of a baseball, developed in portions of the northwest mountains of North Carolina. These storms developed where strong heating interacted with increasing low-level moisture in advance of an approaching cold front on June 9.
BOONE	6/2/2009	0.88	A few severe afternoon thunderstorms developed later June 2nd in a warm, unstable air mass ahead of a slow-moving frontal boundary located north of the area. Numerous penny to quarter-size hail reports were received.
FOSCOE	6/3/2009	0.75	A moderately unstable air mass and seasonably strong mid-level shear helped to produce multicellular storms on the afternoon of June 3rd which produced scattered pockets of damaging winds and some penny or larger size hail in the mountains and foothills.
FOSCOE	6/18/2009	0.75	A weakening complex of storms dropping southeast from the ridge over the central U.S. brought showers and thunderstorms to NC mountains during the afternoon of June 18th. One storm brought penny size hail.

Location	Date	Size (mm)	Description
PERKINSVILLE	5/14/2010	1	A cold front approached the region during the day and passed through the evening hours. Storms developed along and ahead of this front, many of which increased to severe magnitude and produce mainly large hail with some wind damage reports.
BOONE	3/23/2011	1	As a cold front moved across the region, numerous showers and thunderstorms developed along it. Some of the storms increased to severe levels and produced damaging winds and hail.
KELLERSVILLE	5/13/2011	0.88	An upper level storm system approaching from the west helped to trigger numerous showers and thunderstorms mainly over the mountainous terrain of northwest North Carolina. The storms developed along a slow-moving frontal boundary and with abundant moisture in place some of the storms produced heavy rainfall with flash flooding along with hail and strong winds.
KELLERSVILLE	5/13/2011	1	An upper level storm system approaching from the west helped to trigger numerous showers and thunderstorms mainly over the mountainous terrain of northwest North Carolina. The storms developed along a slow-moving frontal boundary and with abundant moisture in place some of the storms produced heavy rainfall with flash flooding along with hail and strong winds.
SODA HILL	5/22/2011	1.75	The public reported golf ball hail.
PERKINSVILLE	5/24/2011	1	Dime to quarter size hail fell just north of Boone.
BOONE	5/24/2011	1	Two distinct upper level storm systems passed through the area, one in the late morning, the second during the late afternoon and early evening. Each brought a round of active severe weather to the region. Enough time passed after the exit of the first for afternoon heating to play a factor just prior to the arrival of the second. The earlier storms were primarily hail, while the second round consisted of strong damaging winds. Precipitation was also heavy with radar estimated rainfall from eastern Watauga county through northern Wilkes county ranging from 1 to 3.5 inches in several hours with flooding reported near Millers Creek.
BLOWING ROCK	5/26/2011	1.75	Hail up to golf-ball size was reported from Blowing Rock northeast toward Aho.
BAMBOO	5/26/2011	0.88	The atmosphere quickly became unstable during the afternoon of May 26th resulting in the development of severe thunderstorms in northwest North Carolina. The first storms were primarily hail producers, but in the evening, a line of storms started forming in Western NC. From this point on, the main threat became damaging straight-line winds. In addition, training of cells over the mountains lead to isolated flash flooding. The storms finally moved east of the Blue Ridge in the late evening, where a bow echo type squall line developed and raced across Stokes County producing a wide swath of wind damage.
BLOWING ROCK	6/9/2011	1	Despite being under the influence by an area of high pressure, enough ridge top convergence of winds took place to help facilitate the development of isolated to scattered thunderstorms. A few of these storms reached severe levels with large hail and damaging winds.
BLOWING ROCK	6/12/2011	0.88	Nickel size hail fell on Sunrise Cove.
DEEP GAP	6/21/2011	1	Quarter size hail fell on Owl Rest Lane.
PERKINSVILLE	6/21/2011	1	During the afternoon of the 21st, a thunderstorm complex headed south through eastern Kentucky. Convection along the eastern edge of this system helped to prompt additional development farther east. This process repeated itself through the evening hours leading to multiple thunderstorms moving through the region, with many of the storms producing damaging wind or large hail.

Location	Date	Size (mm)	Description
PERKINSVILLE	6/28/2011	1	A cold front swept through the region on the 28th. Multiple clusters of storms accompanied the front as it progressed. Some of these storms increased to severe levels and produced large hail and damaging winds. Flash flooding also occurred with one of the storms.
VALLE CRUCIS	7/3/2011	1.25	Hail of up to Half Dollar size fell just west of Boone.
FOSCOE	3/15/2012	0.88	Widely scattered thunderstorms developed in the afternoon, some with heavy rain and large hail. The heavy rainfall was confined to small area in southern Watauga County, southeast of Foscoe, where radar estimated rainfall was in the 2 to 3-inch range in several hours and caused some local runoff problems.
FOSCOE	3/15/2012	0.75	Widely scattered thunderstorms developed in the afternoon, some with heavy rain and large hail. The heavy rainfall was confined to small area in southern Watauga County, southeast of Foscoe, where radar estimated rainfall was in the 2 to 3-inch range in several hours and caused some local runoff problems.
FOSCOE	3/15/2012	0.88	Widely scattered thunderstorms developed in the afternoon, some with heavy rain and large hail. The heavy rainfall was confined to small area in southern Watauga County, southeast of Foscoe, where radar estimated rainfall was in the 2 to 3-inch range in several hours and caused some local runoff problems.
SUGAR GROVE	4/30/2012	1	The public reported quarter-sized hail near Beaver Dam.
BLOWING ROCK	6/30/2012	1.5	Hail ranging from dime to ping pong ball size fell in the Blackberry area.
BLOWING ROCK	5/21/2013	1	The combination of an upper level disturbance passing over the region and daytime heating triggered spotty shower and thunderstorm activity across the mountains. A few storms became severe for a short while during the evening, and produced large hail.
FOSCOE	5/21/2013	1	The combination of an upper level disturbance passing over the region and daytime heating triggered spotty shower and thunderstorm activity across the mountains. A few storms became severe for a short while during the evening, and produced large hail.
TODD	4/9/2015	0.75	Enough three-quarter inch diameter hail fell that the landscape appeared snow covered.
MABEL	4/9/2015	1	Numerous showers and some storms developed within the interaction of a stationary front over the region and upper level disturbances moving along this boundary. A number of the storms produced hail less than an inch in diameter with an isolated report of one-inch diameter hail. Damaging winds were produced by one thunderstorm in Yadkin County.
MATNEY	4/20/2015	0.88	Numerous showers and thunderstorms developed in advance of and with the passage of a cold front. Some of these storms increased to severe levels and produced hail ranging from quarter size to golf ball size. Other hail less than one-inch diameter fell.
BOWERS GAP	5/11/2015	1	A spotter observed 1.00-inch hail at Beech Mountain.
ROMINGER	5/2/2016	1	Hail up to a 1 inch in diameter covered the ground near Beech Mountain, North Carolina.
AHO	9/29/2016	1	A strong upper low situated across the Ohio River Valley continued its journey south, where it settled just to the west of the Appalachian Mountains. This low aided in the initiation of strong to severe thunderstorms during the afternoon hours of September 29th, which produced large hail and isolated wind damage across the higher elevations of northwest North Carolina before pushing just east of the Blue Ridge divide.
BLOWING ROCK	5/19/2017	1	Above normal temperatures and abundant moisture triggered afternoon thunderstorms across portions of North Carolina ahead of a cold front. These scattered thunderstorms pulsed up periodically, producing isolated large hail and wind damage, especially for those located along and East of the Blue Ridge Mountains.
Wilkes County			

Location	Date	Size (mm)	Description
ROARING RIVER	5/13/2000	1.75	Thunderstorms during the afternoon of the 13th produced damaging winds and hail up to golf ball size.
WILKESBORO	5/27/2000	0.75	Thunderstorms during the afternoon of the 27th produced hail up to dime size and damaging winds. Thunderstorm winds downed numerous trees 5 miles south of Wilkesboro.
WILKESBORO	6/26/2001	0.75	Thunderstorms during the afternoon of the 26th produced hail up to dime size and damaging winds.
HAYS	4/17/2002	0.88	Thunderstorms during the afternoon and evening of the 17th produced hail up to nickel size and dangerous lightning
WILKESBORO	4/28/2002	1.25	Thunderstorms on the 28th produced hail up to half dollar size.
MCGRADY	7/2/2002	0.75	Thunderstorms during the afternoon of the 2nd produced damaging winds and hail up to dime size. Thunderstorm winds downed numerous trees across Ashe county. One tree was downed onto a house, causing damage to the roof.
NORTH WILKESBORO	5/3/2003	0.75	Thunderstorms during the afternoon and early evening hour on the 3rd produced hail up to golf ball size. Up to golf ball size hail covered the ground in Elkin and up to quarter size hail covered the ground in Mt. Airy.
MULBERRY	5/3/2003	0.75	Thunderstorms during the afternoon and early evening hour on the 3rd produced hail up to golf ball size. Up to golf ball size hail covered the ground in Elkin and up to quarter size hail covered the ground in Mt. Airy.
WILKESBORO	5/3/2003	0.88	Thunderstorms during the afternoon and early evening hours on the 3rd produced hail up to golf ball size. Up to golf ball size hail covered the ground in Elkin and up to quarter size hail covered the ground in Mt. Airy.
NORTH WILKESBORO	5/3/2003	0.88	Thunderstorms during the afternoon and early evening hours on the 3rd produced hail up to golf ball size. Up to golf ball size hail covered the ground in Elkin and up to quarter size hail covered the ground in Mt. Airy.
WILKESBORO	7/5/2003	0.88	Thunderstorms during the afternoon of the 5th produced flash flooding, hail up to nickel size, and damaging winds.
ROARING RIVER	7/18/2003	0.88	Thunderstorms during the afternoon of the 18th produced damaging winds and hail up to nickel size. Thunderstorm winds downed trees in Roaring River.
MILLERS CREEK	5/8/2004	0.75	An isolated severe thunderstorm resulted in trees down across central parts of the county and one report of penny size hail.
NORTH WILKESBORO	3/23/2005	1	Thunderstorms during the afternoon of 23rd produced hail up to quarter sized across northern North Carolina.
NORTH WILKESBORO	7/2/2005	0.75	
MCGRADY	8/5/2005	0.75	
WILBAR	5/14/2006	0.75	Hail was 2 inches deep along Highway 16.
MULBERRY	9/10/2006	0.75	Hail covered the ground.
NORTH WILKESBORO	9/28/2006	0.75	
ELKVILLE	4/15/2007	0.88	Nickel size hail fell in the community of Ferguson.
ELKVILLE	6/11/2007	0.75	Severe thunderstorms produced wind damage and hail up to quarter size in northwest North Carolina.
MILLERS CREEK	6/24/2007	0.75	Severe thunderstorms caused wind damage and hail up to the size of a penny.
MORAVIAN FALLS	6/24/2007	0.75	Severe thunderstorms caused wind damage and hail up to the size of a penny.
NORTH WILKESBORO	6/28/2007	0.75	Severe thunderstorms resulted in wind damage and hail up to the size of quarters.

Location	Date	Size (mm)	Description
BENHAM	6/28/2007	1	Severe thunderstorms resulted in wind damage and hail up to the size of quarters.
MORAVIAN FALLS	8/24/2007	1	Scattered thunderstorms developed on October 24th, across the mountains and foothills. Some of these storms became severe, producing hail up to the size of quarters and wind damage.
RONDA	5/8/2008	1	A strong storm system across the Ohio Valley during the afternoon of Thursday, May 8th, pushed east toward the mountains Thursday evening. A boundary was trailing from the low across southern Virginia. This put the region in a high shear environment, meaning, winds at the surface were blowing from the southeast, while a few thousand feet above the surface, the winds were blowing out of the southwest at 40 to 50 mph. Supercells formed in the foothills and piedmont of North Carolina, ahead of a strong but broken line of thunderstorms that formed just west of the mountains and became more organized by the time it reached the Blue Ridge. These severe thunderstorms brought damaging winds, large hail and flash flooding to portions of Northwest North Carolina.
DENNY	6/26/2008	0.75	An unstable atmosphere set the stage for afternoon development of showers and thunderstorms on June 26. Some of these storms reached severe levels and generated large hail and damaging downburst winds.
DOUGHTON	6/27/2008	0.75	A few severe thunderstorms, producing damaging winds and large hail, developed in a warm and moist southwest flow in advance of an approaching cold front on June 27.
ROARING RIVER	7/7/2008	1	An uncharacteristic area of relatively cool low pressure moved southeast out of Canada into the region. Daytime heating due to sunshine combined with the relatively cooler low overhead and helped to result in a very unstable atmosphere. The result was the formation of thunderstorms with numerous reports of severe hail and damaging winds.
MAPLE SPGS	7/7/2008	1.25	An uncharacteristic area of relatively cool low pressure moved southeast out of Canada into the region. Daytime heating due to sunshine combined with the relatively cooler low overhead and helped to result in a very unstable atmosphere. The result was the formation of thunderstorms with numerous reports of severe hail and damaging winds.
NORTH WILKESBORO	7/7/2008	1	An uncharacteristic area of relatively cool low pressure moved southeast out of Canada into the region. Daytime heating due to sunshine combined with the relatively cooler low overhead and helped to result in a very unstable atmosphere. The result was the formation of thunderstorms with numerous reports of severe hail and damaging winds.
HAYS	7/7/2008	0.75	An uncharacteristic area of relatively cool low pressure moved southeast out of Canada into the region. Daytime heating due to sunshine combined with the relatively cooler low overhead and helped to result in a very unstable atmosphere. The result was the formation of thunderstorms with numerous reports of severe hail and damaging winds.
HAYS	7/7/2008	0.75	An uncharacteristic area of relatively cool low pressure moved southeast out of Canada into the region. Daytime heating due to sunshine combined with the relatively cooler low overhead and helped to result in a very unstable atmosphere. The result was the formation of thunderstorms with numerous reports of severe hail and damaging winds.
HENDRIX	7/7/2008	1.75	An uncharacteristic area of relatively cool low pressure moved southeast out of Canada into the region. Daytime heating due to sunshine combined with the relatively cooler low overhead and helped to result in a very unstable atmosphere. The result was the formation of thunderstorms with numerous reports of severe hail and damaging winds.
CONGO	7/7/2008	0.88	An uncharacteristic area of relatively cool low pressure moved southeast out of Canada into the region. Daytime heating due to sunshine combined with the relatively cooler low overhead and helped to result in a very unstable atmosphere. The result was the formation of thunderstorms with numerous reports of severe hail and damaging winds.
FERGUSON	7/9/2008	0.88	An upper level cold low had been slowly progressing into the region since July 7. On July 9, the center of the low was shifting east of the area and the feature's associated cold front was moving across the area. A combination good instability due to the low, plenty of moisture near the surface, relatively dry air aloft, and the passage of the cold front,

