# Hazard Mitigation Plan Update

## High Country Region

Stantec

August, 2017

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# TABLE OF CONTENTS

# 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 hazard 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 in our communities. 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.

Each of the four counties participating in the update of the High Country Hazard Mitigation Plan participated in the last update of the plan. The history of plan development is further described in Section 2: Planning Process. This regional plan draws from the region's previous hazard mitigation plan (2012) and from local plans and documents that incorporate the region's sustained efforts to incorporate hazard mitigation principles and practices into routine government activities and functions. At its core, this 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 primary fall under the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) program. Grant programs include the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation (PDM) program, and the Flood Mitigation Administration (FMA) program. Communities with an adopted and federally-approved hazard mitigation plan thereby become eligible for funding under these programs and are pre-positioned to receive available mitigation funds before and after the next disaster strikes.

Additionally, the Flood Insurance Reform Act of 2004 (P.L. 108-264) created two new grant programs, Severe Repetitive Loss (SRL) and Repetitive Flood Claim (RFC), and modified the existing Flood Mitigation Assistance (FMA) program. One of the requirements of this Act is that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for these FEMA mitigation programs. However, as of early 2014, these programs have been folded into a single Flood Mitigation Assistance (FMA) program.

This change was brought on by new, major federal flood insurance legislation that was passed in 2012 under the Biggert-Waters Flood Insurance Reform Act (P.L. 112-141) and the subsequent Homeowner Flood Insurance Affordability Act in 2014 which revised Biggert-Waters.

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:

- Update the existing High Country Regional Hazard Mitigation Plan to demonstrate progress and reflect current conditions;
- Increase public awareness and education of hazards and hazard mitigation;
- 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. All hazard warranted some analysis and 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** lists the participating areas, which are the same as those that participated in the previous plan development process.

**TABLE 1.1: 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 |

## 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), Biggert-Waters Flood Insurance Reform Act of 2012 (P.L. 112-141) and the Homeowner Flood Insurance Affordability Act.

## 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, FEMA's HAZUS®MH loss estimation methodology 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 communities in the High Country Region seek to determine the most appropriate mitigation actions to pursue and implement—enabling them to prioritize and focus 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 use of a Capability Assessment Review Form. It provides 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.

Lastly, the **Appendices** provide documentation including: Appendix A: Plan Adoption; Appendix B: Planning Tools; Appendix C: Local Mitigation Plan Review Tool; Appendix D: Planning Process Documentation; and Appendix E: Community Rating System.

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# Section 2

# PLANNING PROCESS

This section describes the planning process undertaken by the High Country Region in the update of its Regional Hazard Mitigation Plan. It consists of the following eight subsections:

- 2.1 Overview of Hazard Mitigation Planning
- 2.2 History of Hazard Mitigation Planning in the High Country Region
- 2.3 Preparing the Plan
- 2.4 The High Country Regional Hazard Mitigation Planning Committee
- 2.5 Community Meetings and Workshops
- 2.6 Involving the Public
- 2.7 Involving the Stakeholders
- 2.8 Documentation of Plan Progress

| 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. |

## 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 10: *Plan Maintenance*). 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.

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, communities that participate in mitigation planning are 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. In addition, the planning process provides inherent benefits of collaboration that are useful in pre- and post-disaster preparation efforts.

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

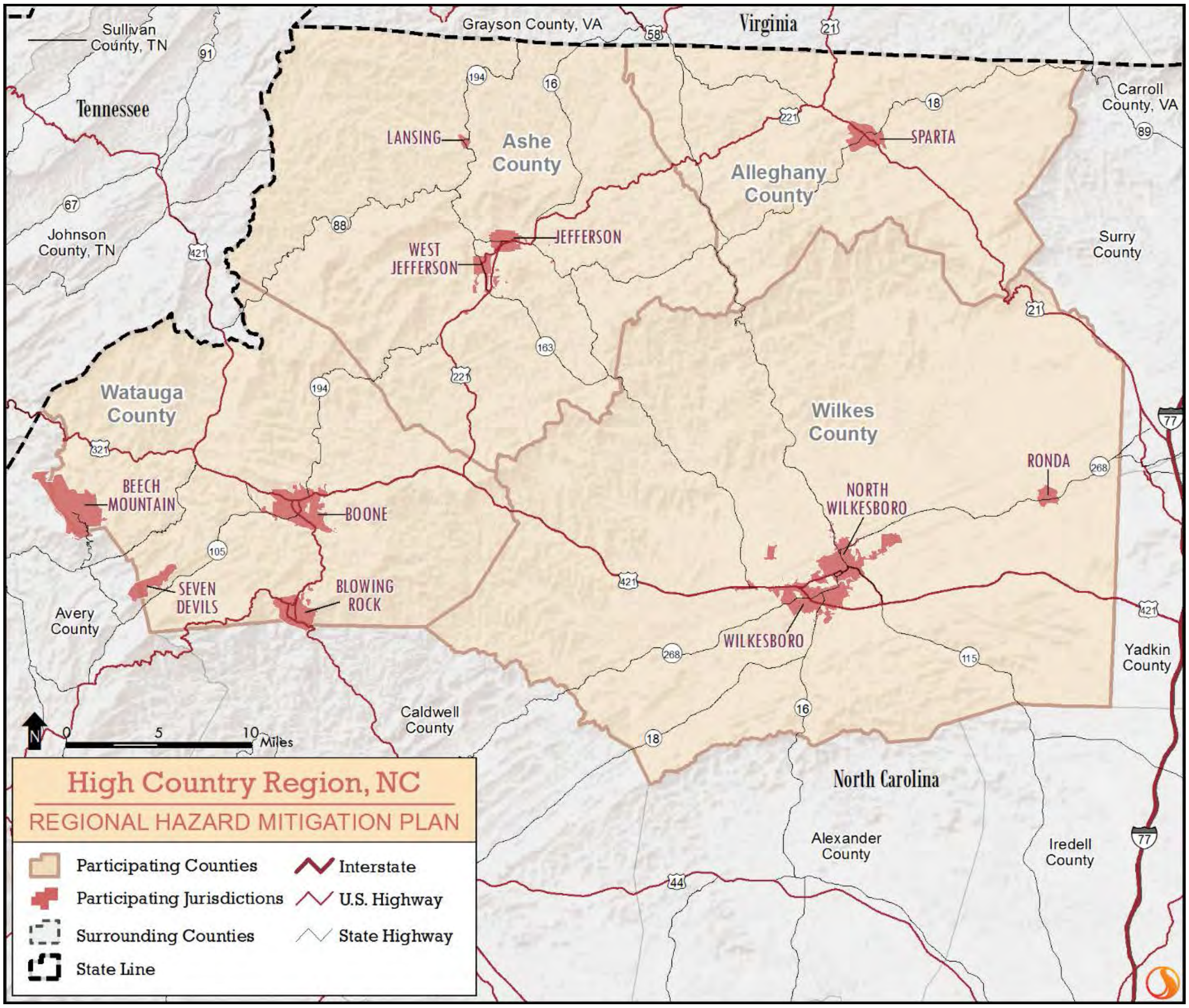
Each of the four counties and jurisdictions participating in this Plan participated in the previous version of this plan (dated August 2012). The previous version of this plan was the first regional planning effort amongst participants. Prior to the regional planning efforts, all participants had approved county-level hazard mitigation plans in place.

No new jurisdictions have joined the plan development process and all of the jurisdictions that participated in previous planning efforts have participated in the development of this regional plan. Participating jurisdictions are listed in **Table 2.1** and shown in **Figure 2.1** below.

**TABLE 2.1: PARTICIPATING JURISDICTIONS IN THE HIGH COUNTRY REGIONAL HAZARD MITIGATION PLAN**

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

**FIGURE 2.1: HIGH COUNTRY REGION PARTICIPATING JURISDICTIONS**




## 2.3 PREPARING THE 2017 PLAN

Hazard mitigation plans are required to be updated every five years to remain eligible for federal mitigation and public assistance funding. To simplify planning efforts for the jurisdictions in the High Country Region, the counties of Alleghany, Ashe, Watauga, and Wilkes developed the second iteration of the regional plan. Regional planning efforts allow resources to be shared amongst the participating jurisdictions and eases the administrative duties of all of the participants by combining the four existing county-level plans into one multi-jurisdictional plan.

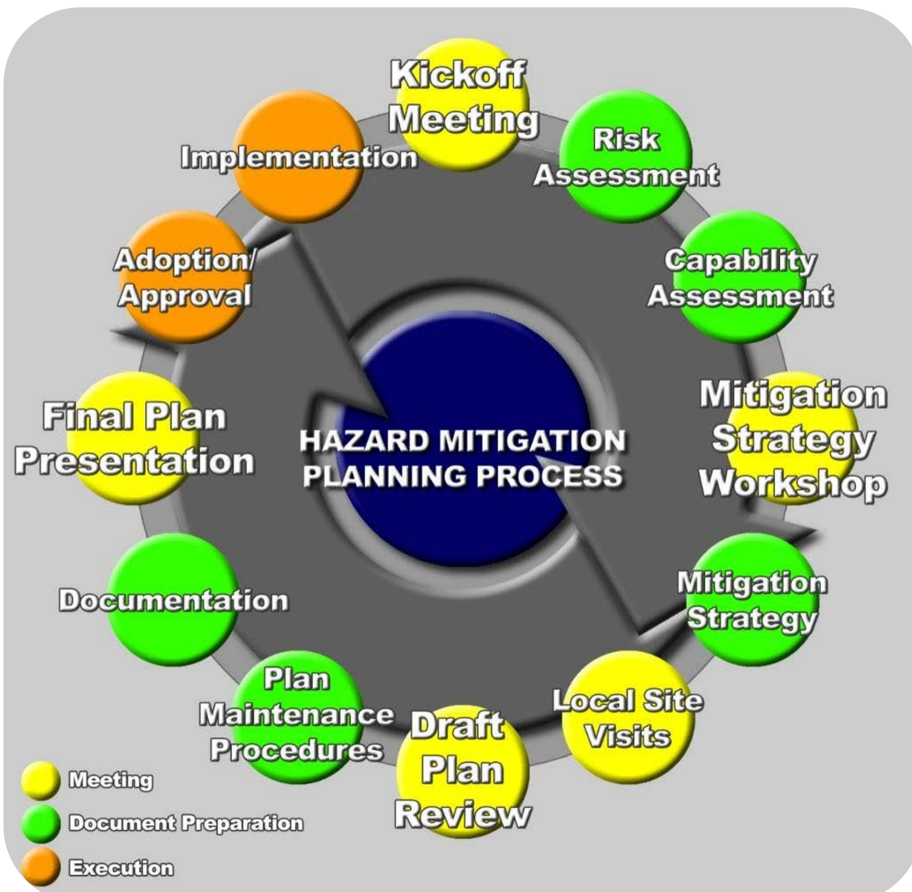
To prepare the 2017 *High Country Regional Hazard Mitigation Plan*, the High Country Region hired Stantec and ESP as consultants to provide professional mitigation planning services. This plan was facilitated under the direction of a professional planner. Caroline Cunningham from Stantec served as the project manager while Nathan Slaughter served as the lead planner for this project; both are members of the American Institute of Certified Planners (AICP).

Per the contractual scope of work, the Stantec consultant team followed the mitigation planning process recommended by FEMA in the Local Multi-Hazard Mitigation Planning Guidance and recommendations provided by North Carolina Division of Emergency Management (NCEM) mitigation planning staff. 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 on September 16, 2009 in Part 201 of the Code of Federal Regulations (CFR).

The process used to prepare this Plan included twelve major steps that were completed over the course of approximately nine months beginning in November 2016. Each of these planning steps (illustrated in **Figure 2.2**) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: *Introduction*.

Over the past five years, each participating jurisdiction has been actively working to implement their existing plans. This is documented in the Mitigation Action Plan through the implementation status updates for each of the Mitigation Actions. The Capability Assessment also documents changes and improvements in the capabilities of each participating jurisdiction to implement the Mitigation Strategy.

**FIGURE 2.2: MITIGATION PLANNING PROCESS FOR THE HIGH COUNTRY REGION**



## 2.4 THE HIGH COUNTRY REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

During the initial 2012 development of the region 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 High Country 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. The High Country Regional Hazard Mitigation Planning Committee includes representatives with the authority to regulate development and those involved with hazard mitigation activities. This group was reconvened for the 2017 plan update.

Beginning in November 2016, the High Country 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 email distribution list.

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

- participate in High Country 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 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 2017 *High Country Regional Hazard Mitigation Plan*

**Table 2.2** lists the members of the High Country Regional Hazard Mitigation Planning Committee who were responsible for participating in the development of the Plan. Committee members are listed by county and agency represented.

**TABLE 2.2: MEMBERS OF THE HIGH COUNTRY REGIONAL HAZARD MITIGATION PLANNING COMMITTEE**

| NAME/TITLE | DEPARTMENT/ORGANIZATION/AGENCY |
|---|---|
| ***Alleghany County*** | |
| Daniel Roten*/EM Director & Fire Inspector | Alleghany County EMA |
| Kevin Dowell/ Planner & Code Enforcement | Sparta Town Administration |
| ***Ashe County*** | |

| NAME/TITLE | DEPARTMENT/ORGANIZATION/AGENCY |
|---|---|
| Patty Gambill*/Emergency Management Coordinator | Ashe County EMA |
| Adam Stump/Planner | Ashe County Planning |
| Cathy Howell/Town Manager | Town of Jefferson |
| Marcy Little/Town Clerk | Town of Lansing |
| Brantley Price/Town Manager | Town of West Jefferson |
| ***Watauga County[1]*** | |
| Taylor Marsh*/Emergency Management Coordinator | Watauga County |
| Joe Furman/Planner | Watauga County Planning and Inspections |
| Tim Holloman/Town Manager | Town of Beech Mountain |
| Jeff Scott/Planner | Town of Beech Mountain |
| Bob Pudney/Fire Chief | Town of Beech Mountain |
| Ed Evans/Town Manager | Town of Blowing Rock |
| John Ward/Town Manager | Town of Boone |
| Jimmy Isaacs/Fire Chief | Town of Boone |
| Debbie Powers/Town Manager | Town of Seven Devils |
| Bobby Powell/Fire Chief | Town of Seven Devils |
| ***Wilkes County*** | |
| Suzanne Hamby*/ Emergency Management Coordinator | Wilkes County EMA |
| Robert Johnson/Mayor | Town of North Wilkesboro |
| Larry South/Town Manager | Town of North Wilkesboro |
| Victor Varela/Mayor | Town of Ronda |
| Mike Inscore/Mayor Town of Wilkesboro | Town of Wilkesboro |
| Ken Noland/Town Manager | Town of Wilkesboro |
| ***Consultant Team*** | |
| Caroline Cunningham/Project Manager | Stantec |
| Eric Davis/Hazus Specialist | Stantec |
| Christina Hurley/Planner and Risk Assessment | Stantec |
| Nathan Slaughter/Senior Planner | ESP/Hawksley |

**Served as the county lead during the plan development process.*

Additional participation and input from other identified stakeholders, neighboring jurisdictions, and the general public was sought by the High Country counties during the planning process through phone calls and the distribution of e-mails, advertisements and public notices aimed at informing people on the status of the Hazard Mitigation Plan (public and stakeholder involvement is further discussed in Section 2.7).

[1] Watauga County served as the designee for all participating jurisdictions with the county. Documentation letters can be found in Appendix D.

### 2.4.1 Multi-Jurisdictional Participation

The High Country Regional Multi-Jurisdictional Hazard Mitigation Plan includes four counties and eleven incorporated municipalities as identified in Table 2.1 and Figure 2.1. To satisfy multi-jurisdictional participation requirements, each county and its participating jurisdictions were tasked with involved in the following activities:

- Participate in mitigation planning workshops;
- Identify completed/new mitigation projects, if applicable;
- Review the draft plan; and
- Develop and adopt (or update) their local Mitigation Action Plan.

Each jurisdiction participated in the planning process and has developed and updated 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. Documentation for this participation is found via adoption resolutions in Appendix A and sign-in sheets and Appendix D.

***Watauga County Jurisdictional Participation***
The jurisdictions within Watauga County opted to nominate a designee for their participation in the plan. The designee (Taylor Marsh, Watauga County EMA), continued to keep jurisdictions informed throughout the planning process. Documentation of this role can be found in Appendix D.

## 2.5 PLAN DEVELOPMENT MEETINGS

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

**November 10, 2016**
**Project Kickoff Meeting**

Immediately following the contractual Notice to Proceed, ESP staff arranged for a project kickoff meeting. Patty Gambill, Ashe County's Emergency Management Coordinator and the point of contact for the project, sent an email inviting representatives from the participating counties and municipalities, NCEM, and other local organizations to the meeting.

Mr. Slaughter led the meeting of the Regional Hazard Mitigation Planning Committee and began by having attendees introduce themselves. The 9 attendees included representatives from various departments

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

and local jurisdictions within each of the four counties participating in the plan update. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed each of the handouts that were distributed in the meeting packets (agenda, project description, presentation slides, and Public Participation Survey). He then defined mitigation and gave a review of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

Mr. Slaughter then provided information about the project. He indicated that the project is funded by a FEMA PDM grant, representatives from each County met together to hire Hawksley Consulting (now Stantec, Inc.) to manage the update. Funding match requirements will be met by providing "in-kind" services.

Mr. Slaughter then explained some of the basic concepts of mitigation. He explained that we want to mitigate hazard impacts on the existing development in our communities (houses, businesses, infrastructure, critical facilities, etc). Secondly, but not less important, we want to ensure that future development is conducted in a way that doesn't increase our vulnerability. This is done by having good plans, policies and procedures in place.

Following the overview, Mr. Slaughter led the group in an "icebreaker" exercise to refamiliarize meeting participants to various mitigation techniques. He briefly recapped the six different categories of mitigation techniques: emergency services; prevention; natural resource protection; structural projects; public education and awareness; and property protection. Each attendee was then given $20 in mock currency and asked to "spend" their mitigation money as they personally deemed appropriate among the six mitigation categories. Money was "spent" by placing it in cups labeled with each of the mitigation techniques. Upon completion of the exercise, Mr. Slaughter stated that the results would be tabulated and shared with the group at the next meeting. The results would also be compared against those from the previous plan development's ice breaker exercise. This would help demonstrate how priorities in mitigation actions have changed over the past 5 years.

Following the icebreaker exercise, Mr. Slaughter reviewed the key objectives of the project which are to:

- Complete update of existing plans to demonstrate progress and reflect current conditions
- Current plan expires May 20, 2018
- Public awareness and education
- Maintain grant eligibility for participating jurisdictions
- Maintain compliance with State and Federal requirements.

Mr. Slaughter reviewed a list of the participating jurisdictions and then explained the mitigation planning process and specific tasks to be accomplished for this project, including the planning process, risk assessment, capability assessment, mitigation strategy, mitigation action plan and plan maintenance procedures. For the risk assessment portion of the process, Mr. Slaughter asked each county to designate a point person to coordinate the gathering of GIS data required for the analysis. He also reviewed the list of identified hazards and asked the committee members if they still agreed with the list of identified hazards. He also asked if there were any new hazards they wanted to consider for the plan. There were no revisions to the identified hazards.

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

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

Mr. Slaughter then reviewed the roles and responsibilities of Hawksley Consulting, 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 HMPT meeting was scheduled for some time in Spring of 2017 to discuss the findings of the risk and capability assessments and begin updating existing and identifying any new mitigation actions.

**March 28, 2017**
**Second High Country Regional Hazard Mitigation Planning Committee Meeting**
Caroline Cunningham (Stantec) and Nathan Slaughter (ESP) facilitated High Country Regional Hazard Mitigation Plan Mitigation Strategy Workshop. The purpose of the meeting was to provide an overview of hazard mitigation, plan progress to date (including risk assessment and public survey results), review jurisdiction capabilities, and update and develop mitigation actions. It began with a round-robin of introductions. Following introductions Ms. Cunningham and Mr. Slaughter presented a PowerPoint presentation covering the following items:

- Public Survey Results
- Risk Assessment Results
- Mitigation Strategy
- Schedule/Next Steps
- Breakout Groups/Plan Update Workshop

*Public Survey Results*
Mr. Slaughter presented select results from the public survey. This began with an overview of the methods used to advertise the survey and the types of devices used to complete the survey. The survey was active for approximately 3-months and received over 300 responses.

*Risk Assessment Results*
Next, the risk assessment results were presented. It was emphasized that the presented material was a high level approach compared to what could be found in the draft plan. Each hazard highlighted profile items such as previous occurrences, probability, potential impacts and losses.
Comments and suggestions were made by the planning team for follow-up.

The results of the risk assessment 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 ranking of hazards was presented and attendees were asked to review and comment on the list if anything seemed out of place with perceived risks. High ranking hazards were Winter Storm, Severe Thunderstorm (wind), Hailstorm, Hurricane and Tropical Storm, Flood Drought, and Flood.

The planning team opted to move the following hazards:
- Wildfire – move from moderate to high
- HAZMAT – move from low to moderate

Considerations of hurricane and tornado were also made but no changes were made.

*Mitigation Strategy*
Ms. Cunningham then gave an overview of the mitigation strategy, explaining that it includes goals, actions, and the action plan. First, the goals were presented for review. No changes were suggested by the planning team. Ms. Cunningham said she was send out to the larger team, via email, for their input.

Next, Ms. Cunningham explained the 4 step process needed to complete the mitigation action plan updates:

- Review and update existing actions
- Evaluate potential hazard mitigation actions
- Develop new hazard mitigation actions
- Prioritize actions

Ms. Cunningham asked the planning team to provide a status update for their existing mitigation actions including an explanation for FEMA) by May 5, 2017. She then explained a variety of actions should be considered but all actions considered did not have to be included as actions. Potential actions could come from the public (via the public survey or the public meeting), the risk assessment, or community needs. Ms. Cunningham also explained that potential actions should be evaluated based on several factors using the "STAPLEE" approach, including:

- Social concerns
- Technical feasibility
- Administrative capabilities
- Political feasibility (public support)
- Legal authority
- Economic (cost)
- Environmental issues

Ms. Cunningham explained that the mitigation action worksheet could be used to submit potential new actions. It was emphasized that action plan should be viewed as the community's wish list for any type of mitigation needs. Further, should a disaster event be declared or a community seek FEMA funding, FEMA will check to ensure the action is covered via the plan.

Lastly, actions should be prioritized as high, moderate, or low by considered the following:

- Effect on overall risk to life and property
- Ease of implementation
- Political and community support
- A general economic cost/benefit review
- Funding availability
- Continued compliance with the NFIP

*Capability Assessment*
Next, Ms. Cunningham provided an overview of the Capability Assessment. She explained that this was a FEMA requirement and meant to provide FEMA with an understanding of what capabilities are in place to implement mitigation actions. She explained that during the previous plan update, communities

answered an extensive survey about capabilities. For this update, the capabilities just need to be reviewed. The Stantec team took a first look for new plans and capabilities in place, but asked that each jurisdiction verify the information.

*Schedule/Next Steps*

Ms. Cunningham reviewed the plan schedule, loose ends, and items needed for the plan.

She emphasized that jurisdictional participation is a must for plan approval. State NCEM Planners suggested that jurisdictions with limited capability to attend meetings provide a letter making their County EMA Director their designee for the plan. The letter needs to come from a high ranking official, such as the mayor. Ms. Cunningham offered to follow-up with the state to see if an example letter is available.

CRS – Lastly, a reminder to those communities participating in the CRS program (Boone and Watauga County) need to complete the CRS survey. At the time of the meeting, the survey has been completed by Watauga County.

Ms. Cunningham and Mr. Slaughter 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 is 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 via the public survey; and (2) upon completion of a final draft Plan, but prior to official plan approval and adoption.

Each of the participating jurisdictions will hold public meetings before the final plan is officially adopted by the local governing bodies. These meetings will occur at different times once FEMA has granted conditional approval of the Plan. Adoption resolutions will be included in Appendix A.

## 2.6.1 Public Participation Survey

The High Country Region was successful in gathering citizens' 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 High Country Regional Hazard Mitigation Plan Committee to be made available for residents to complete at local public offices. The Town of Boone and Ashe County issued a press release to further advertise the survey. A link to an electronic version of the survey was also posted on county and jurisdiction websites. The online version of the survey was provided on the following websites:

- AsheMountainTimes.com
- TownofBeechmountain.com
- Gobleridge.net
- TownofBoone.net
- HighCountryPress.com
- Watauga County Social Media (Facebook)
- County Emergency Management websites for Alleghany, Ashe, Watauga and Wilkes Counties.


***Figure 2.3: Public Survey Posting***

A sample of the website posting for Beech Mountain is shown in **Figure 2.3**. All documentation of the survey can be found in Appendix D.

A total of 377 survey responses were received, which provided valuable input for the High Country Regional Hazard Mitigation Plan Committee to consider in the development of the plan update. Of note, this was nearly double from the previous planning effort. Selected survey results are presented below.

- Approximately 43 percent of survey respondents had been impacted by a disaster.
- Respondents ranked Severe Winter/Ice Storm as the highest threat to their neighborhood (43 percent), followed by Wildfire (18 percent), Severe Thunderstorms/Wind (12 percent), and Flooding (9 percent).
- Approximately 44 percent of respondents have taken actions to make their homes more resistant to hazards and 84 percent are interested in making their homes more resistant to hazards.
- 66 percent of respondents do not know what office to contact regarding reducing their risks to hazards.

A copy of the survey and a detailed summary of the survey results are provided in Appendix D.

## 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 hazard 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. |

The High Country Regional Hazard Mitigation Planning Team worked to provide an opportunity for a wide range of stakeholders, including opportunity for neighboring communities, agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, private entities, and others to be involved in the planning process.

In order to involve a wide range of stakeholders, the region went beyond in its local outreach efforts and broadly distributed the *Public Participation Survey*. These opportunities were 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. They survey was shared and publicized throughout the High Country Region and beyond.

In addition, neighboring counties were notified by email of the plan update process and invited to participate in the planning process. The email was sent to jurisdiction emergency management coordinators. A complete list of those emailed and a copy of the outreach email can be found in Appendix D.

Furthermore, the following activities demonstrate broad stakeholder involvement:

- Survey information was requested and shared with an App State Public Administration Program representative.
- Members of the planning team have the authority to regulate development through planning or code enforcement.
- A key benefit to regional planning efforts is that many neighboring communities are collaborating in the development of the plan.
- Lastly, the final draft plan was publicized on websites for stakeholder comment and review.

## 2.8 INCORPORATION OF EXISTING PLANS, STUDIES, REPORTS, AND TECHNICAL INFORMATION

Several plans and studies have been leveraged during the development of this plan. Each section references these sources which are primarily found in Section 4 through Section 7. Types of sources leveraged included:

- Local planning documents (e.g., floodplain management ordinances, land use plans)
- Local, state, federal hazard technical information (e.g., USGS Earthquake data, Hazus-MH)
- FEMA hazard mitigation plans and planning guidance

## 2.9 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 the Mitigation Action Plan found in Section 9.

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.

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# 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**.

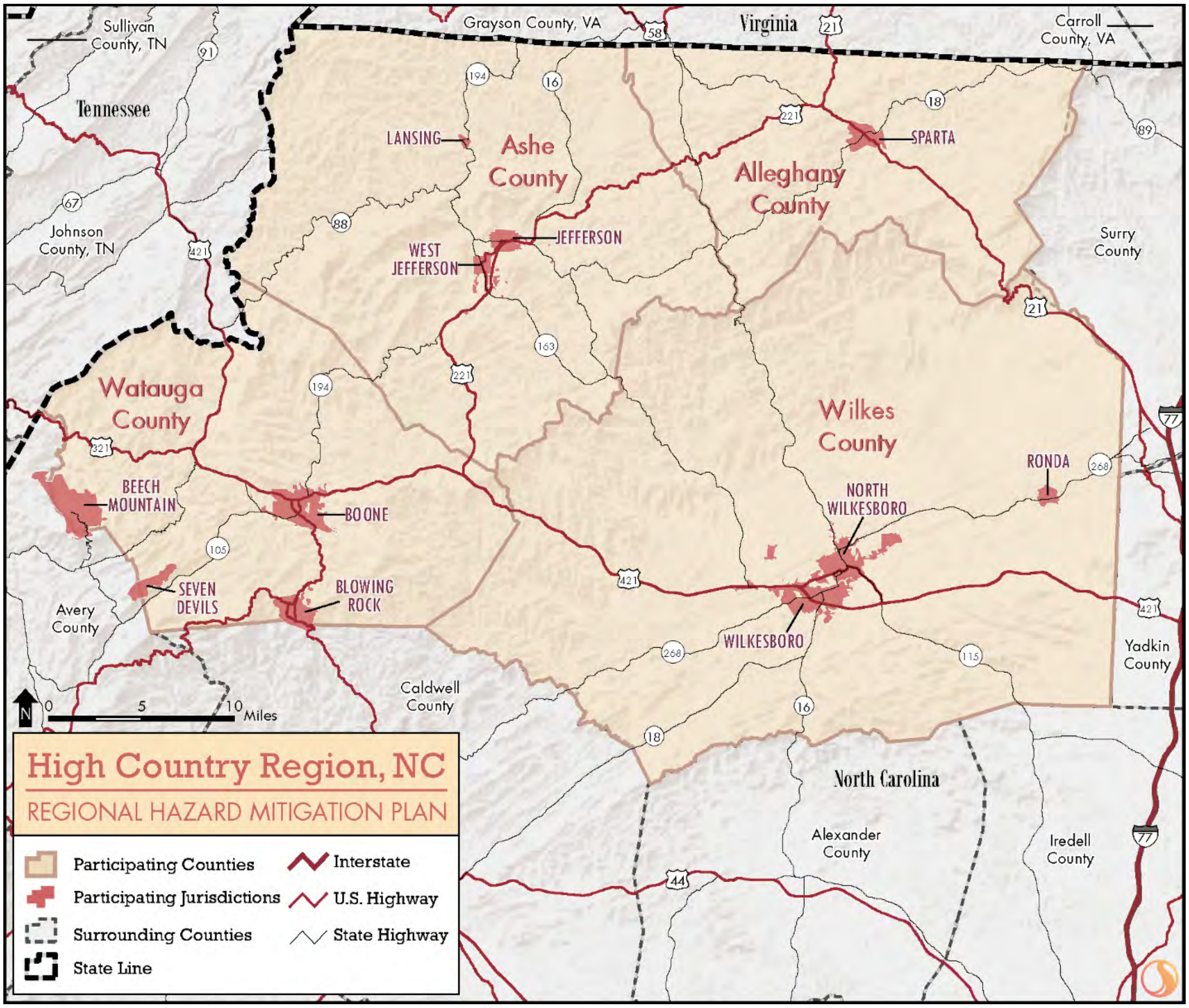
**TABLE 3.1: TOTAL AREAS OF PARTICIPATING COUNTIES**

| 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, particularly in precipitation, 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. Average temperatures vary throughout the region, largely in part due to elevation. 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 low eighties and average low temperatures are in the high fifties.[1]

**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 (nearly 70,000 persons). Comparatively, Alleghany County has about 11,000 persons (2015 American Community Survey). Between 2010 and 2015, the majority of participating jurisdictions experienced population growth, however three counties and three towns did see a decline. The Town of Beech Mountain had the highest rate of growth at 78.4 percent; however, this was just 251 persons. Unincorporated areas of Watauga County saw the highest growth in overall population with an increase of over 1,100 people. Population counts from the US Census Bureau for 1990, 2000, 2010, and 2015 for each of the participating counties and jurisdictions are presented in **Table 3.2**. The American Community Survey (ACS) was used for the 2015 population estimates.

[1] From the US Climate Data website

**TABLE 3.2: POPULATION COUNTS FOR PARTICIPATING JURISDICTIONS**

| Jurisdiction | 1990 Census Population | 2000 Census Population | 2010 Census Population | 2015 ACS Population | % Change 2010-2015 |
|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | **9,590** | **10,677** | **11,155** | **10,911** | **-2.2%** |
| Town of Sparta | 1,957 | 1,817 | 1,770 | 1,802 | 1.8% |
| **ASHE COUNTY** | **22,209** | **24,384** | **27,281** | **27,114** | **-0.6%** |
| Town of Jefferson | 1,300 | 1,422 | 1,611 | 1,374 | -14.7% |
| Town of Lansing | 171 | 151 | 158 | 194 | 22.8% |
| Town of West Jefferson | 1,002 | 1,081 | 1,299 | 1,232 | -5.2% |
| **WATAGUA COUNTY** | **36,952** | **42,695** | **51,079** | **52,240** | **2.3%** |
| Town of Beech Mountain | 239 | 310 | 320 | 571 | 78.4% |
| Town of Blowing Rock | 1,257 | 1,418 | 1,241 | 1,206 | -2.8% |
| Town of Boone | 12,915 | 13,472 | 17,122 | 17,966 | 4.5% |
| Town of Seven Devils | 117 | 129 | 192 | 240 | 25.0% |
| **WILKES COUNTY** | **59,393** | **65,632** | **69,340** | **68,946** | **-0.6%** |
| Town of North Wilkesboro | 3,384 | 4,116 | 4,245 | 4,250 | 0.1% |
| Town of Ronda | 367 | 460 | 417 | 461 | 10.6% |
| Town of Wilkesboro | 2,573 | 3,159 | 3,413 | 3,548 | 4.0% |

*Source: US Census Bureau*

Based on the 2015 American Community Survey, the median age for residents of the participating counties ranges from 29 to 48 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 Persons, Percent (2015) | Black Persons, Percent (2015) | Other Race, Percent (2015) | Persons of Hispanic Origin, Percent (2015)* |
|---|---|---|---|---|
| Alleghany County | 90.8% | 2.2% | 7.0% | 9.3% |
| Ashe County | 94.2% | 0.7% | 5.1% | 5.1% |
| Watauga County | 94.1% | 1.1% | 4.8% | 3.5% |
| Wilkes County | 91.2% | 4.5% | 4.3% | 5.8% |

*Hispanics may be of any race, so also are included in applicable race categories
*Source: US Census Bureau 2015 ACS*

## 3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

### 3.3.1 Housing

According to the 2015 American Community Survey, there are 91,323 housing units in the High Country Region, most of which are single family homes or mobile 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 based on the 2010 US Census.