Location	Date	Size (mm)	Description
			resulted in storms that produced severe weather, especially in the form of damaging winds.
NORTH WILKESBORO	5/4/2009	0.75	A thunderstorm brought up to penny sized hail to central portions of Wilkes County during the afternoon of May 4th.
MORAVIAN FALLS	5/29/2009	0.75	A cold front moved through the area late in the afternoon into the early evening on May 29th. Thunderstorms developed along the Blue Ridge and moved eastward into the Piedmont. Some of these storms became severe producing penny size hail.
NORTH WILKESBORO	6/9/2009	0.88	An area of low pressure aloft dropping southeast through the area triggered scattered severe thunderstorms during the afternoon of June 9th over the mountains with reports of hail, wind and heavy rain. Storms progressed into the Piedmont by the evening with wind damage reports from Caswell County.
MILLERS CREEK	5/14/2010	1.25	Hail fell ranging from quarter to half dollar size.
WINDY GAP	5/14/2010	1	Quarter size hail covered the ground on Route 421 just past Windy Gap Road. Damage values are estimated.
PURLEAR	5/14/2010	1	A cold front approached the region during the day and passed through the evening hours. Storms developed along and ahead of this front, many of which increased to severe magnitude and produce mainly large hail with some wind damage reports.
WILBAR	6/27/2010	1	Moisture return in advance of an approaching cold front combined with an upper level area of low pressure to produce scattered evening thunderstorms west of the Blue Ridge. A few of these storms were strong enough to produce damaging winds.
NORTH WILKESBORO	7/13/2010	0.88	A strong upper level trough of low pressure moved across the Mid-Atlantic region during the afternoon and evening. Large scale lift in advance of this feature tapped into deep moisture to produce numerous severe thunderstorms in northwest and north central North Carolina.
NORTH WILKESBORO	7/13/2010	1	A strong upper level trough of low pressure moved across the Mid-Atlantic region during the afternoon and evening. Large scale lift in advance of this feature tapped into deep moisture to produce numerous severe thunderstorms in northwest and north central North Carolina.
TRAPHILL	2/28/2011	0.75	A cold front brought an abrupt end to record-setting temperatures in parts of the area and triggered some strong to severe storms across several counties. Most of the storms produced only penny-size hail but a few produced wind damage or severe hail.
HAYS	4/9/2011	0.88	A high pressure centered over New England pushed a back door cold front to northwest North Carolina. At the same time a strong upper level low pressure system approached from the west during the afternoon of the 9th. This resulted in the development of severe thunderstorms which produced large hail.
DOCKERY	5/13/2011	0.88	An upper level storm system approaching from the west helped to trigger numerous showers and thunderstorms mainly over the mountainous terrain of northwest North Carolina. The storms developed along a slow-moving frontal boundary and with abundant moisture in place some of the storms produced heavy rainfall with flash flooding along with hail and strong winds.
NORTH WILKESBORO	5/23/2011	0.75	A 53-mph wind gust also occurred at this location.
ROARING RIVER	5/23/2011	1	Hail fell in the town of Roaring River.
HUNTING CREEK	5/23/2011	1.75	Hail occurred on Fishing Creek Road.
WINDY GAP	5/23/2011	1.75	Hail reported at exit 276 on Highway 421.
MILLERS CREEK	5/23/2011	1.75	Hail reported near the intersection of Pads Road and Boone Trail.

Location	Date	Size (mm)	Description
CLINGMAN	5/23/2011	1	A large supercell brought numerous reports of severe weather mainly to parts of Wilkes County but also into western Surry County.
NORTH WILKESBORO	5/23/2011	1.75	A large supercell brought numerous reports of severe weather mainly to parts of Wilkes County but also into western Surry County.
VANNOY	5/24/2011	1.5	Two distinct upper level storm systems passed through the area, one in the late morning, the second during the late afternoon and early evening. Each brought a round of active severe weather to the region. Enough time passed after the exit of the first for afternoon heating to play a factor just prior to the arrival of the second. The earlier storms were primarily hail, while the second round consisted of strong damaging winds. Precipitation was also heavy with radar estimated rainfall from eastern Watauga county through northern Wilkes county ranging from 1 to 3.5 inches in several hours with flooding reported near Millers Creek.
TRAPHILL	5/24/2011	1.75	Two distinct upper level storm systems passed through the area, one in the late morning, the second during the late afternoon and early evening. Each brought a round of active severe weather to the region. Enough time passed after the exit of the first for afternoon heating to play a factor just prior to the arrival of the second. The earlier storms were primarily hail, while the second round consisted of strong damaging winds. Precipitation was also heavy with radar estimated rainfall from eastern Watauga county through northern Wilkes county ranging from 1 to 3.5 inches in several hours with flooding reported near Millers Creek.
LOMAX	7/4/2011	1	A strong upper level wave moved across the area during the afternoon. The lift created by this wave combined with moderate to strong instability over the region produced widespread showers and thunderstorms. Enough dry air was present in the low and mid-levels to allow for strong downbursts of winds to occur with many of these storms. A few storms also produced large hail.
MAPLE SPGS	7/13/2011	1	A weak upper level storm system and surface boundary were moving into the region. These features provided enough lift to generate scattered thunderstorms east of the Blue Ridge. With marginal wind shear and instability present, only a few of these storms were able to become severe.
DENNY	7/13/2011	1	A weak upper level storm system and surface boundary were moving into the region. These features provided enough lift to generate scattered thunderstorms east of the Blue Ridge. With marginal wind shear and instability present, only a few of these storms were able to become severe.
MAPLE SPGS	8/18/2011	1	An approaching upper level storm system embedded in the northwest flow aloft, along with low level moisture convergence and daytime heating, triggered thunderstorm development in the early afternoon. A few of these storms brought hail up to quarter size and damaging winds. A slow-moving storm dropped intense rainfall over Sparta, NC causing small streams to flood.
FERGUSON	3/31/2012	1	A small cluster of storms developed along and behind a cold front passing slowly through northwest North Carolina. The few of the storms became briefly severe with hail up to quarter size.
TRAPHILL	4/30/2012	1.75	The public reported golf ball-sized hail just southeast of Traphill.
WILKESBORO	4/30/2012	0.75	The public reported penny-sized hail in North Wilkesboro.
CLINGMAN	5/1/2012	1	Quarter size hail was reported by an ambulance traveling on U.S. Route 421, south of Ronda.
WILKES CO ARPT	5/14/2012	1	Nickel to quarter size hail was observed beginning at 5:53 PM EDT and ending at 5:56 PM EDT at the intersection of Congo Road and Winkler Mill Road, as well as along Highway 421.

Location	Date	Size (mm)	Description
WILKES CO ARPT	5/14/2012	0.88	A slow-moving upper level low pressure system moving across the Tennessee Valley triggered widespread showers and thunderstorms along the Blue Ridge Mountains of North Carolina and Virginia. A few storms became severe in North Carolina, where atmospheric instability was greatest. The ground was observed to be saturated in many areas along the Blue Ridge from rainfall during previous days, which helped to enhance the flooding threat.
WILBAR	7/3/2012	1	A broad upper ridge to over the central U.S. continued to allow periodic upper level storm systems to drop toward the region. Despite a fairly disorganized surface pattern the intense heat and high humidity helped to generate a few severe thunderstorms in the afternoon.
OSBORNVILLE	7/25/2012	0.88	A few pulse-type thunderstorms developed near a surface front in an environment with moderate to strong instability and wind shear.
WINDY GAP	7/25/2012	1.25	A few pulse-type thunderstorms developed near a surface front in an environment with moderate to strong instability and wind shear.
WILKESBORO	8/1/2012	0.75	The public observed penny-sized hail in Wilkesboro.
HUNTING CREEK	5/6/2013	1	Quarter-size hail was observed along Route 115.
CRICKET	5/6/2013	1	A deep upper level low pressure system was pinwheeling across Tennessee, while high pressure was wedged against the eastern face of the Appalachians. Breaks in the cloud cover across northern North Carolina added to the surface-based instability, which allowed thunderstorms across the area to intensify to severe levels during the evening.
ABSHERS	5/22/2013	1	Scattered strong to severe thunderstorms developed during the afternoon and evening due to strong instability associated with an approaching upper level trough and the associated cold front.
ABSHERS	6/11/2014	1	Numerous showers and thunderstorms developed in the unstable, moisture laden air in advance of an approaching strong cold front. A couple of these storms reached severe levels by producing damaging winds and quarter size hail.
OSBORNVILLE	6/17/2014	1	Quarter size hail fell on Somers Road.
WILKES CO ARPT	6/19/2014	1.25	Hail ranging from quarter size to half dollar size fell on Route 421.
WILKES CO ARPT	6/19/2014	0.88	Nickel size hail fell in an area that covered parts of Collegiate Drive, Highway 421, and Highway 268 in Wilkesboro.
ELKIN	2/24/2016	1	A strong surface low was located over Western Tennessee in the morning. A wedge was in place over the region and expected to be eroded by a strong low-level jet. Bulk shear of 60 knots and Storm-Relative Helicity in the 400-600 m**2/s**2 range provided the dynamics for this severe event. With this in place, thunderstorms developed mainly east of the Blue Ridge in the Piedmont. Reports of Thunderstorm wind damage and large hail came in from multiple counties across North Carolina.
ROARING RIVER	5/12/2016	1	A stationary front was draped across the Virginia and North Carolina state border during the afternoon of May 12th. Scattered showers and storms were triggered along this boundary, impacting portions of the Piedmont counties of northwest North Carolina. Large hail and damaging winds were the primary threats with these storms.
BOOMER	9/28/2016	1	A quasi-stationary frontal boundary continued to produce bands of deep convection early in the morning on September 28th, as a strong upper low continued to deepen in parts of the Ohio Valley. Widespread severe weather began to occur in the midafternoon hours, mainly in the form of large hail and isolated wind damage across mainly the northern piedmont counties of North Carolina, as the storms moved off of the Blue Ridge Plateau.

Location	Date	Size (mm)	Description
SUMMIT	3/27/2017	0.75	A few thunderstorms developed ahead of a strong cold front during the afternoon and evening of the March 27th, a few of which intensified and became severe for short periods of time.
DOCKERY	9/5/2017	0.88	High pressure gave way to a slow-moving cold front which entered the region early on the 5th, before stalling just east of the Blue Ridge mountains in Virginia and North Carolina. This frontal passage provided the focus for isolated thunderstorms to develop across portions of north central North Carolina, a few of which produced small hail and isolated wind damage.
BOOMER	7/21/2018	1.75	Golf ball-size hail fell along Price Road.
BOOMER	7/21/2018	0.88	During the afternoon and evening of the 21st, the influence of an area of high pressure weakened, while the influence of an approaching frontal boundary strengthened. The result was the development of isolated to scattered showers and thunderstorms. A couple of these storms increased to severe levels and generated damaging winds and large hail.
BUCK	9/2/2018	1.25	High pressure in place over the region continued a pattern that had been in place for several days. Early morning fog would break early in the day and give way to isolated, terrain enhanced convection during the afternoon hours.

TABLE H.6: ICE STORM EVENTS

Date	Description
Alleghany County	
12/13/2000	Freezing rain during the late evening of the 13th and early morning of the 14th produced 1/4 inch of glaze. Numerous accidents were reported on icy roads.
2/5/2004	A winter storm brought significant ice accretions to the northern mountains of North Carolina during the evening of the 5th and morning of the 6th. Ice accumulated to between a quarter and a half inch in both Watauga and Alleghany counties.
12/15/2005	An ice storm produced a 1/4 to 1/2-inch coating of ice across Northern North Carolina starting on the morning of the 15th in the west and continuing into the evening. Downed trees, limbs and power lines created power outages across much of the region. Emergency managers estimated that 12,000 people lost power during the storm. Surry county reported 300 trees downed across the county with 8,000 people losing power in the Dobson, Mount Airy and Westfield areas.
1/21/2007	There was 0.25 inch of ice county-wide.
2/1/2008	One quarter to one third of an inch of glaze occurred during this event. The weight of the ice downed trees and power lines in the county.
12/25/2009	A report of 0.6 inches of ice near Ennice was received. Tree and power lines were also reported down.
1/21/2010	Ice accretion totaled 0.50 inches in Cherry Lane, 0.40 inches in Ennice, and 0.25 inches in Sparta. The ice was sufficient enough to bring large tree limbs down in Cherry Lane. Damage values are estimated.
2/26/2013	A total of one-quarter of an inch of ice was reported, especially in the Roaring Gap region.
11/14/2018	Ice accretion totals across the county ranged from 0.25 inches at a location one mile south-southwest of Whitehead and also at a location three miles west-southwest of Piney Creek, and 0.40 inches at a location three miles northeast of Sparta. Power outages due to downed power lines included at least 1000 customers. Damage values are estimated.
Ashe County	
12/13/2000	Freezing rain during the late evening of the 13th and early morning of the 14th produced 1/4 inch of glaze. Numerous accidents were reported on icy roads.