**TABLE 3.4: HOUSING CHARACTERISTICS**

| Jurisdiction | Housing Units (2000) | Housing Units (2010) | Housing Units (2015) | Seasonal Units, Percent (2010) | Median Home Value (2011-2015) |
|---|---|---|---|---|---|
| Alleghany County | 6,412 | 8,094 | 8,128 | 29.5% | $146,600 |
| Ashe County | 13,268 | 17,342 | 17,441 | 24.6% | $151,500 |
| Watauga County | 23,155 | 32,137 | 32,737 | 28.0% | $231,700 |
| Wilkes County | 29,261 | 33,065 | 33,017 | 3.7% | $114,800 |

*Source: US 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 EnergyUnited and Surry-Yadkin Electric Membership Corporation.

Water and sewer service is 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. 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.

### 3.3.3 Land Use

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 Employment Security Commission (NCESC), in 2016, Alleghany County had an average annual employment of 3,290 workers. In 2016, the Education and Health Services industry employed 25.6 percent of the County's workforce followed by Manufacturing (16.7%); Leisure and Hospitality (14.5%); and Trade, Transportation, and Utilities (14.4%). In 2016, the estimated annual median wage in Alleghany County was $32,106 compared to $33,100 in the state of North Carolina.

In 2016, Ashe County had an estimated annual employment of 6,370 workers. According to the NCESC, in 2016, the Education and Health Services industry and the Trade, Transportation, and Utilities industry employed the most people, each with 26.0 percent of the workforce, followed by Manufacturing (12.1%). The estimated annual median wage in Ashe County was $27,581 in 2016.

Watauga County had an estimated annual employment of 25,080 workers in 2016. According to the NCESC, in 2016, the Education and Health Services industry employed 30.2 percent of the workforce followed by Leisure and Hospitality (19.5%) and Trade, Transportation, and Utilities (18.6%). The estimated annual median wage in Watauga County was $27,755 in 2016.

In 2016, Wilkes County had an estimated annual employment of 21,660 workers. In 2016, according to the NCESC, the Education and Health Services industry employed 21.5 percent of the workforce. Manufacturing was the second largest industry, employing 20.6 percent of workers, and followed closely behind by Trade, Transportation, and Utilities (18.9%). The estimated annual median wage in Wilkes County was $26,957.

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# Section 4

# HAZARD IDENTIFICATION

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

- 4.1 Overview
- 4.2 Description of Full Range of Hazards
- 4.3 Disaster Declarations
- 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.

During the 2010 development of this regional plan, an extensive hazard identification process was undertaken. The region reviewed hazards suggested under FEMA planning guidance, existing county-level plans, the North Carolina state plan, research of past disaster declarations in the region[1], and input from the planning team. Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources. During this update, the documented evaluation process was review and updated (Table 4.3). In addition, the list was cross-checked with the 2013 version of the North Carolina Hazard Mitigation Plan and reviewed at the kickoff meeting with planning team. No changes were made to the hazard list for the 2017 Plan.

**Table 4.1** lists the full range of natural hazards initially identified for inclusion in the Plan and provides a brief description for each. This table includes 23 individual hazards. Some of these hazards are considered to be interrelated or cascading, but for preliminary hazard identification purposes these individual hazards are broken out separately.

Next, **Table 4.2** lists the disaster declarations in the High Country Region. This is followed by **Table 4.3** which 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

[1] A complete list of disaster declarations for the High Country Region can be found below in Section 4.3.

considered, the table indicates whether 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 Planning Committee during the plan update process.

Lastly, **Table 4.4** provides a summary of the hazard identification and evaluation process noting that 15 of the 23 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with a "☑")

## 4.2 DESCRIPTION OF FULL RANGE OF HAZARDS

**TABLE 4.1: DESCRIPTIONS OF THE FULL RANGE OF INITIALLY IDENTIFIED HAZARDS**

| Hazard | Description |
|---|---|
| **ATMOSPHERIC HAZARDS** | |
| **Avalanche** | A rapid fall or slide of a large mass of snow down a mountainside. |
| **Drought** | A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality. High temperatures, high winds, and low humidity can worsen drought conditions and make areas more susceptible to wildfire. Human demands and actions have the ability to hasten or mitigate drought-related impacts on local communities. |
| **Hailstorm** | Any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant. Hail is formed when updrafts in thunderstorms carry raindrops into parts of the atmosphere where the temperatures are below freezing. |
| **Heat Wave** | A heat wave may occur when temperatures hover 10 degrees or more above the average high temperature for the region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a "dome" of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility. A heat wave combined with a drought can be very dangerous and have severe economic consequences on a community. |
| **Hurricane and Tropical Storm** | Hurricanes and tropical storms 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 with a diameter averaging 10 to 30 miles across. 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. When sustained winds reach or exceed 74 miles per hour the storm is deemed a hurricane. The primary damaging forces associated with these storms are high-level sustained winds, heavy precipitation and tornadoes. Coastal areas are also vulnerable to the additional forces of storm surge, wind-driven waves and tidal flooding which can be more destructive than cyclone wind. 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 extends from June through November. |

| | |
|---|---|
| **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 thunder. On average, 73 people are killed each year by lightning strikes in the United States. |
| **Nor'easter** | Like hurricanes, nor'easters are ocean storms capable of causing substantial damage to coastal areas in the Eastern United States due to their associated strong winds and heavy surf. Nor'easters are named for the winds that blow in from the northeast and drive the storm up the East Coast along the Gulf Stream, a band of warm water that lies off the Atlantic coast. They are caused by the interaction of the jet stream with horizontal temperature gradients and generally occur during the fall and winter months when moisture and cold air are plentiful. Nor'easters are known for dumping heavy amounts of rain and snow, producing hurricane-force winds, and creating high surf that causes severe beach erosion and coastal flooding. |
| **Tornado** | A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. Tornadoes are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size and duration of the storm. |
| **Severe Thunderstorm** | Thunderstorms are caused by air masses of varying temperatures meeting in the atmosphere. Rapidly rising warm moist air fuels the formation of thunderstorms. Thunderstorms may occur singularly, in lines, or in clusters. They can move through an area very quickly or linger for several hours. Thunderstorms may result in hail, tornadoes, or straight-line winds. Windstorms pose a threat to lives, property, and vital utilities primarily due to the effects of flying debris and can down trees and power lines. |
| **Winter Storm and Freeze** | Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life. |
| **GEOLOGIC HAZARDS** | |
| **Earthquake** | A sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the surface. This movement forces the gradual building and accumulation of energy. Eventually, strain becomes so great that the energy is abruptly released, causing the shaking at the earth's surface which we know as an earthquake. Roughly 90 percent of all earthquakes occur at the boundaries where plates meet, although it is possible for earthquakes to occur entirely within plates. 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. |

| | |
|---|---|
| **Expansive Soils** | Soils that will exhibit some degree of volume change with variations in moisture conditions. The most important properties affecting degree of volume change in a soil are clay mineralogy and the aqueous environment. Expansive soils will exhibit expansion caused by the intake of water and, conversely, will exhibit contraction when moisture is removed by drying. Generally speaking, they often appear sticky when wet, and are characterized by surface cracks when dry. Expansive soils become a problem when structures are built upon them without taking proper design precautions into account with regard to soil type. Cracking in walls and floors can be minor, or can be severe enough for the home to be structurally unsafe. |
| **Landslide** | The movements of a mass of rock, debris, or earth down a slope when the force of gravity pulling down the slope exceeds the strength of the earth materials that comprise to hold it in place. Slopes greater than 10 degrees are more likely to slide, as are slopes where the height from the top of the slope to its toe is greater than 40 feet. Slopes are also more likely to fail if vegetative cover is low and/or soil water content is high. |
| **Land Subsidence** | The gradual settling or sudden sinking of the Earth's surface due to the subsurface movement of earth materials. Causes of land subsidence include groundwater pumpage, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost. |
| **Tsunami** | A series of waves generated by an undersea disturbance such as an earthquake. The speed of a tsunami traveling away from its source can range from up to 500 miles per hour in deep water to approximately 20 to 30 miles per hour in shallower areas near coastlines. Tsunamis differ from regular ocean waves in that their currents travel from the water surface all the way down to the sea floor. Wave amplitudes in deep water are typically less than one meter; they are often barely detectable to the human eye. However, as they approach shore, they slow in shallower water, basically causing the waves from behind to effectively "pile up", and wave heights to increase dramatically. As opposed to typical waves which crash at the shoreline, tsunamis bring with them a continuously flowing 'wall of water' with the potential to cause devastating damage in coastal areas located immediately along the shore. |
| **Volcano** | A mountain that opens downward to a reservoir of molten rock below the surface of the earth. While most mountains are created by forces pushing up the earth from below, volcanoes are different in that they are built up over time by an accumulation of their own eruptive products: lava, ash flows, and airborne ash and dust. Volcanoes erupt when pressure from gases and the molten rock beneath becomes strong enough to cause an explosion. |
| **HYDROLOGIC HAZARDS** | |
| **Dam and Levee Failure** | Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. 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 severe property damage if development exists downstream of the dam. Dam failure can result from natural events, human-induced events, or a combination of the two. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as hurricanes, earthquakes or landslides are significant because there is generally little or no advance warning. |
| **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. |

| | |
|---|---|
| **Flood** | The accumulation of water within a water body which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding (where shallow flooding refers to sheet flow, ponding and urban drainage). |
| **Storm Surge** | A storm surge is a large dome of water often 50 to 100 miles wide and rising anywhere from four to five feet in a Category 1 hurricane up to more than 30 feet in a Category 5 storm. Storm surge heights and associated waves are also dependent upon the shape of the offshore continental shelf (narrow or wide) and the depth of the ocean bottom (bathymetry). A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water close to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. Storm surge arrives ahead of a storm's actual landfall and the more intense the hurricane is, the sooner the surge arrives. Storm surge can be devastating to coastal regions, causing severe beach erosion and property damage along the immediate coast. Further, water rise caused by storm surge can be very rapid, posing a serious threat to those who have not yet evacuated flood-prone areas. |
| **OTHER HAZARDS** | |
| **Hazardous Materials Incident** | 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. 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. |
| **Terror Threat** | Terrorism is defined by FEMA as, "the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom." Terrorist acts may include assassinations, kidnappings, hijackings, bomb scares and bombings, cyber attacks (computer-based), and the use of chemical, biological, nuclear and radiological weapons. |
| **Wildfire** | An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. 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 cause for wildfire is lightning. |

## 4.3 DISASTER DECLARATIONS

Disaster declarations provide initial insight into the hazards that may impact the High Country Regional planning area. Since 1973, ten presidential disaster declarations have been reported in the High Country

Region. This includes five storms related to severe storms and flooding, three storms related to hurricane and tropical events, and two storms related to winter storms events.

**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 Storms and Flooding | | X | X | X |
| 1989 | 844 | Hurricane Hugo | X | X | X | X |
| 1995 | 1073 | Severe Storms, Flooding, and High Winds | | X | X | X |
| 1996 | 1087 | Blizzard of 1996 | X | X | X | X |
| 1996 | 1103 | Winter Storm | | | X | X |
| 1998 | 1200 | Severe Storms and Flooding | | X | X | |
| 2004 | 1546 | Tropical Storm Frances | X | X | X | X |
| 2004 | 1553 | Hurricane Ivan | X | X | X | X |
| 2010 | 1871 | Severe Winter Storms and Flooding | | X | X | |
| 2013 | 4146 | Severe Storms, Flooding, Landslides, and Mudslides | X | X | X | |
| 2013 | 4153 | Severe Storms, Flooding, Landslides, and Mudslides | | X | X | X |

# 4.4 HAZARD EVALUATION

**TABLE 4.3: 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? |
|---|---|---|---|
| **ATMOSPHERIC HAZARDS** | | | |
| Avalanche | NO | • Review of US Forest Service National Avalanche Center web site<br>• Review of the NC State 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.<br>• Avalanche hazard was removed from the North Carolina State Hazard Mitigation Plan after determining the mountain elevation in Western North Carolina did have enough snow not produce this hazard. |
| Drought | YES | • Review of the NC State Hazard Mitigation Plan<br>• Review of the North Carolina Drought Monitor website | • There are reports of drought conditions in 16 out of the last 17 years in the High Country Region and "exceptional" drought levels have been reached in all of the counties, according to the NC Drought Monitor.<br>• Droughts are discussed in NC State Hazard Mitigation Plan as a lesser hazard.<br>• The NC State Hazard Mitigation Plan lists drought as a top hazard for the Mountain Region which includes the High Country counties. |
| Hailstorm | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of NOAA NCEI Storm Events Database | • Hailstorm events are discussed in the state plan under the Severe Thunderstorm hazard.<br>• NCEI reports 305 hailstorm events (0.75-inch size hail to 4 inches) for the High Country Region between 1980 and 2016. For these events there was |

| 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? |
|---|---|---|---|
| | | | almost $764,000 (2017 dollars) in property damages and $111,000 is crop damages, but no deaths or injuries. |
| Heat Wave | NO | • Review of NOAA NCEI Storm Events Database<br>• Review of the North Carolina State Hazard Mitigation Plan | • NCEI does not report any extreme heat event for the High Country counties.<br>• The NC State Hazard Mitigation Plan does not include Heat Wave as a top hazard for the Mountain Region which includes the High Country counties.<br>• The NC State Hazard Mitigation Plan reports the western portion of the state as having the lowest vulnerability in the state. |
| Hurricane and Tropical Storm | YES | • Review of NC State Hazard Mitigation Plan<br>• Analysis of NOAA historical tropical cyclone tracks and National Hurricane Center Website<br>• Review of NOAA NCEI Storm Events Database<br>• Review of historical presidential disaster declarations<br>• FEMA Hazus-MH storm return periods | • Hurricane and tropical storm events are discussed in the state plan and are listed as a top hazard in the Mountain Region which includes the High Country counties.<br>• NOAA historical records indicate 31 hurricanes or tropical storms have come within 75 miles of the High Country Region since 1850.<br>• Three out of twelve disaster declarations in the High Country Region are directly related to hurricane and tropical storm events. |
| Lightning | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of NOAA NCEI Storm Events Database, NOAA lightning statistics | • Lightning events are discussed in the state plan as part of the severe thunderstorm hazard.<br>• NCEI reports 27 lightning events for the High Country Region since 1950. These events have resulted in no recorded deaths, 1 injury and $2.7 |

| 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? |
|---|---|---|---|
| | | | million (2017 dollars) in property damages. |
| Nor'easter | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of NOAA NCEI Storm Events Database | • Nor'easters are discussed in the state plan. The Mountain Region, which includes the High Country Region, has the lowest vulnerability in the state.<br>• NCEI does not report any nor'easter activity for the High Country Region. However, nor'easters may have affected the region as severe winter storms. In this case, the activity would be reported under winter storm events. |
| Tornado | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of NOAA NCEI Storm Events Database | • Tornado events are discussed in the NC State Hazard Mitigation Plan.<br>• NCEI reports 11 tornado events in High Country Region counties since 1973. These events have resulted in no recorded deaths but have caused 9 injuries and $6 million (2017 dollars) in property damage with the most severe being an EF2. |

| 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? |
|---|---|---|---|
| Severe Thunderstorm | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of NOAA NCEI Storm Events Database | • Severe thunderstorm events are discussed in the NC State Hazard Mitigation Plan. The Mountain Region, including the High Country counties, has the greatest vulnerability in the state.<br>• According to the NC State Hazard Mitigation Plan, severe thunderstorm is the top hazard the Mountain Region which includes the High Country counties.<br>• In the High Country Region, NCEI reports 229 thunderstorm events since 1950, 270 high wind events since 1996, and 11 strong wind events. These events have resulted in 5 fatalities, 6 injuries, and $6 million (2017 dollars) in property damage. |
| Winter Storm and Freeze | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of historical presidential disaster declarations.<br>• Review of NOAA NCEI Storm Events Database | • Severe winter storms, including snow storms and ice storms, are discussed in the state plan. They are listed as a top hazard in the Mountain Region which includes the High Country Region counties.<br>• NCEI reports that the High Country counties have been affected by 308 snow and ice events since 1993. These events resulted in 2 reported deaths, 1 injury and $5 million (2017 dollars) in damages.<br>• Two of the region's twelve disaster declarations were directly related to winter storm 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? |
|---|---|---|---|
| **GEOLOGIC HAZARDS** | | | |
| Earthquake | YES | • Review of NC State Hazard Mitigation Plan<br>• USGS Earthquake Hazards Program web site<br>• Review of the National Geophysical Data Center | • Earthquake events are discussed in the state plan and all of the participating counties in the High Country Region are considered to be at moderate risk to an earthquake event (except Ashe County, which ranked 7 out of 9 in the NCEM Composite Ranking).<br>• Earthquakes have occurred in 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.<br>• 35 events are known to have occurred in the region according to the National Geophysical Data Center. The greatest MMI reported was a 6.<br>• 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 4-8%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more. |

| 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? |
|---|---|---|---|
| Expansive Soils | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of USDA Soil Conservation Service's Soil Survey | • Expansive soils are identified in the state plan as a lesser hazard; however the Mountain Region does not identify expansive soils as a top hazard and the state plan<br>• According to FEMA and USDA sources, as well as the state hazard mitigation plan, the High Country Region is located in an area that has a "little to no" clay swelling potential. |
| Landslide | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of USGS Landslide Incidence and Susceptibility Hazard Map<br>• Review of the North Carolina Geological Survey database of historic landslides | • Landslide/debris flow events are discussed in the state plan, and ranked as the top hazard in the Mountain Region which includes the High Country counties. Further, the Mountain Region received the highest vulnerability score in the state.<br>• USGS landslide hazard maps indicate "high landslide incidence" (more than 15% of the area is involved in landsliding) for all counties expect Wilkes.<br>• Data provided by NCGS indicate 491 recorded landslide events in the High Country Region. |
| Land Subsidence | NO | • Review of NC State Hazard Mitigation Plan | • 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.<br>• The plan identifies the High Country counties as having a zero on the land subsidence hazard. |

| 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? |
|---|---|---|---|
| Tsunami | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of FEMA “How-to” mitigation planning guidance (Publication 386-2, “Understanding Your Risks – Identifying Hazards and Estimating Losses). | • Tsunamis are discussed in the state plan and described as a “greater” hazard for the state. However, the Mountain Region scored a zero for tsunami hazard risk.<br>• No record exists of a catastrophic Atlantic basin tsunami impacting the mid-Atlantic coast of the United States.<br>• Tsunami inundation zone maps are not available for communities located along the U.S. East Coast.<br>• 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 NC State Hazard Mitigation Plan<br>• Review of USGS Volcano Hazards Program web site | • There are no active volcanoes in North Carolina.<br>• There has not been a volcanic eruption in North Carolina in over 1 million years.<br>• No volcanoes are located near the High Country Region. |
| **HYDROLOGIC HAZARDS** | | | |
| Dam and Levee Failure | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of North Carolina Division of Land Management web site<br>• Review of U.S. Army Corps of Engineers National Inventory of Dams database | • Dam failure is discussed in the state plan as a hazard of concern for Mountain Region 2 which includes the High Country Region counties. However, the High Country counties only have moderate vulnerability compared to the rest of the state.<br>• Of the 64 dams reported on the National Inventory of Dams, 34 are high hazard (30%), (High hazard is defined as “where failure or mis- |

| 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? |
|---|---|---|---|
| | | | operation will probably cause loss of human life.") |
| Erosion | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of previous hazard mitigation plans in the High Country counties | • Riverine erosion is identified as a hazard in two of the four previous High Country county mitigation plans.<br>• Three of the four counties have previous mitigation actions addressing erosion.<br>• Coastal erosion is discussed in the state plan but only for coastal areas (there is no discussion of riverine erosion). |
| Flood | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of historical disaster declarations<br>• Review of NOAA NCEI Storm Events Database<br>• Review of FEMA's NFIP Community Status Book and Community Rating System (CRS)<br>• Review of FEMA Q3 flood data for the High Country Region counties | • The flood hazard is thoroughly discussed in the state plan.<br>• Seven out of twelve Presidential Disaster Declarations were flood-related and an additional three were hurricane or tropical storm-related which caused flooding issues.<br>• NCEI reports that High Country Region counties have been affected by 228 flood events since 1996. These events in total caused no reported deaths or injuries but caused an estimated $33.3 million (2017 dollars) in property damages.<br>• 10% of parcels the High Country Region are located in an identified floodplain (100 or 500 year).<br>• All but one municipality participate in the NFIP. One town and one county are also participants in the CRS. |
| Storm Surge | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of NOAA NCEI Storm Events Database | • Storm surge is discussed in the state plan under the hurricane hazard and indicates that the Mountain Region has zero vulnerability to storm surge.<br>• No historical events were reported by NCEI |

| 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? |
|---|---|---|---|
| | | | • Given the inland location of the High Country Region, storm surge would not affect the area. |
| **OTHER HAZARDS** | | | |
| Hazardous Materials Incident | YES | • Review of EPA Toxic Release Inventory site locations<br>• Review of USDOT PHMSA hazardous materials incidents | • There are eight toxic release inventory sites located in the High Country Region<br>• There have been 40 reported hazardous materials incidents in the region. |
| Terror Threat | NO | • Review of previous High Country county hazard mitigation plans. | • The Wilkes County Hazard Mitigation Plan included terrorism threat as a hazard but found the level of vulnerability to be low. |
| Wildfire | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of Southern Wildfire Risk Assessment (SWRA) Data<br>• Review of the NC Division of Forest Resources website | • Wildfires are discussed in the state plan as a "greater" hazard of concern.<br>• The state plan lists wildfire as a top hazard in the Mountain Region.<br>• A review of SWRA data indicates that there are areas of concern in the High Country Region.<br>• According to the North Carolina Division of Forest Resources, the High Country Region experiences an average of 109 fires each year which burn a combined 409 acres on average. Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases. |

## 4.5 HAZARD IDENTIFICATION RESULTS

**TABLE 4.4: SUMMARY RESULTS OF THE HAZARD IDENTIFICATION AND EVALUATION PROCESS**

| ATMOSPHERIC HAZARDS | GEOLOGIC HAZARDS |
|---|---|
| ☐ Avalanche | ☑ Earthquake |
| ☑ Drought | ☐ Expansive Soils |
| ☑ Hailstorm | ☑ Landslide |
| ☐ Heat Wave | ☐ Land Subsidence |
| ☑ Hurricane and Tropical Storm | ☐ Tsunami |
| ☑ Lightning | ☐ Volcano |
| ☐ Nor'easter | **HYDROLOGIC HAZARDS** |
| ☑ Tornado | ☑ Dam and Levee Failure |
| ☑ Severe Thunderstorm | ☑ Erosion |
| ☑ Winter Storm and Freeze | ☑ Flood |
| | ☐ Storm Surge |
| | **OTHER HAZARDS** |
| | ☑ Hazardous Materials Incident |
| | ☐ Terror Threat |
| | ☑ Wildfire |

☑ = Hazard considered significant enough for further evaluation in the High Country Region hazard risk assessment.

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# 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:



| **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 |

## 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 High Country Regional Hazard Mitigation Planning Committee (HCRHMPC) 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:

- **Atmospheric**
  - Drought
  - Hailstorm
  - Hurricane and Tropical Storm
  - Lightning
  - Severe Thunderstorm (including straight-line winds)

- Tornado
- Winter Storm and Freeze
- **Geologic**
  - Earthquake
  - Landslide
- **Hydrologic**
  - Dam and Levee Failure
  - Erosion
  - Flood
- **Other**
  - Hazardous Materials Incident
  - Wildfire

Each hazard mentioned above is profiled separately to describe the hazard and potential impacts on the region. The profile for each hazard includes:

- ***Hazard description***: A scientific explanation of the hazard including potential magnitude (or severity) and impacts;
  - ***Location***: Geographical extent of the hazard;
  - ***Previous occurrences***: The number of previous hazard events occurring in the Town (or surrounding area). This section also details previous events including past impacts;
  - ***Extent (or magnitude)*****:** The severity of the hazard in the past and potentially severity in the future. Measures may include wind speed, wave height, or property damage, for example;
  - ***Probability of future events***: The likelihood of future events impacting the region. Given that an exact probability is often difficult to quantify, this characteristic is categorized into ranges in accordance with the PRI described Table 5.45:
    - **Unlikely**: Less than 1% annual probability
    - **Possible**: Between 1% and 10% annual probability
    - **Likely**: Between 10+% and 90% annual probability
    - **Highly Likely**: Greater than 90% annual probability
- ***Vulnerability Assessment***: The vulnerability assessment will address conditions that may increase or decrease vulnerability such as topography, soil type, land use, and development trends will also be included.
  - ***Potential Losses***: Estimated losses will be calculated using available data and resources. Methods utilized include GIS analysis and hazard modeling where tools are available. Information such as number of structures at risk and critical facilities at risk will be analyzed.

Hazard profiles are presented in alphabetical order by hazard grouping (atmospheric, geologic, hydrologic, and other).

## 5.2 STUDY AREA

The High Country Region includes four counties: Alleghany, Ashe, Watauga, and Wilkes Counties. **Table 5.1** provides a summary table of the participating jurisdictions within each county. 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**

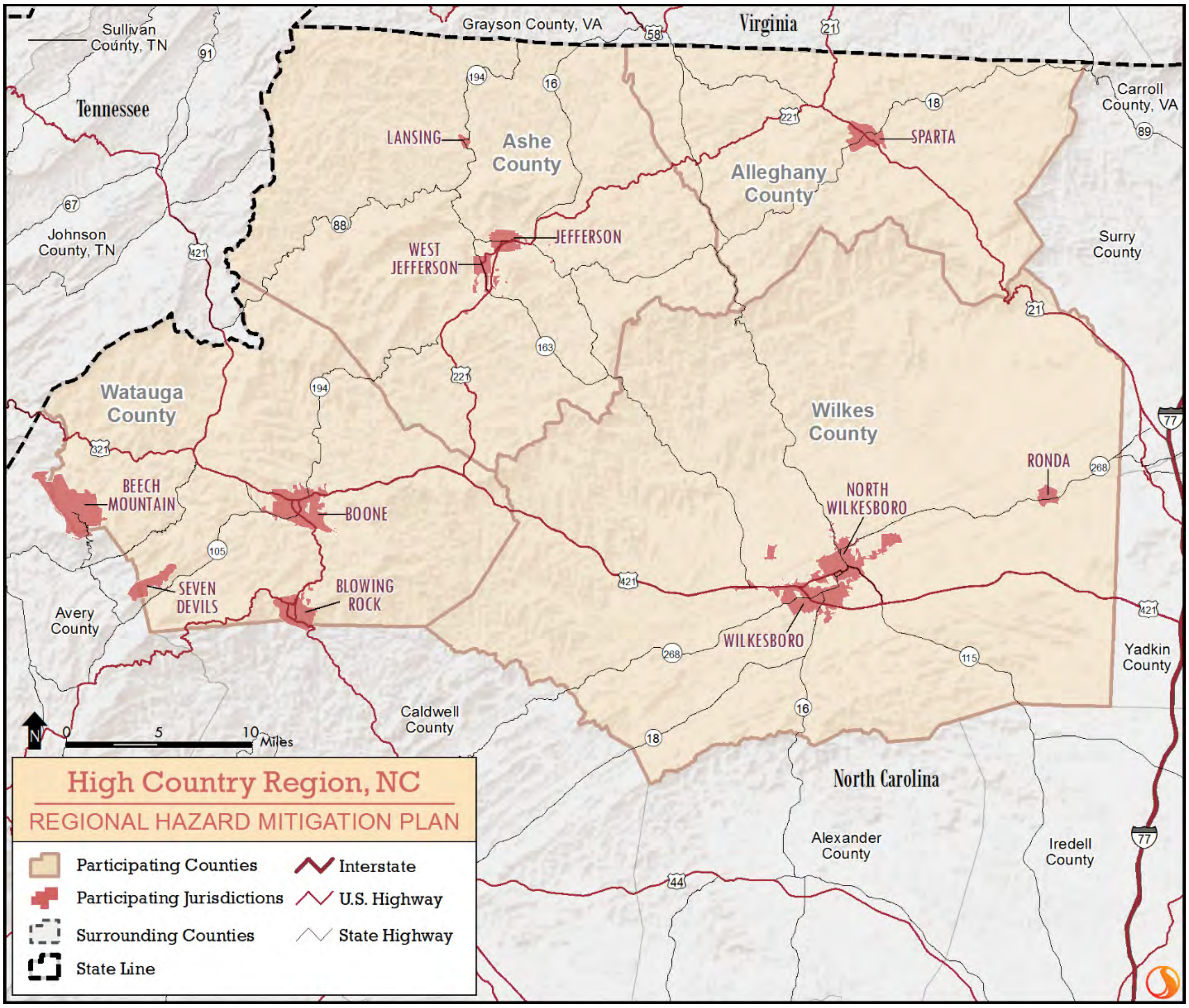



**Table 5.2** lists each significant hazard for the High Country Region and identifies whether or not it has been determined to be a specific hazard of concern for the eleven municipal jurisdictions and each of the four county's unincorporated areas. This is the based on the best available data and information 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 | Atmospheric | | | | | | | Geologic | | Hydrologic | | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Drought | Hailstorm | Hurricane and Tropical Storm | Lightning | Thunderstorm | Tornado | Winter Storm | Earthquake | Landslide | Dam and Levee Failure | Erosion | Flood | HAZMAT | Wildfire |
| **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 | • | • | • | • | • | • | • | • | • | • | • | • | • | • |

# ATMOSPHERIC HAZARDS

## 5.3 DROUGHT

### 5.3.1 Background

Drought is a normal occurrence in virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of a natural reduction in precipitation expected over an extended period, usually lasting a season or more. 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.

The National Centers for Environmental Information (NCEI) identifies drought as a "creeping phenomenon that slowly sneaks up and impacts many sectors of the economy, and operates on many different time scales."[1] Thus, droughts are classified into one of five types: 1) meteorological, 2) hydrologic, 3) agricultural, 4) socioeconomic, or 5) ecological. **Table 5.3** defines of drought types.

**TABLE 5.3 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. (Dry weather patterns dominate an area; can begin/end rapidly). |
| **Hydrologic Drought** | The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels. (Low water supply is evident; conditions take longer to develop and then recover. |
| **Agricultural Drought** | Soil moisture deficiencies relative to water demands of plant life, usually crops. (Crops significantly affected). |
| **Socioeconomic Drought** | The effect of demands for water exceeding the supply because of a weather-related supply shortfall. |
| **Ecological Drought** | A prolonged and widespread deficit in naturally available water supplies — including changes in natural and managed hydrology — that create multiple stresses across ecosystems |

*Source: NOAA National Centers for Environmental Information*[1]

Droughts can be 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 several years, the direct and indirect economic impacts can be significant.

## 5.3.2 Location

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. All areas of the planning area can be impacted by drought.

## 5.3.3 Historical Occurrences

Data from the North Carolina Drought Management Advisory Council was used to ascertain historical drought events in the High Country Region. The North Carolina Drought Management Advisory Council reports data on North Carolina drought conditions from 2000 to 2017 through the North Carolina Drought Monitor. It classifies drought conditions by county on a scale of D0 to D4:

- D0: Abnormally Dry
- D1: Moderate Drought
- D2: Severe Drought
- D3: Extreme Drought
- D4: Exceptional Drought

[1] National Centers for Environmental Information (2017). "Definition of Drought." *National Oceanic and Atmospheric Administration.* Retrieved from https://www.ncdc.noaa.gov/monitoring-references/dyk/drought-definition

According to the North Carolina Drought Monitor, at least one or more of the counties in the High Country Region has had drought occurrences sixteen of the last seventeen years (2000-2016) (**Table 5.4**). In addition, **Table 5.5** shows the most severe drought classification for each year.