Date	Description
2/3/2005	Low pressure moved across the Middle Atlantic States February 3rd and brought significant ice accumulations to the mountains of northwest North Carolina. Ice accretions ranged from one quarter of an inch in eastern Watauga County to an eighth of an inch in western sections of Ashe County.
12/15/2005	An ice storm produced a 1/4 to 1/2-inch coating of ice across Northern North Carolina starting on the morning of the 15th in the west and continuing into the evening. Downed trees, limbs and power lines created power outages across much of the region. Emergency managers estimated that 12,000 people lost power during the storm. Surry county reported 300 trees downed across the county with 8,000 people losing power in the Dobson, Mount Airy and Westfield areas.
1/21/2007	There was 0.25 inch of ice county-wide.
2/1/2008	One quarter to one third of an inch of glaze occurred during this event. The weight of the ice downed trees and power lines in the county.
12/25/2009	Spotter in Toliver area reported 1/3 of an inch of ice accretion.
1/21/2010	Ice accretion totaled 0.50 inches in Fleetwood and 0.25 inches in West Jefferson.
2/26/2013	A total of one-quarter inch of ice developed across the county, especially along and near the crest of the Blue Ridge, including the community of Glendale.
11/14/2018	Ice accretion totals across the county ranged from 0.10 inches at a location two miles south-southeast of Trout, 0.25 inches at a location one mile east of West Jefferson, and 0.40 inches at a location two miles west-northwest of Fleetwood. Power outages occurred due to downed power lines and impacted 5500 customers. Damage values are estimated.
Watauga County	
2/5/2004	A winter storm brought significant ice accretions to the northern mountains of North Carolina during the evening of the 5th and morning of the 6th. Ice accumulated to between a quarter and a half inch in both Watauga and Alleghany counties.
2/3/2005	Low pressure moved across the Middle Atlantic States February 3rd and brought significant ice accumulations to the mountains of northwest North Carolina. Ice accretions ranged from one quarter of an inch in eastern Watauga County to an eighth of an inch in western sections of Ashe County.
1/21/2007	There was 0.25 inch of ice county-wide.
2/1/2008	One quarter to one third of an inch of glaze occurred during this event. The highest totals occurred closer to the Blue Ridge. The weight of the ice downed trees and power lines in the county.
12/25/2009	Up to 1 inch of ice was reported on trees with some trees and power lines brought down.
1/21/2010	Ice accretions totaled 0.75 inches in Boone and 0.25 inches in Vilas.
2/26/2013	A total of one-quarter inch of ice developed across the county, especially along the crest of the Blue Ridge, including the community of Boone. Higher elevations near Boone realized ice around four-tenth of an inch thick. Ice up to one inch thick was received near the community of Aho at an elevation around 4000 feet.
11/14/2018	Ice accretion across the county ranged from 0.25 inches at a location one mile west of Boone and also a location one mile west-northwest of Aho, 0.30 inches at a location two miles east-northeast of Sands, and 0.50 inches at a location one mile north of Boone. Power outages occurred to downed power lines and impacted at least 1000 customers. Several trees were brought down by the weight of the ice.
Wilkes County	
2/2/2004	Low pressure moving up the Mid-Atlantic coast brought wintry weather conditions to the mountains and foothills of North Carolina during the evening of the 2nd through the morning of the 3rd. 5 inches of snow fell across most of Watauga County, along with one quarter inch of glaze. In Wilkes County, there was one quarter inch of ice accretion.
12/15/2005	An ice storm produced a 1/4 to 1/2-inch coating of ice across Northern North Carolina starting on the morning of the 15th in the west and continuing into the evening. Downed trees, limbs and power lines created power outages across much of the region. Emergency managers estimated that 12,000 people lost power during the storm. Surry county reported 300 trees downed across the county with 8,000 people losing power in the Dobson, Mount Airy and Westfield areas.

Date	Description
1/21/2007	Widespread accounts of 0.25 inch of ice along the Blue Ridge Parkway.
2/1/2008	One quarter to one third of an inch of glaze occurred during this event. The highest totals occurred closer to the Blue Ridge. The weight of the ice downed trees and power lines in the county.
12/25/2009	Numerous trees were brought down by ice, mainly along higher mountain ridges.

TABLE H.7: LIGHTNING EVENTS (2000-2020)

Location	Date	Description
Alleghany County		
SPARTA	5/10/2005	Lightning struck a tree and caused it to fall across a road, temporarily blocking traffic.
GLADE VLY	5/26/2011	Lightning struck a barn and caused a large fire.
GLADE VLY	8/17/2016	Lightning struck a home on Fox Run Lane resulting in a fire which destroyed the house. Damage values are estimated.
PEDEN	4/22/2017	Lightning struck a tree, set it on fire, and the tree fell across U.S. 221 near Route 113. Damage values are estimated.
TOPIA	7/16/2019	Lightning struck a home on Willies Road, igniting a fire. The home was completely destroyed by the fire.
Ashe County		
FLEETWOOD	7/24/2011	A building was struck by lightning.
BROWNWOOD	7/1/2012	A house fire was caused by lightning on Gap Trail Road.
GLENDALE SPGS	7/19/2013	Lightning struck a power pole on Glendale School Road.
Watauga County		
BOONE	6/14/2001	Thunderstorms during the evening produced damaging lightning and flash flooding. Lightning struck two houses during the late afternoon of the 14th starting fires. One house was completely destroyed while the second house suffered considerable damage. Heavy thunderstorm rains flooded a small part of Boone, requiring several rescues.
VALLE CRUCIS	7/17/2013	Lightning struck a church which sustained minor damage and a tree was exploded adjacent to the church. A propane line and fuse boxes in the church were damaged.
Wilkes County		
HAYS	6/15/2001	Lightning struck the C&L Manufacturing company, starting a fire that destroyed the building, equipment and inventory.
HAYS	6/5/2002	Lightning struck a house 2 miles east of Hays, starting a fire that burned much of the house to the ground. A truck and other equipment that was in the garage were also destroyed.
TRAPHILL	7/10/2003	Thunderstorms during the evening of the 10th produced damaging lightning and downed trees 7 miles east of Elkin. Lightning created a fire that destroyed a garage in Traphill.
PARSONVILLE	6/4/2010	Lightning struck a home at the Rendezvous Ridge Vineyard causing structural damage and minor water damage.
WILKESBORO	7/27/2010	Lightning struck a one-story home on Country Club Road, causing damage to insulation, wiring, and some trusses.
MOXLEY	6/9/2011	Lightning struck an unoccupied home and caused a fire that gutted the living room area. The remainder of the home sustained smoke damage. There was minor water damage due to the firefighting efforts. Damage values are estimated.
MILLERS CREEK	5/14/2012	Lightning caused structural damage to a storage shed along Highway 16 in the Millers Creek community.
MILLERS CREEK	8/17/2017	Lightning struck an outbuilding, and set it on fire, at a property located on Kite Road. Damage values are estimated.
MULBERRY	8/17/2017	Lightning struck and downed a tree on Windy Ridge Road. Damage values are estimated.

TABLE H.8: THUNDERSTORM WIND EVENTS (2000-2020)

Location	Date	MPH	Description
Alleghany County			
GLADE VLY	6/11/2003	65	Thunderstorm winds downed trees in Glade Valley, in northern Stokes County, and in Danbury, and 5 miles north of Danbury.
SPARTA	6/11/2006	60	A large tree was downed on Maines Road.
SPARTA	7/19/2006	50	Thunderstorms began developing during the afternoon hours of the 19th due primarily to daytime heating in an already unstable atmosphere. Some of these increased to severe levels, producing damaging wind gusts. As evening arrived, severe storms continued to be a treat thanks to the approach and then arrival of a dying meso-scale convective complex that moved out of the Ohio Valley and into our region. Again, damaging wind gusts, and large hail resulted from these severe storms.
ENNICE	8/3/2006	60	Large tree blown down on the west side of town.
PINEY CREEK	8/23/2007	55	A large tree was blown down on Topia Road in the town of Piney Creek.
ENNICE	7/9/2008	50	A tree was blown down on Crab Creek Road. Damage values are estimated.
SPARTA	7/9/2008	50	A tree was blown down on Memorial Park Drive. Damage values are estimated.
ENNICE	7/23/2008	50	Large tree limbs were blown down. Damage values are estimated.
SPARTA	6/14/2010	55	Trees were blown down along Pine Swamp Road, Glade Valley Road and Memorial Park Drive around Sparta. Damage amounts are estimated.
ENNICE	7/8/2010	50	Trees were reported down on the Blue Ridge Parkway.
CHERRY LANE	8/5/2010	50	A tree was brought down on US Route 21.
GLADE VLY	8/5/2010	50	High winds left a tree down across Glade Valley Road.
CHERRY LANE	8/5/2010	50	Tree reported down on the Blue Ridge Parkway.
PEDEN	6/18/2011	60	Thunderstorm winds downed around ten trees and large tree limbs along approximately a 12-mile path from near Scottsville to Sparta. A tin roof of a barn was also damaged near Sparta. Damage values are estimated.
BARRETT	8/8/2011	50	Four large trees were blown down and a long swath of corn was flattened along Lazy Branch Road.
PINEY CREEK	9/2/2011	50	Thunderstorm winds blew a tree down across Highway 113 near Piney Creek, blocking the highway. Damage values are estimated.
STRATFORD	9/2/2011	50	Thunderstorm winds blew a tree down across Highway 93, blocking the road. Damage values are estimated.
TWIN OAKS	9/2/2011	55	Thunderstorm winds blew trees down in the community of Twin Oaks. Damage values are estimated.
LAUREL SPGS	9/2/2011	55	Thunderstorm winds blew trees down on New Hope Church Road. Damage values are estimated.
PINEY CREEK	6/29/2012	50	Thunderstorm winds blew three trees down in the area near Mouth of Wilson to near Ennice. Damage values are estimated.
PINEY CREEK	7/5/2012	50	Trees were blown down on Route 113 near Piney Creek.
TOPIA	7/2/2014	50	Two trees were blown down by thunderstorm winds in the Piney Creek area.
PINEY CREEK	10/14/2014	65	Thunderstorm winds blew multiple trees down in Piney Creek and numerous trees down throughout the county. Damage values are estimated.
EDMONDS	6/16/2016	55	Thunderstorm winds blew down trees along Route 158.
ENNICE	6/23/2016	55	Thunderstorm winds blew over numerous trees in and around Ennice.
BLEVINS XRDS	10/23/2017	60	Thunderstorm winds brought down several large trees, damaged a couple of barns and a mobile home along a path from Rector Road to Glade Valley Road.
SPARTA	8/1/2019	50	A few trees were blown down by severe thunderstorm winds in Alleghany Manor near the river.

Location	Date	MPH	Description
SPARTA	1/11/2020	55	About a half dozen trees were blown down by severe thunderstorm winds across the county. A few trees were also noted to have fallen onto power lines. A barn was also damaged and blown into a mobile home.
Ashe County			
HELTON	5/13/2002		Thunderstorm winds during the morning of the 13th downed trees in Helton.
JEFFERSON	6/1/2002		Thunderstorm winds downed trees 7 miles north of Jefferson.
COUNTYWIDE	7/2/2002		Thunderstorms during the afternoon of the 2nd produced damaging winds and hail up to dime size. Thunderstorm winds downed numerous trees across Ashe county. One tree was downed onto a house, causing damage to the roof.
COUNTYWIDE	7/4/2002		Thunderstorms during the afternoon of the 4th produced damaging winds and hail up to one inch in diameter. Thunderstorm winds downed trees in Elkin, southwestern Yadkin county, and across Ashe County. Thunderstorm winds also downed trees 4 miles west of Dobson, including onto two residences, causing damage to the roofs.
WEST JEFFERSON	5/31/2004	60	Thunderstorm winds blew numerous trees down with the greatest amount (over 50) along Highway 321 where Cove Creek enters the Watauga River.
WEST JEFFERSON	7/19/2006	50	Thunderstorms began developing during the afternoon hours of the 19th due primarily to daytime heating in an already unstable atmosphere. Some of these increased to severe levels, producing damaging wind gusts. As evening arrived, severe storms continued to be a treat thanks to the approach and then arrival of a dying meso-scale convective complex that moved out of the Ohio Valley and into our region. Again, damaging wind gusts, and large hail resulted from these severe storms.
LANSING	6/1/2007	52	A large tree was blown down on the east side of Lansing.
JEFFERSON	6/28/2007	52	Three trees down on Bill Bledsoe Road.
LANSING	8/1/2007	55	A tree was blown down along Highway 194, three miles north of Lansing.
GLENDALE SPGS	8/21/2007	50	A RAWS observation site measured a wind gust of 58 mph during a thunderstorm.
WAGONER	6/14/2008	50	A tree was blown down on Joe Little Road. Damage values are estimated.
GLENDALE SPGS	6/22/2008	50	Numerous large tree limbs were blown down by thunderstorm winds. Damage values are estimated.
CLIFTON	7/22/2008	50	A six to eight-inch diameter tree was blown down. Damage values are estimated.
JEFFERSON	8/2/2008	55	Trees were blown down near Shatley Springs.
FLATWOOD	8/7/2008	50	Large tree limbs were blown down.
JEFFERSON	6/16/2009	55	Thunderstorm winds knocked a tree on a power line on Route 221.
FLEETWOOD	6/20/2009	50	A large tree limb was blown down on Railroad Grade Rd.
WARRENSVILLE	8/5/2009	55	A tree was blown down on Pounding Mill Road, near Warrensville.
TODD	6/14/2010	50	A large tree limb was down on Three Top Road near Highway 194. Damage amounts are estimated.
FLEETWOOD	6/10/2011	50	Thunderstorm winds blew large limbs down in Fleetwood. Damage values are estimated.
GLENDALE SPGS	6/11/2011	55	Thunderstorm winds blew off part of the backside of a roof of a mobile home. Damage values are estimated.
JEFFERSON	6/18/2011	50	Thunderstorm winds blew two trees down on East Main Street. One of the trees fell on a power line. Damage values are estimated.
CLIFTON	6/18/2011	50	Thunderstorm winds downed a tree on a power line along Hickory Heights Drive. Damage values are estimated.
CRUMPLER	6/18/2011	55	Thunderstorm winds downed a tree on Chestnut Hill Road. Damage values are estimated.
BINA	6/18/2011	50	Thunderstorm winds downed a tree on West Deep Ford Road. Damage values are estimated.