**TABLE 5.4: SUMMARY OF DROUGHT OCCURRENCES IN THE HIGH COUNTRY REGION**

| LOCATION | NUMBER YEARS WITH DROUGHT OCCURRENCES |
|---|---|
| ALLEGHANY COUNTY | 15 |
| ASHE COUNTY | 16 |
| WATAUGA COUNTY | 16 |
| WILKES COUNTY | 16 |

*Source: North Carolina Drought Monitor*

**TABLE 5.5: HISTORICAL DROUGHT OCCURRENCES IN THE HIGH COUNTRY REGION**

Abnormally Dry | Moderate Drought | Severe Drought | Extreme Drought | Exceptional Drought

| | Alleghany County | Ashe County | Watauga County | Wilkes County |
|---|---|---|---|---|
| **2000** | EXTREME (up to 3 weeks) | EXTREME (up to 9 weeks) | EXTREME (up to 10 weeks) | EXTREME (up to 8 weeks) |
| **2001** | EXTREME (up to 17 weeks) | EXTREME (up to 23 weeks) | EXTREME (up to 24 weeks) | EXTREME (up to 24 weeks) |
| **2002** | EXCEPTIONAL (up to 4 weeks) | EXCEPTIONAL (up to 4 weeks) | EXCEPTIONAL (up to 4 weeks) | EXCEPTIONAL (up to 15 weeks) |
| **2003** | NORMAL (52 weeks) | NORMAL (52 weeks) | NORMAL (52 weeks) | NORMAL (52 weeks) |
| **2004** | NORMAL (52 weeks) | ABNORMAL (up to 1 week) | ABNORMAL (up to 3 week) | ABNORMAL (up to 5 week) |
| **2005** | MODERATE (up to 1 week) | MODERATE (up to 4 weeks) | MODERATE (up to 4 weeks) | MODERATE (up to 1 weeks) |
| **2006** | SEVERE (up to 1 week) | SEVERE (up to 1 week) | SEVERE (up to 1 week) | SEVERE (up to 4 weeks) |
| **2007** | EXTREME (up to 10 weeks) | EXCEPTIONAL (up to 13 weeks) | EXCEPTIONAL (up to 13 weeks) | EXCEPTIONAL (up to 3 weeks) |
| **2008** | EXTREME (up to 13 weeks) | EXCEPTIONAL (up to 2 weeks) | EXCEPTIONAL (up to 8 weeks) | EXCEPTIONAL (up to 8 weeks) |
| **2009** | MODERATE (up to 7 weeks) | MODERATE (up to 18 weeks) | MODERATE (up to 18 weeks) | MODERATE (up to 18 weeks) |
| **2010** | MODERATE (up to 11 weeks) | MODERATE (up to 14 weeks) | MODERATE (up to 15 weeks) | MODERATE (up to 12 weeks) |
| **2011** | MODERATE (up to 3 weeks) | MODERATE (up to 3 weeks) | MODERATE (up to 3 weeks) | MODERATE (up to 3 weeks) |
| **2012** | MODERATE (up to 5 weeks) | MODERATE (up to 5 weeks) | MODERATE (up to 5 weeks) | MODERATE (up to 6 weeks) |
| **2013** | MODERATE (up to 2 weeks) | ABNORMAL (up to 2 weeks) | ABNORMAL (up to 2 weeks) | MODERATE (up to 3 weeks) |
| **2014** | ABNORMAL (up to 5 weeks) | ABNORMAL (up to 18 weeks) | ABNORMAL (up to 18 weeks) | ABNORMAL (up to 14 weeks) |
| **2015** | ABNORMAL (up to 30 weeks) | ABNORMAL (up to 29 weeks) | MODERATE (up to 7 weeks) | MODERATE (up to 14 weeks) |
| **2016** | ABNORMAL (up to 10 weeks) | MODERATE (up to 10 weeks) | MODERATE (up to 12 weeks) | MODERATE (up to 7 weeks) |

*Source: North Carolina Drought Monitor*

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

### *Alleghany County*

Most 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. Previous drought occurrences have increased public awareness.

1998-2000: A four-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, the town enacted mandatory water restrictions. Farmers were forced to obtain feed from other states in wake of drought-damaged crops.

***Ashe County***

2002-2003: Voluntary water conservation measures were 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 Extent

Extent of drought can be defined in terms of the U.S. Drought Monitor classifications. Drought has ranged from “Abnormal” (D0) to “Exceptional” (D4) in the High Country Region. Each county in the planning area has experienced a state of “Exceptional” drought, the highest classification possible.

### 5.3.5 Probability of Future Occurrences

According the North Carolina Drought Monitor’s historical data, sixteen of the last seventeen years has resulted in drought in one or more counties in the High Country Region, resulting in an average annual drought occurrence rate of 94-percent for those years. Therefore, annual probability of future drought events is considered “highly likely” (greater than 90% annual probability). However, historical information also indicates that there is a much lower probability for extreme, long-lasting drought conditions.

# 5.4 HAILSTORM

## 5.4.1 Background

Hailstorms are a potentially damaging outgrowth of severe thunderstorms (thunderstorms are discussed separately in Section 5.8). 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.

Hailstone size can range a great deal in size from 5 millimeters (mm) – approximately pea-sized – to greater than 100 mm – approximately melon-sized. Hailstones are categorized using the **TOR**nado and Storm **R**esearch **O**rganization (TORRO) Hailstorm Intensity Scale (**Table 5.6**). Hailstone size descriptions are in **Table 5.7**.

**TABLE 5.6: TORRO HAILSTORM INTENSITY SCALE (IN MILLIMETERS)**

| | INTENSITY CATEGORY | TYPICAL HAIL DIAMETER | PROBABLE KINETIC ENERGY, J-M$^2$ | TYPICAL DAMAGE IMPACTS | SIZE CODE |
|---|---|---|---|---|---|
| H0 | Hard Hail | 5 | 0-20 | No damage | 1 |
| H1 | Potentially Damaging | 5-15 | >20 | Slight general damage to plants, crops | 1-3 |
| H2 | Significant | 10-20 | >100 | Significant damage to fruit, crops, vegetation | 1-4 |
| H3 | Severe | 20-30 | >300 | Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored | 2-5 |
| H4 | Severe | 25-40 | >500 | Widespread glass damage, vehicle bodywork damage | 3-6 |
| H5 | Destructive | 30-50 | >800 | Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries | 4-7 |
| H6 | Destructive | 40-60 | | Bodywork of grounded aircraft dented, brick walls pitted | 5-8 |
| H7 | Destructive | 50-75 | | Severe roof damage, risk of serious injuries | 6-9 |
| H8 | Destructive | 60-90 | | Severe damage to multiple roof types (including sheet and metal); damage aircraft bodywork | 7-10 |
| H9 | Super Hailstorms | 75-100 | | Extensive structural damage (including concrete and wooden walls). Risk of severe or even fatal injuries to persons caught in the open | 8-10 |
| H10 | Super Hailstorms | >100 | | Extensive structural damage (including destruction of wooden houses and damage to brick-built homes). Risk of severe or even fatal injuries to persons caught in the open | 9-10 |

**TABLE 5.7: TORRO HAILSTORM SIZE CODE DESCRIPTIONS**

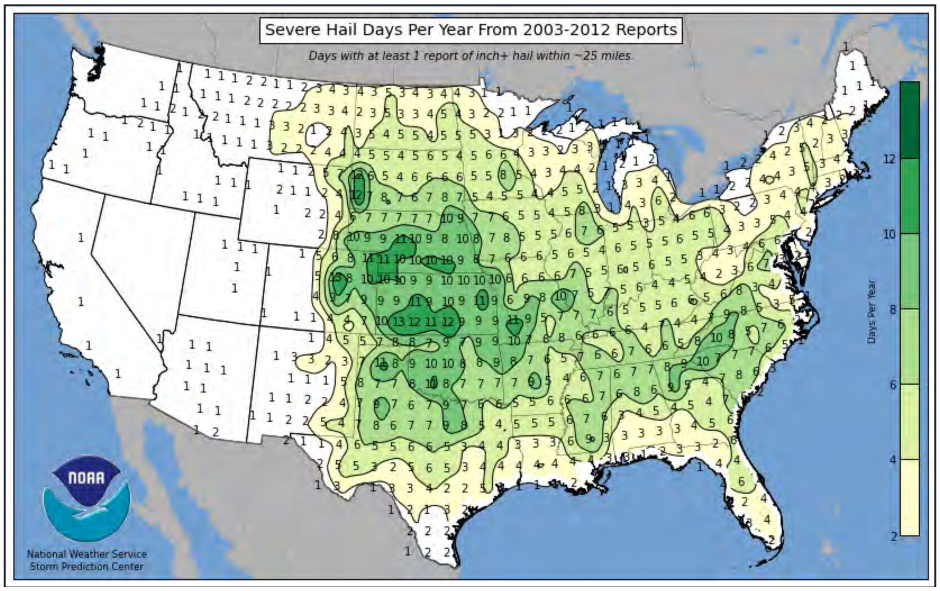
| SIZE CODES | DIAMETER | RELATIONAL SIZE |
|---|---|---|
| 0 | 5-9 | Pea |
| 1 | 9-15 | Mothball |
| 2 | 16-20 | Marble, grape |
| 3 | 21-30 | Walnut |
| 4 | 31-40 | Pigeon's egg > squash ball |
| 5 | 41-50 | Golf ball > Pullet's egg |
| 6 | 51-60 | Hen's egg |
| 7 | 61-75 | Tennis ball > cricket ball |
| 8 | 76-90 | Large orange > Soft ball |
| 9 | 91-100 | Grapefruit |
| 10 | >100 | Melon |

Hail annually causes more than $1 billion in damage to property and crops. It damages buildings and homes by perforating holes in roofs and shingles, breaking windows and denting siding, and damages automobiles by denting panels and breaking windows. Hail rarely causes any deaths; however, several dozen people are injured each year in the United States.

## 5.4.2 Location

Hailstorms frequently accompany thunderstorms, so their locations and spatial extents coincide. It is assumed the High Country Region is uniformly exposed to severe thunderstorms; therefore, all areas of the region are equally exposed to hailstorms. Additionally, according to the National Weather Service, the High Country Region is located in an area of the United States that receives an average of eight to ten days per year with hail events (see **Figure 5.2** below).

**FIGURE 5.2: UNITED STATES AVERAGE NUMBER OF DAYS PER YEAR WITH SEVERE HAIL EVENTS**




## 5.4.3 Historical Occurrences

The National Centers for Environmental Information's Storm Events Database reported 305 hail events in the High Country Region between 1980 and 2016. **Table 5.8** is a summary of the hail events in the High Country Region. **Table 5.9** provides detailed information about each event that occurred in the region. In all, hail occurrences resulted in nearly $764,000 in property damages and $111,400 in Crop Damage (2017 dollars). Hail ranged in diameter from 0.75 inches to 4 inches. **Figure 5.3** presents the location and size of hail events in the High Country Region.

**TABLE 5.8: SUMMARY OF HAIL OCCURRENCES IN THE HIGH COUNTRY REGION**

| LOCATION | NUMBER OF OCCURRENCES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|
| **ALLEGHANY COUNTY** | **46** | **$37,565** | $18,111 |
| Sparta | 4 | $36,221 | $18,111 |
| Unincorporated Area | 42 | $1,344 | $0 |
| **ASHE COUNTY** | **79** | **$11,409** | **$0** |
| Jefferson | 9 | $0 | $0 |
| Lansing | 8 | $0 | $0 |
| West Jefferson | 4 | $0 | $0 |
| Unincorporated Area | 58 | $11,409 | $0 |
| **WATAUGA COUNTY** | **68** | **$709,354** | **$0** |
| Beech Mountain | 1 | $0 | $0 |
| Blowing Rock | 12 | $0 | $0 |
| Boone | 12 | $610,152 | $0 |
| Seven Devils | 1 | $0 | $0 |
| Unincorporated Area | 52 | $99,202 | $0 |
| **WILKES COUNTY** | **112** | **$4,637** | **$93,258** |
| North Wilkesboro | 15 | $1,159 | $0 |
| Ronda | 1 | $0 | $0 |

| LOCATION | NUMBER OF OCCURRENCES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|
| Wilkesboro | 13 | $0 | $0 |
| Unincorporated Area | 83 | $3,478 | $93,258 |
| HIGH COUNTRY REGION TOTAL | 305 | $763,703 | $111,369 |

*Source: National Centers for Environmental Information*

**TABLE 5.9: HISTORICAL HAIL OCCURRENCES IN THE HIGH COUNTRY REGION**

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| | | | ALLEGHANY COUNTY | | |
| Alleghany County | 4/9/1991 | 1.00 | 0/0 | $0 | $0 |
| Ennice | 5/5/1996 | 0.88 | 0/0 | $0 | $0 |
| Laurel Springs | 5/11/1996 | 0.75 | 0/0 | $0 | $0 |
| Sparta | 5/11/1996 | 0.75 | 0/0 | $0 | $0 |
| Sparta | 5/24/1996 | 1.50 | 0/0 | $36,221 | $18,111 |
| Laurel Springs | 3/5/1997 | 0.75 | 0/0 | $0 | $0 |
| Twin Oaks | 6/2/1997 | 1.00 | 0/0 | $0 | $0 |
| Ennice | 6/10/1998 | 0.75 | 0/0 | $0 | $0 |
| Roaring Gap | 6/11/1998 | 0.88 | 0/0 | $0 | $0 |
| Laurel Springs | 8/20/1999 | 0.75 | 0/0 | $0 | $0 |
| Roaring Gap | 4/17/2002 | 0.88 | 0/0 | $0 | $0 |
| Sparta | 7/2/2002 | 0.75 | 0/0 | $0 | $0 |
| Piney Creek | 7/2/2002 | 0.75 | 0/0 | $0 | $0 |
| Sparta | 6/30/2003 | 0.75 | 0/0 | $0 | $0 |
| Ennice | 5/22/2004 | 1.00 | 0/0 | $0 | $0 |
| Piney Creek | 5/23/2004 | 0.88 | 0/0 | $0 | $0 |
| Ennice | 7/18/2004 | 0.75 | 0/0 | $0 | $0 |
| Ennice | 7/18/2004 | 0.75 | 0/0 | $0 | $0 |
| Laurel Springs | 5/14/2006 | 0.88 | 0/0 | $0 | $0 |
| Cherry Lane | 10/5/2006 | 0.75 | 0/0 | $0 | $0 |
| Ennice | 6/11/2007 | 0.75 | 0/0 | $0 | $0 |
| Ennice | 6/12/2007 | 0.88 | 0/0 | $1,344 | $0 |
| Twin Oaks | 6/29/2008 | 0.75 | 0/0 | $0 | $0 |
| Piney Creek | 8/2/2008 | 1.00 | 0/0 | $0 | $0 |
| Whitehead | 6/9/2009 | 0.75 | 0/0 | $0 | $0 |
| Glade Valley | 4/9/2011 | 0.88 | 0/0 | $0 | $0 |
| Twin Oaks | 5/11/2011 | 1.00 | 0/0 | $0 | $0 |
| Twin Oaks | 5/11/2011 | 0.75 | 0/0 | $0 | $0 |
| Piney Creek | 5/26/2011 | 1.00 | 0/0 | $0 | $0 |
| Glade Valley | 6/10/2011 | 0.88 | 0/0 | $0 | $0 |
| Roaring Gap | 6/10/2011 | 1.00 | 0/0 | $0 | $0 |
| Cherry Lane | 6/10/2011 | 0.75 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | |
| Ennice | 6/11/2011 | 1.00 | 0/0 | $0 | $0 |
| Barrett | 6/11/2011 | 1.00 | 0/0 | $0 | $0 |
| Cherry Lane | 6/11/2011 | 0.75 | 0/0 | $0 | $0 |
| Topia | 3/15/2012 | 1.00 | 0/0 | $0 | $0 |
| Whitehead | 3/23/2012 | 0.88 | 0/0 | $0 | $0 |
| Barrett | 3/24/2012 | 1.25 | 0/0 | $0 | $0 |
| Laurel Springs | 4/3/2012 | 0.75 | 0/0 | $0 | $0 |
| Barrett | 6/30/2012 | 1.00 | 0/0 | $0 | $0 |
| Roaring Gap | 7/5/2012 | 0.88 | 0/0 | $0 | $0 |
| Roaring Gap | 7/5/2012 | 0.88 | 0/0 | $0 | $0 |
| Roaring Gap | 5/22/2013 | 0.75 | 0/0 | $0 | $0 |
| Roaring Gap | 5/22/2013 | 0.75 | 0/0 | $0 | $0 |
| Piney Creek | 5/2/2016 | 1.00 | 0/0 | $0 | $0 |
| Cherry Lane | 5/2/2016 | 1.00 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | |
| Ashe County | 3/26/1988 | 0.75 | 0/0 | $0 | $0 |
| Fleetwood | 6/16/1995 | 0.88 | 0/0 | $0 | $0 |
| West Jefferson | 4/29/1996 | 0.75 | 0/0 | $0 | $0 |
| West Jefferson | 4/29/1996 | 1.00 | 0/0 | $0 | $0 |
| Lansing | 5/5/1996 | 0.88 | 0/0 | $0 | $0 |
| Jefferson | 5/11/1996 | 0.75 | 0/0 | $0 | $0 |
| Jefferson | 5/24/1996 | 0.75 | 0/0 | $0 | $0 |
| Glendale Springs | 6/2/1997 | 0.75 | 0/0 | $0 | $0 |
| Glendale Springs | 6/2/1997 | 0.75 | 0/0 | $0 | $0 |
| Glendale Springs | 6/2/1997 | 0.75 | 0/0 | $0 | $0 |
| Idlewood | 7/9/1997 | 1.75 | 0/0 | $3,541 | $0 |
| Warrensville | 5/20/1998 | 0.88 | 0/0 | $0 | $0 |
| Lansing | 6/3/1998 | 1.00 | 0/0 | $0 | $0 |
| West Jefferson | 6/10/1998 | 1.50 | 0/0 | $0 | $0 |
| Grassy Creek | 4/23/1999 | 0.75 | 0/0 | $0 | $0 |
| Lansing | 5/7/1999 | 0.75 | 0/0 | $0 | $0 |
| Baldwin | 7/7/1999 | 0.75 | 0/0 | $0 | $0 |
| Jefferson | 8/20/1999 | 0.75 | 0/0 | $0 | $0 |
| Jefferson | 6/25/2001 | 1.50 | 0/0 | $0 | $0 |
| Todd | 4/28/2002 | 0.88 | 0/0 | $0 | $0 |
| Trout | 4/28/2002 | 0.88 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | |
| Warrensville | 5/2/2003 | 1.00 | 0/0 | $0 | $0 |
| Jefferson | 5/14/2006 | 1.00 | 0/0 | $0 | $0 |
| Wagoner | 5/14/2006 | 0.75 | 0/0 | $0 | $0 |
| Idlewild | 5/14/2006 | 0.75 | 0/0 | $0 | $0 |
| Nella | 9/28/2006 | 0.88 | 0/0 | $0 | $0 |
| Lansing | 3/28/2007 | 1.75 | 0/0 | $0 | $0 |
| Lansing | 3/28/2007 | 0.88 | 0/0 | $0 | $0 |
| Baldwin | 6/24/2007 | 0.75 | 0/0 | $1,344 | $0 |
| Jefferson | 7/23/2007 | 0.75 | 0/0 | $0 | $0 |
| Lansing | 7/23/2007 | 0.75 | 0/0 | $0 | $0 |
| Ashland | 8/23/2007 | 0.88 | 0/0 | $0 | $0 |
| Jefferson | 8/24/2007 | 1.00 | 0/0 | $0 | $0 |
| Glendale Springs | 6/7/2008 | 0.75 | 0/0 | $0 | $0 |
| Glendale Springs | 6/22/2008 | 1.75 | 0/0 | $6,524 | $0 |
| Glendale Springs | 6/22/2008 | 0.88 | 0/0 | $0 | $0 |
| Glendale Springs | 6/22/2008 | 0.75 | 0/0 | $0 | $0 |
| Apple Grove | 6/22/2008 | 0.88 | 0/0 | $0 | $0 |
| Lansing | 7/21/2008 | 0.75 | 0/0 | $0 | $0 |
| Clifton | 7/22/2008 | 0.75 | 0/0 | $0 | $0 |
| Jefferson | 8/2/2008 | 0.88 | 0/0 | $0 | $0 |
| Scottville | 6/2/2009 | 1.00 | 0/0 | $0 | $0 |
| Crumpler | 6/2/2009 | 0.88 | 0/0 | $0 | $0 |
| Nathans Creek | 6/2/2009 | 0.75 | 0/0 | $0 | $0 |
| Flatwood | 6/3/2009 | 0.75 | 0/0 | $0 | $0 |
| Jefferson | 6/9/2009 | 0.88 | 0/0 | $0 | $0 |
| Glendale Springs | 6/17/2009 | 0.75 | 0/0 | $0 | $0 |
| Todd | 8/5/2009 | 0.75 | 0/0 | $0 | $0 |
| Fleetwood | 2/28/2011 | 0.75 | 0/0 | $0 | $0 |
| Lansing | 4/4/2011 | 1.00 | 0/0 | $0 | $0 |
| Tuckerdale | 4/9/2011 | 0.88 | 0/0 | $0 | $0 |
| Todd | 4/9/2011 | 0.75 | 0/0 | $0 | $0 |
| Fleetwood | 4/9/2011 | 1.75 | 0/0 | $0 | $0 |
| Scottville | 5/3/2011 | 0.75 | 0/0 | $0 | $0 |
| Glendale Springs | 5/3/2011 | 1.75 | 0/0 | $0 | $0 |
| Crumpler | 5/11/2011 | 1.00 | 0/0 | $0 | $0 |
| Bina | 5/11/2011 | 1.00 | 0/0 | $0 | $0 |
| Todd | 5/22/2011 | 1.75 | 0/0 | $0 | $0 |
| Todd | 5/22/2011 | 1.00 | 0/0 | $0 | $0 |
| Fleetwood | 5/24/2011 | 0.75 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| | | | **ASHE COUNTY** | | |
| Glendale Springs | 5/24/2011 | 2.00 | 0/0 | $0 | $0 |
| Trout | 6/5/2011 | 0.88 | 0/0 | $0 | $0 |
| Ashland | 6/8/2011 | 0.75 | 0/0 | $0 | $0 |
| Ashland | 6/8/2011 | 0.88 | 0/0 | $0 | $0 |
| Ashland | 6/8/2011 | 0.88 | 0/0 | $0 | $0 |
| Fleetwood | 6/10/2011 | 0.75 | 0/0 | $0 | $0 |
| Creston | 6/21/2011 | 1.00 | 0/0 | $0 | $0 |
| Creston | 7/3/2011 | 1.00 | 0/0 | $0 | $0 |
| Toliver | 7/4/2011 | 1.00 | 0/0 | $0 | $0 |
| Fig | 3/31/2012 | 1.00 | 0/0 | $0 | $0 |
| Warrensville | 5/3/2012 | 0.88 | 0/0 | $0 | $0 |
| Wagoner | 8/1/2012 | 1.00 | 0/0 | $0 | $0 |
| Trout | 5/22/2013 | 1.00 | 0/0 | $0 | $0 |
| Trout | 4/9/2015 | 0.88 | 0/0 | $0 | $0 |
| Bina | 4/20/2015 | 1.00 | 0/0 | $0 | $0 |
| West Jefferson | 6/26/2015 | 0.88 | 0/0 | $0 | $0 |
| Baldwin | 6/26/2015 | 1.00 | 0/0 | $0 | $0 |
| Toliver | 9/4/2015 | 1.00 | 0/0 | $0 | $0 |
| Hemlock | 5/2/2016 | 1.00 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| | | | **WATAUGA COUNTY** | | |
| Watauga County | 5/6/1984 | 1.75 | 0/0 | $0 | $0 |
| Watauga County | 5/6/1984 | 1.75 | 0/0 | $0 | $0 |
| Sugar Grove | 5/13/1995 | 0.75 | 0/0 | $0 | $0 |
| Boone | 5/13/1995 | 0.88 | 0/0 | $0 | $0 |
| Blowing Rock | 5/13/1995 | 1.10 | 0/0 | $0 | $0 |
| Blowing Rock | 5/13/1995 | 0.88 | 0/0 | $0 | $0 |
| Boone | 6/9/1995 | 0.88 | 0/0 | $0 | $0 |
| Blowing Rock | 6/16/1995 | 0.75 | 0/0 | $0 | $0 |
| Beech Mountain | 6/17/1995 | 0.88 | 0/0 | $0 | $0 |
| Seven Devils | 6/17/1995 | 0.75 | 0/0 | $0 | $0 |
| Boone | 5/5/1996 | 1.00 | 0/0 | $0 | $0 |
| Deep Gap | 3/5/1997 | 0.75 | 0/0 | $0 | $0 |
| Blowing Rock | 5/3/1998 | 0.75 | 0/0 | $0 | $0 |
| Blowing Rock | 5/7/1998 | 1.00 | 0/0 | $0 | $0 |
| Boone | 6/2/1998 | 4.00 | 0/0 | $610,152 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | |
| Boone | 6/3/1998 | 3.00 | 0/0 | $0 | $0 |
| Meat Camp | 6/3/1998 | 3.00 | 0/0 | $0 | $0 |
| Boone | 6/3/1998 | 1.75 | 0/0 | $0 | $0 |
| Zionville | 4/28/2002 | 0.75 | 0/0 | $0 | $0 |
| Valle Crucis | 6/4/2002 | 0.75 | 0/0 | $0 | $0 |
| Deep Gap | 7/3/2002 | 0.88 | 0/0 | $0 | $0 |
| Boone | 4/30/2003 | 0.75 | 0/0 | $0 | $0 |
| Zionville | 5/2/2003 | 0.75 | 0/0 | $0 | $0 |
| Blowing Rock | 5/15/2003 | 1.25 | 0/0 | $0 | $0 |
| Blowing Rock | 6/30/2003 | 0.88 | 0/0 | $0 | $0 |
| Valle Crucis | 8/3/2005 | 1.75 | 0/0 | $0 | $0 |
| Zionville | 5/14/2006 | 0.75 | 0/0 | $0 | $0 |
| Boone | 5/14/2006 | 1.00 | 0/0 | $0 | $0 |
| Todd | 7/19/2006 | 1.00 | 0/0 | $0 | $0 |
| Sands | 7/19/2006 | 0.75 | 0/0 | $0 | $0 |
| Lovill | 7/21/2006 | 0.75 | 0/0 | $0 | $0 |
| Silverstone | 6/24/2007 | 0.75 | 0/0 | $1,344 | $0 |
| Matney | 7/27/2007 | 1.00 | 0/0 | $0 | $0 |
| Boone | 5/11/2008 | 0.88 | 0/0 | $0 | $0 |
| Valle Crucis | 6/9/2008 | 1.00 | 0/0 | $0 | $0 |
| Rominger | 6/9/2008 | 0.88 | 0/0 | $0 | $0 |
| Kellersville | 6/9/2008 | 1.00 | 0/0 | $0 | $0 |
| Kellersville | 6/9/2008 | 2.75 | 0/0 | $97,858 | $0 |
| Boone | 6/2/2009 | 0.88 | 0/0 | $0 | $0 |
| Foscoe | 6/3/2009 | 0.75 | 0/0 | $0 | $0 |
| Foscoe | 6/18/2009 | 0.75 | 0/0 | $0 | $0 |
| Perkinsville | 5/14/2010 | 1.00 | 0/0 | $0 | $0 |
| Boone | 3/23/2011 | 1.00 | 0/0 | $0 | $0 |
| Kellersville | 5/13/2011 | 0.88 | 0/0 | $0 | $0 |
| Kellersville | 5/13/2011 | 1.00 | 0/0 | $0 | $0 |
| Soda Hill | 5/22/2011 | 1.75 | 0/0 | $0 | $0 |
| Boone | 5/24/2011 | 1.00 | 0/0 | $0 | $0 |
| Perkinsville | 5/24/2011 | 1.00 | 0/0 | $0 | $0 |
| Blowing Rock | 5/26/2011 | 1.75 | 0/0 | $0 | $0 |
| Bamboo | 5/26/2011 | 0.88 | 0/0 | $0 | $0 |
| Blowing Rock | 6/9/2011 | 1.00 | 0/0 | $0 | $0 |
| Blowing Rock | 6/12/2011 | 0.88 | 0/0 | $0 | $0 |
| Deep Gap | 6/21/2011 | 1.00 | 0/0 | $0 | $0 |
| Perkinsville | 6/21/2011 | 1.00 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | |
| Perkinsville | 6/28/2011 | 1.00 | 0/0 | $0 | $0 |
| Valle Crucis | 7/3/2011 | 1.25 | 0/0 | $0 | $0 |
| Foscoe | 3/15/2012 | 0.88 | 0/0 | $0 | $0 |
| Foscoe | 3/15/2012 | 0.75 | 0/0 | $0 | $0 |
| Foscoe | 3/15/2012 | 0.88 | 0/0 | $0 | $0 |
| Sugar Grove | 4/30/2012 | 1.00 | 0/0 | $0 | $0 |
| Blowing Rock | 6/30/2012 | 1.50 | 0/0 | $0 | $0 |
| Blowing Rock | 5/21/2013 | 1.00 | 0/0 | $0 | $0 |
| Foscoe | 5/21/2013 | 1.00 | 0/0 | $0 | $0 |
| Todd | 4/9/2015 | 0.75 | 0/0 | $0 | $0 |
| Mabel | 4/9/2015 | 1.00 | 0/0 | $0 | $0 |
| Matney | 4/20/2015 | 0.88 | 0/0 | $0 | $0 |
| Bowers Gap | 5/11/2015 | 1.00 | 0/0 | $0 | $0 |
| Rominger | 5/2/2016 | 1.00 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| Wilkes County | 4/14/1984 | 1.75 | 0/0 | $0 | $0 |
| Wilkes County | 4/14/1984 | 1.00 | 0/0 | $0 | $0 |
| Wilkes County | 4/14/1984 | 1.00 | 0/0 | $0 | $0 |
| Wilkes County | 5/22/1985 | 1.00 | 0/0 | $0 | $0 |
| Wilkes County | 7/10/1985 | 1.00 | 0/0 | $0 | $0 |
| Wilkes County | 5/20/1986 | 2.00 | 0/0 | $0 | $0 |
| Wilkes County | 3/26/1988 | 0.75 | 0/0 | $0 | $0 |
| Wilkes County | 5/10/1988 | 0.75 | 0/0 | $0 | $0 |
| Wilkes County | 9/24/1988 | 1.75 | 0/0 | $0 | $0 |
| Wilkes County | 3/15/1989 | 0.75 | 0/0 | $0 | $0 |
| Wilkes County | 5/1/1990 | 1.50 | 0/0 | $0 | $0 |
| Wilkes County | 4/16/1992 | 0.75 | 0/0 | $0 | $0 |
| North Wilkesboro | 8/19/1994 | 1.25 | 0/0 | $0 | $0 |
| To 5 | 6/16/1995 | 0.88 | 0/0 | $0 | $93,258 |
| McGrady | 7/5/1995 | 0.75 | 0/0 | $0 | $0 |
| Austin | 5/5/1996 | 0.75 | 0/0 | $0 | $0 |
| Purlear | 5/5/1996 | 1.25 | 0/0 | $0 | $0 |
| Millers Creek | 5/5/1996 | 0.88 | 0/0 | $0 | $0 |
| Wilkesboro | 5/24/1996 | 1.75 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| Wilkesboro | 5/27/1996 | 0.75 | 0/0 | $0 | $0 |
| Ferguson | 6/2/1997 | 0.75 | 0/0 | $0 | $0 |
| Ferguson | 5/7/1998 | 1.75 | 0/0 | $0 | $0 |
| Moravian Falls | 5/7/1998 | 1.75 | 0/0 | $0 | $0 |
| Roaring River | 5/25/1998 | 1.50 | 0/0 | $0 | $0 |
| Wilkesboro | 5/27/1998 | 1.00 | 0/0 | $0 | $0 |
| Wilkesboro | 6/3/1998 | 0.88 | 0/0 | $0 | $0 |
| Moravian Falls | 6/3/1998 | 1.00 | 0/0 | $0 | $0 |
| Wilkesboro | 6/10/1998 | 0.75 | 0/0 | $0 | $0 |
| North Wilkesboro | 8/26/1999 | 1.25 | 0/0 | $0 | $0 |
| Wilkesboro | 8/26/1999 | 1.00 | 0/0 | $0 | $0 |
| Roaring River | 5/13/2000 | 1.75 | 0/0 | $0 | $0 |
| Roaring River | 5/13/2000 | 1.00 | 0/0 | $0 | $0 |
| Wilkesboro | 5/27/2000 | 0.75 | 0/0 | $0 | $0 |
| Wilkesboro | 6/26/2001 | 0.75 | 0/0 | $0 | $0 |
| Hays | 4/17/2002 | 0.88 | 0/0 | $0 | $0 |
| Wilkesboro | 4/28/2002 | 1.25 | 0/0 | $0 | $0 |
| McGrady | 7/2/2002 | 0.75 | 0/0 | $0 | $0 |
| North Wilkesboro | 5/3/2003 | 0.75 | 0/0 | $0 | $0 |
| Mulberry | 5/3/2003 | 0.75 | 0/0 | $0 | $0 |
| Wilkesboro | 5/3/2003 | 0.88 | 0/0 | $0 | $0 |
| North Wilkesboro | 5/3/2003 | 0.88 | 0/0 | $0 | $0 |
| Wilkesboro | 7/5/2003 | 0.88 | 0/0 | $0 | $0 |
| Roaring River | 7/18/2003 | 0.88 | 0/0 | $0 | $0 |
| Millers Creek | 5/8/2004 | 0.75 | 0/0 | $0 | $0 |
| North Wilkesboro | 3/23/2005 | 1.00 | 0/0 | $0 | $0 |
| North Wilkesboro | 7/2/2005 | 0.75 | 0/0 | $0 | $0 |
| Mcgrady | 8/5/2005 | 0.75 | 0/0 | $0 | $0 |
| Wilbar | 5/14/2006 | 0.75 | 0/0 | $0 | $0 |
| Mulberry | 9/10/2006 | 0.75 | 0/0 | $0 | $0 |
| North Wilkesboro | 9/28/2006 | 0.75 | 0/0 | $0 | $0 |
| Elkville | 4/15/2007 | 0.88 | 0/0 | $0 | $0 |
| Elkville | 6/11/2007 | 0.75 | 0/0 | $0 | $0 |
| Millers Creek | 6/24/2007 | 0.75 | 0/0 | $0 | $0 |
| Moravian Falls | 6/24/2007 | 0.75 | 0/0 | $0 | $0 |
| North Wilkesboro | 6/28/2007 | 0.75 | 0/0 | $1,344 | $0 |
| Benham | 6/28/2007 | 1.00 | 0/0 | $4,032 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| Moravian Falls | 8/24/2007 | 1.00 | 0/0 | $0 | $0 |
| Ronda | 5/8/2008 | 1.00 | 0/0 | $0 | $0 |
| Denny | 6/26/2008 | 0.75 | 0/0 | $0 | $0 |
| Doughton | 6/27/2008 | 0.75 | 0/0 | $0 | $0 |
| Roaring River | 7/7/2008 | 1.00 | 0/0 | $0 | $0 |
| Maple Springs | 7/7/2008 | 1.25 | 0/0 | $0 | $0 |
| North Wilkesboro | 7/7/2008 | 1.00 | 0/0 | $0 | $0 |
| Hays | 7/7/2008 | 0.75 | 0/0 | $0 | $0 |
| Hays | 7/7/2008 | 0.75 | 0/0 | $0 | $0 |
| Hendrix | 7/7/2008 | 1.75 | 0/0 | $0 | $0 |
| Congo | 7/7/2008 | 0.88 | 0/0 | $0 | $0 |
| Ferguson | 7/9/2008 | 0.88 | 0/0 | $0 | $0 |
| North Wilkesboro | 5/4/2009 | 0.75 | 0/0 | $0 | $0 |
| Moravian Falls | 5/29/2009 | 0.75 | 0/0 | $0 | $0 |
| North Wilkesboro | 6/9/2009 | 0.88 | 0/0 | $0 | $0 |
| Purlear | 5/14/2010 | 1.00 | 0/0 | $0 | $0 |
| Millers Creek | 5/14/2010 | 1.25 | 0/0 | $0 | $0 |
| Windy Gap | 5/14/2010 | 1.00 | 0/0 | $0 | $0 |
| Wilbar | 6/27/2010 | 1.00 | 0/0 | $0 | $0 |
| North Wilkesboro | 7/13/2010 | 0.88 | 0/0 | $0 | $0 |
| North Wilkesboro | 7/13/2010 | 1.00 | 0/0 | $0 | $0 |
| Traphill | 2/28/2011 | 0.75 | 0/0 | $0 | $0 |
| Hays | 4/9/2011 | 0.88 | 0/0 | $0 | $0 |
| Dockery | 5/13/2011 | 0.88 | 0/0 | $0 | $0 |
| Roaring River | 5/23/2011 | 1.00 | 0/0 | $0 | $0 |
| Hunting Creek | 5/23/2011 | 1.75 | 0/0 | $0 | $0 |
| Millers Creek | 5/23/2011 | 1.75 | 0/0 | $0 | $0 |
| Windy Gap | 5/23/2011 | 1.75 | 0/0 | $0 | $0 |
| Clingman | 5/23/2011 | 1.00 | 0/0 | $0 | $0 |
| North Wilkesboro | 5/23/2011 | 1.75 | 0/0 | $0 | $0 |
| North Wilkesboro | 5/23/2011 | 0.75 | 0/0 | $0 | $0 |
| Vannoy | 5/24/2011 | 1.50 | 0/0 | $0 | $0 |
| Traphill | 5/24/2011 | 1.75 | 0/0 | $0 | $0 |
| Lomax | 7/4/2011 | 1.00 | 0/0 | $0 | $0 |
| Maple Springs | 7/13/2011 | 1.00 | 0/0 | $0 | $0 |
| Denny | 7/13/2011 | 1.00 | 0/0 | $0 | $0 |
| Maple Springs | 8/18/2011 | 1.00 | 0/0 | $0 | $0 |

| LOCATION | DATE | MAGNITUDE (INCHES) | DEATH/INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | CROP DAMAGE (2017 DOLLARS) |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| Ferguson | 3/31/2012 | 1.00 | 0/0 | $0 | $0 |
| Wilkesboro | 4/30/2012 | 0.75 | 0/0 | $0 | $0 |
| Traphill | 4/30/2012 | 1.75 | 0/0 | $0 | $0 |
| Clingman | 5/1/2012 | 1.00 | 0/0 | $0 | $0 |
| Wilkes Co Airport | 5/14/2012 | 1.00 | 0/0 | $0 | $0 |
| Wilkes Co Airport | 5/14/2012 | 0.88 | 0/0 | $0 | $0 |
| Wilbar | 7/3/2012 | 1.00 | 0/0 | $0 | $0 |
| Osbornville | 7/25/2012 | 0.88 | 0/0 | $0 | $0 |
| Windy Gap | 7/25/2012 | 1.25 | 0/0 | $0 | $0 |
| Wilkesboro | 8/1/2012 | 0.75 | 0/0 | $0 | $0 |
| Hunting Creek | 5/6/2013 | 1.00 | 0/0 | $0 | $0 |
| Cricket | 5/6/2013 | 1.00 | 0/0 | $0 | $0 |
| Abshers | 5/22/2013 | 1.00 | 0/0 | $0 | $0 |
| Abshers | 6/11/2014 | 1.00 | 0/0 | $0 | $0 |
| Osbornville | 6/17/2014 | 1.00 | 0/0 | $0 | $0 |
| Wilkes Co Airport | 6/19/2014 | 1.25 | 0/0 | $0 | $0 |
| Wilkes Co Airport | 6/19/2014 | 0.88 | 0/0 | $0 | $0 |
| Elkin | 2/24/2016 | 1.00 | 0/0 | $0 | $0 |
| Roaring River | 5/12/2016 | 1.00 | 0/0 | $0 | $0 |

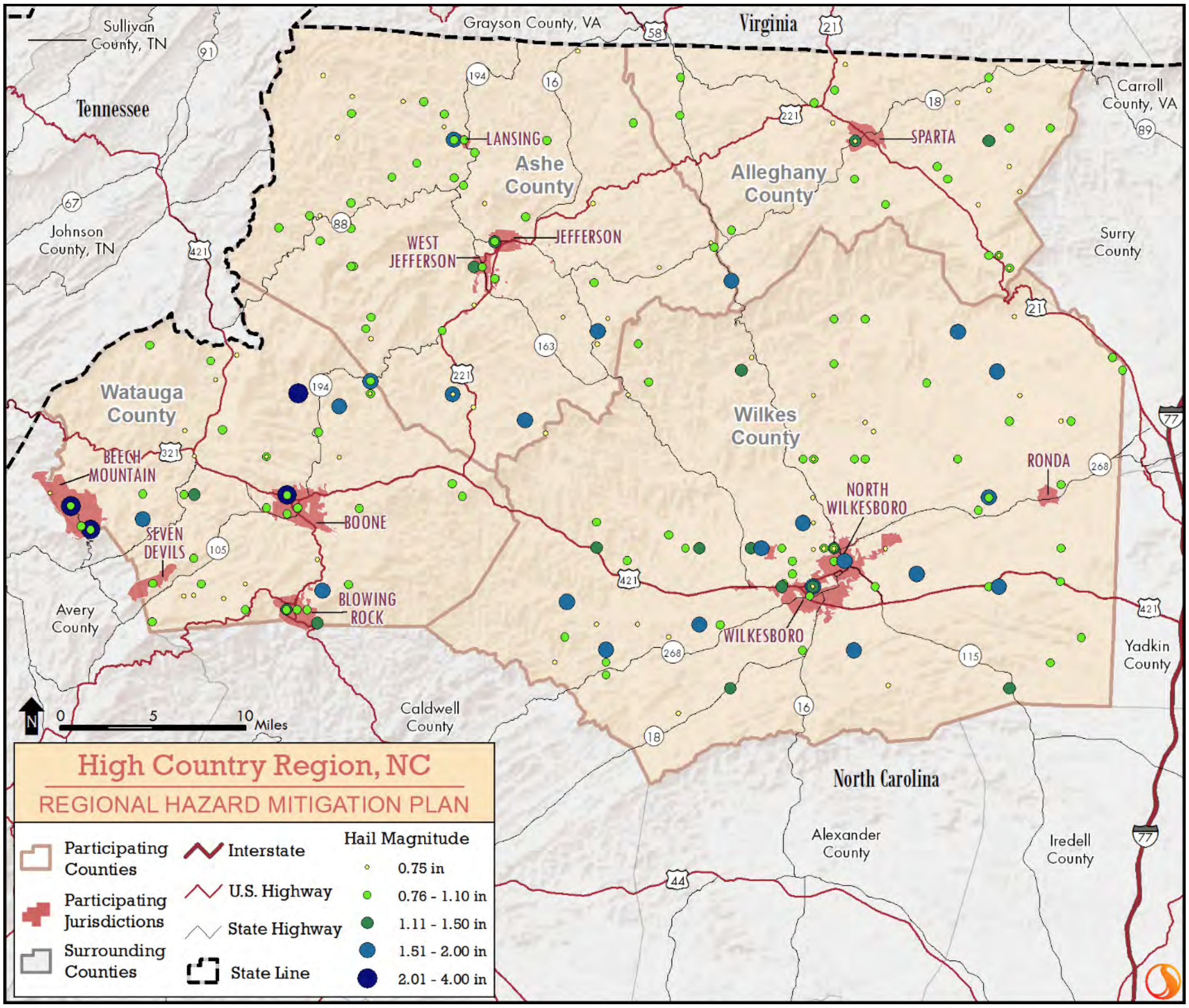
### *Boone, Watauga County – June 2, 1998*

The NCEI reported a thunderstorm in Boone that produced “softball-sized” hail (up to four inches). Hailstones from this event damaged personally owned vehicles and around 200 cars at a local dealership, resulting in damages over $610,000 (2017 dollars).

### *Watauga County – June 9, 2008*

Severe thunderstorms on June 9, 2008 near the Kellersville/Beech Mountain area in Watauga County produced “baseball-sized” hail (2.75 inches). Hail accumulated to a depth of one inch and caused damages to vehicles and other property. Damages from this event were nearly $98,000 (2017 dollars).

**FIGURE 5.3 HAIL EVENTS IN THE HIGH COUNTRY REGION**




## 5.4.4 Extent

According to the TORRO Scale, hailstones can exceed 100 mm (3.9 inches) in diameter, known as super hail. The largest hailstone reported in the High Country Region occurred on June 2, 1998 in Boone, Watauga County, measuring four inches. The next day there were two reports of hailstones 3 inches in diameter. Hailstones of these sizes can cause extensive structural damages and possibly lead to severe injuries or fatalities for persons caught in the open. Most hailstones in the region have been 1 inch or greater.

Extent can also be measured in terms of damage and human impacts (including loss of life and injuries). The greatest amount of property damage reported from a single hail event was over $610,000 (2017 dollars), which also occurred in Boone during the June 2, 1998 event. Hail events have also led to crop damage in the region, with the greatest amount of crop damage impacting tobacco crops located two to five miles southeast of Ronda (Wilkes County). Damages for this event totaled nearly $94,000. However, costlier events are possible.[2]

### 5.4.5 Probability of Future Occurrences

A total of 305 events are recorded in the NCEI's Storm Events Database between 1980 and 2016, meaning hail has occurred at an average of 8.5 events annually. Based on this information, it is assumed hail is highly likely (greater than 90% annual chance) to impact the High Country Region each year.

Since hail is an atmospheric hazard, it is assumed that the entire High Country Region has equal exposure, and thus probability, to this hazard. Future hail events can be expected to continue to cause minor damage to property and vehicles throughout the region.

## *5.5 HURRICANE AND TROPICAL STORM*

### 5.5.1 Background

Hurricanes and tropical storms 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. Most 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 5.10**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

[2] NCEI Storm Events Database

**TABLE 5.10: 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*

The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure and storm surge potential, 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 5.11** 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 5.11: HURRICANE DAMAGE CLASSIFICATIONS**

| Storm 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*

## 5.5.2 Location

Hurricanes 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 County Region. All areas in the High County Region are susceptible to hurricane and tropical storms.

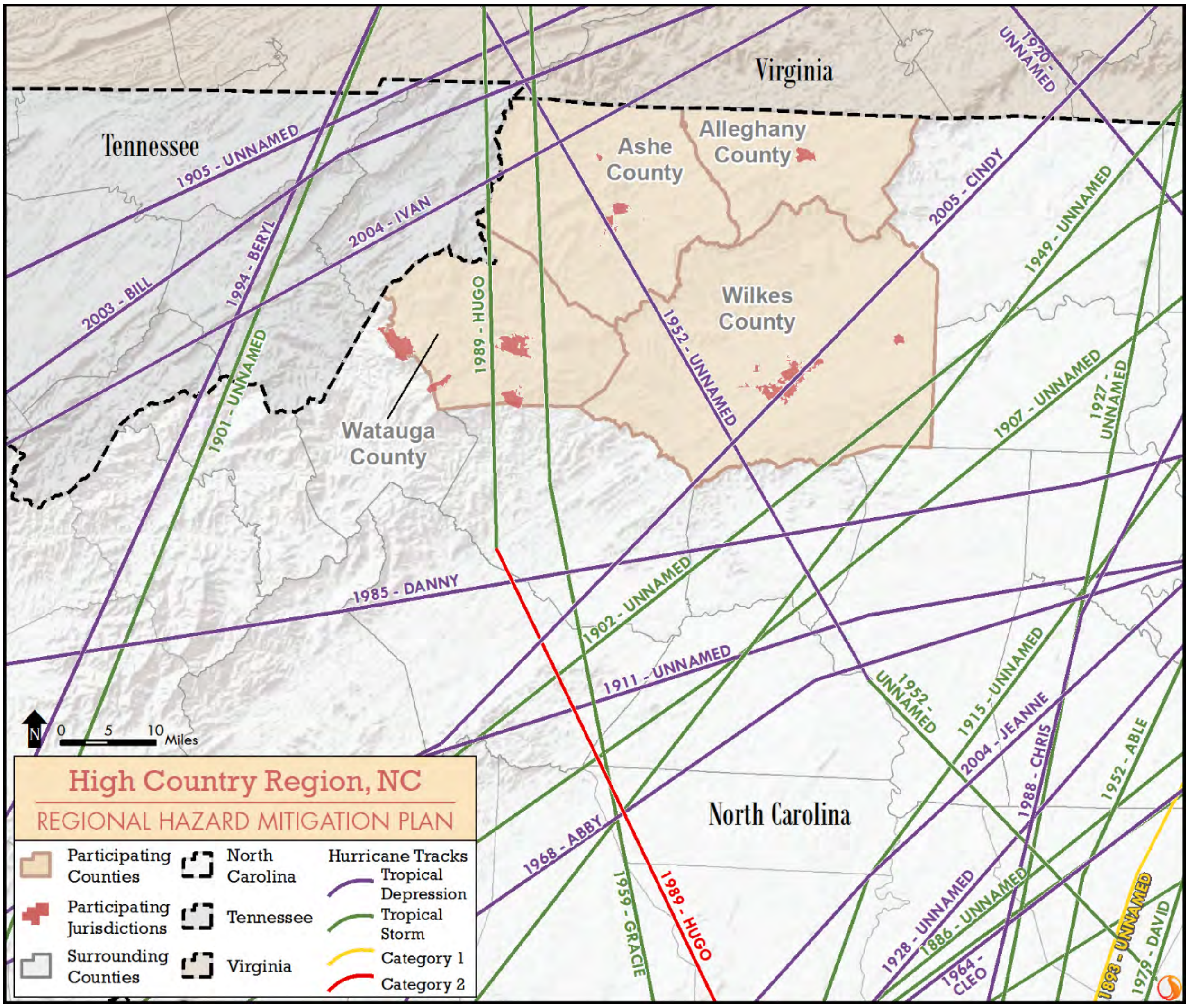
## 5.5.3 Historical Occurrences

The National Hurricane Center's historical storm track records indicate 32 hurricane or tropical storm tracks have passed within 75 miles of the High Country Region since 1850.[3] This includes: one Category 2 hurricane, one Category 1 hurricane, fourteen tropical storms, and sixteen tropical depressions. 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. The Category One storm track passed several miles east of the region in 1893.

Of the recorded storm events, five tropical storms traversed directly through the High Country Region as shown in **Figure 5.4**. **Table 5.12** 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.

[3] 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 impacts in terms of rainfall and high winds.

**FIGURE 5.4: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES OF THE HIGH COUNTRY REGION**




*Source: National Oceanic and Atmospheric Administration, National Hurricane Center*

**TABLE 5.12: HISTORICAL STORM TRACKS WITHIN 75 MILES OF THE HIGH COUNTRY REGION (1850–2015)**

| 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 |
| 6/22/1886 | Not Named | 52 | Tropical Storm |
| 9/24/1889 | Not Named | 52 | Tropical Storm |
| 8/28/1893 | Not Named | 86 | Category 1 |
| 7/8/1896 | Not Named | 35 | Tropical Depression |
| 9/4/1913 | Not Named | 35 | Tropical Depression |
| 8/3/1915 | Not Named | 40 | Tropical Storm |
| 9/23/1920 | Not Named | 40 | Tropical Depression |
| 10/3/1927 | Not Named | 46 | Tropical Storm |
| 8/16/1928 | Not Named | 29 | Tropical Depression |
| 8/14/1940 | Not Named | 29 | Tropical Depression |
| 8/29/1949 | Not Named | 46 | Tropical Storm |
| 8/31/1952 | Able | 52 | Tropical Storm |
| 8/28/1952 | Not Named | 46 | Tropical Storm |
| 9/30/1959 | Gracie | 69 | Tropical Storm |
| 8/30/1964 | Cleo | 29 | Tropical Depression |
| 6/9/1968 | Abby | 29 | Tropical Depression |
| 8/20/1969 | Camille | 29 | Tropical Depression |
| 9/5/1979 | David | 52 | Tropical Storm |
| 7/25/1985 | Bob | 52 | Tropical Storm |
| 8/18/1985 | Danny | 29 | Tropical Depression |
| 8/29/1988 | Chris | 29 | Tropical Depression |
| 9/22/1989 | Hugo | 98 | Category 2 |
| 8/17/1994 | Beryl | 17 | Tropical Depression |
| 9/5/1999 | Dennis | 29 | Tropical Depression |
| 7/2/2003 | Bill | 23 | Tropical Depression |
| 9/8/2004 | Frances | 29 | Tropical Depression |
| 9/18/2004 | Ivan | 23 | Tropical Depression |
| 9/28/2004 | Jeanne | 23 | Tropical Depression |
| 7/7/2005 | Cindy | 23 | Tropical Depression |

*Source: 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 2011. However, federal records indicate that disaster declarations were made in 1989 (Hurricane Hugo), 2004 (Tropical Storm Frances), and 2004 (Hurricane Ivan).[4] 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. However, the wind combined with a saturated ground may results in downed trees

[4] 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.

or landsliding. 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 County. Structural and non-structural damages, including those to the power distribution center, totaled over $8 million in Wilkes County.[5] Homes, businesses, industries, and agriculture suffered estimated losses of $14 million in Alleghany.

In addition, shelters were in full operation 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.

[5] Wilkes County Multi-Jurisdictional Hazard Mitigation Plan Draft. (2009). Retrieved from http://www.wilkescounty.net/wp-content/uploads/2011/10/Wilkes_CJHMP_Update_2009.pdf

*Hurricane Ivan – 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.

## 5.5.4 Extent

Extent of hurricane hazards can be defined by hurricane category and wind speed. The strongest event to directly traverse the High Country region was Hurricane Hugo a 98-mile per hour Category 2 hurricane. When Hugo passed through the region, it was classified as a tropical storm and maintained wind gusts of 80-90 miles per hour. However, due to the region's proximity to the Atlantic Coast, stronger events are possible.

## 5.5.5 Probability of Future Occurrences

A total of 31 tropical storms or hurricanes have passed within 75 miles of the High Country Region between 1851 and 2015, resulting in a historic annual rate of occurrence of 19-percent. Therefore, a probability of "likely" was assigned (between 10 and 90% annual probability).

The inland location of the region makes it more susceptible 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 remains a real threat to the High Country Region due to induced events like flooding and landsliding.

# *5.6 LIGHTNING*

## 5.6.1 Background

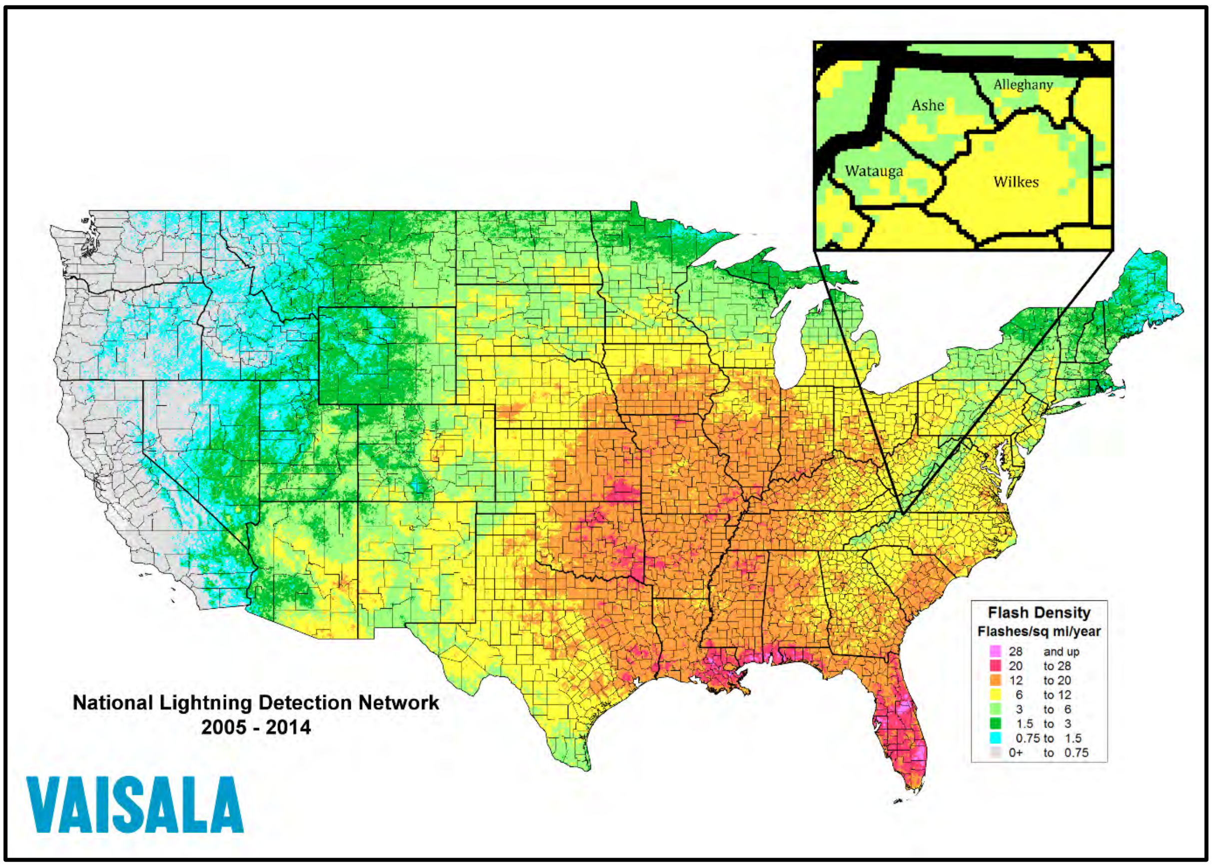
Lightning is a discharge of electrical energy resulting from the buildup of positive and negative charges within a thunderstorm, creating a "bolt" when the buildup of charges becomes strong enough. This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning 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 can also 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.

## 5.6.2 Location

Lightning occurs randomly, therefore it is impossible to predict where and with what frequency it will strike. It is assumed all the High Country Region is uniformly exposed to lightning. Vaisala, Inc.'s U.S. National Lightning Detection Network (NLDN) compiled lightning flash data from 2005 to 2014 to show lightning flash frequency per mile per year; see **Figure 5.5.** The High Country Region experiences an average of 3 to 12 flashes per square mile per year. Alleghany, Ashe, and Watauga Counties (including the jurisdictions within) appear to be on the lower end of that range (3 to 6 flashes), while Wilkes County (and the jurisdictions within) appears on the upper end (6 to 12 flashes).

**FIGURE 5.5: LIGHTNING FLASH DENSITY IN THE UNITED STATES**




*Source: Vaisala U.S. National Lightning Detection Network*

## 5.6.3 Historical Occurrences

Lightning events have been recorded in the NCEI Storm Events Database since 1996. A total of 27 lightning events were reported for the High Country Region between 1996 and 2016. These events resulted in over

$2.7 million (2017 dollars) in damages, as listed in summary **Table 5.13**. Furthermore, lightning has caused one injury in the High Country Region. Detailed information on historical lightning events can be found in **Table 5.14**.

**TABLE 5.13: SUMMARY OF LIGHTNING OCCURRENCES IN THE HIGH COUNTRY REGION**

| LOCATION | NUMBER OF OCCURRENCES | PROPERTY DAMAGE (2017 DOLLARS) |
|---|---|---|
| **Alleghany County** | **6** | **$402,378** |
| Sparta | 1 | $0 |
| Unincorporated Area | 5 | $402,378 |
| **Ashe County** | **3** | **$11,014** |
| Jefferson | 0 | $0 |
| Lansing | 0 | $0 |
| West Jefferson | 0 | $0 |
| Unincorporated Area | 3 | $11,014 |
| **Watauga County** | **7** | **$1,252,721** |
| Beech Mountain | 0 | $0 |
| Blowing Rock | 2 | $34,049 |
| Boone | 4 | $1,216,985 |
| Seven Devils | 0 | $0 |
| Unincorporated Area | 1 | $1,688 |
| **Wilkes County** | **11** | **$973,036** |
| North Wilkesboro | 0 | $0 |
| Ronda | 1 | $14,489 |
| Wilkesboro | 3 | $78,045 |
| Unincorporated Area | 7 | $951,514 |
| **HIGH COUNTRY REGION TOTAL** | **27** | **$2,710,162** |

*Source: NCEI Storm Events Database (1996 – 2016)*

**TABLE 5.14: HISTORICAL LIGHTNING OCCURRENCES IN THE HIGH COUNTRY REGION**

| LOCATION | DATE | DEATH/ INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | DETAILS |
|---|---|---|---|---|
| | | **ALLEGHANY COUNTY** | | |
| Stratford | 1/19/1996 | 0/0 | $9,055 | n/a |
| Piney Creek | 5/24/1998 | 0/0 | $1,743 | A thunderstorm during the morning hours on the 24th produced damaging lightning. A lightning strike started a small fire which damaged a home in Piney Creek. |
| Countywide | 7/7/1999 | 0/0 | $76,609 | Lightning struck and killed 12 cattle in Alleghany County and damaged a mobile home in Surry County. |
| Sparta | 5/10/2005 | 0/0 | $0 | Lightning struck a tree and caused it to fall across a road, temporarily blocking traffic. |
| Glade Valley | 5/26/2011 | 0/0 | $5,970 | Lightning struck a barn and caused a large fire. |
| Glade Valley | 8/17/2016 | 0/0 | $309,000 | Lightning struck a home on Fox Run Lane resulting in a fire which destroyed the house. Damage values are estimated. |

| LOCATION | DATE | DEATH/ INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | DETAILS |
|---|---|---|---|---|
| **ASHE COUNTY** | | | | |
| Fleetwood | 7/24/2011 | 0/0 | $1,194 | Lightning struck a building. |
| Brownwood | 7/1/2012 | 0/0 | $8,695 | Lightning caused a house fire on Gap Trail Road. |
| Glendale Springs | 7/19/2013 | 0/0 | $1,126 | Lightning struck a power pole on Glendale School Road. |

| LOCATION | DATE | DEATH/ INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | DETAILS |
|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | |
| Boone | 7/28/1996 | 0/0 | $905,534 | Lightning started a fire in a large downtown business destroying an 8,200 square foot building. Damage was estimated at $440,000. Nearby buildings sustained fire and smoke damage estimated near $70,000. |
| Blowing Rock | 7/16/1997 | 0/1 | $0 | A lightning strike during the early afternoon hours injured a golfer in Blowing Rock. |
| Boone | 3/20/1998 | 0/0 | $8,716 | Lightning damaged a house in Boone. |
| Boone | 5/13/1999 | 0/0 | $102,146 | Lightning struck a barn, causing a fire, destroying the barn, a tractor and other farm equipment. |
| Blowing Rock | 5/18/1999 | 0/0 | $34,049 | Lightning struck a house in Blowing Rock, blowing a hole in the roof, breaking water pipes, and causing damage to the rafters. |
| Boone | 6/14/2001 | 0/0 | $200,588 | Lightning struck two houses starting fires. One house was destroyed, and the second house suffered considerable damage. |
| Valle Crucis | 7/17/2013 | 0/0 | $1,688 | Lightning struck a church which sustained minor damage and a tree exploded adjacent to the church. A propane line and fuse boxes in the church were damaged. |

| LOCATION | DATE | DEATH/ INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | DETAILS |
|---|---|---|---|---|
| **WILKES COUNTY** | | | | |
| Wilkesboro | 6/19/1996 | 0/0 | $54,332 | Thunderstorms produced lightning that started a fire, destroying a home 9 miles west of Wilkesboro. |
| Ronda | 6/20/1996 | 0/0 | $14,489 | Lightning started a fire which destroyed an abandoned house 1 mile south of Ronda. |
| Wilkesboro | 6/20/1996 | 0/0 | $14,489 | A lightning strike started a fire which destroyed an abandoned house 7 miles northwest of Wilkesboro. |
| Roaring River | 9/9/1997 | 0/0 | $8,852 | Lightning started a fire that destroyed a storage building 4 miles north of Roaring River. An antique motorcycle and lawn equipment were also destroyed. |
| Hays | 6/15/2001 | 0/0 | $641,883 | Lightning struck the C&L Manufacturing company, starting a fire that destroyed the building, equipment, and inventory. |
| Hays | 6/5/2002 | 0/0 | $155,797 | Lightning struck a house 2 miles east of Hays, starting a fire, burning most of it to the ground. A truck and other equipment in the garage were also destroyed. |
| Traphill | 7/10/2003 | 0/0 | $30,252 | Lightning created a fire that destroyed a garage. |

| LOCATION | DATE | DEATH/ INJURIES | PROPERTY DAMAGE (2017 DOLLARS) | DETAILS |
|---|---|---|---|---|
| **WILKES COUNTY** | | | | |
| Parsonville | 6/4/2010 | 0/0 | $24,597 | Lightning struck a home at the Rendezvous Ridge Vineyard causing structural damage and minor water damage. |
| Wilkesboro | 7/27/2010 | 0/0 | $9,224 | Lightning struck a one-story home on Country Club Road, causing damage to insulation, wiring, and some trusses. |
| Moxley | 6/9/2011 | 0/0 | $89,554 | Lightning struck an unoccupied home, causing a fire that gutted the living room area. The rest of the home sustained smoke damage. There was minor water damage from firefighting efforts. |
| Millers Creek | 5/14/2012 | 0/0 | $580 | Lightning caused structural damage to a storage shed along Highway 16 in the Millers Creek community. |

### 5.6.4 Extent

The High Country Region receives 3 to 12 lightning flashes per square mile per year (Figure 5.5). However, not all these flashes result in lightning strikes. Lightning extent can also be measured in terms of damages and human impacts. The greatest amount of damage reported from a single event was $905,534 (2017 dollars), although costlier events are possible and likely have occurred in the past (particularly due to structure fires). One injury has been reported for this hazard in the High Country Region. Further, serious human impacts (severe injury and loss of life) caused by lightning are possible in the future.

### 5.6.5 Probability of Future Occurrences

The NCEI Storm Events Database reported 27 events between 1996 and 2016, resulting in an average of more than one event each year for the last 20 years. It is also likely the data is not inclusive of all events in the area. Lightning flashes and strikes are an annual occurrence, though all events may not result in damage. Therefore, the lightning hazard was assigned a probability of "highly likely" (greater than 90% annual chance). It can be expected that future lightning events will continue to threaten life and cause minor property damages throughout the region.

## *5.7 SEVERE THUNDERSTORM*

### 5.7.1 Background

Thunderstorms can produce a variety of accompanying hazards including wind (discussed here), hail, and lightning.[6] Although thunderstorms generally affect a small area, they are very dangerous may cause substantial property damage.

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

Three conditions must 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.

The National Weather Service reports 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.