Location	Date	MPH	Description
WARRENSVILLE	8/8/2011	50	A large tree was blown down on Pounding Mill Road near Highway 194.
CLIFTON	8/8/2011	50	A tree was blown down by thunderstorm winds on Buffalo Road.
CRUMPLER	9/2/2011	50	Thunderstorm winds blew a tree down at 900 George McMillan Road, blocking the road. Damage values are estimated.
HELTON	7/1/2012	50	A tree was blown down along Silas Creek Road.
GLENDALE SPGS	7/1/2012	50	A tree was down on Trading Post Road next to the Blue Ridge Parkway.
CRUMPLER	7/1/2012	50	Thunderstorm winds blew down a tree on Silas Creek Road.
CRESTON	7/24/2012	50	Several trees and powerlines were blown down.
GLENDALE SPGS	7/25/2012	50	A few trees and powerlines were reported down.
TUCKERDALE	7/25/2012	50	Thunderstorm winds blew down a tree on Little Horse Creek Road.
BINA	6/13/2013	50	Thunderstorms along a squall line produced damaging winds that blew down two trees along Deep Ford Road near Lansing. Damage values are estimated.
BRANDON	7/4/2013	50	One tree down on South Big Horse Creek Road between Lansing and Tuckerdale and another on Jim Duvall Road.
SCOTTVILLE	6/26/2015	50	Two trees were blown down along Route 221.
NATHANS CREEK	7/13/2015	50	Thunderstorm winds blew a tree down on Carson Woods Road. Damage values are estimated.
WARRENSVILLE	7/13/2015	50	Thunderstorm winds blew a tree down. Damage values are estimated.
NATHANS CREEK	6/16/2016	50	Thunderstorm winds blew a large tree down on Tom Fowler Road.
JEFFERSON	6/16/2016	50	Thunderstorm winds blew down a large tree on old Highway 16.
ROTEN	7/8/2016	60	Numerous trees and power lines were blown down by thunderstorm winds across portions of Ashe County. An estimated 50 power poles were snapped in the county by thunderstorm winds. At the peak of the storm, more than 18,000 BREMCO customers were without power. There were 40 calls to Ashe County 911 about debris, trees and power lines blown down.
WEAVERS FORD	7/31/2019	50	Two trees were blown down by thunderstorm winds near the intersection of North Carolina Highway 16 and Smithey Road.
CRESTON	8/13/2019	50	One tree blown down by severe thunderstorm winds at the intersection of Route 88 and Baker Hollow Road. A second tree was blown down onto power lines on Peak Road.
FLEETWOOD	10/31/2019	50	Thunderstorm winds blew down three trees between around the town of Fleetwood.
Watauga County			
BOONE	7/8/2001		A thunderstorm during the late afternoon of the 8th downed trees 8 miles west of Boone.
BOONE	5/26/2004	70	Thunderstorms with damaging winds downed numerous trees, tree limbs, and powerlines across various parts of the county. Also, a 90X20 ft shed was blown over in Bethel.
BOONE	5/26/2004	70	Thunderstorms with damaging winds downed numerous trees, tree limbs, and powerlines across various parts of the county. Also, a 90X20 ft shed was blown over in Bethel.
BETHEL	5/26/2004	70	Thunderstorms with damaging winds downed numerous trees, tree limbs, and powerlines across various parts of the county. Also, a 90X20 ft shed was blown over in Bethel.
TRIPLETT	5/26/2004	70	Thunderstorms with damaging winds downed numerous trees, tree limbs, and powerlines across various parts of the county. Also, a 90X20 ft shed was blown over in Bethel.
BOONE	5/31/2004	70	Thunderstorm winds blew numerous trees down with the greatest amount (over 50) along Highway 321 where Cove Creek enters the Watauga River.

Location	Date	MPH	Description
BLOWING ROCK	5/31/2004	57	Thunderstorm winds blew numerous trees down with the greatest amount (over 50) along Highway 321 where Cove Creek enters the Watauga River.
BOONE	5/31/2004	60	Thunderstorm winds blew numerous trees down with the greatest amount (over 50) along Highway 321 where Cove Creek enters the Watauga River.
SANDS	4/2/2006	60	A cold front moved through the area on April 2nd into April 3rd. Some of the storms in the line of storms associated with the front became severe...and produced penny to nickel size hail, and some trees were downed by 70 mph winds.
BOONE	4/25/2006	47	A cold front moved into the area on the evening of the 25th. A storm associated with this front produced damaging winds in the town of Boone. A tree was blown into a home, and winds at the time were measured at 54 mph at the neighboring airport.
BOONE	6/10/2008	55	Several trees were blown down onto Highway 105, resulting in the road being closed. Damage values are estimated.
BOONE	6/10/2008	55	Several trees were blown down. Damage values are estimated.
FOSCOE	6/26/2008	50	A row of small trees were blown down near the intersection of Highway 105 and Clarks Creek Road. Damage values are estimated.
SUGAR GROVE	6/16/2009	55	One tree was blown down on Georges Gap Road near Sugar Grove.
SUGAR GROVE	6/16/2009	55	Thunderstorm winds brought down one tree on Rush Branch Road.
BOONE	6/17/2009	55	Several trees were down on Elk Creek Road.
BLOWING ROCK	6/17/2009	50	Thunderstorm winds knocked down a tree on U.S. Highway 321 near Blowing Rock.
ZIONVILLE	6/14/2010	55	Several trees were blown down on Highway 421 near the Tennessee border. Damage amounts are estimated.
VILAS	6/21/2010	50	Trees were blown down at the intersection of Sherwood Road and Walls Road. Damage amounts are estimated.
FOSCOE	2/28/2011	50	A possible microburst downed a number of trees 10 to 12 inches in diameter at the Grandfather Mountain Community Center. One tree fell on the building, shingles were blown off the roof and a wheelbarrow blown 200 yards.
KELLERSVILLE	5/10/2011	50	A few trees were blown down by thunderstorm winds.
VILAS	6/12/2011	60	Thunderstorm winds blew power lines down. Damage values are estimated.
PEORIA	7/1/2012	55	NCDOT reported at least 10 large trees down and many smaller trees and limbs in western Watauga County. Damage was mainly along Highway 321 in the communities of Beaver Dam, Bethel and Kellersville.
BOONE	8/1/2012	50	The Watauga County 911 Center reported that several trees were down on Bamboo Road on the east side of Boone. The Watauga County Sheriff's Office reported that a tree was down on a home on Blue Ridge Avenue in Boone.
BOONE BLWNG RCK ARPT	6/13/2013	58	Thunderstorm winds along a squall line downed trees in Boone. Damage values are estimated.
RUTHERWOOD	7/17/2013	50	A few trees were blown down.
RUTHERWOOD	7/17/2013	52	An estimated wind gust of 60 MPH was reported.
SHULLS MILLS	7/17/2013	50	There were several reports of downed trees including a tree that fell onto wires in the Wilson Ridge area, and a few trees down on White Laurel Road and Elk Creek Road.
BETHEL	7/8/2014	50	A tree was reported down northwest of Sugar Grove.
PERKINSVILLE	7/8/2014	50	One tree was blown down by thunderstorm winds in Boone.
ZIONVILLE	10/14/2014	50	Thunderstorms brought hit and miss wind damage across the county. There were reports of trees down along Wonderland Trail, Laurel Lane, Winterberry Trail, Silverleaf Road, and Broadstone Road. Damage values are estimated.
TRIPLETT	7/13/2015	50	Thunderstorm winds blew trees down on Elk Creek Road. Damage values are estimated.
VALLE CRUCIS	8/5/2015	50	The public reported that a tree was down on a gazebo at a private residence.

Location	Date	MPH	Description
HODGES GAP	8/5/2015	50	The Watauga County 911 Center reported that a tree was down along North Carolina Highway 105 near its intersection with Earl Lyons Road.
VALLE CRUCIS	8/5/2015	50	The Watauga County 911 Center reported that a tree was down at the intersection of State Route 194 and Broadstone Road, blocking the northbound lane of Route 194.
REESE	7/8/2016	60	A line of severe thunderstorms brought down numerous trees and power lines across Watauga County. In Reese and Zionville, 30 to 40 trees were blown down. At least one person was injured, when a tree fell onto a vehicle on Big Hill Road near Boone. A section of roof was blown off the Nathan's Walk apartment complex in downtown Boone. At the peak of the event, over 16,000 people in Watauga County were without power.
ZIONVILLE	7/6/2018	50	Thunderstorm winds downed power lines in Zionville. Damage values are estimated.
TODD	10/31/2019	50	Thunderstorm winds blew down one tree along Route 194 in Todd.
Wilkes County			
WILKESBORO	5/27/2000		Thunderstorm winds downed numerous trees 5 miles south of Wilkesboro.
EAST PORTION	6/3/2000		Thunderstorm winds downed trees across eastern Wilkes County and large tree limbs 2 miles north of Mt Airy.
TRAPHILL	8/10/2000		Thunderstorms winds downed trees in Traphill and across Yadkin County.
BOOMER	11/9/2000		Thunderstorm winds during the evening of the 9th downed trees in Flat Rock and Boomer.
WILKESBORO	8/11/2001		Thunderstorm winds downed a tree onto a power line 3 miles east of Wilkesboro, causing a power outage to 700 buildings.
WILBAR	5/1/2002		Thunderstorm winds downed large trees onto Route 16 two miles northwest of Wilbar, closing the road temporarily.
HAYS	8/2/2002		Thunderstorm winds downed tree in Hays.
MILLERS CREEK	6/8/2003	65	Thunderstorm winds downed trees in Millers Creek, Roaring River, 10 miles northeast of Wilkesboro, western Yadkin County, Ayersville, 5 miles northwest of Wentworth, across Route 62 in Hamer, and also tore the roof off of a tobacco barn in Hamer.
WILKESBORO	6/8/2003	60	Thunderstorm winds downed trees in Millers Creek, Roaring River, 10 miles northeast of Wilkesboro, western Yadkin County, Ayersville, 5 miles northwest of Wentworth, across Route 62 in Hamer, and also tore the roof off of a tobacco barn in Hamer.
ROARING RIVER	6/8/2003	65	Thunderstorm winds downed trees in Millers Creek, Roaring River, 10 miles northeast of Wilkesboro, western Yadkin County, Ayersville, 5 miles northwest of Wentworth, across Route 62 in Hamer, and also tore the roof off of a tobacco barn in Hamer.
HAYS	7/5/2003	60	Thunderstorm winds downed trees in Hays, 5 miles north of Lawsonville, and downed a tree onto a house in Mulberry.
MULBERRY	7/5/2003	60	Thunderstorm winds downed trees in Hays, 5 miles north of Lawsonville, and downed a tree onto a house in Mulberry.
TRAPHILL	7/12/2003	60	Thunderstorm winds down trees in Traphill, 3 miles southwest of Dobson, and 5 miles northwest of State Road.
WILKESBORO	7/18/2003	60	Thunderstorm winds downed trees in Roaring River, onto a car near Wilkesboro, and across Yadkin County.
ROARING RIVER	7/18/2003	60	Thunderstorm winds downed trees in Roaring River, onto a car near Wilkesboro, and across Yadkin County.
NORTH WILKESBORO	8/30/2003	65	In North Wilkesboro, strong thunderstorm winds uprooted trees, with one landing on a vehicle. A portion of a facade was torn off a business and several power poles were knocked down.
MILLERS CREEK	5/8/2004	50	An isolated severe thunderstorm resulted in trees down across central parts of the county and one report of penny size hail.
WILKESBORO	5/8/2004	50	An isolated severe thunderstorm resulted in trees down across central parts of the county and one report of penny size hail.