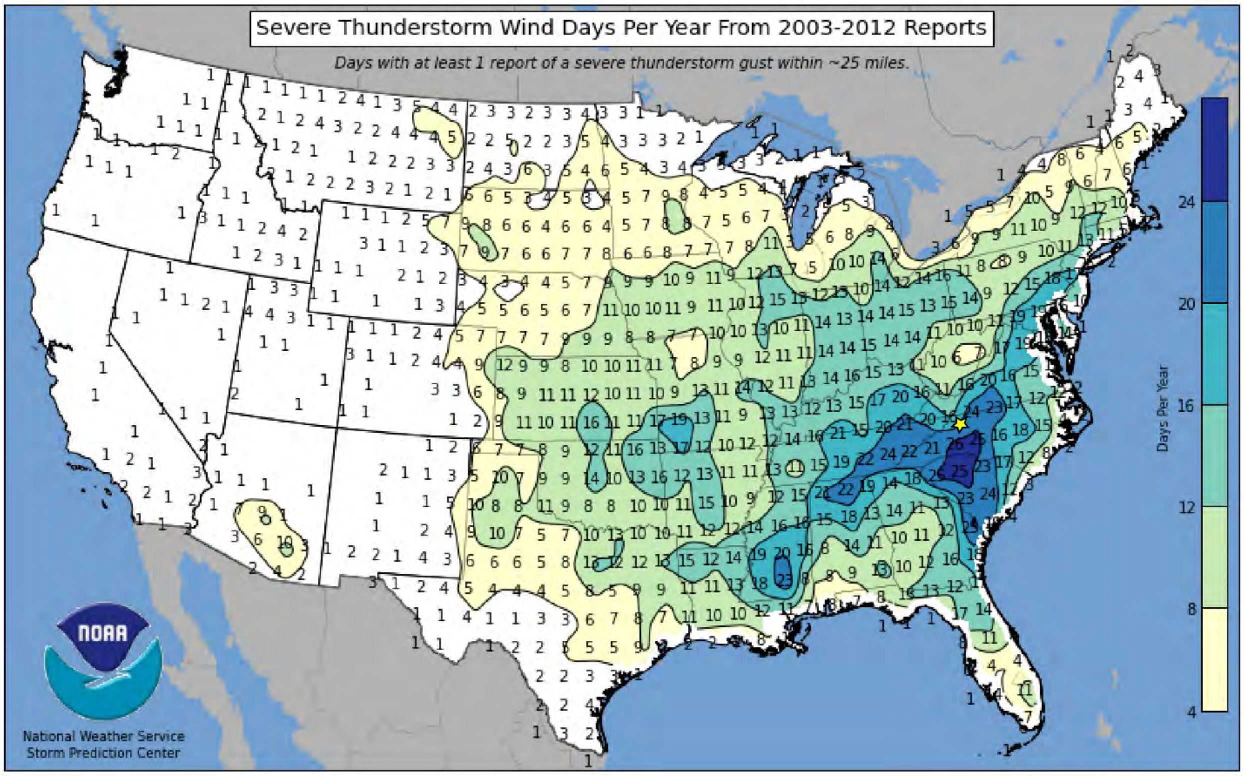
High winds can form due to pressure of the Northeast coast that combines with strong pressure moving through the Ohio Valley. This creates a tight pressure gradient across the region, resulting in high winds which increase with elevation. It is common for gusts of 30 to 60 miles per hour during the winter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

Downbursts are also possible with thunderstorm events. Such events are an extreme burst of wind exceeding 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by downward 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."

## 5.7.2 Location

A thunderstorm 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. According to the National Weather Service, there are 16 to 24 days per year where at least one severe thunderstorm gust is reported within 25 miles of the High Country Region (see **Figure. 5.6** below).

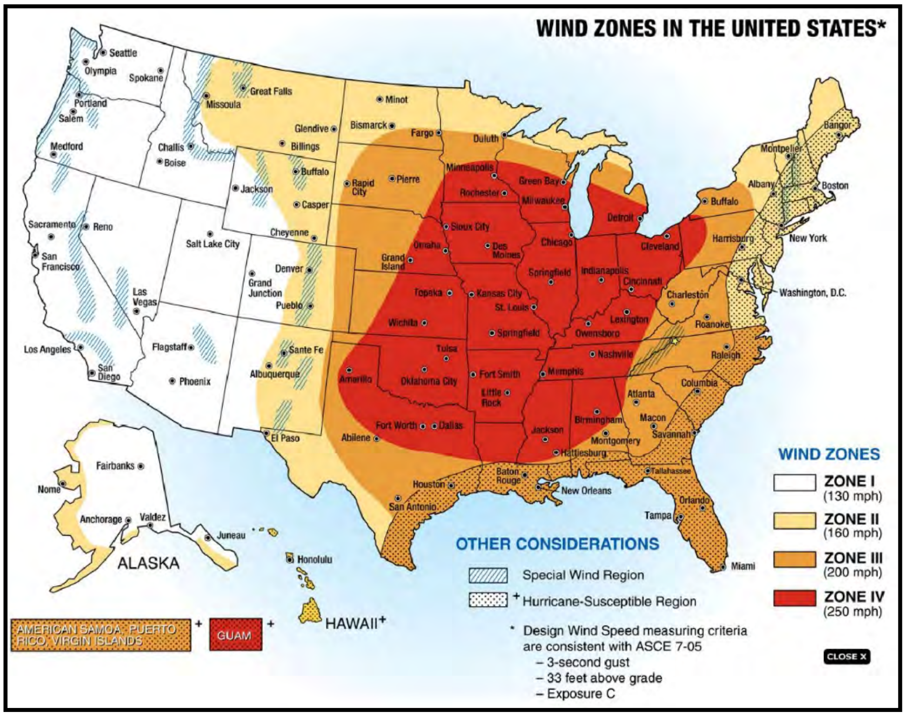
**FIGURE 5.6: UNITED STATES AVERAGE NUMBER OF DAYS PER YEAR WITH SEVERE THUNDERSTORM WIND**




The map in **Figure 5.7** from the Federal Emergency Management Agency illustrates wind zones in the United States. The High Country Region is in Wind Zone III, where velocities can reach up to 200 miles per hour (in 3-second gusts). This area is also considered a “Special Wind Region.” FEMA defines a Special Wind Region as an area where records or experience indicate basic wind speeds are higher than normal. These regions generally consist of mountainous terrain, gorges, and other special topographic features.

Also, the High Country Region typically experiences several straight-line wind events each year and is in a high wind area and subject to high-wind construction codes. These wind events can and have caused significant damage. It is assumed that the High Country Region has uniform exposure to an event and the spatial extent of an impact could be large.

**FIGURE 5.7: UNITED STATES WIND ZONE MAP**




## 5.7.3 Historical Occurrences

Severe storms resulted in seven disaster declarations for one or more counties in the High Country Region in 1973, 1977, 1995, 1998, and 2013. (Section 4 provides a complete listing of disaster declarations.) The NCEI Storm Events Database reports three different types of wind events: High Wind events, Strong Wind events, and Thunderstorm Wind events. Thunderstorm wind events have been recorded since 1950, while high wind and strong wind events have been recorded since 1996. There have been 270 high wind events (1996 – 2016), 11 strong wind events (1996 – 2016), and 229 thunderstorm wind events (1950 – 2016), totaling 656 wind events since 1950 in the High Country Region.[7]

These events caused over $6 million in property damages and over $125 thousand in crop damages (2017 dollars). There were reports of six injuries and five fatalities. **Table 5.15** and **Table 5.16** summarize this information. **Table 5.17** presents detailed high wind, strong wind, and thunderstorm wind event reports including date, magnitude, and associated damages for each event.

[7] 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.

**TABLE 5.15: SUMMARY OF HIGH WIND OCCURRENCES IN THE HIGH COUNTRY REGION**

| Location | Number of Occurrences | Property Damage (2017 Dollars) | Crop Damage (2017 Dollars) |
|---|---|---|---|
| Alleghany County | 50 | $734,715 | $42,653 |
| Ashe County | 100 | $645,546 | $0 |
| Watauga County | 100 | $1,445,798 | $0 |
| Wilkes | 31 | $1,049,141 | $8,852 |
| **HIGH COUNTRY REGION TOTAL** | **281** | **$3,875,201** | **$51,505** |

**TABLE 5.16: SUMMARY OF THUNDERSTORM WIND OCCURRENCES IN THE HIGH COUNTRY REGION**

| Location | Number of Occurrences | Property Damage (2017 Dollars) | Crop Damage (2017 Dollars) |
|---|---|---|---|
| **ALLEGHANY COUNTY** | **32** | **$153,726** | **$2,388** |
| Sparta | 5 | $7,454 | $0 |
| Unincorporated Areas | 27 | $146,272 | $2,388 |
| **ASHE COUNTY** | **54** | **$281,045** | **$0** |
| Jefferson | 7 | $13,838 | $0 |
| Lansing | 3 | $0 | $0 |
| West Jefferson | 2 | $1,384 | $0 |
| Unincorporated Area | 42 | $265,823 | $0 |
| **WATAUGA COUNTY** | **58** | **$282,477** | **$0** |
| Beech Mountain | 7 | $11,269 | $0 |
| Blowing Rock | 3 | $0 | $0 |
| Boone | 13 | $90,553 | $0 |
| Seven Devils | 14 | $180,656 | $0 |
| Unincorporated Area | 21 | $0 | $0 |
| **WILKES COUNTY** | **85** | **$804,942** | **$0** |
| North Wilkesboro | 2 | $18,652 | $0 |
| Ronda | 0 | $0 | $0 |
| Wilkesboro | 22 | $297,174 | $0 |
| Unincorporated Area | 2 | 3 | $15,580 |
| **HIGH COUNTRY REGION TOTAL** | **229** | **$2,274,449** | **$71,651** |

**TABLE 5.17: HISTORICAL THUNDERSTORM (WIND) OCCURRENCES IN THE HIGH COUNTRY REGION**

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | | |
| Alleghany Co. | 6/7/1985 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Roaring Gap | 8/16/1994 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Roaring Gap | 7/17/1995 | Thunderstorm Wind | 73 | 0/0 | $27,977 | -- |
| Alleghany Co. | 10/5/1995 | High Wind | -- | 0/0 | $373,031 | -- |
| High Terrain | 11/11/1995 | High Wind | -- | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | | |
| Alleghany Co. | 11/11/1995 | High Wind | -- | 0/0 | $3,730 | -- |
| Alleghany Co. | 1/19/1996 | High Wind | -- | 0/0 | $9,055 | -- |
| Sparta | 5/11/1996 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 9/6/1996 | High Wind | -- | 0/0 | $0 | -- |
| Laurel Springs | 3/5/1997 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 2/24/1998 | High Wind | -- | 0/0 | $26,149 | High winds not associated with a thunderstorm ripped a roof off a building, toppling several trees in Glade Valley & knocked down trees, producing minor damage to homes in Idlewild in Ashe County. |
| Ennice | 6/10/1998 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Sparta | 11/25/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 3/3/1999 | High Wind | -- | 0/0 | $5,107 | High winds tore a sunroof off a home and downed trees onto several automobiles in Ashe County. High winds also downed tree limbs & power lines in Ashe, Watauga, & Alleghany counties, leaving several thousand people without power. |
| Sparta | 8/20/1999 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 1/11/2000 | High Wind | -- | 0/0 | $8,264 | High winds downed trees across Ashe, Watauga, Alleghany, and Wilkes counties. |
| Alleghany Co. | 1/13/2000 | High Wind | -- | 0/0 | $6,611 | High winds downed large trees, tree limbs, and power lines. These winds resulted in minor property damage in Ashe, Alleghany, and Watauga counties. |
| Alleghany Co. | 11/10/2000 | High Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 12/17/2000 | High Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 2/4/2002 | High Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 11/6/2002 | High Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 12/25/2002 | High Wind | -- | 0/0 | $0 | -- |
| Alleghany Co. | 1/8/2003 | High Wind | 65 | 0/0 | $3,025 | High winds trees and some power lines. A house near Sparta had shingles blown off the roof. |
| Alleghany Co. | 1/23/2003 | High Wind | 65 | 0/0 | $0 | -- |
| Alleghany Co. | 5/12/2003 | High Wind | 60 | 0/0 | $0 | -- |
| Glade Valley | 6/11/2003 | Thunderstorm Wind | 65 | 0/0 | $0 | -- |
| Alleghany Co. | 10/14/2003 | High Wind | 55 | 0/0 | $0 | -- |
| Alleghany Co. | 11/13/2003 | High Wind | 52 | 0/0 | $0 | -- |
| Alleghany Co. | 3/7/2004 | High Wind | 60 | 0/0 | $0 | -- |
| Alleghany Co. | 9/17/2004 | High Wind | 50 | 0/0 | $0 | -- |
| Alleghany Co. | 9/18/2004 | High Wind | 55 | 0/0 | $0 | -- |
| Alleghany Co. | 1/23/2005 | High Wind | 52 | 0/0 | $0 | -- |
| Alleghany Co. | 4/3/2005 | High Wind | 55 | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | | |
| Alleghany Co. | 1/14/2006 | High Wind | 50 | 0/0 | $0 | -- |
| Alleghany Co. | 6/11/2006 | Thunderstorm Wind | 60 | 0/0 | $1,246 | A large tree was downed on Maines Road. |
| Alleghany Co. | 7/19/2006 | Thunderstorm Wind | 50 | 0/0 | $1,384 | Damaging wind gusts, and large hail resulted from these severe storms. |
| Alleghany Co. | 8/3/2006 | Thunderstorm Wind | 60 | 0/0 | $1,384 | A tree was blown down on Crab Creek Road. Damage values are estimated. |
| Alleghany Co. | 10/28/2006 | High Wind | 50 | 0/0 | $6,921 | Trees were blown down on Route 18 near Laurel Springs. |
| Alleghany Co. | 12/1/2006 | High Wind | 53 | 0/0 | $6,921 | Trees downed across the county. |
| Alleghany Co. | 2/7/2007 | High Wind | 59 | 0/0 | $1,344 | Strong northwest winds developed behind an existing low pressure system, with gusts over 60 mph in the NC mountains. These winds downed a tree in Alleghany County. |
| Alleghany Co. | 2/22/2007 | High Wind | 52 | 0/0 | $13,439 | Tractor trailer blown off Highway 21 five miles northwest of Sparta. |
| Alleghany Co. | 4/16/2007 | High Wind | 82 | 0/0 | $167,990 | Pine and apple trees were blown down by 82 mph winds in Sparta. Also, in Sparta, a pine tree blew over onto a house, damaging primarily the garage section. Elsewhere across the county, trees were blown down by winds more than 60 mph. |
| Piney Creek | 8/23/2007 | Thunderstorm Wind | 55 | 0/0 | $1,344 | A large tree was blown down on Topia Road. |
| Alleghany Co. | 12/3/2007 | High Wind | 52 | 0/0 | $6,720 | Strong northwest winds in the wake of a cold front created winds gusts up to 60 mph and downed trees. Trees were blown down in portions of the county, including the western part of the town of Sparta. |
| Alleghany Co. | 12/16/2007 | High Wind | 50 | 0/0 | $26,878 | Strong northwest winds developed behind an existing low pressure system, with gusts over 60 mph in the NC mountains. These winds downed a tree in Alleghany County. |
| Alleghany Co. | 1/30/2008 | High Wind | 50 | 0/0 | $6,524 | Winds increased significantly cold front. Gusts were mainly in the 50 to 55 mph range with occasional gusts around 60 mph. In Laurel Springs, trees were down near Rte 18. |
| Alleghany Co. | 2/10/2008 | High Wind | 60 | 0/0 | $13,048 | A few trees and power lines were downed throughout the county. A tin roof was damaged three miles south of Sparta. |
| Alleghany Co. | 5/12/2008 | High Wind | 52 | 0/0 | $1,305 | A tree was blown down on Fox Ridge Road, 3.5 miles east of Sparta. |
| Sparta | 7/9/2008 | Thunderstorm Wind | 50 | 0/0 | $1,305 | A tree was blown down on Memorial Park Drive. Damage values are estimated. |
| Ennice | 7/9/2008 | Thunderstorm Wind | 50 | 0/0 | $1,305 | A tree was blown down on Crab Creek Road. Damage values are estimated. |
| Ennice | 7/23/2008 | Thunderstorm Wind | 50 | 0/0 | $652 | Large tree limbs were blown down. Damage values are estimated. |
| Alleghany Co. | 12/31/2008 | High Wind | 52 | 0/0 | $0 | -- |
| Alleghany Co. | 2/12/2009 | High Wind | 52 | 0/0 | $0 | -- |
| Alleghany Co. | 3/29/2009 | High Wind | 53 | 0/0 | $0 | -- |
| Alleghany Co. | 12/9/2009 | High Wind | 50 | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | | |
| Alleghany Co. | 2/10/2010 | High Wind | 55 | 0/0 | $1,230 | Strong northwest winds on the backside of a deepening coastal low produced a wind gust to 63 mph at Roaring Gap. Large limbs blocking a road was also reported in Ennice. |
| Sparta | 6/14/2010 | Thunderstorm Wind | 55 | 0/0 | $6,149 | Trees were blown down along Pine Swamp Road, Glade Valley Road, and Memorial Park Drive around Sparta. |
| Ennice | 7/8/2010 | Thunderstorm Wind | 50 | 0/0 | $2,460 | Trees reported down on Blue Ridge Parkway. |
| Cherry Lane | 8/5/2010 | Thunderstorm Wind | 50 | 0/0 | $615 | A tree was brought down on US Route 21. |
| Glade Valley | 8/5/2010 | Thunderstorm Wind | 50 | 0/0 | $615 | High winds downed a tree on Glade Vly Rd. |
| Alleghany Co. | 2/25/2011 | High Wind | 50 | 0/0 | $0 | -- |
| Peden | 6/18/2011 | Thunderstorm Wind | 60 | 0/0 | $29,851 | Thunderstorm winds downed around ten trees and large tree limbs along a 12-mile path near Scottsville to Sparta. A tin roof of a barn was also damaged near Sparta. |
| Barrett | 8/8/2011 | Thunderstorm Wind | 50 | 0/0 | $1,194 | Four large trees were blown down and a long swath of corn was flattened along Lazy Branch Road. |
| Stratford | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Thunderstorm winds blew a tree down across Highway 93, blocking the road. |
| Twin Oaks | 9/2/2011 | Thunderstorm Wind | 55 | 0/0 | $1,194 | Thunderstorm winds blew trees down in the community of Twin Oaks. |
| Piney Creek | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Thunderstorm winds blew a tree down across Highway 113 near Piney Creek, blocking the highway. |
| Laurel Springs | 9/2/2011 | Thunderstorm Wind | 55 | 0/0 | $2,985 | Thunderstorm winds blew trees down on New Hope Church Road. |
| Alleghany Co. | 2/11/2012 | High Wind | 50 | 0/0 | $1,739 | High winds blew trees down in parts of the county. Specifically, a tree was blown down on Allen Road near Scottville, near a golf course northwest of Sparta, an in Laurel Springs. |
| Piney Creek | 6/29/2012 | Thunderstorm Wind | 50 | 0/0 | $1,739 | Thunderstorm winds blew three trees down near Mouth of Wilson near Ennice. |
| Piney Creek | 7/5/2012 | Thunderstorm Wind | 50 | 0/0 | $1,043 | Trees were blown down on Route 113 near Piney Creek. |
| Alleghany Co. | 9/18/2012 | Strong Wind | 39 | 0/0 | $11,593 | Very wet soils from heavy rain and sub-severe winds contributed to 20 trees falling across the western half of Alleghany County. |
| Alleghany Co. | 10/29/2012 | High Wind | 50 | 0/0 | $2,319 | High winds downed four trees in the county near the communities of Chestnut Grove, Cherry Lane, and Glade Valley. |
| Alleghany Co. | 12/21/2012 | High Wind | 55 | 0/0 | $11,593 | The Alleghany County 911 Center reported numerous trees were down in the Laurel Springs and Glade Creek areas. |
| Alleghany Co. | 4/19/2013 | High Wind | 52 | 0/0 | $0 | -- |
| Alleghany Co. | 3/12/2014 | High Wind | 50 | 0/0 | $656 | A couple of trees were reported blown down along Route 18 in Ennice and Route 93 in Piney Creek. |
| Alleghany Co. | 3/30/2014 | High Wind | 50 | 0/0 | $5,464 | Trees were reported blown down due to high winds around the county. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | | |
| Topia | 7/2/2014 | Thunderstorm Wind | 50 | 0/0 | $1,093 | Two trees were blown down by thunderstorm winds in the Piney Creek area. |
| Piney Creek | 10/14/2014 | Thunderstorm Wind | 65 | 0/0 | $54,636 | Thunderstorm winds blew multiple trees down in Piney Creek and numerous trees down throughout the county. |
| Alleghany Co. | 2/14/2015 | High Wind | 50 | 0/0 | $5,305 | The Alleghany County Fire and Rescue Department reported that there were multiple trees down at various locations throughout the county. |
| Alleghany Co. | 4/2/2016 | High Wind | 50 | 0/0 | $8,755 | Multiple trees were blown down along the Blue Ridge Parkway. Also, two trees were reported blown down near the intersection of Route 21 and Cherry Lane. |
| Edmonds | 6/16/2016 | Thunderstorm Wind | 55 | 0/0 | $2,060 | Thunderstorm winds blew down trees along Route 158. |
| Ennice | 6/23/2016 | Thunderstorm Wind | 55 | 0/0 | $10,300 | Thunderstorm winds blew over numerous trees in and around Ennice. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Ashe Co. | 6/4/1959 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 8/11/1983 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Creston | 6/11/1995 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Warrensville | 7/16/1995 | Thunderstorm Wind | -- | 0/0 | $4,663 | -- |
| Ashe Co. | 1/19/1996 | High Wind | -- | 0/0 | $0 | -- |
| Jefferson | 5/11/1996 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 11/8/1996 | High Wind | -- | 0/0 | $0 | -- |
| Tuckerdale | 6/13/1997 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Lansing | 7/3/1997 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 2/24/1998 | High Wind | -- | 0/0 | $17,433 | High winds produced minor damage to homes in Idlewild in Ashe County. |
| Ashe Co. | 3/20/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Glendale Springs | 6/3/1998 | Thunderstorm Wind | -- | 0/0 | $26,149 | Thunderstorm winds toppled large trees and power lines in Glendale Springs. |
| Ashe Co. | 3/3/1999 | High Wind | -- | 0/0 | $42,561 | High winds tore a sunroof off a home and downed trees onto several automobiles in Ashe County. |
| Ashe Co. | 4/16/1999 | High Wind | -- | 0/0 | $3,405 | High winds during the afternoon of the 16th downed trees and power lines, some blocking roads. |
| Baldwin | 7/30/1999 | Thunderstorm Wind | -- | 0/0 | $8,512 | Thunderstorm winds on the 30th damaged a chicken coup 2.5 miles southwest of Baldwin and snapped the tops off trees from 2.5 miles southwest of Baldwin to West Jefferson. |
| Creston | 8/20/1999 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wagoner | 8/20/1999 | Thunderstorm Wind | -- | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Ashe Co. | 12/28/1999 | High Wind | 53 | 0/0 | $0 | -- |
| Ashe Co. | 1/11/2000 | High Wind | -- | 0/0 | $8,264 | High winds also tore part of a roof off West Jefferson Elementary School in Ashe County, and toppled a tree onto a truck in Moravian Falls in Wilkes County. |
| Ashe Co. | 1/13/2000 | High Wind | 54 | 0/0 | $6,611 | High winds resulted in minor property damage in Ashe, Alleghany, and Watauga counties. |
| Ashe Co. | 1/20/2000 | High Wind | 53 | 0/0 | $0 | -- |
| Ashe Co. | 11/10/2000 | High Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 12/17/2000 | High Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 3/6/2001 | High Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 2/4/2002 | High Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 3/10/2002 | High Wind | -- | 0/0 | $7,790 | A car dealership in West Jefferson had windows blown out by the high winds. |
| Helton | 5/13/2002 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 5/13/2002 | High Wind | -- | 0/0 | $0 | -- |
| Jefferson | 6/1/2002 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 7/2/2002 | Thunderstorm Wind | -- | 0/0 | $15,580 | Thunderstorm winds downed numerous trees across Ashe county. One tree was downed onto a house, causing damage to the roof. |
| Ashe Co. | 7/4/2002 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 11/6/2002 | High Wind | -- | 0/0 | $15,580 | One tree fell onto a house in West Jefferson damaging the roof. |
| Ashe Co. | 11/30/2002 | High Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 12/14/2002 | High Wind | -- | 0/0 | $0 | -- |
| Ashe Co. | 12/25/2002 | High Wind | -- | 1/0 | $0 | -- |
| Ashe Co. | 1/8/2003 | High Wind | 60 | 0/0 | $0 | -- |
| Ashe Co. | 1/23/2003 | High Wind | 65 | 0/0 | $0 | -- |
| Ashe Co. | 2/22/2003 | High Wind | 60 | 0/0 | $0 | -- |
| Ashe Co. | 4/10/2003 | Strong Wind | 87 | 0/0 | $1,513 | A non-thunderstorm wind gust of 87 mph was measured on Bald Knob in Ashe County. |
| Ashe Co. | 5/12/2003 | High Wind | 60 | 0/0 | $0 | -- |
| Ashe Co. | 10/14/2003 | High Wind | 53 | 0/0 | $0 | -- |
| Ashe Co. | 11/13/2003 | High Wind | 52 | 0/0 | $0 | -- |
| Ashe Co. | 1/12/2004 | High Wind | 64 | 0/0 | $0 | -- |
| Ashe Co. | 1/24/2004 | Strong Wind | 41 | 1/1 | $7,343 | Strong winds on the afternoon of the 24th, blew a tree, onto a vehicle, resulting in one fatality and one injury. |
| Ashe Co. | 1/28/2004 | High Wind | 55 | 0/0 | $0 | -- |
| West Jefferson | 5/31/2004 | Thunderstorm Wind | 60 | 0/0 | $0 | -- |
| Ashe Co. | 9/17/2004 | High Wind | 50 | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Ashe Co. | 9/18/2004 | High Wind | 55 | 0/0 | $0 | -- |
| Ashe Co. | 12/1/2004 | High Wind | 55 | 0/0 | $0 | -- |
| Ashe Co. | 1/23/2005 | High Wind | 52 | 0/0 | $0 | -- |
| Ashe Co. | 4/3/2005 | High Wind | 56 | 0/0 | $0 | -- |
| Ashe Co. | 11/24/2005 | High Wind | 55 | 0/0 | $0 | -- |
| Ashe Co. | 12/9/2005 | High Wind | 60 | 0/0 | $0 | -- |
| Ashe Co. | 12/26/2005 | High Wind | 59 | 0/0 | $0 | -- |
| Ashe Co. | 1/14/2006 | High Wind | 50 | 0/0 | $0 | -- |
| Ashe Co. | 1/24/2006 | High Wind | 71 | 0/0 | $0 | -- |
| Ashe Co. | 3/1/2006 | High Wind | 53 | 0/0 | $0 | -- |
| Ashe Co. | 3/2/2006 | High Wind | 59 | 0/0 | $0 | -- |
| Ashe Co. | 4/3/2006 | High Wind | 63 | 0/0 | $0 | -- |
| West Jefferson | 7/19/2006 | Thunderstorm Wind | 50 | 0/0 | $1,384 | Damaging wind gusts, and large hail resulted from these severe storms. |
| Ashe Co. | 10/29/2006 | High Wind | 52 | 0/0 | $0 | -- |
| Ashe Co. | 12/1/2006 | High Wind | 52 | 0/0 | $2,768 | Trees downed. |
| Ashe Co. | 2/7/2007 | High Wind | 56 | 0/0 | $0 | -- |
| Ashe Co. | 2/14/2007 | High Wind | 54 | 0/0 | $1,344 | Tree down in Grassy Creek. |
| Ashe Co. | 2/18/2007 | High Wind | 52 | 0/0 | $4,032 | A few trees down in Shatley Springs and Jefferson. |
| Ashe Co. | 2/22/2007 | High Wind | 55 | 0/0 | $16,127 | County dispatch also reported trees down countywide, as well as powerlines. A barn was damaged in Baldwin. |
| Ashe Co. | 4/16/2007 | High Wind | 52 | 0/0 | $0 | -- |
| Lansing | 6/1/2007 | Thunderstorm Wind | 52 | 0/0 | $0 | -- |
| Jefferson | 6/28/2007 | Thunderstorm Wind | 52 | 0/0 | $4,032 | Three trees down on Bill Bledsoe Road. |
| Lansing | 8/1/2007 | Thunderstorm Wind | 55 | 0/0 | $0 | -- |
| Glendale Springs | 8/21/2007 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Ashe Co. | 12/3/2007 | High Wind | 52 | 0/0 | $6,720 | Several trees were uprooted. |
| Ashe Co. | 12/16/2007 | High Wind | 50 | 0/0 | $33,598 | Strong winds damaged a roof in Creston and downed trees along SR 16 near Crumpler. |
| Ashe Co. | 1/30/2008 | High Wind | 53 | 0/0 | $0 | -- |
| Ashe Co. | 2/10/2008 | High Wind | 70 | 0/0 | $13,048 | A few trees were downed throughout the county. One tree fell onto a few vehicles near Ashe Lake. |
| Ashe Co. | 3/8/2008 | High Wind | 54 | 0/0 | $0 | -- |
| Ashe Co. | 5/11/2008 | High Wind | 52 | 0/0 | $6,524 | Several trees were blown down throughout the county. |
| Wagoner | 6/14/2008 | Thunderstorm Wind | 50 | 0/0 | $1,305 | A tree was blown down on Joe Little Road. |
| Glendale Springs | 6/22/2008 | Thunderstorm Wind | 50 | 0/0 | $1,305 | Numerous large tree limbs were blown down by thunderstorm winds. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Clifton | 7/22/2008 | Thunderstorm Wind | 50 | 0/0 | $1,305 | A six to eight-inch diameter tree was blown down. |
| Jefferson | 8/2/2008 | Thunderstorm Wind | 55 | 0/0 | $2,610 | Trees were blown down near Shatley Springs. |
| Flatwood | 8/7/2008 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Ashe Co. | 12/7/2008 | High Wind | 54 | 0/0 | $0 | -- |
| Ashe Co. | 12/31/2008 | High Wind | 61 | 0/0 | $0 | -- |
| Ashe Co. | 12/31/2008 | High Wind | 56 | 0/0 | $0 | -- |
| Ashe Co. | 12/31/2008 | High Wind | 53 | 0/0 | $0 | -- |
| Ashe Co. | 12/31/2008 | High Wind | 56 | 0/0 | $0 | -- |
| Ashe Co. | 2/11/2009 | High Wind | 61 | 0/0 | $0 | -- |
| Ashe Co. | 3/29/2009 | High Wind | 51 | 0/0 | $0 | -- |
| Ashe Co. | 4/3/2009 | High Wind | 54 | 0/0 | $0 | -- |
| Jefferson | 6/16/2009 | Thunderstorm Wind | 55 | 0/0 | $950 | Thunderstorm winds knocked a tree on a power line on Route 221. |
| Fleetwood | 6/20/2009 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Warrensville | 8/5/2009 | Thunderstorm Wind | 55 | 0/0 | $1,267 | A tree was blown down on Pounding Mill Road, near Warrensville. |
| Ashe Co. | 11/27/2009 | High Wind | 50 | 0/0 | $2,534 | Two trees downed in West Jefferson. |
| Ashe Co. | 12/9/2009 | High Wind | 55 | 0/0 | $0 | -- |
| Ashe Co. | 2/10/2010 | High Wind | 57 | 0/0 | $0 | -- |
| Ashe Co. | 2/26/2010 | High Wind | 60 | 0/0 | $0 | -- |
| Todd | 6/14/2010 | Thunderstorm Wind | 50 | 0/0 | $369 | A large tree limb was down on Three Top Road near Highway 194. |
| Ashe Co. | 12/13/2010 | High Wind | 57 | 0/0 | $0 | -- |
| Ashe Co. | 2/2/2011 | High Wind | 50 | 0/0 | $0 | -- |
| Ashe Co. | 2/25/2011 | High Wind | 55 | 0/0 | $0 | -- |
| Fleetwood | 6/10/2011 | Thunderstorm Wind | 50 | 0/0 | $1,791 | Thunderstorm winds blew large limbs down in Fleetwood. |
| Glendale Springs | 6/11/2011 | Thunderstorm Wind | 55 | 0/0 | $23,881 | Thunderstorm winds blew off part of the backside of a roof of a mobile home. |
| Clifton | 6/18/2011 | Thunderstorm Wind | 50 | 0/0 | $4,657 | Thunderstorm winds downed a tree on a power line along Hickory Heights Drive. |
| Bina | 6/18/2011 | Thunderstorm Wind | 50 | 0/0 | $1,075 | Thunderstorm winds downed a tree on West Deep Ford Road. |
| Jefferson | 6/18/2011 | Thunderstorm Wind | 50 | 0/0 | $5,731 | Thunderstorm winds blew two trees down on East Main Street. One of the trees fell on a power line. |
| Crumpler | 6/18/2011 | Thunderstorm Wind | 55 | 0/0 | $1,075 | Thunderstorm winds downed a tree on Chestnut Hill Road. |
| Warrensville | 8/8/2011 | Thunderstorm Wind | 50 | 0/0 | $358 | A large tree was blown down on Pounding Mill Road near Highway 194. |
| Clifton | 8/8/2011 | Thunderstorm Wind | 50 | 0/0 | $358 | A tree was blown down by thunderstorm winds on Buffalo Road. |
| Crumpler | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Thunderstorm winds downed a tree at 900 George McMillan Road, blocking the road. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Ashe Co. | 11/23/2011 | High Wind | 56 | 0/0 | $0 | -- |
| Ashe Co. | 11/28/2011 | Strong Wind | 30 | 0/0 | $1,194 | There were two reports of trees down in the county. The maximum wind gust at Jefferson Airport (KGEV) was only 29 mph at 415 PM but soils were quite wet from 2 to 3 inches of rainfall across the county. |
| Ashe Co. | 12/7/2011 | High Wind | 50 | 0/0 | $2,985 | High winds blew down at least five trees on roads across Ashe County. |
| Ashe Co. | 1/12/2012 | High Wind | 50 | 0/0 | $2,319 | Trees were reported down on Highway 88 west due to the high winds. |
| Ashe Co. | 2/11/2012 | High Wind | 55 | 0/0 | $57,964 | High winds blew trees down throughout the county. Examples include a tree down on Hartzog Road near Glendale Springs, a tree down two miles west of Jefferson, and a tree six miles south southwest of Mouth of Wilson. |
| Ashe Co. | 2/24/2012 | High Wind | 65 | 0/0 | $0 | -- |
| Ashe Co. | 2/25/2012 | High Wind | 50 | 0/0 | $1,739 | High winds blew three trees down across the county. Watertank Road near Fleetwood, Highway 88 near Creston, and Garvey Bridge Road near Crumpler each had one of these three trees blown down onto them. |
| Helton | 7/1/2012 | Thunderstorm Wind | 50 | 0/0 | $348 | A tree was blown down along Silas Creek Rd. |
| Crumpler | 7/1/2012 | Thunderstorm Wind | 50 | 0/0 | $116 | A tree was blown down along Silas Creek Rd. |
| Glendale Springs | 7/1/2012 | Thunderstorm Wind | 50 | 0/0 | $348 | A tree was down on Trading Post Road next to the Blue Ridge Parkway. |
| Creston | 7/24/2012 | Thunderstorm Wind | 50 | 0/0 | $5,796 | Several trees and powerlines were downed. |
| Tuckerdale | 7/25/2012 | Thunderstorm Wind | 50 | 0/0 | $348 | Thunderstorm winds blew down a tree on Little Horse Creek Road. |
| Glendale Springs | 7/25/2012 | Thunderstorm Wind | 50 | 0/0 | $5,796 | Trees and powerlines were reported down. |
| Ashe Co. | 10/29/2012 | High Wind | 61 | 0/0 | $347,782 | Wind gusts of 60 to 70 mph were recorded at instrumentation at the airport near West Jefferson. These damaging winds downed trees and power lines near Warrensville and throughout the county. |
| Ashe Co. | 12/21/2012 | High Wind | 67 | 0/0 | $0 | -- |
| Ashe Co. | 12/27/2012 | High Wind | 68 | 0/0 | $0 | -- |
| Ashe Co. | 1/24/2013 | High Wind | 57 | 0/0 | $3,377 | Several gusts in the 50 to 57 knot range were observed. Multiple trees and power lines were blown down near Fleetwood. |
| Ashe Co. | 1/29/2013 | High Wind | 52 | 0/0 | $5,628 | The NCDOT reported several trees were blown down across Ashe County in and around the community of Lansing. |
| Ashe Co. | 2/1/2013 | High Wind | 55 | 0/0 | $2,814 | High winds blew trees down along Highway 194 near Todd. |
| Ashe Co. | 2/3/2013 | High Wind | 53 | 0/0 | $0 | -- |
| Ashe Co. | 2/7/2013 | High Wind | 50 | 0/0 | $1,126 | High winds blew two trees down, one on Parker Eller Road four miles north of Jefferson, the other on Old Field Creek Road, five miles east-northeast of Lansing. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Bina | 6/13/2013 | Thunderstorm Wind | 50 | 0/0 | $1,126 | Thunderstorms along a squall line produced damaging winds that blew down two trees along Deep Ford Road near Lansing. |
| Brandon | 7/4/2013 | Thunderstorm Wind | 50 | 0/0 | $563 | One tree down on South Big Horse Creek Road between Lansing and Tuckerdale and another on Jim Duvall Road. |
| Ashe Co. | 1/3/2014 | High Wind | 52 | 0/0 | $0 | -- |
| Ashe Co. | 1/25/2014 | High Wind | 52 | 0/0 | $0 | -- |
| Ashe Co. | 3/12/2014 | High Wind | 52 | 0/0 | $0 | -- |
| Ashe Co. | 3/30/2014 | High Wind | 50 | 0/0 | $656 | A few trees and large branches were brought down. The peak wind gust at Ashe County Airport (KGEV) was 53 mph at 535 EDT. |
| Ashe Co. | 5/22/2014 | High Wind | 51 | 0/0 | $3,278 | A 51 knot wind gust was measured at the Jefferson Airport AWOS at 0815 EDT. In addition, The Ashe County 911 Call Center received reports of a few trees blown down in various locations across the county. |
| Ashe Co. | 10/14/2014 | High Wind | 55 | 0/0 | $4,917 | High winds downed nine trees around Crumpler. |
| Ashe Co. | 1/30/2015 | High Wind | 50 | 0/0 | $0 | -- |
| Ashe Co. | 2/2/2015 | High Wind | 50 | 0/0 | $1,061 | High winds in West Jefferson caused damage to the door of a commercial building. The door was blown open and damaged. The nearby AWOS at West Jefferson (KGEV) recorded a wind gust of 58 mph. |
| Ashe Co. | 2/14/2015 | High Wind | 54 | 0/0 | $5,305 | The Ashe County 911 Center reported that there were several trees down at various locations throughout the county. A trained spotter measured a wind gust of 62 mph at 3600 feet elevation near West Jefferson. |
| Scottville | 6/26/2015 | Thunderstorm Wind | 50 | 0/0 | $1,061 | Two trees were blown down along Rte 221. |
| Warrensville | 7/13/2015 | Thunderstorm Wind | 50 | 0/0 | $530 | Thunderstorm winds blew a tree down. |
| Nathans Creek | 7/13/2015 | Thunderstorm Wind | 50 | 0/0 | $530 | A tree was downed on Carson Woods Road. |
| Ashe Co. | 10/3/2015 | Strong Wind | 30 | 0/0 | $1,061 | Strong winds and saturated ground allowed for two trees to be blown down in the county - one across Grassy Creek Road, the other across Campbell Road. |
| Ashe Co. | 2/10/2016 | High Wind | 51 | 0/0 | $0 | -- |
| Ashe Co. | 2/13/2016 | High Wind | 59 | 0/0 | $0 | -- |
| Ashe Co. | 2/25/2016 | High Wind | 60 | 0/0 | $0 | -- |
| Ashe Co. | 4/2/2016 | High Wind | 65 | 0/0 | $5,150 | Wind gusts ranging from of 60 to 75 mph occurred at parts of the county. In Jefferson, the wind blew some shingles off a roof. |
| Ashe Co. | 4/9/2016 | High Wind | 56 | 0/0 | $0 | -- |
| Nathans Creek | 6/16/2016 | Thunderstorm Wind | 50 | 0/0 | $515 | Thunderstorm winds blew a large tree down on Tom Fowler Road. |
| Jefferson | 6/16/2016 | Thunderstorm Wind | 50 | 0/0 | $515 | A large tree was downed on old Highway 16. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Roten | 7/8/2016 | Thunderstorm Wind | 60 | 0/0 | $154,500 | 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. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Boone | 4/15/1993 | Thunderstorm Wind | -- | 0/0 | $9,843 | Winds snapped telephone poles and destroyed a garage. |
| Blowing Rock | 8/18/1995 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 1/19/1996 | High Wind | -- | 0/0 | $162,996 | -- |
| Watauga Co. | 11/8/1996 | High Wind | -- | 0/0 | $0 | -- |
| Boone | 3/5/1997 | Thunderstorm Wind | 56 | 0/0 | $0 | -- |
| Boone | 3/5/1997 | Thunderstorm Wind | 65 | 0/0 | $35,409 | Winds damaged a log cabin and toppled over 50 trees nine miles east of Boone. |
| Boone | 6/13/1997 | Thunderstorm Wind | -- | 0/0 | $3,541 | Thunderstorm winds blew a metal shed across a road in Boone. |
| Zionville | 6/13/1997 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Matney | 8/17/1997 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 2/4/1998 | High Wind | -- | 0/0 | $17,433 | High winds knocked down a barn near Boone in Watauga County, broke off several large tree limbs mainly in the northern portion of Watauga County. |
| Zionville | 6/3/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Meat Camp | 6/3/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Boone | 11/25/1998 | Thunderstorm Wind | 60 | 0/0 | $0 | -- |
| Watauga Co. | 3/3/1999 | High Wind | -- | 0/0 | $5,107 | High winds downed tree limbs and power lines in Ashe, Watauga, and Alleghany counties, leaving several thousand people without power. |
| Watauga Co. | 9/15/1999 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 12/28/1999 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 1/11/2000 | High Wind | -- | 0/0 | $8,264 | High winds downed trees across Ashe, Watauga, Alleghany, and Wilkes counties. |
| Watauga Co. | 1/13/2000 | High Wind | -- | 0/0 | $6,611 | High winds downed large trees, tree limbs, and power lines. These winds resulted in minor property damage in Ashe, Alleghany, and Watauga counties. |
| Watauga Co. | 1/20/2000 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 3/20/2000 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 11/10/2000 | High Wind | -- | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Watauga Co. | 11/21/2000 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 12/12/2000 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 12/17/2000 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 3/5/2001 | High Wind | -- | 0/0 | $200,588 | High winds downed numerous trees in the Blowing Rock area. Several houses were damaged as winds ripped shingles off their roofs. One house suffered over $50,000 damage as the roof was blown off and walls were damaged. Many trees were downed onto vehicles and buildings, resulting in numerous reports of minor damage. |
| Watauga Co. | 3/6/2001 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 3/20/2001 | High Wind | -- | 0/0 | $8,024 | In Ashe and Watauga counties, the combination of the heavy wet snow and strong winds downed power lines with scattered power outages reported. In Watauga County there was also minor damage to several structures when trees land on them. |
| Watauga Co. | 4/2/2001 | High Wind | -- | 0/0 | $16,047 | High winds blew down a gable roof over a porch at a church in Mable |
| Boone | 7/8/2001 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 10/14/2001 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 10/16/2001 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 12/18/2001 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 2/4/2002 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 3/10/2002 | High Wind | -- | 0/2 | $4,674 | A car was damaged by a falling limb in Blowing Rock. Two occupants received minor injuries. |
| Watauga Co. | 11/6/2002 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 11/30/2002 | High Wind | -- | 0/0 | $15,580 | In Boone a roof was damaged by a fallen tree. |
| Watauga Co. | 12/14/2002 | High Wind | 62 | 0/0 | $0 | -- |
| Watauga Co. | 12/22/2002 | High Wind | -- | 0/0 | $0 | -- |
| Watauga Co. | 12/25/2002 | High Wind | 70 | 1/0 | $77,898 | A man in Meat Camp was killed when a tree fell onto a tractor he was riding. The tractor was also damaged. In addition, numerous wind gusts of near 70 mph were reported in Ashe, Alleghany, and Watauga counties. In Watauga County, many trees were downed onto homes causing significant damage to roofs and front porches. |
| Watauga Co. | 1/8/2003 | High Wind | 60 | 0/0 | $0 | -- |
| Watauga Co. | 1/23/2003 | High Wind | 63 | 0/0 | $0 | -- |
| Watauga Co. | 2/3/2003 | High Wind | 60 | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Watauga Co. | 2/22/2003 | High Wind | 77 | 0/0 | $22,689 | Boone in Watauga County measured a wind gust of 77 miles an hour. A tree fell onto two cars near Boone, otherwise no reports of damage to private property were received. |
| Watauga Co. | 5/12/2003 | High Wind | 60 | 0/0 | $0 | -- |
| Watauga Co. | 10/14/2003 | High Wind | 55 | 0/0 | $0 | -- |
| Watauga Co. | 11/13/2003 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 1/28/2004 | High Wind | 55 | 0/0 | $0 | -- |
| Boone | 5/26/2004 | Thunderstorm Wind | 70 | 0/0 | $0 | -- |
| Bethel | 5/26/2004 | Thunderstorm Wind | 70 | 0/0 | $0 | -- |
| Triplett | 5/26/2004 | Thunderstorm Wind | 70 | 0/0 | $0 | -- |
| Boone | 5/31/2004 | Thunderstorm Wind | 70 | 0/0 | $0 | -- |
| Blowing Rock | 5/31/2004 | Thunderstorm Wind | 57 | 0/0 | $0 | -- |
| Boone | 5/31/2004 | Thunderstorm Wind | 60 | 0/0 | $0 | -- |
| Watauga Co. | 9/17/2004 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 9/18/2004 | High Wind | 55 | 0/0 | $0 | -- |
| Watauga Co. | 12/1/2004 | High Wind | 55 | 0/0 | $0 | -- |
| Watauga Co. | 1/23/2005 | High Wind | 54 | 0/0 | $0 | -- |
| Watauga Co. | 4/3/2005 | High Wind | 55 | 0/0 | $0 | -- |
| Watauga Co. | 11/24/2005 | High Wind | 52 | 0/0 | $0 | -- |
| Watauga Co. | 12/9/2005 | High Wind | 60 | 0/0 | $0 | -- |
| Watauga Co. | 12/26/2005 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 1/14/2006 | High Wind | 51 | 0/0 | $0 | -- |
| Watauga Co. | 1/24/2006 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 3/1/2006 | High Wind | 53 | 0/0 | $0 | -- |
| Watauga Co. | 3/2/2006 | High Wind | 58 | 0/0 | $0 | -- |
| Sands | 4/2/2006 | Thunderstorm Wind | 60 | 0/0 | $4,153 | Severe storms produced penny to nickel size hail, and some trees were downed by 70 mph winds. |
| Watauga Co. | 4/3/2006 | High Wind | 53 | 0/0 | $0 | -- |
| Boone | 4/25/2006 | Thunderstorm Wind | 47 | 0/0 | $20,764 | A tree was blown into a home, and winds at the time were measured at 54 mph at the neighboring airport. |
| Watauga Co. | 10/28/2006 | High Wind | 50 | 0/0 | $276,847 | Trees and powerlines were downed. |
| Watauga Co. | 12/1/2006 | High Wind | 52 | 0/0 | $11,074 | Emergency Manager reported trees downed in Boone |
| Watauga Co. | 2/7/2007 | High Wind | 52 | 0/0 | $0 | -- |
| Watauga Co. | 2/14/2007 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 2/18/2007 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 2/22/2007 | High Wind | 58 | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Watauga Co. | 4/15/2007 | High Wind | 62 | 0/0 | $335,979 | Trees were blown down countywide. One tree fell onto a house in Foscoe. |
| Watauga Co. | 12/3/2007 | High Wind | 52 | 0/0 | $2,688 | A large tree was uprooted in Boone. |
| Watauga Co. | 12/16/2007 | High Wind | 50 | 0/0 | $16,127 | Strong winds downed trees countywide. |
| Watauga Co. | 1/30/2008 | High Wind | 50 | 0/0 | $45,667 | High wind gusts caused trees to be blown down across the county. |
| Watauga Co. | 2/10/2008 | High Wind | 55 | 0/0 | $19,572 | A chicken house was overturned in the Deep Gap area. Trees and power lines were downed throughout the county. |
| Watauga Co. | 3/8/2008 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 5/11/2008 | High Wind | 52 | 0/0 | $6,524 | Several trees downed across the county. |
| Boone | 6/10/2008 | Thunderstorm Wind | 55 | 0/0 | $3,914 | Several trees were downed onto Highway 105, resulting in the road being closed. |
| Foscoe | 6/26/2008 | Thunderstorm Wind | 50 | 0/0 | $3,914 | A row of small trees was downed near Highway 105 & Clarks Creek Rd. |
| Watauga Co. | 12/7/2008 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 12/7/2008 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 12/7/2008 | High Wind | 50 | 0/0 | $6,524 | Several trees down in Boone. |
| Watauga Co. | 12/31/2008 | High Wind | 51 | 0/0 | $0 | -- |
| Watauga Co. | 12/31/2008 | High Wind | 54 | 0/0 | $0 | -- |
| Watauga Co. | 2/12/2009 | High Wind | 52 | 0/0 | $0 | -- |
| Watauga Co. | 3/29/2009 | High Wind | 55 | 0/0 | $887 | High winds behind a cold front affected the High Country with gusts to over 60 mph. A large tree near Meat Camp was downed. |
| Watauga Co. | 4/3/2009 | High Wind | 50 | 0/0 | $44,337 | A tree was blown down on top of a car on Deerfield road in Boone. The high winds also blew partially down the awning above the gasoline pumps of a service station in Boone. |
| Sugar Grove | 6/16/2009 | Thunderstorm Wind | 55 | 0/0 | $317 | Thunderstorm winds brought down one tree on Rush Branch Road. |
| Sugar Grove | 6/16/2009 | Thunderstorm Wind | 55 | 0/0 | $317 | One tree was blown down on Georges Gap Road near Sugar Grove. |
| Blowing Rock | 6/17/2009 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Boone | 6/17/2009 | Thunderstorm Wind | 55 | 0/0 | $633 | Several trees were down on Elk Creek Road. |
| Watauga Co. | 11/27/2009 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 12/9/2009 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 12/25/2009 | High Wind | 70 | 0/0 | $3,800 | Extreme wind gusts occurred at some higher elevation locations. Poga Mountain (elevation 3740 feet) just over the Watauga County line in Avery County had a wind gust to 82 mph and numerous gusts over 70 mph. Extensive damage in Beech Mountain area. |
| Watauga Co. | 2/10/2010 | High Wind | 58 | 0/0 | $1,230 | Strong northwest winds on the backside of a deepening coastal low produced a wind gusts to 58 and 67 MPH at Boone. A tree was downed on US 221 & on Georges Gap Road. |
| Watauga Co. | 2/26/2010 | High Wind | 56 | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Zionville | 6/14/2010 | Thunderstorm Wind | 55 | 0/0 | $3,321 | Several trees were blown down on Highway 421 near the Tennessee border. |
| Vilas | 6/21/2010 | Thunderstorm Wind | 50 | 0/0 | $2,460 | Trees were blown down at the intersection of Sherwood Road and Walls Road. |
| Watauga Co. | 2/2/2011 | High Wind | 50 | 0/0 | $1,194 | High winds blew a tree down on top of a truck along Route 421 near Boone. |
| Watauga Co. | 2/14/2011 | High Wind | 62 | 0/0 | $5,970 | Very strong winds brought down a tree onto power lines near Boone and caused the Rocky Knob wildfire. |
| Watauga Co. | 2/25/2011 | High Wind | 51 | 0/0 | $0 | -- |
| Foscoe | 2/28/2011 | Thunderstorm Wind | 50 | 0/0 | $1,791 | A possible microburst downed several trees 10 -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 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Vilas | 6/12/2011 | Thunderstorm Wind | 60 | 0/0 | $3,582 | Thunderstorm winds blew power lines down. |
| Watauga Co. | 11/23/2011 | Strong Wind | 46 | 0/0 | $716 | Boone AWOS (KTNB) had a maximum measured wind gust of 46 mph at 9:15 AM and winds were strong throughout the day. Two trees were reported down along Highway 105 near Seven Devils. |
| Watauga Co. | 12/7/2011 | High Wind | 58 | 0/0 | $2,985 | High winds knocked down at least five trees across roads across Watauga County. Trees and power lines were blown down on Route 221 near Holloway Mountain Road |
| Watauga Co. | 1/12/2012 | High Wind | 50 | 0/0 | $57,964 | Power lines were brought down along Vanderpool Road and Powderhorn Mountain Road due to the high winds. Trees were down countywide, especially from Boone west to the border with Tennessee. |
| Peoria | 7/1/2012 | Thunderstorm Wind | 55 | 0/0 | $3,478 | 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 | Thunderstorm Wind | 50 | 0/0 | $34,778 | 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. |
| Watauga Co. | 10/29/2012 | High Wind | 50 | 0/0 | $8,115 | Because of Hurricane Sandy, winds blew trees down across the county. A lone tree was blown down near Perkinsville, and a lone tree was also blown down near Valle Crucis. More than one tree was blown down near Beach Mountain, and these brought down a power line. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Watauga Co. | 12/20/2012 | High Wind | 67 | 0/0 | $6,956 | A carport in Zionville was destroyed by high winds and at least one tree each was down on Howards Creek Road just northwest of Hillcrest, Poplar Hill Road and Horseshoe Road at Boone in the Dougherty Heights area, and another on Holloway Mountain Road just south-southeast of Foscoe. |
| Watauga Co. | 12/26/2012 | High Wind | 56 | 0/0 | $0 | |
| Watauga Co. | 1/24/2013 | High Wind | 66 | 0/0 | $5,628 | . These strong winds blew a roof off a shed and brought down multiple trees and power lines down along Browns Chapel Road. |
| Watauga Co. | 1/29/2013 | High Wind | 54 | 0/0 | $0 | -- |
| Watauga Co. | 2/3/2013 | High Wind | 54 | 0/0 | $0 | -- |
| Watauga Co. | 2/8/2013 | High Wind | 50 | 0/0 | $1,126 | High winds blew down two trees along State Route 105 near the intersection of Shulls Mill Road, five miles northwest of Blowing Rock. |
| Watauga Co. | 2/20/2013 | High Wind | 57 | 0/0 | $0 | -- |
| Boone Blowing Rock Airport | 6/13/2013 | Thunderstorm Wind | 58 | 0/0 | $3,377 | Thunderstorm winds along a squall line downed trees in Boone. |
| Rutherwood | 7/17/2013 | Thunderstorm Wind | 50 | 0/0 | $675 | A few trees were blown down. |
| Rutherwood | 7/17/2013 | Thunderstorm Wind | 52 | 0/0 | $0 | -- |
| Shulls Mills | 7/17/2013 | Thunderstorm Wind | 50 | 0/0 | $3,377 | 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. |
| Watauga Co. | 1/3/2014 | High Wind | 50 | 0/0 | $1,093 | A tree was blown down in Deep Gap. Another tree was downed near Stony Point. |
| Watauga Co. | 3/12/2014 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 3/30/2014 | High Wind | 67 | 0/0 | $328 | One tree was reported down in Boone. |
| Watauga Co. | 5/22/2014 | High Wind | 50 | 0/0 | $3,278 | The Watauga County 911 Call Center received reports of a few trees blown down in various locations across the county. |
| Bethel | 7/8/2014 | Thunderstorm Wind | 50 | 0/0 | $546 | A tree was downed nw of Sugar Grove. |
| Perkinsville | 7/8/2014 | Thunderstorm Wind | 50 | 0/0 | $546 | One tree was downed in Boone. |
| Watauga Co. | 9/7/2014 | Strong Wind | 30 | 0/0 | $546 | The combination of gusty winds and very wet soil conditions from heavy rain caused a tree to fall, blocking Incline Drive in the community of Vilas. |
| Zionville | 10/14/2014 | Thunderstorm Wind | 50 | 0/0 | $10,927 | There were reports of trees down along Wonderland Trail, Laurel Lane, Winterberry Trail, Silverleaf Road, and Broadstone Road. |
| Watauga Co. | 2/14/2015 | High Wind | 62 | 0/0 | $5,305 | The Watuaga County 911 Center reported that several trees were down at various locations throughout the county |
| Triplett | 7/13/2015 | Thunderstorm Wind | 50 | 0/0 | $1,591 | Winds downed trees on Elk Creek Road. |
| Valle Crucis | 8/5/2015 | Thunderstorm Wind | 50 | 0/0 | $530 | 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. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Valle Crucis | 8/5/2015 | Thunderstorm Wind | 50 | 0/0 | $1,061 | The public reported that a tree was down on a gazebo at a private residence. |
| Hodges Gap | 8/5/2015 | Thunderstorm Wind | 50 | 0/0 | $530 | The Watauga County 911 Center reported that a tree was down along North Carolina Highway 105 near its intersection with Earl Lyons Road. |
| Watauga Co. | 10/3/2015 | Strong Wind | 30 | 0/0 | $21,218 | Strong winds and saturated ground allowed for some trees to be blown down across the county. Power outages occurred for fifty customers when a tree fell on power lines in Blowing Rock. |
| Watauga Co. | 11/18/2015 | Strong Wind | 45 | 0/0 | $1,061 | Strong southeasterly winds resulted in isolated reports of downed trees in Watauga County. |
| Watauga Co. | 2/13/2016 | High Wind | 54 | 0/0 | $0 | -- |
| Watauga Co. | 2/25/2016 | High Wind | 50 | 0/0 | $0 | -- |
| Watauga Co. | 4/2/2016 | High Wind | 68 | 0/0 | $5,150 | Wind gusts ranging from 58 to 68 mph occurred at parts of the county. In Meat Camp, several trees were blown down. |
| Reese | 7/8/2016 | Thunderstorm Wind | 60 | 0/1 | $103,000 | 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. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Wilkes Co. | 7/30/1976 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/6/1977 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/6/1977 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 2/1/1979 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 7/26/1984 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 5/16/1985 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/7/1985 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 8/21/1985 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/16/1987 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 7/31/1987 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 8/5/1987 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 9/10/1987 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 9/10/1987 | Thunderstorm Wind | -- | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Wilkes Co. | 7/10/1988 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 7/30/1988 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 8/15/1988 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 5/5/1989 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/2/1989 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/12/1989 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/12/1989 | Thunderstorm Wind | -- | 0/1 | $0 | -- |
| Wilkes Co. | 7/12/1989 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 11/15/1989 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 4/9/1991 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 3/10/1992 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/26/1992 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkesboro | 8/19/1994 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Moravian Falls | 8/27/1994 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Hays | 6/10/1995 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilbar | 6/26/1995 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Fairplains | 7/17/1995 | Thunderstorm Wind | -- | 0/0 | $37,303 | Thunderstorm winds destroyed a hay barn and downed trees in Fairplains. One of the trees damaged a house. A vehicle was severely damaged and two other vehicles were slightly damaged when debris from the hay barn hit them. In addition, thunderstorm winds also damaged fencing. |
| North Wilkesboro | 7/17/1995 | Thunderstorm Wind | -- | 0/0 | $14,921 | -- |
| North Wilkesboro | 7/25/1995 | Thunderstorm Wind | -- | 0/0 | $9,326 | -- |
| Wilkesboro | 7/25/1995 | Thunderstorm Wind | -- | 0/0 | $7,461 | -- |
| Wilkesboro | 7/25/1995 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkesboro | 7/25/1995 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkesboro | 8/18/1995 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Traphill | 8/18/1995 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 1/19/1996 | High Wind | -- | 0/0 | $162,996 | -- |
| Wilkesboro | 1/19/1996 | Thunderstorm Wind | -- | 0/0 | $5,433 | -- |
| Wilkesboro | 4/23/1996 | Thunderstorm Wind | -- | 0/0 | $9,055 | Winds downed trees in Wilkesboro. |
| South Portion | 5/27/1996 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Mulberry | 6/24/1996 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| North Wilkesboro | 8/15/1996 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Mulberry | 8/23/1996 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 9/6/1996 | High Wind | -- | 0/0 | $45,277 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Wilkes Co. | 3/5/1997 | Thunderstorm Wind | -- | 0/0 | $283,271 | Winds uprooted trees, and damaged or destroyed mobile homes, outbuildings, barns, and roofs of homes and businesses. Thunderstorm winds destroyed a chicken house and damaged 25 other chicken houses across the county, killing 8,000 chicks. |
| North Wilkesboro | 3/5/1997 | Thunderstorm Wind | -- | 0/0 | $212,453 | The winds broke out windows of businesses in North Wilkesboro. At the North Wilkesboro Speedway about four miles southeast of North Wilkesboro, thunderstorm winds destroyed a building and damaged several other buildings, and damaged or destroyed several billboards. |
| Elkin | 3/5/1997 | Thunderstorm Wind | -- | 0/0 | $88,522 | The winds destroyed two greenhouses and damaged four others about six miles southwest of Elkin. |
| Wilkesboro | 7/28/1997 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 2/4/1998 | High Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 2/24/1998 | High Wind | -- | 0/0 | $17,433 | High winds knocked down trees in Surry and Wilkes Counties and destroyed a horse barn in Mulberry in Wilkes County. In Wilkes County, there were scattered power outages and some chicken houses were damaged. |
| Wilkesboro | 5/7/1998 | Thunderstorm Wind | -- | 0/0 | $17,433 | Thunderstorms during the afternoon and evening hours on the 7th produced two tornadoes, hail up to golf ball size, and damaging winds. |
| East Portion | 5/25/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkesboro | 5/26/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| North Wilkesboro | 5/26/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 6/3/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Moravian Falls | 6/3/1998 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Ferguson | 6/10/1998 | Thunderstorm Wind | -- | 0/0 | $1,743 | Thunderstorm winds toppled several 12-14 inch diameter trees about 3 miles southeast of Ferguson. Some roofing on chicken coops was also peeled back. |
| Roaring River | 6/16/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Mulberry | 10/8/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Traphill | 10/8/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkesboro | 11/26/1998 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| North Wilkesboro | 6/10/1999 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Mcgrady | 8/20/1999 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 9/15/1999 | High Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 1/11/2000 | High Wind | -- | 0/0 | $8,264 | High winds toppled a tree onto a truck in Moravian Falls in Wilkes County. |
| Wilkesboro | 5/27/2000 | Thunderstorm Wind | -- | 0/0 | $0 | -- |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| East Portion | 6/3/2000 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Traphill | 8/10/2000 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Boomer | 11/9/2000 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkesboro | 8/11/2001 | Thunderstorm Wind | -- | 0/0 | $16,047 | 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 Wind | -- | 0/0 | $0 | -- |
| Hays | 8/2/2002 | Thunderstorm Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 12/1/2002 | High Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 12/25/2002 | High Wind | -- | 0/0 | $0 | -- |
| Wilkes Co. | 2/22/2003 | High Wind | 60 | 0/0 | $0 | -- |
| Millers Creek | 6/8/2003 | Thunderstorm Wind | 65 | 0/0 | $0 | -- |
| Wilkesboro | 6/8/2003 | Thunderstorm Wind | 60 | 0/0 | $0 | -- |
| Roaring River | 6/8/2003 | Thunderstorm Wind | 65 | 0/0 | $0 | -- |
| Hays | 7/5/2003 | Thunderstorm Wind | 60 | 0/0 | $0 | -- |
| Mulberry | 7/5/2003 | Thunderstorm Wind | 60 | 0/0 | $15,126 | Thunderstorm winds downed a tree onto a house in Mulberry. |
| Traphill | 7/12/2003 | Thunderstorm Wind | 60 | 0/0 | $0 | -- |
| Wilkesboro | 7/18/2003 | Thunderstorm Wind | 60 | 0/0 | $7,563 | Thunderstorm winds downed a tree onto a car near Wilkesboro. |
| Roaring River | 7/18/2003 | Thunderstorm Wind | 60 | 0/0 | $0 | -- |
| North Wilkesboro | 8/30/2003 | Thunderstorm Wind | 65 | 0/0 | $15,126 | 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. |
| Wilkes Co. | 10/14/2003 | High Wind | 55 | 0/0 | $0 | -- |
| Wilkes Co. | 3/7/2004 | High Wind | 60 | 0/0 | $0 | -- |
| Millers Creek | 5/8/2004 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Wilkesboro | 5/8/2004 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Mulberry | 5/8/2004 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Wilkesboro | 7/12/2004 | Thunderstorm Wind | 60 | 0/0 | $0 | -- |
| Wilkes Co. | 4/3/2005 | High Wind | 50 | 0/1 | $0 | -- |
| North Wilkesboro | 7/2/2005 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Wilkes Co. | 1/14/2006 | High Wind | 50 | 0/0 | $0 | -- |
| Windy Gap | 6/22/2006 | Thunderstorm Wind | 55 | 0/0 | $1,246 | Large tree blown down across Windy Gap Road |
| Millers Creek | 7/13/2006 | Thunderstorm Wind | 75 | 0/0 | $5,537 | The severe winds ranged generally between 60 and 75 mph with numerous reports of large trees down. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Roaring River | 7/28/2006 | Thunderstorm Wind | 60 | 0/0 | $110,739 | Numerous trees were downed, 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 | Thunderstorm Wind | 55 | 0/0 | $1,384 | Tree down on Airport Road. |
| Purlear | 8/11/2006 | Thunderstorm Wind | 55 | 0/0 | $2,768 | A severe thunderstorm downed a tree on a power line in the Purlear community. |
| Traphill | 8/30/2006 | Thunderstorm Wind | 60 | 0/0 | $2,768 | Trees down. |
| Wilkes Co. | 12/1/2006 | High Wind | 56 | 0/0 | $415,270 | High winds tore away the roof of Multi-Solutions on SR 115, along with roofing from Harold's Restaurant. Debris landed in the parking lot, damaging two cars, a van, a pickup truck, and a sport/utility vehicle. |
| Wilkes Co. | 4/15/2007 | High Wind | 63 | 0/0 | $335,979 | Numerous trees were downed countywide. |
| Wilbar | 6/24/2007 | Thunderstorm Wind | 52 | 0/0 | $5,376 | Several trees down on Route 16 North. |
| Boomer | 6/24/2007 | Thunderstorm Wind | 52 | 0/0 | $4,032 | Several trees down on Route 18 South. |
| Elkville | 6/24/2007 | Thunderstorm Wind | 52 | 0/0 | $5,376 | Several trees down on Route 268. |
| Traphill | 6/25/2007 | Thunderstorm Wind | 52 | 0/0 | $2,016 | Several 4 to 5 inch limbs down near Traphill. |
| North Wilkesboro | 7/16/2007 | Thunderstorm Wind | 50 | 0/0 | $4,032 | Thunderstorm winds downed some trees. |
| Hays | 7/17/2007 | Thunderstorm Wind | 50 | 0/0 | $2,688 | Winds downed large tree limbs. |
| Wilkesboro | 8/24/2007 | Thunderstorm Wind | 55 | 0/0 | $2,688 | A large tree was downed onto a power line. |
| Wilkesboro | 8/24/2007 | Thunderstorm Wind | 55 | 0/0 | $1,344 | A tree was downed across Browns Ford Rd. |
| Hays | 8/29/2007 | Thunderstorm Wind | 55 | 0/0 | $1,344 | A large tree downed across Bethany Ford Rd. |
| Wilkes Co. | 2/10/2008 | High Wind | 52 | 0/0 | $6,524 | Trees were downed throughout the county. There were also sporadic power outages. |
| Wilkesboro | 3/4/2008 | Thunderstorm Wind | 60 | 0/0 | $1,305 | 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. |
| Wilkes Co. | 5/12/2008 | High Wind | 52 | 0/0 | $2,610 | One tree was blown down in Parsonville. Another tree was blown down along Mining Church Road, 5 miles northwest of Elkin. |
| Traphill | 6/27/2008 | Thunderstorm Wind | 50 | 0/0 | $1,957 | Two trees were blown down by thunderstorm winds on Traphill Road. |
| Boomer | 7/7/2008 | Thunderstorm Wind | 55 | 0/0 | $1,957 | Several 2-4 inch diameter limbs downed. |
| Millers Creek | 7/9/2008 | Thunderstorm Wind | 50 | 0/0 | $1,174 | A tree was blown down. |
| North Wilkesboro | 7/9/2008 | Thunderstorm Wind | 50 | 0/0 | $2,610 | Two trees were downed on Mountain View Road. |
| Wilkesboro | 7/23/2008 | Thunderstorm Wind | 55 | 0/0 | $5,219 | Trees were blown down. |
| Roaring River | 8/2/2008 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Traphill | 8/2/2008 | Thunderstorm Wind | 55 | 0/0 | $2,610 | Trees were downed on Traphill Road. |
| North Wilkesboro | 8/2/2008 | Thunderstorm Wind | 55 | 0/0 | $3,914 | Numerous trees were downed. |
| Windy Gap | 8/2/2008 | Thunderstorm Wind | 55 | 0/0 | $3,914 | Numerous trees were downed. |
| Boomer | 8/14/2008 | Thunderstorm Wind | 55 | 0/0 | $1,305 | One tree was blown down along Highway 18. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| North Wilkesboro | 9/9/2008 | Thunderstorm Wind | 60 | 0/0 | $30,010 | Approximately 20 to 30 trees were blown down in and around North Wilkesboro. |
| Wilkes Co. | 12/31/2008 | High Wind | 50 | 0/0 | $19,572 | About 20 trees were blown down mainly across the northern portions of the county. |
| Wilkes Co. | 2/11/2009 | High Wind | 52 | 0/0 | $0 | |
| Traphill | 5/31/2009 | Thunderstorm Wind | 55 | 0/0 | $0 | -- |
| Knotville | 6/3/2009 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Wilkesboro | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Highway 16/18. |
| Congo | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was downed on Fish Dam Creek Road. |
| Millers Creek | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Green Acres Road. |
| Millers Creek | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Pads Road. |
| Cricket | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was downed on Sunset Orchard Road. |
| Traphill | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was downed on Traphill Ridge Road. |
| Hays | 8/5/2009 | Thunderstorm Wind | 55 | 0/0 | $2,534 | An 80-foot tree was uprooted and down across a driveway near Airport Road. |
| Wilkesboro | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Millers Creek | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Kite Road. |
| Cricket | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down. |
| North Wilkesboro | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was downed on Damascus Church Road. |
| Cricket | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Cricket Drive. |
| Buck | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Dixie Hill Road. |
| Clingman | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Mathis Mill Road. |
| Thurmond | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was downed on S. Center Church Rd. |
| Benham | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was downed on Pleasant Ridge Road. |
| Ferguson | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Cricket | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Prospect Drive. |
| Roaring River | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was blown down on Ruritan Road. |
| Wilkes Co. Airport | 8/5/2009 | Thunderstorm Wind | 50 | 0/0 | $1,267 | A tree was downed on Winkler Mill Road. |
| Wilkes Co. | 2/10/2010 | High Wind | 50 | 0/0 | $12,299 | Strong northwest winds on the backside of a deepening coastal low brought down numerous trees across the county. |
| Wilkes Co. | 2/25/2010 | High Wind | 50 | 0/0 | $3,690 | Trees were blown down in the Traphill and Ronda areas. A tree was also reported down on Route 18 near North Wilkesboro. |
| Thurmond | 4/8/2010 | Thunderstorm Wind | 60 | 0/0 | $3,690 | Numerous trees were brought down on Center Church Road in the State Road community. |
| Thurmond | 4/8/2010 | Thunderstorm Wind | 55 | 0/0 | $3,690 | Numerous trees were downed at the inter-section of Thurmond Road & Haystack Road. |
| Thurmond | 4/8/2010 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Traphill | 4/8/2010 | Thunderstorm Wind | 50 | 0/0 | $2,460 | Several trees were down and a chicken house was destroyed on Roaring Gap Rd. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Millers Creek | 5/14/2010 | Thunderstorm Wind | 50 | 0/0 | $1,107 | A tree was blown down. |
| Knotville | 5/16/2010 | Thunderstorm Wind | 50 | 0/0 | $1,107 | Thunderstorms winds blew a tree down at the intersection of River Liberty Church Road and Highway 268. |
| Congo | 5/28/2010 | Thunderstorm Wind | 50 | 0/0 | $1,107 | Thunderstorm winds blew a tree down on Windfield Huffman Road. |
| Ronda | 5/28/2010 | Thunderstorm Wind | 50 | 0/0 | $1,107 | Thunderstorm winds blew a tree down on Route 268 just east of Ronda. |
| Maple Springs | 6/3/2010 | Thunderstorm Wind | 50 | 0/0 | $1,845 | Two trees were downed near Old Route 60. |
| Roaring River | 6/4/2010 | Thunderstorm Wind | 50 | 0/0 | $2,214 | A tree was downed at 10000 Elkin Highway. |
| Roaring River | 6/4/2010 | Thunderstorm Wind | 50 | 0/0 | $1,107 | A tree was downed at 10000 Elkin Highway. |
| Champion | 6/14/2010 | Thunderstorm Wind | 50 | 0/0 | $2,214 | Two trees were downed on Mt Pleasant Rd. |
| Traphill | 6/14/2010 | Thunderstorm Wind | 50 | 0/0 | $4,919 | Several large trees were downed in Traphill. |
| Wilkesboro | 6/14/2010 | Thunderstorm Wind | 50 | 0/0 | $2,214 | Two trees were blown down in Wilkesboro. |
| Elkin | 6/14/2010 | Thunderstorm Wind | 50 | 0/0 | $3,690 | A few trees were blown down on Route 268 near the Wilkes and Yadkin border. |
| Millers Creek | 6/19/2010 | Thunderstorm Wind | 50 | 0/0 | $1,107 | A tree was blown down on Hacketts Road. |
| McGrady | 6/19/2010 | Thunderstorm Wind | 50 | 0/0 | $1,107 | A tree was blown down on Sparta Road. |
| Mulberry | 7/8/2010 | Thunderstorm Wind | 50 | 0/0 | $2,460 | Trees were blown down on Highway 18. |
| Traphill | 7/8/2010 | Thunderstorm Wind | 50 | 0/0 | $3,321 | Thunderstorm winds downed on Traphill Rd. |
| Traphill | 7/13/2010 | Thunderstorm Wind | 50 | 0/0 | $615 | One tree was downed by in Traphill. |
| Ferguson | 7/13/2010 | Thunderstorm Wind | 50 | 0/0 | $4,428 | Trees were downed along Rte 268 between Ferguson and West Kerr Scott Reservoir. |
| Ronda | 7/13/2010 | Thunderstorm Wind | 50 | 0/0 | $1,230 | A tree was downed along Macedonia Church Rd off Hwy 268. Small tree limbs also snapped. |
| Ronda | 7/13/2010 | Thunderstorm Wind | 50 | 0/0 | $615 | A tree was knocked down |
| Millers Creek | 7/13/2010 | Thunderstorm Wind | 50 | 0/0 | $615 | A tree was downed on Boone Tr off Hwy 16. |
| North Wilkesboro | 7/13/2010 | Thunderstorm Wind | 50 | 0/0 | $18,448 | Thunderstorm winds caused a 3-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. |
| Wilkesboro | 7/16/2010 | Thunderstorm Wind | 55 | 0/0 | $4,428 | Several trees were blown down Brushy Mountain Road. |
| Dockery | 7/18/2010 | Thunderstorm Wind | 52 | 0/0 | $0 | -- |
| Windy Gap | 7/27/2010 | Thunderstorm Wind | 50 | 0/0 | $2,460 | 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 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Boomer | 8/5/2010 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Champion | 8/5/2010 | Thunderstorm Wind | 55 | 0/0 | $6,149 | Numerous trees and power lines were downed or damaged by the high winds. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Hunting Creek | 8/5/2010 | Thunderstorm Wind | 55 | 0/0 | $2,460 | Numerous large tree limbs were down on Hendren Road and nickel-sized hail fell. |
| Elkville | 8/18/2010 | Thunderstorm Wind | 50 | 0/0 | $615 | Thunderstorm winds blew down a tree across Beaver Creek Road. |
| Millers Creek | 10/25/2010 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Wilkes Co. | 2/25/2011 | High Wind | 55 | 0/0 | $5,970 | There were 10-12 trees & power lines downed from winds across the county. Two grass fires started from fallen power lines. |
| Ferguson | 3/23/2011 | Thunderstorm Wind | 55 | 0/0 | $5,970 | Thunderstorm winds blew power lines down. |
| Wilkes Co. | 4/2/2011 | Strong Wind | 43 | 0/0 | $1,194 | Estimated winds up to 50 MPH downed a 12-foot apple tree and several other trees across the county. |
| Hays | 4/4/2011 | Thunderstorm Wind | 50 | 0/0 | $2,388 | 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 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Hunting Creek | 4/28/2011 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Wilkesboro | 5/13/2011 | Thunderstorm Wind | 55 | 0/0 | $0 | -- |
| Knotville | 5/23/2011 | Thunderstorm Wind | 60 | 0/0 | $5,970 | Several trees were blown down by winds on Hwy 268 near Johnson Rd. 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. |
| Millers Creek | 5/23/2011 | Thunderstorm Wind | 60 | 0/0 | $5,970 | Many large trees were downed 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 fallen white pines. |
| Mulberry | 5/23/2011 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Traphill | 5/24/2011 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Congo | 5/24/2011 | Thunderstorm Wind | 60 | 0/0 | $11,941 | 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. |
| Maple Springs | 5/26/2011 | Thunderstorm Wind | 60 | 0/0 | $3,582 | Trees were reported down in numerous locations across Wilkes County. 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 | Thunderstorm Wind | 50 | 0/0 | $2,149 | Thunderstorm winds blew two large maple trees down on Summit Road. |
| Clingman | 6/11/2011 | Thunderstorm Wind | 55 | 0/0 | $5,373 | Winds trees downed on Clingman Road. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Clingman | 6/11/2011 | Thunderstorm Wind | 55 | 0/0 | $5,373 | Winds downed near Old Highway 60. |
| Ronda | 6/11/2011 | Thunderstorm Wind | 50 | 0/0 | $1,075 | Thunderstorm winds blew a tree down. |
| Elkin | 6/11/2011 | Thunderstorm Wind | 60 | 0/0 | $23,881 | Winds downed trees and power lines. |
| Lomax | 6/12/2011 | Thunderstorm Wind | 50 | 0/0 | $2,149 | Thunderstorm winds blew two trees down near Shepherds Crossroads. |
| Vannoy | 6/21/2011 | Thunderstorm Wind | 60 | 0/0 | $21,493 | Thunderstorm winds blew numerous trees down including apple trees and the top half of other trees. |
| Champion | 6/21/2011 | Thunderstorm Wind | 50 | 0/0 | $1,791 | Winds downed a large tree on a fence. |
| Purlear | 6/21/2011 | Thunderstorm Wind | 55 | 0/0 | $3,224 | Thunderstorm winds blew two trees down on Parsonville Road and one tree down on Shingle Gap Road. |
| Moravian Falls | 6/21/2011 | Thunderstorm Wind | 50 | 0/0 | $1,075 | Winds downed a Bradford Pear Tree. |
| Hunting Creek | 6/21/2011 | Thunderstorm Wind | 50 | 0/0 | $1,075 | Thunderstorm winds blew a tree down on River Liberty Grove Church Road. |
| North Wilkesboro | 6/21/2011 | Thunderstorm Wind | 50 | 0/0 | $1,075 | Thunderstorm winds blew a tree down on River Liberty Grove Church Road. |
| Boomer | 7/4/2011 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Windy Gap | 7/4/2011 | Thunderstorm Wind | 50 | 0/0 | $1,194 | A few trees downed near Windy Gap Road. |
| Maple Springs | 7/13/2011 | Thunderstorm Wind | 55 | 0/0 | $23,881 | Winds blew down a tree on a power line on Reedy Creek Road, another on Lonesome Pine Road, and 3 more Lewis Fork Baptist Church Road, with one of these falling on a house & vehicle. On Red Top Road, a 30x40' open sided shed was blown away. |
| Ronda | 7/13/2011 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Ronda | 7/24/2011 | Thunderstorm Wind | 50 | 0/0 | $1,194 | Thunderstorm winds downed three trees in the Ronda, Clingman and Pleasant Hill area. |
| Roaring River | 8/11/2011 | Thunderstorm Wind | 50 | 0/0 | $358 | One tree was reported blown down. |
| Roaring River | 8/18/2011 | Thunderstorm Wind | 50 | 0/0 | $716 | Two trees were downed 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. Airport | 8/20/2011 | Thunderstorm Wind | 50 | 0/0 | $716 | A few trees were blown down by thunderstorm winds on River Street. |
| North Wilkesboro | 8/20/2011 | Thunderstorm Wind | 50 | 0/0 | $1,075 | Thunderstorm winds downed a tree on Hwy 268 E and several trees near Roaring River. |
| Purlear | 9/1/2011 | Thunderstorm Wind | 55 | 0/0 | $5,373 | Thunderstorm winds blew several trees down along the 8700 block of Boone Trail. |
| Traphill | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Thunderstorm winds blew a tree down in the 10000 block of Austin Traphill Road. |
| Roaring River | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Winds blew a tree down on White Plains Road. |
| Moravian Falls | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Winds blew a tree down on Cemetery Road. |
| Dockery | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Winds downed a tree in the 7000 block of Traphill Road. |
| Fairplains | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Winds downed a tree in Mulberry. |
| Roaring River | 9/2/2011 | Thunderstorm Wind | 50 | 0/0 | $597 | Winds blew a tin roof off an out building. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Windy Gap | 2/24/2012 | Thunderstorm Wind | 50 | 0/0 | $5,796 | Winds blew a tin roof off an out building. |
| Wilkes Co. Airport | 5/14/2012 | Thunderstorm Wind | 50 | 0/0 | $1,159 | Two trees were downed near the intersection of Congo Rd & Winkler Mill Rd. |
| Moxley | 6/18/2012 | Thunderstorm Wind | 50 | 0/0 | $1,739 | Winds downed several large tree limbs and one large tree at Stone Mountain Golf Club. |
| Mulberry | 6/22/2012 | Thunderstorm Wind | 55 | 0/0 | $8,695 | Winds blew multiple trees down on Hwy 18. |
| Joynes | 6/29/2012 | Thunderstorm Wind | 60 | 0/0 | $28,982 | Winds blew down a couple dozen trees across the northeast part of the county, mainly near Traphill to near Pleasant Hill. |
| Wilbar | 7/3/2012 | Thunderstorm Wind | 50 | 0/0 | $696 | A few trees were down across Route 16. |
| Benham | 7/5/2012 | Thunderstorm Wind | 50 | 0/0 | $1,739 | Multiple trees toppled on Austin-Traphill Rd. |
| Thurmond | 7/5/2012 | Thunderstorm Wind | 50 | 0/0 | $0 | -- |
| Darby | 7/5/2012 | Thunderstorm Wind | 50 | 0/0 | $696 | Two trees were reported down near Darby with small limbs and debris littering the hwy. |
| Hays | 7/22/2012 | Thunderstorm Wind | 50 | 0/0 | $696 | Several trees were downed on Mountain View Road. |
| Benham | 7/23/2012 | Thunderstorm Wind | 50 | 0/0 | $2,898 | A tree and powerlines were blown over or pulled down on Mining Church Rd. |
| Clingman | 7/25/2012 | Thunderstorm Wind | 50 | 0/0 | $1,043 | Several trees were blown down |
| Wilkesboro | 8/1/2012 | Thunderstorm Wind | 50 | 0/0 | $8,115 | The Wilkes County Sheriff's Department reported several trees & power lines were down throughout North Wilkesboro. Trees were down on Johnson road near Hays, about 4 miles NE of North Wilkesboro. |
| Moravian Falls | 8/2/2012 | Thunderstorm Wind | 50 | 0/0 | $5,796 | Trees & power lines were downed on SR 16. |
| Thurmond | 9/3/2012 | Thunderstorm Wind | 50 | 0/0 | $580 | One tree was downed on U.S. Rte 21 near the intersection of Thurmond Road. |
| Hunting Creek | 9/8/2012 | Thunderstorm Wind | 50 | 0/0 | $580 | One tree was downed on Highway 115 near Spring Drive and Fishing Creek Road. |
| Ronda | 9/8/2012 | Thunderstorm Wind | 50 | 0/0 | $1,159 | A power line was blown down by thunderstorm winds along Highway 268 East in the community of Ronda. |
| Wilkes Co. | 10/30/2012 | High Wind | 50 | 0/0 | $2,898 | Postal Service workers reported a few trees down within North Wilkesboro. |
| Wilkes Co. | 12/22/2012 | High Wind | 50 | 0/0 | $1,159 | The Wilkes County 911 Center reported that two trees were down, one on Parsonville Road in Parsonville and another on Elledge Mill Road in Mulberry. |
| Mulberry | 6/13/2013 | Thunderstorm Wind | 50 | 1/0 | $563 | 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. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Hays | 6/13/2013 | Thunderstorm Wind | 55 | 1/0 | $84,413 | 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. |
| Reddies River | 7/4/2013 | Thunderstorm Wind | 50 | 0/0 | $338 | A tree was reported down on NC Route 16. |
| Wilkes Co. | 1/2/2014 | High Wind | 54 | 0/0 | $0 | -- |
| Wilkes Co. | 1/25/2014 | High Wind | 60 | 0/0 | $0 | -- |
| Wilkes Co. | 3/12/2014 | High Wind | 50 | 0/0 | $983 | There were reports of trees down in several different locations in the county. |
| Wilkes Co. | 3/30/2014 | High Wind | 50 | 0/0 | $4,371 | Sporadic tree damage was reported mainly across northern sections of the county. |
| Hays | 6/9/2014 | Thunderstorm Wind | 50 | 0/0 | $10,927 | Thunderstorm winds blew down a set of powerlines in the community of Hays. |
| Champion | 6/9/2014 | Thunderstorm Wind | 50 | 0/0 | $1,639 | The one tree was downed at the intersection of Boone Trail and Boiling Springs Rd. Another tree downed on Huffman Fork Road, & a third was downed in Millers Creek. |
| Roaring River | 6/9/2014 | Thunderstorm Wind | 50 | 0/0 | $1,093 | The one tree fell on Red White and Blue Road. Another tree fell in the community of Roaring River. |
| Ronda | 6/9/2014 | Thunderstorm Wind | 50 | 0/0 | $546 | Winds downed a tree in the 1300 block of Hwy 268. |
| North Wilkesboro | 6/10/2014 | Thunderstorm Wind | 50 | 0/0 | $546 | Winds blew a tree down on Sunset Drive. |
| North Wilkesboro | 6/10/2014 | Thunderstorm Wind | 50 | 0/0 | $546 | Winds blew a tree down on Caudill Road. |
| Hays | 6/12/2014 | Thunderstorm Wind | 50 | 0/0 | $2,185 | Winds downed a few trees in Hays. One tree blocked Oak Ridge Road near Rock Creek. |
| Osbornville | 6/17/2014 | Thunderstorm Wind | 50 | 0/0 | $2,185 | Winds blew down several large tree branches on Somers Road. |
| Moravian Falls | 6/19/2014 | Thunderstorm Wind | 50 | 0/0 | $2,185 | Thunderstorm winds blew a power line down at the intersection of Brushy Mountain Road and Country Club Road. |
| Moravian Falls | 6/19/2014 | Thunderstorm Wind | 65 | 0/0 | $10,927 | Thunderstorm winds down over 100 trees in the Moravian Falls area with most of these at the Brushy Mountain Farm and Orchard. |
| Moravian Falls | 6/19/2014 | Thunderstorm Wind | 65 | 0/0 | $546 | Thunderstorm winds blew down a tree which blocked Germantown Road. |
| Purlear | 7/8/2014 | Thunderstorm Wind | 50 | 0/0 | $1,639 | 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. |
| North Wilkesboro | 7/8/2014 | Thunderstorm Wind | 50 | 0/0 | $328 | A tree blown down on Flint Hill Rd. |