Location	Date	MPH	Description
MULBERRY	5/8/2004	50	An isolated severe thunderstorm resulted in trees down across central parts of the county and one report of penny size hail.
WILKESBORO	7/12/2004	60	Thunderstorm winds downed trees and powerlines on Route 268 just east of North Wilkesboro.
NORTH WILKESBORO	7/2/2005	50	Large tree down
WINDY GAP	6/22/2006	55	Large tree blown down across Windy Gap Road.
MILLERS CREEK	7/13/2006	50	In advance of an approaching cold front, thunderstorms developed. Some of these storms became severe producing damaging winds and large hail. The severe winds ranged generally between 60 and 75 mph with numerous reports of large trees down. A 100-year-old, 50-foot-tall, with a 3-foot diameter trunk oak tree and a 40-foot-tall sycamore tree in Yadkin County was among this lot. In locations of Rockingham, Stokes, and Yadkin Counties some of the downed trees fell on houses and vehicles. The hail that fell ranged from penny to nickel size.
ROARING RIVER	7/28/2006	60	Thunderstorms developed with the passage of an upper level disturbance. Some of these storms reached severe limits by producing wind gusts on the order of 60 to near 75 mph. Numerous trees were blown down by these winds, some into power lines and roof tops. Other wind damage included damage to a mobile home in Roaring River, Wilkes County.
HAYS	8/7/2006	55	Tree down on Airport Road.
PURLEAR	8/11/2006	55	A severe thunderstorm blew a tree down across a power line in the Purlear community.
TRAPHILL	8/30/2006	60	Trees down.
WILBAR	6/24/2007	52	Several trees down on Route 16 North.
BOOMER	6/24/2007	52	Several trees down on Route 18 South.
ELKVILLE	6/24/2007	52	Several trees down on Route 268.
TRAPHILL	6/25/2007	52	Several 4 to 5-inch limbs down near Traphill.
NORTH WILKESBORO	7/16/2007	50	Thunderstorm winds downed some trees. Damage values are estimated.
HAYS	7/17/2007	50	Thunderstorm winds down some large tree limbs.
WILKESBORO	8/24/2007	55	A large tree was blown down onto a power line.
WILKESBORO	8/24/2007	55	A tree was blown down across Browns Ford Road.
HAYS	8/29/2007	55	A large tree was blown down across Bethany Ford Road.
WILKESBORO	3/4/2008	52	Trees were downed by thunderstorm gusts of 60 MPH. Road were covered with pieces of trees. Power lines were also downed by winds in the Miller Creek area.
TRAPHILL	6/27/2008	50	Two trees were blown down by thunderstorm winds on Traphill Road. Damage values are estimated.
BOOMER	7/7/2008	55	Several two to four-inch diameter limbs were blown down. Damage values are estimated.
MILLERS CREEK	7/9/2008	50	A tree was blown down. Damage values are estimated.
NORTH WILKESBORO	7/9/2008	50	Two trees were blown down on Mountain View Road. Damage values are estimated.
WILKESBORO	7/23/2008	55	Trees were blown down. Damage values are estimated.
ROARING RIVER	8/2/2008	50	Large limbs were blown out of a tree.
NORTH WILKESBORO	8/2/2008	55	Numerous trees were downed.
WINDY GAP	8/2/2008	55	Numerous trees were downed.
TRAPHILL	8/2/2008	55	Trees were downed on Traphill Road.
BOOMER	8/14/2008	55	One tree was blown down along Highway 18.

Location	Date	MPH	Description
NORTH WILKESBORO	9/9/2008	60	Approximately 20 to 30 trees were blown down in and around North Wilkesboro.
TRAPHILL	5/31/2009	55	A tree was blown down along Swaringen Road.
KNOTVILLE	6/3/2009	50	Trees were blown down across Highway 268.
CRICKET	8/5/2009	50	A tree was blown down on Cricket Drive.
NORTH WILKESBORO	8/5/2009	50	A tree was blown down on Damascus Church Road.
BUCK	8/5/2009	50	A tree was blown down on Dixie Hill Road.
CONGO	8/5/2009	50	A tree was blown down on Fish Dam Creek Road.
MILLERS CREEK	8/5/2009	50	A tree was blown down on Green Acres Road.
WILKESBORO	8/5/2009	50	A tree was blown down on Highway 16/18.
MILLERS CREEK	8/5/2009	50	A tree was blown down on Kite Road.
CLINGMAN	8/5/2009	50	A tree was blown down on Mathis Mill Road.
MILLERS CREEK	8/5/2009	50	A tree was blown down on Pads Road.
BENHAM	8/5/2009	50	A tree was blown down on Pleasant Ridge Road.
CRICKET	8/5/2009	50	A tree was blown down on Prospect Drive.
ROARING RIVER	8/5/2009	50	A tree was blown down on Ruritan Road.
THURMOND	8/5/2009	50	A tree was blown down on S. Center Church Road.
CRICKET	8/5/2009	50	A tree was blown down on Sunset Orchard Road.
TRAPHILL	8/5/2009	50	A tree was blown down on Traphill Ridge Road.
WILKES CO ARPT	8/5/2009	50	A tree was blown down on Winkler Mill Road.
WILKESBORO	8/5/2009	50	A tree was blown down.
CRICKET	8/5/2009	50	A tree was blown down.
FERGUSON	8/5/2009	50	A tree was blown down.
HAYS	8/5/2009	55	An 80-foot tree was uprooted and down across a driveway near Airport Road.
THURMOND	4/8/2010	55	Numerous trees were brought down at the intersection of Thurmond Road and Haystack Road.
THURMOND	4/8/2010	60	Numerous trees were brought down on Center Church Road in the State Road community.
TRAPHILL	4/8/2010	50	Several trees were down and a chicken house was destroyed on Roaring Gap Rd.
THURMOND	4/8/2010	50	Several trees were reported down on Zephyr Mountain Park Road.
MILLERS CREEK	5/14/2010	50	A tree was blown down. Damage values are estimated.
KNOTVILLE	5/16/2010	50	Thunderstorms winds blew a tree down at the intersection of River Liberty Church Road and Highway 268. Damage values are estimated.
RONDA	5/28/2010	50	Thunderstorm winds blew a tree down on Route 268 just east of Ronda. Damage values are estimated.
CONGO	5/28/2010	50	Thunderstorm winds blew a tree down on Windfield Huffman Road. Damage values are estimated.
MAPLE SPGS	6/3/2010	50	Thunderstorm winds brought down several large tree limbs along and near Community Road. Damage amounts are estimated.
ROARING RIVER	6/4/2010	50	A tree was blown down at 10000 Elkin Highway. Damage amounts are estimated.
ROARING RIVER	6/4/2010	50	Two trees were blown down near Old Route 60. Damage amounts are estimated.
ELKIN	6/14/2010	50	A few trees were blown down on Route 268 near the Wilkes and Yadkin border. Damage amounts are estimated.
TRAPHILL	6/14/2010	50	Several large trees were blown down in Traphill. Damage amounts are estimated.

Location	Date	MPH	Description
WILKESBORO	6/14/2010	50	Two trees were blown down in Wilkesboro. Damage amounts are estimated.
CHAMPION	6/14/2010	50	Two trees were blown down on Mount Pleasant Road. Damage amounts are estimated.
MILLERS CREEK	6/19/2010	50	A tree was blown down on Hacketts Road. Damage amounts are estimated.
MCGRADY	6/19/2010	50	A tree was blown down on Sparta Road. Damage amounts are estimated.
TRAPHILL	7/8/2010	50	Thunderstorm winds blew trees down on Traphill Road.
MULBERRY	7/8/2010	50	Trees were blown down on Highway 18.
RONDA	7/13/2010	50	A tree was knocked down by thunderstorm winds along Macedonia Church Road off of Highway 268. Several small tree limbs were also snapped.
TRAPHILL	7/13/2010	50	One tree was blown down by thunderstorm winds in Traphill.
MILLERS CREEK	7/13/2010	50	One tree was blown down on Boone Trail off of Highway 16.
FERGUSON	7/13/2010	50	Several trees were blown down along Route 268 between Ferguson and West Kerr Scott Reservoir.
NORTH WILKESBORO	7/13/2010	50	Thunderstorm winds caused a three-foot diameter oak tree to split in half. Large limbs also fell, one of which fell on a garage and damaging a Ford Explorer. This event occurred across the street from the North Wilkesboro Fire Department.
RONDA	7/13/2010	50	Thunderstorm winds knocked down one tree.
WILKESBORO	7/16/2010	55	Several trees were blown down Brushy Mountain Road.
DOCKERY	7/18/2010	52	Thunderstorm winds were estimated to gust as high as 60 mph.
WINDY GAP	7/27/2010	50	Thunderstorm winds blew down several trees on North Carolina Highway 16th South, Windy Gap Road, Old 60 East Highway, and North Carolina Highway 16 North.
CHAMPION	8/5/2010	50	A tree was brought down by high winds on Rest Home Road.
BOOMER	8/5/2010	50	A tree was reported down.
HUNTING CREEK	8/5/2010	55	Numerous large tree limbs were down on Hendren Road and nickel-sized hail fell.
CHAMPION	8/5/2010	55	Numerous trees and power lines were brought down or damaged by the high winds.
ELKVILLE	8/18/2010	50	Thunderstorm winds blew down a tree across Beaver Creek Road.
MILLERS CREEK	10/25/2010	50	Trees were blown down on Highway 16.
FERGUSON	3/23/2011	55	Thunderstorm winds blew power lines down. Damage values are estimated.
HAYS	4/4/2011	50	Several large trees were blown down and a carport was picked up and lifted into the trees in Hays by thunderstorm winds.
HUNTING CREEK	4/28/2011	50	Several trees were blown down by thunderstorm winds.
HUNTING CREEK	4/28/2011	50	Thunderstorm winds blew down one tree.
WILKESBORO	5/13/2011	55	Trees were reported down due the high winds along State Route 16 in Wilkesboro.
MILLERS CREEK	5/23/2011	60	Many large trees were blown down in the Millers Creek area. At least six pine trees were reported down near the intersection of Pads Road and Boone Trail. A local newspaper reported damage to a workshop and a storage building from white pines that fell on them.
KNOTVILLE	5/23/2011	60	Several trees were blown down by thunderstorm winds on Highway 268 near Johnson Road. Local newspapers also mentioned a Ford Explorer that was damaged by a falling tree along with several fences in North Wilkesboro. A few of the trees fell on houses causing some damage as well.
MULBERRY	5/23/2011	50	Two large trees were blow over.
CONGO	5/24/2011	60	High winds from thunderstorms brought down some trees onto power lines west of Millers Creek and several trees at locations eastward for several miles through the town. Trees and power lines were also reported down in the Traphill, Austin and Thurmond areas by a local newspaper.
TRAPHILL	5/24/2011	50	Several trees were blown down.

Location	Date	MPH	Description
MAPLE SPGS	5/26/2011	60	Trees were reported down in numerous locations across Wilkes County as a line of very strong storms moved through the central part of the county from around 930 PM to 1000 PM Among the locations reporting a tree or multiple trees down were Boone Trail near Highway 421, along Congo Road and Grandview Drive in the Millers Creek area, on Elledge Mill Road, Charity Church Road near Shingle Gap Road, along Highway 16/18 near Route 421 and in the Traphill area.
SUMMIT	6/9/2011	50	Thunderstorm winds blew two large maple trees down on Summit Road. Damage values are estimated.
RONDA	6/11/2011	50	Thunderstorm winds blew a tree down. Damage values are estimated.
ELKIN	6/11/2011	60	Thunderstorm winds blew trees and power lines down. Damage values are estimated.
CLINGMAN	6/11/2011	55	Thunderstorm winds blew trees down near Old Highway 60. Damage values are estimated.
CLINGMAN	6/11/2011	55	Thunderstorm winds blew trees down on Clingman Road. Damage values are estimated.
LOMAX	6/12/2011	50	Thunderstorm winds blew two trees down near Shepherds Crossroads. Damage values are estimated.
HUNTING CREEK	6/21/2011	50	Thunderstorm winds blew a Bradford Pear tree down on Fishing Creek Arbor Road. Damage values are estimated.
CHAMPION	6/21/2011	50	Thunderstorm winds blew a large tree down on a fence. Damage values are estimated.
NORTH WILKESBORO	6/21/2011	50	Thunderstorm winds blew a tree down on River Liberty Grove Church Road. Damage values are estimated.
MORAVIAN FALLS	6/21/2011	50	Thunderstorm winds blew down a Bradford Pear Tree. Damage values are estimated.
VANNOY	6/21/2011	60	Thunderstorm winds blew numerous trees down including apple trees and the top half of other trees. Damage values are estimated.
PURLEAR	6/21/2011	55	Thunderstorm winds blew two trees down on Parsonville Road and one tree down on Shingle Gap Road. Damage values are estimated.
WINDY GAP	7/4/2011	50	A few trees blown down near Windy Gap Road.
BOOMER	7/4/2011	50	One tree was blown down on Jim Caudill Road and another on Jess Walsh Road near W. Kerr Scott Reservoir.
MAPLE SPGS	7/13/2011	55	Thunderstorm winds blew down a tree on a power line on Reedy Creek Road, another on Lonesome Pine Road, and three more Lewis Fork Baptist Church Road, with one of these falling on a house and vehicle. On Red Top Road, a 30 by 40 foot open sided shed was blown away.
RONDA	7/13/2011	50	Thunderstorm winds blew down one tree and several limbs in the Ronda area.
RONDA	7/24/2011	50	Thunderstorm winds blew down three trees in the Ronda, Clingman and Pleasant Hill area.
ROARING RIVER	8/11/2011	50	One tree was reported blown down southwest of Ronda.
ROARING RIVER	8/18/2011	50	Two trees were reported blown down from thunderstorm winds, one on Route 268 east and the other on Peacock Street. A spotter also reported that several large limbs were blown down.
WILKES CO ARPT	8/20/2011	50	A few trees were blown down by thunderstorm winds on River Street.
NORTH WILKESBORO	8/20/2011	50	Thunderstorm winds knocked a tree down on Highway 268 East and several trees near Roaring River.
PURLEAR	9/1/2011	55	Thunderstorm winds blew several trees down along the 8700 block of Boone Trail. Damage values are estimated.
TRAPHILL	9/2/2011	50	Thunderstorm winds blew a tree down in the 10000 block of Austin Traphill Road. Damage values are estimated.

Location	Date	MPH	Description
DOCKERY	9/2/2011	50	Thunderstorm winds blew a tree down in the 7000 block of Traphill Road. Damage values are estimated.
FAIRPLAINS	9/2/2011	50	Thunderstorm winds blew a tree down in the community of Mulberry. Damage values are estimated.
MORAVIAN FALLS	9/2/2011	50	Thunderstorm winds blew a tree down on Cemetery Road. Damage values are estimated.
ROARING RIVER	9/2/2011	50	Thunderstorm winds blew a tree down on Red White and Blue Road. Damage values are estimated.
ROARING RIVER	9/2/2011	50	Thunderstorm winds blew a tree down on White Plains Road. Damage values are estimated.
WINDY GAP	2/24/2012	50	Thunderstorm winds blew a tin roof off an out building. Damage values are estimated.
WILKES CO ARPT	5/14/2012	50	Two trees were blown down near the intersection of Congo Road and Winkler Mill Road.
MOXLEY	6/18/2012	50	Thunderstorm winds blew several large tree limbs and one large tree down at the Stone Mountain Golf Club. Damage values are estimated.
MULBERRY	6/22/2012	55	Thunderstorm winds blew multiple trees down on Highway 18. Damage values are estimated.
JOYNES	6/29/2012	60	Thunderstorm winds blew down a couple dozen trees across the northeast part of the county, mainly near Traphill to near Pleasant Hill. Damage values are estimated.
WILBAR	7/3/2012	50	A few trees were down across Route 16 after storms passed through.
THURMOND	7/5/2012	50	Large limb down on South Center Church Road.
BENHAM	7/5/2012	50	Multiple trees toppled along Austin-Traphill Road.
DARBY	7/5/2012	50	Two trees were reported down near Darby with lots of small limbs and debris littering the highway.
HAYS	7/22/2012	50	Several trees were toppled down on Mountain View Road.
BENHAM	7/23/2012	50	A tree and powerlines were blown over or pulled down on Mining Church Rd.
CLINGMAN	7/25/2012	50	A number of trees were blown down.
WILKESBORO	8/1/2012	50	The Wilkes County Sheriff's Department reported that several trees and power lines were down throughout North Wilkesboro. In addition, trees were down on Johnson road near Hays, approximately four miles northeast of North Wilkesboro.
MORAVIAN FALLS	8/2/2012	50	Trees and power lines were blown down along State Route 16.
THURMOND	9/3/2012	50	One tree was blown down by thunderstorm winds on U.S. Route 21 near the intersection of Thurmond Road.
RONDA	9/8/2012	50	A power line was blown down by thunderstorm winds along Highway 268 East in the community of Ronda.
HUNTING CREEK	9/8/2012	50	One tree was blown down by thunderstorm winds on Highway 115 near Spring Drive and Fishing Creek Road.
MULBERRY	6/13/2013	50	Thunderstorms along a squall line downed a large white pine tree at a residence along Mountain Valley Church Road as the line crossed the area west of Mulberry. The tree fell on an elderly man as he was walking across his yard. Damage values are estimated.
HAYS	6/13/2013	55	Thunderstorms along a squall line produced damaging winds that downed trees along a swath that included the communities of Roaring River, Hays, and Pleasant Hill. There was tremendous damage in the Pleasant Hill region. A total of 50 to 100 trees that were blown down along the Pleasant Hill Drive and Blue Ridge Avenue. Near Hays, a tree fell and brought down a power line on a garage. A firefighter responded to a vehicle fire behind the garage, touched the garage with the line on it, and was electrocuted. Damage values are estimated.
REDDIES RIVER	7/4/2013	50	A tree was reported down on NC Route 16.

Location	Date	MPH	Description
RONDA	6/9/2014	50	Thunderstorm winds blew a tree down in the 1300 block of Hwy 268. Damage values are estimated.
HAYS	6/9/2014	50	Thunderstorm winds blew down a set of powerlines in the community of Hays. Damage values are estimated.
CHAMPION	6/9/2014	50	Thunderstorm winds blew down three trees. The one tree was located at the intersection of Boone Trail and Boiling Springs Road. Another tree was located on Huffman Fork Road. The third tree was located in the community of Millers Creek. Damage values are estimated.
ROARING RIVER	6/9/2014	50	Thunderstorm winds blew two trees down. The one tree fell on Red White and Blue Road. The other tree fell in the community of Roaring River. Damage values are estimated.
NORTH WILKESBORO	6/10/2014	50	Thunderstorm winds blew a tree down on Caudill Road. Damage values are estimated.
NORTH WILKESBORO	6/10/2014	50	Thunderstorm winds blew a tree down on Sunset Drive. Damage values are estimated.
HAYS	6/12/2014	50	Thunderstorm winds blew down a few trees in Hays and one tree that blocked Oak Ridge Road near Rock Creek. Damage values are estimated.
OSBORNVILLE	6/17/2014	50	Thunderstorm winds blew down several large tree branches on Somers Road. Damage values are estimated.
MORAVIAN FALLS	6/19/2014	50	Thunderstorm winds blew a power line down at the intersection of Brushy Mountain Road and Country Club Road. Damage values are estimated.
MORAVIAN FALLS	6/19/2014	65	Thunderstorm winds blew down a tree which blocked Germantown Road. Damage values are estimated.
MORAVIAN FALLS	6/19/2014	65	Thunderstorm winds down over 100 trees in the Moravian Falls area with most of these at the Brushy Mountain Farm and Orchard. Damage values are estimated.
NORTH WILKESBORO	7/8/2014	50	A tree blown down on Flint Hill Rd.
PURLEAR	7/8/2014	50	Single trees were reported blown down by thunderstorm winds in three locations west of Wilkesboro, including Mountain Meadow Lane, West NC Route 268, and North Holiness Church Road.
BOOMER	2/24/2016	55	Thunderstorm winds knocked down multiple trees along Boomer Road.
WILKES CO ARPT	2/24/2016	50	Thunderstorm winds knocked over trees along Congo Road. near the intersection of Crysel Road.
MCGRADY	6/16/2016	55	Thunderstorm winds blew down trees on Highway 18 northbound.
BENHAM	7/8/2016	50	A tree was blown down by thunderstorm winds near the State Road Grocery Store.
PARSONVILLE	7/8/2016	60	Numerous large trees and power lines were blown down across Wilkes County. A roof was blown off of a building near the community of Elkville. Several large oak trees older than 100 years old were blown down near Hays. At the peak of the storm, over 14,000 Duke Energy customers were without power, with over 18,000 Blue Ridge Energy customers without power. In Millers Creek, one tree fell on a mobile home causing extensive damage. Other damage to structures and vehicles were reports in North Wilkesboro and Rock Creek.
ROARING RIVER	7/27/2016	50	A large tree was blown down by thunderstorm winds along Abtco Road. Another tree was blown down along Roaring River Road.
ROARING RIVER	7/27/2016	50	A large tree was blown down by thunderstorm winds on Antioch Church Road.
CLINGMAN	7/31/2016	50	A couple of trees were blown down by thunderstorm winds near Somers Road and Highway 421.

Location	Date	MPH	Description
NORTH WILKESBORO ARP	7/31/2016	50	A few trees and powerlines were blown down by thunderstorm winds across North Wilkesboro.
HUNTING CREEK	9/26/2016	50	Thunderstorm winds resulted in a tree blocking the road on Fox Run Drive.
RADICAL	9/26/2016	50	Thunderstorm winds resulted in a tree down at the intersection of Yellow Banks Road and Harold Mountain Road.
TRAPHILL	9/26/2016	50	Thunderstorm winds resulted in one tree down at the intersection of Traphill Road and Traphill Ridge Road.
MILLERS CREEK	9/26/2016	50	Thunderstorm winds resulted in the downing of a tree along the 2000 block of Highway 16.
NORTH WILKESBORO	9/30/2016	50	Thunderstorm winds resulted in a downed tree along Gentry Street.
MULBERRY	9/30/2016	50	Thunderstorm winds resulted in a tree down on Elledge Mill Road.
MORAVIAN FALLS	9/30/2016	55	Thunderstorm winds resulted in two trees down along cemetery road and Old Farm Roads.
RONDA	3/27/2017	50	A large tree was blown down by thunderstorm winds along Little Elkin Church Road.
TRAPHILL	3/27/2017	50	A large tree was blown down by thunderstorm winds along Traphill Road.
KNOTVILLE	3/27/2017	50	A large tree was blown down by thunderstorm winds at the intersection of River Road and Liberty Grove Road.
WILKESBORO	8/17/2017	50	Thunderstorm winds blew a tree down on Boone Trail Road near Route 421. Damage values are estimated.
PURLEAR	8/17/2017	50	Thunderstorm winds blew a tree down on Boone Trail. Damage values are estimated.
WILKES CO ARPT	8/17/2017	50	Thunderstorm winds blew a tree down on School Street. Damage values are estimated.
WILKESBORO	8/17/2017	50	Thunderstorm winds blew a tree limb down onto a power line on Gilreath Street.
HAYS	9/5/2017	60	Thunderstorm winds downed multiple large tree limbs within the community of Hays.
MORAVIAN FALLS	10/23/2017	60	Thunderstorm winds knocked down numerous trees across Wilkes County. One of the trees fell on a car and another would take out a power line. Over 20,000 people in Wilkes county were without power.
BOOMER	4/15/2018	50	At least three trees were blown down by thunderstorm winds around the community of Boomer.
THURMOND	5/20/2018	55	Thunderstorm winds caused roof damage to a home and brought down a couple of trees.
WINDY GAP	5/20/2018	50	Thunderstorm winds knocked down a tree near the intersection of Highway 115 and Hunting Creek Road.
CLINGMAN	5/20/2018	50	Thunderstorm winds knocked down a tree on Dennyville Road.
RONDA	5/20/2018	50	Thunderstorm winds knocked down a tree on J A Russell Drive.
ELKIN	6/1/2018	55	Multiple trees were blown down by severe thunderstorm winds.
NORTH WILKESBORO	6/25/2018	50	A tree was blown down by thunderstorm winds along Hilltop Acre Street.
PURLEAR	6/25/2018	50	Two trees were blown down by thunderstorm winds along Arbor Grove Church Road.
ELKIN	8/2/2018	55	Thunderstorm winds blew down multiple trees in Pleasant Hill.
CHAMPION	8/12/2018	50	Thunderstorm winds blew down one tree along Champion Mount Pleasant Road.
MORAVIAN FALLS	8/12/2018	50	Thunderstorm winds blew down one tree along Germantown Road in the town of Moravian Falls.
WILKESBORO	8/12/2018	50	Thunderstorm winds blew down one tree along Hays Street.
FAIRPLAINS	8/12/2018	50	Thunderstorm winds blew down one tree along John McGrady Road.
CONGO	8/17/2018	50	Thunderstorm winds blew down several trees along North Minton Road.

Location	Date	MPH	Description
HAYS	8/30/2018	50	Thunderstorm winds blew down one tree on Traphill Road and a second tree on Maple Grove Church Road.
BUCK	9/2/2018	50	Thunderstorm winds brought down trees along Congo Road and Buck Road. One of the trees came down on a power line causing a fire.
MORAVIAN FALLS	4/14/2019	50	Thunderstorm winds blew down a tree on Germantown Road. Damage values are estimated.
NORTH WILKESBORO	4/14/2019	50	Thunderstorm winds blew down limbs with diameters greater than four inches. Damage values are estimated.
BOOMER	4/14/2019	50	Thunderstorm winds blew numerous large tree limbs down in, and around, Boomer. Damage values are estimated.
WILKES CO ARPT	4/14/2019	50	Thunderstorm winds blew one tree down on Old Brickyard Road. Damage values are estimated.
CRICKET	4/14/2019	60	Thunderstorm winds snapped and uprooted six trees. Damage values are estimated.
WILKESBORO	8/4/2019	50	Two trees were blown down by thunderstorm wind gusts near Wilkesboro. A car was damaged when it hit a downed tree near the intersection of Curtis Bridge Road and Woodlawn Boulevard. A large white oak tree was also blown down at the east end of Greenbrier Lane near Woodlawn Boulevard.
RONDA	8/13/2019	55	Multiple trees were blown down by severe thunderstorm winds.
MT ZION	10/31/2019	55	Thunderstorm winds blew down five trees with some falling on to power lines in the western portion of Wilkes County.
WILKESBORO	4/12/2020	50	Thunderstorm winds blew down a tree in the 900 block of Old U.S. Highway 421.
ROARING RIVER	4/12/2020	50	Thunderstorm winds blew down a tree in the community of Roaring River.
PARSONVILLE	4/12/2020	50	Thunderstorm winds blew down multiple trees in the Parsonville area.
ELKIN	4/13/2020	50	Thunderstorm winds blew a tree onto a wooden outbuilding on J. A. Russell Drive. A man was inside the building at the time the tree fell, and was later transported to the hospital with minor injuries.
ELKIN	4/13/2020	50	Thunderstorm winds blew down at least one tree on Edwards-Lakeview Drive.
MILLERS CREEK	4/13/2020	55	Thunderstorm winds blew down at least two trees into a home in the Millers Creek area.