| Location | Date | Event Type | Magnitude (Knots) | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Wilkes Co. | 10/3/2015 | Strong Wind | 30 | 0/0 | $2,652 | Strong winds and saturated ground allowed for a few trees to be blown down. |
| Boomer | 2/24/2016 | Thunderstorm Wind | 55 | 0/0 | $5,150 | Thunderstorm winds knocked down multiple trees along Boomer Road. |
| Wilkes Co. Airport | 2/24/2016 | Thunderstorm Wind | 50 | 0/0 | $1,030 | Thunderstorm winds knocked over trees along Congo Road. near the intersection of Crysel Road. |
| Wilkes Co. | 4/2/2016 | High Wind | 52 | 0/0 | $0 | -- |
| McGrady | 6/16/2016 | Thunderstorm Wind | 55 | 0/0 | $1,030 | Thunderstorm winds blew down trees on Highway 18 northbound. |
| Parsonville | 7/8/2016 | Thunderstorm Wind | 60 | 0/0 | $103,000 | Numerous large trees and power lines were blown down across Wilkes County. A roof was blown off 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. |
| Benham | 7/8/2016 | Thunderstorm Wind | 50 | 0/0 | $515 | A tree was blown down by thunderstorm winds near the State Road Grocery Store. |
| Roaring River | 7/27/2016 | Thunderstorm Wind | 50 | 0/0 | $515 | A large tree was downed by thunderstorm winds on Antioch Church Road. |
| Roaring River | 7/27/2016 | Thunderstorm Wind | 50 | 0/0 | $1,030 | A large tree was downed by thunderstorm winds along Abtco Road. Another tree was blown down along Roaring River Road. |
| North Wilkesboro Airport | 7/31/2016 | Thunderstorm Wind | 50 | 0/0 | $5,150 | A few trees and powerlines were blown down by thunderstorm winds across North Wilkesboro. |
| Clingman | 7/31/2016 | Thunderstorm Wind | 50 | 0/0 | $1,030 | A couple of trees were downed by winds near Somers Road and Highway 421. |

### *Crop Damages*

Six of the historical wind events have resulted in crop damages per the NCEI's Storm Events Database. Most of these crop damages were a result of downed apple trees or damages to apple orchards.

## 5.7.4 Extent

Thunderstorm wind extent is measured in terms of wind speed. Nearly 80-percent of wind events had gusts 50-miles per hour or greater. The highest sustained wind reported in the High Country Region was 88-miles per hour in Boone (Watauga County). However, stronger gusts are possible. The High Country Region is in Wind Zone III (**Figure. 5.9**), where velocities can reach up to 200 miles per hour (in 3-second gusts). This area is also considered a "Special Wind Region." FEMA defines a Special Wind Region as an area where records or experience indicate basic wind speeds are higher than normal. These regions general consist of mountainous terrain, gorges, and other special topographic features.

Extent can also be measured in terms damages and human impacts (including injuries and loss of life). The greatest amount of damage associated with one thunderstorm wind event was $415,270 (occurring in Wilkes County), but costlier events are possible. Further, fatalities and injuries have occurred with this hazard and are possible in the future.

### 5.7.5 Probability of Future Occurrences

The NCEI Storm Events Database reported a total of 656 high wind, strong wind, and thunderstorm wind events over 66 years (1950-2016). This is results an average of nearly ten events per year. Additionally, it is likely many events have gone unreported. Therefore, wind events were assigned an annual probability of "highly likely" (greater than 90-percent annual chance).

## *5.8 TORNADO*

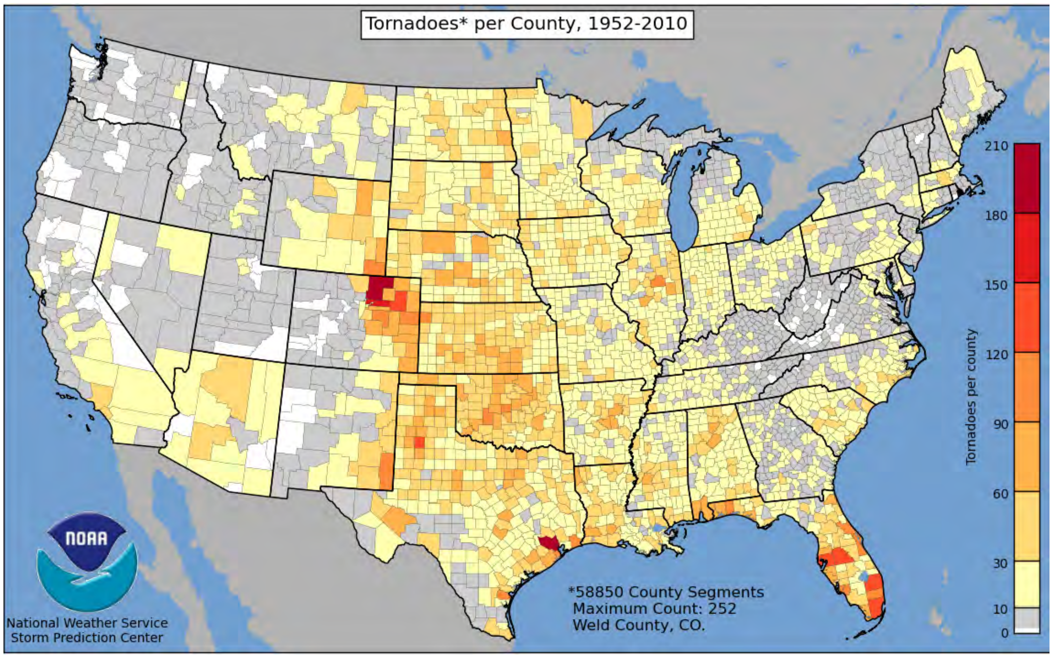
### 5.8.1 Background

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Most often, tornadoes are generated during 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. 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 can cause extreme destruction and turning normally harmless objects into deadly missiles.

Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries.[8] 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 5.8** shows tornado activity per county in the United States based on the number of recorded tornadoes between 1952 and 2010.

[8] NOAA, 2009.

**FIGURE 5.8: TORNADO ACTIVITY PER COUNTY IN THE UNITED STATES**




*Source: National Weather Service Storm Prediction Center*[9]

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 using the Fujita and Enhanced Fujita Scales. Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (**Table 5.18**). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.19**).

**TABLE 5.18: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)**

| F-SCALE NUMBER | INTENSITY | 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 to 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. |

[9] http://www.weather.gov/images/hgx/swa/2013_graphs/tornadoes_county.png

| F-SCALE NUMBER | INTENSITY | WIND SPEED | TYPE OF DAMAGE DONE |
|---|---|---|---|
| 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. |

**TABLE 5.19 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)**

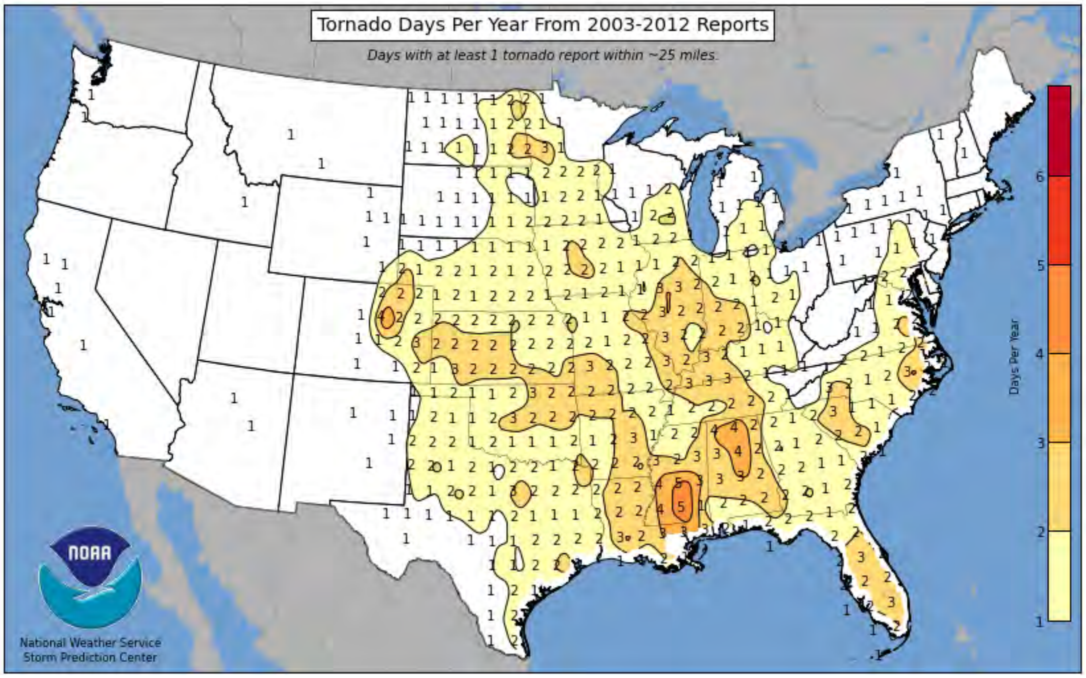
| EF-SCALE NUMBER | INTENSITY PHRASE | 3 SECOND GUST | TYPE OF DAMAGE DONE |
|---|---|---|---|
| EF0 | GALE | 65–85 MPH | Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards. |
| EF1 | MODERATE | 86–110 MPH | The lower limit is the beginning of 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. |
| EF2 | SIGNIFICANT | 111–135 MPH | Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated. |
| EF3 | SEVERE | 136–165 MPH | Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted. |
| EF4 | DEVASTATING | 166–200 MPH | Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated. |
| EF5 | INCREDIBLE | Over 200 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. |

## 5.8.2 Location

Tornadoes occur throughout the state of North Carolina, and thus 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 areas that are more susceptible to tornado strikes over time. Therefore, it is assumed that the High Country Region is uniformly exposed to this hazard.

Additionally, the map below from the National Weather Service (**Figure 5.9**) shows there are zero to two days per year where a tornado is reported within 25 miles of the High Country Region based on data from 2003-2012.

**FIGURE 5.9: UNITED STATES AVERAGE NUMBER OF TORNADOES REPORTED ANNUALLY**




*Source: NWS Storm Prediction Center*

## 5.8.3 Historical Occurrences

The National Weather Service Storm Prediction Center (SPC) lists a total of 11 recorded tornado events in the High Country Region since 1973 (summarized in **Table 5.20**), resulting in over $6 million (2017 dollars) in property damages.[10] In addition, nine injuries were reported (details listed in **Table 5.21**). It is important to note that only reported tornadoes are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported over the past 39 years. The locations of historic tornado events are shown in **Figure 5.10**.