TABLE H.9: TORNADO EVENTS (2000-2020)

Location	Date	Scale	Description
Alleghany County			
BLEVINS XRDS	5/8/2009	EF2	A low-end EF-2 tornado touched down on Osee Road and was intermittently on the ground approximately 5 miles moving east-southeast, finally lifting between Old Barrett Road and Glade Valley Road. ||A single wide mobile home was destroyed on Osee Road, causing four injuries. Along the track, cement silos were collapsed, 5 other homes were damaged, and several other structures were heavily damaged. Two people received minor injuries when struck by debris after winds blew out windows in their home. Monetary damages are estimates.
BLEVINS XRDS	5/8/2009	EF1	There was also a brief touchdown of an EF-1 tornado near Jarvis Road. This tornado tracked around a quarter mile and then lifted near Early Road. Numerous trees were snapped.
Ashe County			
IDLEWOOD	10/8/2017	EF0	A tornado touched down as an EF1 near Highway 421 close to Harley in Wilkes County and traveled north about 4.3 miles before moving into Ashe County near the Blue Ridge Parkway and Phillips Gap Road at 5:54PM (LST). The tornado would continue about 2.7

Location	Date	Scale	Description
			miles further north into Ashe County before lifting at 6:00PM near Idlewilde. The damage through Ashe County was restricted to numerous trees being snapped or knocked over. Average path width was 150 yards or less. EF1 (86-110 MPH) damage was consistent through the lifespan of this tornado. Also, of note, this was the first recorded/documented tornado in Ashe County since records began in 1950.
Wilkes County			
JOYNES	9/5/2011	EF1	The tornado touched down just south of the intersection of Longbottom Road and Green Street Mountain Resort Road. From here, it tracked north into Stone Mountain State Park where it destroyed 14 outbuildings, damaged three homes, and uprooted a large oak tree. Damage values are estimated.
MAPLE SPGS	10/8/2017	EF1	A tornado touched down as an EF1 near Highway 421 close to Harley in Wilkes County and traveled north about 4.3 miles before moving into Ashe County near the Blue Ridge Parkway and Phillips Gap Road at 5:54PM (LST). The tornado would continue about 2.7 miles further north into Ashe County before lifting at 6:00PM near Idlewilde. Most of the damage that occurred was to trees being snapped or knocked over with half a dozen structures damaged, mainly along Summit Road, just south of the Blue Ridge Parkway. The widest width of the tornado was 300 yards, but the average width of 150 yards or less. EF1 (86-110 MPH) damage was consistent through the lifespan of this tornado.
WILKESBORO	10/23/2017	EF1	A tornado touched down in Wilkesboro at 411 PM EST near the intersection of East Main and Salem Streets. It would move north for over eight miles before lifting at Yellow Banks Road west of Hays at 420 PM EST. Multiple structures in Wilkesboro received significant damage. The following morning, Duke Energy which supplies power to much of the County indicated that over 23,000 customers were still without power. There was one injury, which resulted from a tree falling on a one-story home which caused a resident to be hit in the head by debris. Dozens of trees and power poles were reported down. The tornado max width was 275 yards and maintained EF1 (86-110 MPH) strength through much of its lifespan.

TABLE H.10: WINTER STORM EVENTS (2000-2020)

Date	Description
Alleghany County	
1/19/2002	Freezing rain during the 19th resulted in a quarter of an inch of glaze.
12/4/2002	Snow during the afternoon of the 4th through early morning of the 5th accumulated 4 to 8 inches before changing to freezing rain. In addition, ice accretions of a quarter of an inch or more occurred in Surry, Yadkin, and Rockingham counties. Numerous accidents were reported on snow- and ice-covered roads.
2/15/2003	Freezing rain and sleet fell across the region from late on the 15th through midday on the 17th. Ice accretions ranged from 1/4 to 1/2 inch in the northwestern mountains and foothills to as much as 1 inch east of the foothills. Sleet accumulated from 1 to 4 inches. Up to 50,000 residences were without power for a brief time.
12/4/2003	Heavy snow developed across northwest North Carolina during the morning of the 4th and continued into the evening. Snow accumulations of 3 to 6 inches fell with locally higher amounts in the mountains.
1/30/2005	A low-pressure system tracking along the east coast brought a wintry mix of precipitation to the region. Ice accretion was one quarter of an inch in most locations with a few isolated locations in Rockingham Co. receiving one third inch accretion. Snowfall was a secondary element with 3 to 4 inches being the norm. The exception was Ashe Co. where snowfall amounts ranged from 4 to 5 inches.
2/4/2010	Snow broke out across the county late Thursday evening and continued through the day Friday. It mixed with sleet and freezing rain during the day Friday when warmer air moved in aloft. The precipitation ended as snow showers Friday evening. Total snow accumulations of 7 to 8 inches were common. Ice accumulation of up to 0.20 inches was

Date	Description
	reported in the Ennice area. The snow and freezing rain combined to bring down numerous trees and power lines across the county. Some structures were also damaged by the falling trees.
2/19/2012	Snowfall totals across the county ranged from 4.0 inches near Glade Valley to 5.0 inches in Sparta.
4/4/2013	A trained spotter observed 3.0 inches of snow in Twin Oaks. The public reported 1 to 2 inches of snow from the Glade Valley area.
3/6/2014	Snowfall totals ranged from 4 to 7 inches across the county.
11/1/2014	The public observed 5.9 inches of snow at Laurel Springs, with 2.0 to 4.0 inches of snow from Ennice and Sparta.
11/26/2014	A National Weather Service employee observed 3.8 inches of snow three miles south of Sparta, while the public observed 3.5 inches of snow at Glade Valley and 1.8 inches of snow at Piney Creek.
1/23/2015	Ice accretion ranged between one and two tenths of an inch along the crest of the Blue Ridge. The western part of the county experienced a trace to one-tenth inch ice accretion.
2/16/2015	The public observed 5.0 to 5.5 inches of snow in the Glade Valley area.
2/25/2015	The public measured 7.0 inches of snow in Sparta, while a trained spotter measured 7.0 inches of snow 3SSW of Glade Valley. Snowfall amounts of 6.0 to 7.0 inches were common across the county.
1/22/2016	Snowfall amounts between 6 and 9 inches were observed across several locations throughout the county. The highest accumulation report was received out of the Glade Valley and Sparta areas, where 8.4 inches was measured. A brief period of sleet was also reported during this storm.
2/14/2016	Snowfall amounts between 4 to 5 inches were observed across several locations in the county. The highest accumulation was in the Sparta area where 5 inches was measured. Small amounts of sleet and freezing rain were also observed with this storm.
1/6/2017	Snowfall amounts between 8 and 10 inches were observed across several locations throughout the county. The highest accumulation report was received out of the Sparta and Glade Valley areas, where 8 inches was measured.
3/24/2018	Snowfall amounts across the county include 4.0 inches one mile south-southwest of Whitehead, 4.2 inches one mile north-northeast of Twin Oaks, 5.5 inches at Ennice and two miles east of Glade Valley, 6.0 inches three miles south of Bridle Creek. Ice accretion amounts across the county include a trace one mile south-southwest of Whitehead, one mile north-northeast of Twin Oaks, and three miles south of Bridle Creek, and one-tenth of an inch three miles east-southeast of Whitehead.
12/8/2018	Snowfall accumulations ranged from 16.0 inches about four miles south-southwest of Sparta to 19.0 inches about two miles south-southeast of Whitehead.
1/12/2019	A winter storm brought mainly freezing rain conditions to Alleghany County, where ice accumulation ranged from 0.25 to 0.3 inches thick across portions of the county. Snow and sleet were also observed, with accumulations for each generally less than 0.5 inches thick.
Ashe County	
1/19/2002	Freezing rain during the 19th resulted in a quarter of an inch of glaze.
12/4/2002	Snow during the afternoon of the 4th through early morning of the 5th accumulated 4 to 8 inches before changing to freezing rain. In addition, ice accretions of a quarter of an inch or more occurred in Surry, Yadkin, and Rockingham counties. Numerous accidents were reported on snow- and ice-covered roads.
2/15/2003	Freezing rain and sleet fell across the region from late on the 15th through midday on the 17th. Ice accretions ranged from 1/4 to 1/2 inch in the northwestern mountains and foothills to as much as 1 inch east of the foothills. Sleet accumulated from 1 to 4 inches. Up to 50,000 residences were without power for a brief time.
12/4/2003	Heavy snow developed across northwest North Carolina during the morning of the 4th and continued into the evening. Snow accumulations of 3 to 6 inches fell with locally higher amounts in the mountains.
12/18/2003	Snow developed during the morning of the 18th and continued into the morning of the 20th. Snow accumulations of 6 to 12 inches occurred with local amounts up to 20 inches.
1/9/2007	An area of low pressure moving through the region helped to bring snow showers to the mountains of northwest North Carolina. On average, 4 inches of snow covered the area.
1/17/2008	Snowfall amounts from the event include 6.0 inches at West Jefferson, 5.0 inches at Lansing, 4.0 inches at Fleetwood, and 3.0 inches at Jefferson.

Date	Description
2/4/2010	Snow broke out across the county late Thursday evening and continued through the day Friday. It mixed with sleet and freezing rain during the day Friday when warmer air moved in aloft. The precipitation ended as snow showers Friday evening. Total snow accumulations of 8 to 10 inches were common. Ice accumulation of up to 0.35 inches was reported in Glendale Springs, with slightly lower amounts around 0.15 inches common across most of the county. Only minor tree and power line damage was reported.
2/9/2010	A light mixed bag of precipitation moved across the county on the 9th producing light accumulations. On the back side of the storm strong northwest winds produced significant upslope snow. Wind gusts as high as 66 mph were recorded in Jefferson the evening of the 10th. Whiteout conditions were common with falling and blowing snow. Total snow accumulations ranged from 4 to 6 inches in the lower elevations, to up to 16 inches on the western slopes. Most of the snow fell during the 10th into early on the 11th.
2/15/2010	A prolonged period of upslope snow brought accumulations up to 16 inches on the western slopes of the higher terrain. Near blizzard conditions were also recorded with considerable blowing and drifting of the snow.
2/24/2010	A prolonged upslope snow event brought a total of 7 to 14 inches of snow across the higher west facing slopes. A strong northwest wind also caused considerable blowing and drifting of the snow and near blizzard conditions at times.
12/12/2010	Snow amounts ranged from 3.5 inches near Laurel Springs to 8.0 inches at Lansing and near both Flatwood and Ashland.
12/16/2010	Snow amounts across the county ranged from 1.0 to 2.5 inches. A wintry mix of freezing rain and sleet also occurred. Damage values are estimated.
1/26/2011	Rain quickly mixed with sleet before changing to snow mid-morning on Wednesday the 26th. The snow was wet and heavy at times, with total accumulations of 4 to 7 inches across the county. Winds also gusted between 40 and 50 miles per hour for a period resulting in near whiteout conditions at times.
2/19/2012	Snowfall totals across the county ranged from 4.0 inches in Jefferson to 4.5 inches in Creston.
10/29/2012	Higher snowfall totals from across the county included 6.0 inches at Whitetop, 6.5 inches at Clifton, 9.0 inches at Lansing and Ashland, and 14.0 inches at Clifton.
4/4/2013	The public observed from 1/2 inch of snow in the Glendale Springs area to 1.0 inch in Fleetwood, to 2.0 inches just east-northeast of Jefferson.
1/2/2014	Snowfall accumulations ranging from 1.7 inches to 5 inches were reported across Ashe County.
1/25/2014	Snowfall accumulations ranged from between 1 and 4 inches across Ashe County, with one report received of 7 inches.
3/6/2014	Snowfall totals ranged from 1.5 to 7 inches across the county.
11/1/2014	An observer reported 5.7 inches of snow just east-southeast of West Jefferson. Another observer indicated 5.0 inches of snow from six miles northwest of Lansing and a Facebook report of 4.5 inches was received from Fleetwood. Most other snow reports around the county were in the 2 to 3-inch range.
11/26/2014	A storm spotter observed 3.0 inches of snow at Creston, while observers recorded 2.2 inches of snow six miles northwest of Lansing and 1.5 inches of snow at Glendale Springs.
1/23/2015	Ice accretion ranged from one to two tenths of an inch along the crest of the Blue Ridge and also along the Watauga County line. The northern part of the county received a trace to one-tenth inch ice accretion.
2/16/2015	Trained spotters and the public measured 4.5 to 5.0 inches in West Jefferson to 5.3 inches 1W of Shatley Springs.
2/24/2015	A spotter measured 4.0 inches of snow in Baldwin. The public measured 3.0 inches in West Jefferson. Another spotter measured 3.0 inches in Yates. Amounts elsewhere were less than 3.0 inches.
2/25/2015	An amateur radio operator measured 8.0 inches of snow in Glendale Springs. Snowfall amounts of 5.0 to 7.0 inches were common across the entire county measured by a variety of sources.
1/22/2016	Snowfall amounts between 8 and 14 inches were observed across several locations throughout the county. The highest accumulation report was received out of the Lansing area, where 13.5 inches was measured. A brief period of sleet was also reported during this storm.
2/8/2016	While the lower elevations had reports of snow ranging from 1-3 inches, observers at higher elevations reported snowfall amounts of 6-8 inches by the end of the event.

Date	Description
2/14/2016	Snowfall amounts between 4 to 7 inches were observed across several locations in the county. The highest accumulation was in the Fleetwood area where 7 inches was measured. Small amounts of sleet and freezing rain were also observed with this storm.
1/6/2017	Snowfall amounts between 6 and 8 inches were observed across several locations throughout the county. The highest accumulation report was received out of the Jefferson area, where 8 inches was measured at numerous locations around the town.
12/8/2018	Snowfall accumulations ranged from 16.0 inches about two miles southwest of Ashland to 25.0 inches about three miles southeast of Fleetwood.
1/12/2019	A winter storm brought mainly freezing rain conditions to the county, where ice accumulation ranged from 0.15 to 0.25 inches thick across most of the county. Sleet was also observed across the county, with accumulations near the community of Lansing reaching a depth of 0.8 inches thick.
2/19/2019	A winter storm produced snow and freezing rain across Ashe County, with snowfall totals reaching 3 inches near Deep Gap and freezing rain accumulations of up to 0.10 inches.
Watauga County	
1/29/2000	Light snow, sleet, and freezing rain developed late in the afternoon of the 29th. Snow and sleet accumulations ranged from 1 to 4 inches, then became mainly freezing rain late at night. Glaze accumulated 1/4 inch to 1/2 inch before the freezing rain ended during the afternoon on the 30th.
1/19/2002	Freezing rain during the 19th resulted in a quarter of an inch of glaze.
12/4/2002	Snow during the afternoon of the 4th through early morning of the 5th accumulated 4 to 8 inches before changing to freezing rain. In addition, ice accretions of a quarter of an inch or more occurred in Surry, Yadkin, and Rockingham counties. Numerous accidents were reported on snow- and ice-covered roads.
2/15/2003	Freezing rain and sleet fell across the region from late on the 15th through midday on the 17th. Ice accretions ranged from 1/4 to 1/2 inch in the northwestern mountains and foothills to as much as 1 inch east of the foothills. Sleet accumulated from 1 to 4 inches. Up to 50,000 residences were without power for a brief time.
12/4/2003	Heavy snow developed across northwest North Carolina during the morning of the 4th and continued into the evening. Snow accumulations of 3 to 6 inches fell with locally higher amounts in the mountains.
12/18/2003	Snow developed during the morning of the 18th and continued into the morning of the 20th. Snow accumulations of 6 to 12 inches occurred with local amounts up to 20 inches.
2/2/2004	Low pressure moving up the Mid-Atlantic coast brought wintry weather conditions to the mountains and foothills of North Carolina during the evening of the 2nd through the morning of the 3rd. 5 inches of snow fell across most of Watauga County, along with one quarter inch of glaze. In Wilkes County, there was one quarter inch of ice accretion.
1/30/2005	A low-pressure system tracking along the east coast brought a wintry mix of precipitation to the region. Ice accretion was one quarter of an inch in most locations with a few isolated locations in Rockingham Co. receiving one third inch accretion. Snowfall was a secondary element with 3 to 4 inches being the norm. The exception was Ashe Co. where snowfall amounts ranged from 4 to 5 inches.
1/9/2007	An area of low pressure moving through the region helped to bring snow showers to the mountains of northwest North Carolina. On average, 4 inches of snow covered the area.
1/17/2008	Snowfall amounts from across the county include 5.5 inches at Boone, 5.0 inches at Meat Camp, and 4.0 inches at Foscoe.
2/4/2010	Snow broke out across the county late Thursday evening and continued through the day Friday. It mixed with sleet and freezing rain during the day Friday when warmer air moved in aloft. The precipitation ended as snow showers Friday evening. Total snow accumulations of 8 to 11 inches were common, with up to a tenth of an inch of ice as well. Only minor tree and power line damage was reported.
2/9/2010	A light mixed bag of precipitation moved across the county on the 9th producing light accumulations. On the back side of the storm strong northwest winds produced significant upslope snow. Wind gusts as high as 67 mph were recorded in Boone the evening of the 10th. Whiteout conditions were common with falling and blowing snow. Total snow accumulations were generally 8 to 12 inches, with most of it falling the 10th into early on the 11th.
2/15/2010	A prolonged period of upslope snow brought accumulations up to 10 inches on the western slopes of the higher terrain. Near blizzard conditions were also recorded with considerable blowing and drifting of the snow.

Date	Description
2/24/2010	A prolonged upslope snow event brought a total of around 8 to 9 inches across the higher elevations, with closer to 4 inches in the east. A strong northwest wind also caused considerable blowing and drifting of the snow and near blizzard conditions at times.
12/12/2010	Snow amounts across the county ranged from 12 inches at Vilas to 15.7 inches near Beech Mountain.
12/16/2010	Snow amounts across the county ranged from 1.0 to 2.0 inches. A mix of freezing rain and sleet also occurred. Damage values are estimated.
1/26/2011	Rain quickly mixed with sleet before changing to snow mid-morning on Wednesday the 26th. The snow was wet and heavy at times, with total accumulations of 4 to 6 inches across the county. Winds also gusted between 40 and 50 miles per hour for a period resulting in near whiteout conditions at times.
10/28/2012	The higher snowfall totals from across the county include 6.0 inches near Rominger, 7.0 inches near Sugar Grove, 11.0 inches at Boone, and 12.0 inches at Beech Mountain.
4/4/2013	The public observed 1/3 inch of snow/sleet mixture in the Sugar Grove area.
3/6/2014	Snow totals ranged from 3 to 8.5 inches across the county.
11/1/2014	An observer reported 6.7 inches of snow from Bethel at an elevation above 3000 feet. The public observed snowfall of 5.0 inches from Zionville and the Post Office at Deep Gap observed 5.0 inches of snow as well. Elsewhere around the county, snow amounts ranged from less than an inch five miles east of Boone to four inches at Silverstone and Valle Crucis.
11/26/2014	A storm spotter observed 5.0 inches of snow at Beech Mountain. Elsewhere around the county snowfall amounts ranged from 1.0 inch at Boone, to 2.0 inches at Valle Crucis, to 2.5 inches five miles southeast of Boone and at Vilas.
1/23/2015	Ice accretion ranged from one to two tenths of an inch across most of the county. Isolated locations received between one-quarter and four-tenths of an inch.
2/16/2015	The Watauga County Sheriff's Office measured 6.0 inches of snow at Blowing Rock. Trained spotters measured 5.0 inches of snow at Deep Gap and 4.0 inches of snow at Todd.
2/24/2015	A spotter measured 5.0 inches of snow at Blowing Rock, while the public observed 4.0 inches of snow at Deep Gap and Todd. Other snow amounts across the county observed by a variety of sources were mostly in the 2.0 to 3.0-inch range.
2/25/2015	A trained spotter measured 8.0 inches of snow near Aho. Snowfall amounts of 5.0 to 7.0 inches were common across the county as reported by spotters, the public, COOP observers, and amateur radio operators.
1/22/2016	Snowfall amounts between 8 and 14 inches were observed across several locations throughout the county. The highest accumulation report was received out of the Blowing Rock area, where 14 inches was measured. A brief period of sleet was also reported during this storm.
2/14/2016	Snowfall amounts between 3 to 5 inches were observed across several locations in the county. The highest accumulation was in the Boone area where 5 inches was measured.
1/6/2017	Snowfall amounts between 5 and 8 inches were observed across several locations throughout the county. The highest accumulation report was received out of the Seven Devils area, where 8 inches was measured.
1/17/2018	Snowfall amounts between 2 to 5 inches were observed across several locations in the county. The highest accumulation was in the Blowing Rock area where 5.0 inches was measured.
3/24/2018	Snowfall amounts across the county include 2.0 inches two miles east-northeast of Peoria, 2.5 inches one mile south-southeast of Valle Crucis, 4.0 inches two miles northeast of Meat Camp and two miles west-northwest of Sands, 4.3 inches at Todd, and 4.5 inches at Blowing Rock. Ice accretion amounts across the county include a trace at Ashland, one mile south-southeast of Valle Crucis, two miles east-northeast of Peoria, and two miles northeast of Meat Camp, one-tenth of an inch two miles west-northwest of Sands, one-eighth of an inch at Todd, three-sixteenths of an inch two miles west of Boone, and three-tenths of an inch three miles west of Blowing Rock.
12/8/2018	Snowfall accumulations ranged from 15.0 inches about one mile southeast of Boone to 26.0 inches at Aho. Six vehicle wrecks were reported with four involving unknown amounts of property damage and two with unknown numbers of injuries. The Boone police department reported 56 stranded motorists.
1/12/2019	A winter storm brought mainly freezing rain conditions to the county, where ice accumulation ranged from 0.2 to 0.5 inches thick across most of the county. Snow and sleet were also observed, a combination of which

Date	Description
	accumulated about 1.5 inches thick near the town of Boone. Accumulations for each were generally less than 0.5 inches thick elsewhere across the county.
2/19/2019	A winter storm produced freezing rain and snow in Watauga county. Ice from freezing rain reached thicknesses from 0.1 inches to a maximum of 0.25 inches 2 miles north-northwest of Boone, while snow reports ranged from trace amounts to 3.2 inches across the county.
Wilkes County	
1/29/2000	Light snow, sleet, and freezing rain developed late in the afternoon of the 29th. Snow and sleet accumulations ranged from 1 to 4 inches, then became mainly freezing rain late at night. Glaze accumulated 1/4 inch to 1/2 inch before the freezing rain ended during the afternoon on the 30th.
12/4/2002	Snow during the afternoon of the 4th through early morning of the 5th accumulated 4 to 8 inches before changing to freezing rain. In addition, ice accretions of a quarter of an inch or more occurred in Surry, Yadkin, and Rockingham counties. Numerous accidents were reported on snow- and ice-covered roads.
2/15/2003	Freezing rain and sleet fell across the region from late on the 15th through midday on the 17th. Ice accretions ranged from 1/4 to 1/2 inch in the northwestern mountains and foothills to as much as 1 inch east of the foothills. Sleet accumulated from 1 to 4 inches. Up to 50,000 residences were without power for a brief time.
1/30/2005	A low-pressure system tracking along the east coast brought a wintry mix of precipitation to the region. Ice accretion was one quarter of an inch in most locations with a few isolated locations in Rockingham Co. receiving one third inch accretion. Snowfall was a secondary element with 3 to 4 inches being the norm. The exception was Ashe Co. where snowfall amounts ranged from 4 to 5 inches.
2/4/2010	Snow broke out across the county late Thursday evening and continued through the day Friday. It mixed with sleet and freezing rain during the day Friday when warmer air moved in aloft. The precipitation ended as snow showers Friday evening. Total snow accumulations of 7 to 9 inches were common. The Brushy Mountain area was hit hard by freezing rain with accumulations up to one inch reported. This caused numerous trees and power lines to fall blocking several roads and knocking out power to thousands. Significant tree damage was reported, with one tree breaking through the roof of a house. At one point almost 4000 customers were without power.
4/4/2013	The public observed around 1/2 inch of snow/sleet mixture in the North Wilkesboro area.
12/8/2013	The Traphill Post Office reported up to 1/8-inch ice accumulation.
3/6/2014	Snowfall reports ranged from 4.5 to 7.5 inches across the county.
2/16/2015	The Wilkes County Fire Department measured 4.7 inches of snow in Hays while the public observed 3.0 inches of snow just south of North Wilkesboro.
2/24/2015	An observer measured 3.0 inches of snow at Purlear, while the public measured 2.5 inches at Hays and 2.0 inches at Millers Creek.
2/25/2015	The public measured 7.0 inches of snow 2N Maple Springs. Snowfall amounts of 5.0 to 7.0 inches were common throughout the county as reported by spotters and the public.
1/20/2016	A North Wilkesboro man suffered fatal injuries in a two-vehicle collision on the night of January 20th. Ice along Rock Creek Road in the Hays Community of Wilkes County was noted as a contributor to the accident. Additional accidents were reported throughout the county on both January 20th/21st which were attributed to poor road conditions due to ice and snow.
1/22/2016	Snowfall amounts between 6 and 12 inches were observed across several locations throughout the county. The highest accumulation report was received out of the Purlear area, where 11.5 inches was measured. A brief period of sleet was also reported during this storm.
2/14/2016	Snowfall amounts between 2 to 3 inches were observed across several locations in the county. The highest accumulation was in the North Wilkesboro area where 3 inches was measured. Freezing rain reports also ranged from a one to three tenths of an inch. Strong winds behind the event caused several ice-covered power lines to be knocked down. Duke Energy reported at 10:30 AM on Tuesday that 4,500 customers were without power in the county.
1/6/2017	Snowfall amounts between 6 and 8 inches were observed across several locations throughout the county. The highest accumulation report was received out of the Boomer area, where 8 inches was measured.
1/17/2018	Snowfall amounts between 3 to 5 inches were observed across several locations in the county. The highest accumulation was in the Millers Creek area where 5.0 inches was measured.

Date	Description
12/8/2018	Snowfall accumulations ranged from 16.0 inches at West Kerr Scott Reservoir to 17.8 inches at North Wilkesboro. The storm caused 26 vehicle accidents and stranded 41 motorists. The weight of the snow downed 57 trees, and there were 29 electrical hazards reported mostly due to trees on power lines. In addition, about 20 people from five families that also included small children were stranded in their homes without power for three days. Several people from the North Carolina National Guard rescued the families and took them to a shelter.
1/12/2019	A winter storm brought mainly freezing rain conditions to the county, where ice accumulation ranged from 0.2 to 0.3 inches thick across much of the county. The icing resulted in power outages, affecting as many as 3,321 customers. Many of the outages were concentrated in the Hays and Traphill areas in the northern half of the county, while several outages were also reported around the communities of Windy Gap and Moravian Falls.