**TABLE 5.20: SUMMARY OF TORNADO OCCURRENCES IN THE HIGH COUNTRY REGION**

| Location | Number of Occurrences | Property Damage (2017 Dollars) |
|---|---|---|
| **ALLEGHANY COUNTY** | **3** | **$1,859,571** |
| Sparta | 0 | $0 |
| Unincorporated Areas | 3 | $1,859,571 |
| **ASHE COUNTY** | **0** | **$0** |
| Jefferson | 0 | $0 |
| Lansing | 0 | $0 |

[10] 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.

| Location | Number of Occurrences | Property Damage (2017 Dollars) |
|---|---|---|
| West Jefferson | 0 | $0 |
| Unincorporated Area | 0 | $0 |
| **WATAUGA COUNTY** | **2** | **$125,419** |
| Beech Mountain | 0 | $0 |
| Blowing Rock | 0 | $0 |
| Boone | 1 | $90,553 |
| Seven Devils | 0 | $0 |
| Unincorporated Area | 1 | $34,866 |
| **WILKES COUNTY** | **6** | **$4,041,117** |
| North Wilkesboro | 0 | $0 |
| Ronda | 0 | $0 |
| Wilkesboro | 0 | $0 |
| Unincorporated Area | 6 | $4,041,117 |
| HIGH COUNTRY REGION TOTAL | 11 | $6,026,108 |

**TABLE 5.21: HISTORICAL TORNADO IMPACTS IN THE HIGH COUNTRY REGION**

| Location | Date | Magnitude | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | |
| Alleghany Co. | 5/27/1973 | F1 | 0/1 | $1,599,883 | -- |
| Blevins Crossroads | 5/8/2009 | EF2 | 0/6 | $253,354 | 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 Crossroads | 5/8/2009 | EF1 | 0/0 | $6,334 | There was 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. |
| Location | Date | Magnitude | Death/ Injuries | Property Damage (2017 dollars) | Details |
| **ASHE COUNTY** | | | | | |
| No tornado events recorded for Ashe County. | | | | | |
| Location | Date | Magnitude | Death/ Injuries | Property Damage (2017 dollars) | Details |
| **WATAUGA COUNTY** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Boone | 4/20/1996 | F1 | 0/2 | $90,553 | 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 significant amounts 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. |
| Zionville | 6/3/1998 | F0 | 0/0 | $34,866 | A tornado from five and a half miles west to three and a half miles west Zionville in the western part of Watauga County destroyed a few barns and toppled trees and tree limbs causing power outages. |

| Location | Date | Magnitude | Death/ Injuries | Property Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| Wilkes County | 5/27/1973 | F1 | 0/0 | $1,599,883 | n/a |
| Wilkes County | 6/1/1974 | F1 | 0/0 | $144,193 | Tornado touched down for about 1 mile, approximately 5 miles west of Wilkesboro. Mostly tree damage and some outbuildings. |
| Wilkes County | 5/31/1975 | F1 | 0/0 | $13,200 | A tornado touched down briefly in a wooded area south of Moravian Falls. |
| Wilkes County | 4/4/1977 | F1 | 0/0 | $1,172,971 | A tornado skipped along from south of Traphill to 5 miles NE of Austin. Damage to trees, mobile homes, chicken houses, and outbuildings. |
| Lomax | 8/16/1994 | F0 | 0/0 | $95,925 | Sheppards Crossroads - A weak tornado produced sporadic damage in several adjacent communities. An old store was destroyed, several chicken houses were flattened, windows were broken and a few farm buildings were damaged. |
| Joynes | 9/5/2011 | EF1 | 0/0 | $1,014,944 | 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. |

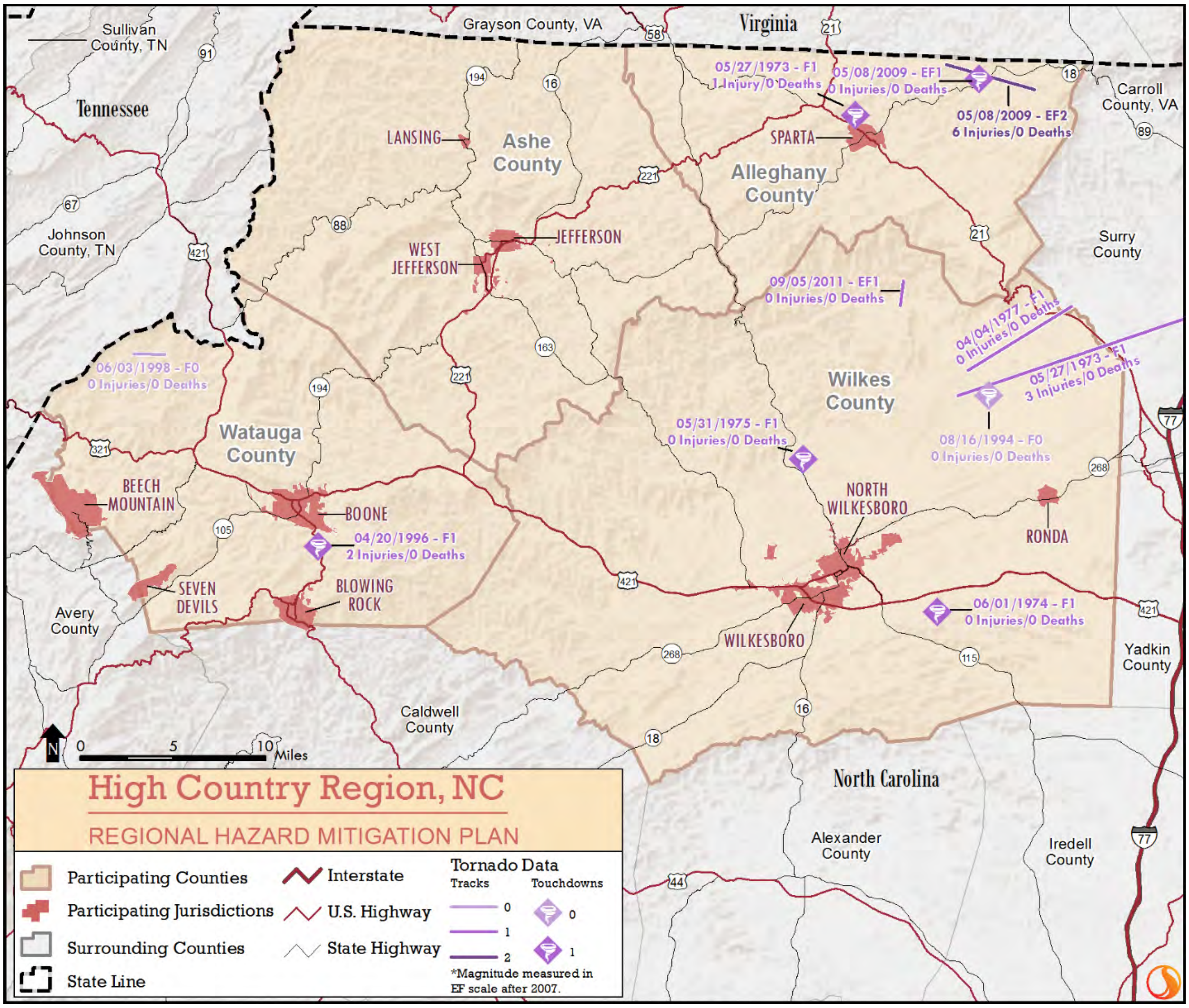
**Watauga County-**

A tornado touching down in Watauga County has been a rare occurrence. In recent history, a funnel touched down between Boone and Blowing Rock costing thousands of dollars in damage to vehicles in a parking lot. Most sightings of funnel clouds never develop to touch the ground. No significant loss from tornadoes has ever been recorded within the county boundaries. The topography of the county prevents many funnel clouds from developing into recordable tornadoes.

**Wilkes County-**

Research into tornados in Wilkes County has shown that each "section" of the county (north, south, east, and west) has experienced this violent type of storm. History has also shown the type of tornado experienced displays a narrow path or track with a duration of less than one (1) minute. Damage estimates have averaged less than $350,000 per storm. There have been no deaths or serious injuries in the ten-year period.

**FIGURE 5.10: TORNADO EVENTS IN THE HIGH COUNTRY REGION**




## 5.8.4 Extent

Tornado extent can be determined by magnitude (Fujita Scale and Enhanced Fujita Scale). The most severe tornado on record to impact the High Country Region was an EF2 (significant tornado with gusts between 111–135 MPH), which occurred in the northeastern corner of Alleghany County, near the Virginia-North Carolina border (see **Figure 5.8**). However, events of greater magnitudes are possible and the region is equally susceptible to such events.

Extent of tornadoes can also be measured in terms of damage and human impacts (including loss of life and injuries). The greatest amount of damage reported from a single tornado in the High Country Region was nearly $1.6 million (2017 dollars), which was caused by an F1 tornado that occurred in northeastern Wilkes County, approximately 7 miles north of the Town of Ronda. However, costlier events are possible. Further, fatalities and injuries have occurred with this hazard and are possible in the future.

### 5.8.5 Probability of Future Occurrences

According to historical information, tornado events are not typically an annual occurrence for the region. Furthermore, the mountainous terrain of the region makes tornadoes a rare occurrence. Based on 11 tornadoes reported in the last 43 years (1973-2016) there was an annual occurrence rate of 26-percent for that time. Based on the historic rate, the tornado hazard was assigned a probability of "likely" (between 10-90% annual chance). To further bolster this assessment, the National Weather Service indicated an average annual occurrence of zero to two tornado events in the High Country Region. While most 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.

## *5.9 WINTER STORM AND FREEZE*

### 5.9.1 Background

A winter storm is an event in which varieties of precipitation are formed that only occur at low temperatures, such as snow, sleet, freezing rain, or ice. Snow storms generally occur with the clash of different types of air masses, with differences in temperature, moisture, and pressure; specifically, when warm moist air interacts with cold dry air. Snow storms that produce a lot of snow require an outside source of moisture, such as the Gulf of Mexico or the Atlantic Ocean.

- Heavy Snow: A heavy snow storm is any winter storm that produces six inches or more of snow within a 48-hour period or less.
- Blizzard: A blizzard is a severe snow storm with winds more than 35 mph and visibility of less than a 1/4 mile for more than 3 hours.
- Ice Storm, Sleet, and Freezing Rain: An ice storm is defined as a storm with significant amounts of freezing rain and is a result of warm air in between two layers of cold air. 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.

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 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.

## 5.9.2 Location

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, winter storms are possible throughout the entire region.

## 5.9.3 Historical Occurrences

Winter weather has resulted in three disaster declarations for one or more of the counties in the High Country Region (Section 4 provides a complete listing of disaster declarations). This includes the Blizzard of 1996, subsequent 1996 winter storms, and a severe winter storm in 2010. The NCEI Storm Events Database reports a total of 308 recorded winter storm events in the High Country Region since 1996 (**Table 5.22**).[11] These events resulted in nearly $2.4 million in property damages and $2.4 million in crop damages (2017 dollars) in damages as well as two deaths and one injury.[12] **Table 5.23** lists historical winter storm occurrences, and those events with reported damages and fatalities are presented in **Table 5.24**.

**TABLE 5.22: SUMMARY OF WINTER STORM EVENTS IN THE HIGH COUNTRY REGION**

| Location | Number of Occurrences | Property Damage (2017 Dollars) | Crop Damage (2017 Dollars) |
|---|---|---|---|
| Alleghany County | 64 | $206,122 | $5,433 |
| Ashe County | 97 | $407,033 | $5,433 |
| Watauga County | 97 | $703,519 | $5,433 |
| Wilkes County | 50 | $1,040,734 | $2,415,528 |
| **HIGH COUNTRY REGION TOTAL** | **308** | **$2,357,408** | **$2,431,828** |

[11] These ice and winter storm events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional winter storm conditions have affected the High Country Region. In addition, the 235 are reported by county, so many of these storms likely affected all of the counties.
[12] The dollar amount provided by NCEI is divided by the number affected counties to reflect a damage estimate for the county.

**TABLE 5.23: HISTORICAL WINTER STORM IMPACTS IN THE HIGH COUNTRY REGION**

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | |
| Alleghany County | 1/5/1996 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/6/1996 | Heavy Snow | 0/1 | $0 | $0 |
| Alleghany County | 1/11/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 1/26/1996 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/1/1996 | Ice Storm | 0/0 | $90,553 | $0 |
| Alleghany County | 2/2/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/3/1996 | Cold/Wind Chill | 0/0 | $36,221 | $0 |
| Alleghany County | 2/16/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 3/8/1996 | Cold/Wind Chill | 0/0 | $0 | $5,433 |
| Alleghany County | 12/18/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 1/10/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 1/23/1997 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 2/13/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/29/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 1/15/1998 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/27/1998 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/23/1998 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/2/1999 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/1/1999 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/19/1999 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 3/3/1999 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 3/9/1999 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 1/17/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 1/19/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/13/2000 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/19/2002 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 12/4/2002 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/22/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/6/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/15/2003 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 3/30/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/4/2003 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/25/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/5/2004 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/26/2004 | Heavy Snow | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | |
| Alleghany County | 1/30/2005 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 2/28/2005 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/15/2005 | Ice Storm | 0/0 | $11,406 | $0 |
| Alleghany County | 10/13/2006 | Frost/Freeze | 0/0 | $0 | $0 |
| Alleghany County | 1/21/2007 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 4/7/2007 | Frost/Freeze | 0/0 | $0 | $0 |
| Alleghany County | 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 |
| Alleghany County | 3/1/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/18/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/25/2009 | Ice Storm | 0/0 | $2,534 | $0 |
| Alleghany County | 1/21/2010 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/29/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/4/2010 | Winter Storm | 0/0 | $61,494 | $0 |
| Alleghany County | 2/19/2012 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 3/27/2012 | Frost/Freeze | 0/0 | $0 | $0 |
| Alleghany County | 1/17/2013 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/26/2013 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 4/4/2013 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 1/7/2014 | Cold/Wind Chill | 0/0 | $0 | $0 |
| Alleghany County | 2/12/2014 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 3/6/2014 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 11/1/2014 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 11/26/2014 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 1/23/2015 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 2/16/2015 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/19/2015 | Extreme Cold/Wind Chill | 0/0 | $0 | $0 |
| Alleghany County | 2/25/2015 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/22/2016 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/14/2016 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/15/2003 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 3/30/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/4/2003 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/25/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/5/2004 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/26/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 1/30/2005 | Winter Weather | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | |
| Alleghany County | 2/28/2005 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/15/2005 | Ice Storm | 0/0 | $11,406 | $0 |
| Alleghany County | 10/13/2006 | Frost/Freeze | 0/0 | $0 | $0 |
| Alleghany County | 1/21/2007 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 4/7/2007 | Frost/Freeze | 0/0 | $0 | $0 |
| Alleghany County | 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 |
| Alleghany County | 3/1/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/18/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 12/25/2009 | Ice Storm | 0/0 | $2,534 | $0 |
| Alleghany County | 1/21/2010 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/29/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/4/2010 | Winter Storm | 0/0 | $61,494 | $0 |
| Alleghany County | 2/19/2012 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 3/27/2012 | Frost/Freeze | 0/0 | $0 | $0 |
| Alleghany County | 1/17/2013 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 2/26/2013 | Ice Storm | 0/0 | $0 | $0 |
| Alleghany County | 4/4/2013 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 1/7/2014 | Cold/Wind Chill | 0/0 | $0 | $0 |
| Alleghany County | 2/12/2014 | Heavy Snow | 0/0 | $0 | $0 |
| Alleghany County | 3/6/2014 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 11/1/2014 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 11/26/2014 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 1/23/2015 | Winter Weather | 0/0 | $0 | $0 |
| Alleghany County | 2/16/2015 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/19/2015 | Extreme Cold/Wind Chill | 0/0 | $0 | $0 |
| Alleghany County | 2/25/2015 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 1/22/2016 | Winter Storm | 0/0 | $0 | $0 |
| Alleghany County | 2/14/2016 | Winter Storm | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | |
| Ashe County | 1/5/1996 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 1/6/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/11/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/26/1996 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/1/1996 | Ice Storm | 0/0 | $90,553 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | |
| Ashe County | 2/2/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/3/1996 | Cold/Wind Chill | 0/0 | $36,221 | $0 |
| Ashe County | 2/12/1996 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/16/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 3/8/1996 | Cold/Wind Chill | 0/0 | $0 | $5,433 |
| Ashe County | 3/19/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 4/8/1996 | Winter Weather | 0/0 | $0 | $0 |
| Ashe County | 12/18/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/10/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/13/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/5/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/29/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/27/1998 | Heavy Snow | 0/0 | $261,494 | $0 |
| Ashe County | 2/3/1998 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/23/1998 | Ice Storm | 0/0 | $0 | $0 |
| Ashe County | 1/2/1999 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/1/1999 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/19/1999 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 3/3/1999 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 3/9/1999 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/17/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/19/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/22/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/13/2000 | Ice Storm | 0/0 | $0 | $0 |
| Ashe County | 12/30/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 3/6/2001 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 3/20/2001 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/19/2002 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 12/4/2002 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 1/22/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/6/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/15/2003 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 3/30/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 4/10/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/4/2003 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 12/18/2003 | Winter Storm | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | |
| Ashe County | 1/25/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/26/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/30/2005 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/3/2005 | Ice Storm | 0/0 | $0 | $0 |
| Ashe County | 2/28/2005 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/15/2005 | Ice Storm | 0/0 | $11,406 | $0 |
| Ashe County | 10/12/2006 | Frost/Freeze | 0/0 | $0 | $0 |
| Ashe County | 1/9/2007 | Winter Weather | 0/0 | $0 | $0 |
| Ashe County | 1/21/2007 | Ice Storm | 0/0 | $0 | $0 |
| Ashe County | 2/17/2007 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/1/2008 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/17/2008 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 |
| Ashe County | 2/27/2008 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/3/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 3/1/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/18/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/25/2009 | Ice Storm | 0/0 | $0 | $0 |
| Ashe County | 1/21/2010 | Ice Storm | 0/0 | $984 | $0 |
| Ashe County | 1/29/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/4/2010 | Winter Storm | 0/0 | $2,460 | $0 |
| Ashe County | 2/9/2010 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/10/2010 | Blizzard | 0/0 | $0 | $0 |
| Ashe County | 2/15/2010 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/24/2010 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/26/2010 | Blizzard | 0/0 | $0 | $0 |
| Ashe County | 12/4/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 12/12/2010 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 12/16/2010 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 12/25/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/6/2011 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/11/2011 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 1/26/2011 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/19/2012 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 3/27/2012 | Frost/Freeze | 0/0 | $0 | $0 |
| Ashe County | 10/29/2012 | Winter Storm | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | |
| Ashe County | 1/17/2013 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/2/2013 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 2/26/2013 | Ice Storm | 0/0 | $0 | $0 |
| Ashe County | 4/4/2013 | Winter Weather | 0/0 | $0 | $0 |
| Ashe County | 1/2/2014 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 1/7/2014 | Cold/Wind Chill | 0/0 | $0 | $0 |
| Ashe County | 1/25/2014 | Winter Weather | 0/0 | $0 | $0 |
| Ashe County | 2/12/2014 | Heavy Snow | 0/0 | $0 | $0 |
| Ashe County | 3/6/2014 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 11/1/2014 | Winter Weather | 0/0 | $0 | $0 |
| Ashe County | 11/26/2014 | Winter Weather | 0/0 | $0 | $0 |
| Ashe County | 1/23/2015 | Winter Weather | 0/0 | $0 | $0 |
| Ashe County | 2/15/2015 | Extreme Cold/Wind Chill | 0/0 | $0 | $0 |
| Ashe County | 2/16/2015 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/19/2015 | Extreme Cold/Wind Chill | 0/0 | $0 | $0 |
| Ashe County | 2/24/2015 | Winter Weather | 0/0 | $0 | $0 |
| Ashe County | 2/25/2015 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 1/22/2016 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/8/2016 | Winter Storm | 0/0 | $0 | $0 |
| Ashe County | 2/14/2016 | Winter Storm | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | |
| Watauga County | 1/5/1996 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 1/6/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/11/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/26/1996 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/1/1996 | Ice Storm | 0/0 | $90,553 | $0 |
| Watauga County | 2/2/1996 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/3/1996 | Cold/Wind Chill | 0/0 | $36,221 | $0 |
| Watauga County | 2/12/1996 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/16/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 3/8/1996 | Cold/Wind Chill | 0/0 | $0 | $5,433 |
| Watauga County | 3/19/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 4/8/1996 | Winter Weather | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | |
| Watauga County | 12/18/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/10/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/13/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 12/5/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 12/29/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/15/1998 | Ice Storm | 0/0 | $0 | $0 |
| Watauga County | 1/27/1998 | Heavy Snow | 0/0 | $522,987 | $0 |
| Watauga County | 2/3/1998 | Heavy Snow | 0/0 | $43,582 | $0 |
| Watauga County | 12/23/1998 | Ice Storm | 0/0 | $0 | $0 |
| Watauga County | 1/2/1999 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/1/1999 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/19/1999 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 3/3/1999 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 3/9/1999 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/17/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/19/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/22/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/29/2000 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 12/30/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 3/6/2001 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 3/20/2001 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/19/2002 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 12/4/2002 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 1/22/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/6/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/15/2003 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 3/30/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 4/10/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 12/4/2003 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 12/18/2003 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 1/25/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/2/2004 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/5/2004 | Ice Storm | 0/0 | $0 | $0 |
| Watauga County | 2/12/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/15/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/26/2004 | Heavy Snow | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | |
| Watauga County | 1/30/2005 | Winter Weather | 0/0 | $0 | $0 |
| Watauga County | 2/3/2005 | Ice Storm | 0/0 | $0 | $0 |
| Watauga County | 2/28/2005 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 10/12/2006 | Frost/Freeze | 0/0 | $0 | $0 |
| Watauga County | 1/9/2007 | Winter Weather | 0/0 | $0 | $0 |
| Watauga County | 1/21/2007 | Ice Storm | 0/0 | $0 | $0 |
| Watauga County | 2/17/2007 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/1/2008 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/17/2008 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 |
| Watauga County | 2/27/2008 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/3/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 3/1/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 12/18/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 12/25/2009 | Ice Storm | 0/0 | $3,800 | $0 |
| Watauga County | 1/21/2010 | Ice Storm | 0/0 | $0 | $0 |
| Watauga County | 1/29/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/4/2010 | Winter Storm | 0/0 | $2,460 | $0 |
| Watauga County | 2/9/2010 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/10/2010 | Blizzard | 0/0 | $0 | $0 |
| Watauga County | 2/15/2010 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/24/2010 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/26/2010 | Blizzard | 0/0 | $0 | $0 |
| Watauga County | 12/4/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 12/12/2010 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 12/16/2010 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 12/25/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/6/2011 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/11/2011 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 1/26/2011 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 3/27/2012 | Frost/Freeze | 0/0 | $0 | $0 |
| Watauga County | 10/28/2012 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 1/17/2013 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/2/2013 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 2/26/2013 | Ice Storm | 0/0 | $0 | $0 |
| Watauga County | 4/4/2013 | Winter Weather | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | |
| Watauga County | 1/7/2014 | Cold/Wind Chill | 0/0 | $0 | $0 |
| Watauga County | 2/12/2014 | Heavy Snow | 0/0 | $0 | $0 |
| Watauga County | 3/6/2014 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 11/1/2014 | Winter Weather | 0/0 | $0 | $0 |
| Watauga County | 11/26/2014 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 1/23/2015 | Winter Weather | 0/0 | $0 | $0 |
| Watauga County | 2/15/2015 | Extreme Cold/Wind Chill | 0/0 | $0 | $0 |
| Watauga County | 2/16/2015 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/19/2015 | Extreme Cold/Wind Chill | 0/0 | $0 | $0 |
| Watauga County | 2/24/2015 | Winter Weather | 0/0 | $0 | $0 |
| Watauga County | 2/25/2015 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 1/22/2016 | Winter Storm | 0/0 | $0 | $0 |
| Watauga County | 2/14/2016 | Winter Storm | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| Wilkes County | 1/6/1996 | Heavy Snow | 0/0 | $253,549 | $0 |
| Wilkes County | 1/11/1996 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 2/1/1996 | Ice Storm | 0/0 | $543,320 | $0 |
| Wilkes County | 2/2/1996 | Winter Storm | 0/0 | $0 | $0 |
| Wilkes County | 2/3/1996 | Cold/Wind Chill | 0/0 | $72,443 | $0 |
| Wilkes County | 2/9/1996 | Winter Weather | 1/0 | $0 | $0 |
| Wilkes County | 3/8/1996 | Cold/Wind Chill | 0/0 | $0 | $72,443 |
| Wilkes County | 1/23/1997 | Winter Weather | 0/0 | $0 | $0 |
| Wilkes County | 2/13/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 4/9/1997 | Cold/Wind Chill | 0/0 | $0 | $177,045 |
| Wilkes County | 4/10/1997 | Cold/Wind Chill | 0/0 | $0 | $177,045 |
| Wilkes County | 12/29/1997 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 12/23/1998 | Ice Storm | 0/0 | $0 | $0 |
| Wilkes County | 2/19/1999 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 3/9/1999 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 1/18/2000 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 1/29/2000 | Winter Storm | 0/0 | $0 | $0 |
| Wilkes County | 1/20/2002 | Frost/Freeze | 0/0 | $0 | $0 |
| Wilkes County | 12/4/2002 | Winter Storm | 0/0 | $0 | $0 |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| Wilkes County | 1/22/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 2/6/2003 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 2/15/2003 | Winter Storm | 0/0 | $0 | $0 |
| Wilkes County | 1/25/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 2/2/2004 | Ice Storm | 0/0 | $0 | $0 |
| Wilkes County | 2/26/2004 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 1/30/2005 | Winter Weather | 0/0 | $0 | $0 |
| Wilkes County | 2/28/2005 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 4/16/2005 | Frost/Freeze | 0/0 | $0 | $0 |
| Wilkes County | 12/15/2005 | Ice Storm | 0/0 | $11,406 | $0 |
| Wilkes County | 1/21/2007 | Ice Storm | 0/0 | $0 | $0 |
| Wilkes County | 4/9/2007 | Frost/Freeze | 0/0 | $0 | $1,988,996 |
| Wilkes County | 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 |
| Wilkes County | 3/1/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 12/18/2009 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 12/25/2009 | Ice Storm | 0/0 | $0 | $0 |
| Wilkes County | 1/29/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 2/4/2010 | Winter Storm | 0/0 | $122,987 | $0 |
| Wilkes County | 3/2/2010 | Heavy Snow | 0/0 | $2,214 | $0 |
| Wilkes County | 12/25/2010 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 4/4/2013 | Winter Weather | 0/0 | $0 | $0 |
| Wilkes County | 12/8/2013 | Winter Weather | 0/0 | $0 | $0 |
| Wilkes County | 1/7/2014 | Cold/Wind Chill | 0/0 | $0 | $0 |
| Wilkes County | 2/12/2014 | Heavy Snow | 0/0 | $0 | $0 |
| Wilkes County | 3/6/2014 | Winter Storm | 0/0 | $0 | $0 |
| Wilkes County | 2/16/2015 | Winter Storm | 0/0 | $0 | $0 |
| Wilkes County | 2/24/2015 | Winter Weather | 0/0 | $0 | $0 |
| Wilkes County | 2/25/2015 | Winter Storm | 0/0 | $0 | $0 |
| Wilkes County | 1/20/2016 | Winter Weather | 1/1 | $30,900 | $0 |
| Wilkes County | 1/22/2016 | Winter Storm | 0/0 | $0 | $0 |
| Wilkes County | 2/14/2016 | Winter Storm | 0/0 | $0 | $0 |

## 5.24: Historical Winter Storm Details

| Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | |
| 2/3/1996 | Cold/Wind Chill | 0/0 | $36,221 | $0 | Extremely cold air spread into northwest and north-central North Carolina on the 3rd and continued until the 6th. Low temperatures during the early morning hours on the 5th ranged from 8 below zero to 12 below zero in the mountains to zero to 6 below zero east of the mountains. Several homes that did not have power restored after the ice storm were damaged when water pipes froze and ruptured. |
| 3/8/1996 | Cold/Wind Chill | 0/0 | $0 | $5,433 | Record breaking low temperatures from the 8th through the 12th damaged the peach, nectarine, berry crops, and the apple crop. Low temperatures were mainly in the single numbers above zero in the mountains. |
| 12/15/2005 | Ice Storm | 0/0 | $11,406 | $0 | An ice storm produced a 1/4 to 1/2-inch coating of ice across Northern North Carolina in the west. 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. |
| 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 | One quarter to 1/3 an inch of glaze occurred during this event. The ice downed trees and power lines in the county. |
| 12/25/2009 | Ice Storm | 0/0 | $2,534 | $0 | A report of 0.6 inches of ice near Ennice was received. Tree and power lines were also reported down. |
| 2/4/2010 | Winter Storm | 0/0 | $61,494 | $0 | 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. |

| Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | |
| 2/3/1996 | Cold/Wind Chill | 0/0 | $36,221 | $0 | Low temperatures during the early morning hours on the 5th ranged from 8 below zero to 12 below zero in the mountains to zero to 6 below zero east of the mountains. Several homes that did not have power restored after the ice storm were damaged when water pipes froze and ruptured. |
| 3/8/1996 | Cold/Wind Chill | 0/0 | $0 | $5,433 | Record breaking low temperatures from the 8th through the 12th damaged the peach, nectarine, berry crops, and the apple crop. Low temperatures were mainly in the single numbers above zero in the mountains. |

| Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | |
| 1/27/1998 | Heavy Snow | 0/0 | $261,494 | $0 | Total snowfall amounts were generally from 18 to 36 inches with maximum snow depths from14 to 24 inches. The heavy wet snow closed schools, businesses, & church services. People were stranded in homes and vehicles. There were numerous traffic accidents, some with injuries indirectly attributed to the storm. The snow was so deep even four-wheel drive vehicles got stuck. The weight of the snow knocked down utility lines, trees, and tree limbs, resulting in thousands of people without power. At one point, it was estimated that half of Watauga County was without power. Buildings, barns, awnings, greenhouses were damaged or collapsed due to the weight of the snow. A carport in Crumpler, Ashe County collapsed & damaged two vehicles. Shelters were set up & the National Guard was called out. Ashe & Watauga County declared federal disaster areas. |
| 12/15/2005 | Ice Storm | 0/0 | $11,406 | $0 | 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. |
| 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 | One quarter to 1/3 an inch of glaze occurred during this event. The ice downed trees and power lines in the county. |
| 1/21/2010 | Ice Storm | 0/0 | $984 | $0 | Ice accretion totaled 0.50 inches in Fleetwood and 0.25 inches in West Jefferson. |
| 2/4/2010 | Winter Storm | 0/0 | $2,460 | $0 | 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. |

| Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | |
| 2/3/1996 | Cold/Wind Chill | 0/0 | $36,221 | $0 | Low temperatures during the early morning hours on the 5th ranged from 8 below zero to 12 below zero in the mountains to zero to 6 below zero east of the mountains. Several homes that did not have power restored after the ice storm were damaged when water pipes froze and ruptured. |
| 3/8/1996 | Cold/Wind Chill | 0/0 | $0 | $5,433 | Record breaking low temperatures from the 8th through the 12th damaged the peach, nectarine, berry crops, and the apple crop. Low temperatures were mainly in the single numbers above zero in the mountains. |

| Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | |
| 1/27/1998 | Heavy Snow | 0/0 | $522,987 | $0 | 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. The heavy wet snow closed schools, businesses, and church services and stranded people in homes and vehicles. There were numerous traffic accidents, some with injuries indirectly attributed to the storm. The snow was so deep that even four-wheel drive vehicles got stuck. The weight of the snow knocked down utility lines, trees, and tree limbs, resulting in thousands of people without power. At one point, it was estimated that half of Watauga County was without power. Buildings, barns, awnings, greenhouses were damaged or collapsed due to the weight of the snow. Ashe and Watauga County were declared federal disaster areas. |
| 2/3/1998 | Heavy Snow | 0/0 | $43,582 | $0 | The heavy wet snow from late January and the weight of the snow and rain collapsed the roof of a Boone business. Hazardous road conditions resulted in traffic accidents. |
| 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 | One quarter to 1/3 an inch of glaze occurred during this event. The ice downed trees and power lines in the county |
| 12/25/2009 | Ice Storm | 0/0 | $3,800 | $0 | Up to 1 inch of ice was reported on trees with some trees and power lines brought down. |
| 2/4/2010 | Winter Storm | 0/0 | $2,460 | $0 | 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. |

| Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| 2/3/1996 | Cold/Wind Chill | 0/0 | $72,443 | $0 | Low temperatures during the early morning hours on the 5th ranged from 8 below zero to 12 below zero in the mountains to zero to 6 below zero east of the mountains. Several homes that did not have power restored after the ice storm were damaged when water pipes froze and ruptured. |
| 3/8/1996 | Cold/Wind Chill | 0/0 | $0 | $72,443 | Record breaking low temperatures from the 8th through the 12th damaged the peach, nectarine, berry crops, and the apple crop. Low temperatures were mainly in the single numbers above zero in the mountains. |
| 4/9/1997 | Cold/Wind Chill | 0/0 | $0 | $177,045 | Temperatures in the 20s during the morning hours on the 9th damaged peach and nectarine crops in mainly the western and northern portions of Wilkes County. |
| 4/10/1997 | Cold/Wind Chill | 0/0 | $0 | $177,045 | Temperatures in the 20s during the morning hours on the 10th damaged peach and nectarine crops in mainly the western and northern portions of Wilkes County. |
| 12/15/2005 | Ice Storm | 0/0 | $11,406 | $0 | 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. |

| Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | |
| 4/9/2007 | Frost/Freeze | 0/0 | $0 | $1,988,996 | The peach and nectarine crop were a total loss, with apples seeing a 50% loss. Crop damage and dollar amounts listed represent the losses for 3 consecutive nights of freezing weather. |
| 2/1/2008 | Ice Storm | 0/0 | $3,914 | $0 | 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. |
| 2/4/2010 | Winter Storm | 0/0 | $122,987 | $0 | 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. |
| 3/2/2010 | Heavy Snow | 0/0 | $2,214 | $0 | 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. |
| 1/20/2016 | Winter Weather | 1/1 | $30,900 | $0 | 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. One accident resulted in a fatality. |

There have been several notable winter storm events in the region. In extreme occurrences, over sixty inches have fallen (as 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 of the area.

### *1993 Severe Winter Storm*

This storm dropped 28 inches of snow over a three-day period. Some areas had 10 foot drifts. Furthermore, thousands lost power, some for over a week.

### *1996 Winter Storm*

This storm left two feet of snow and several thousand citizens without power for up to nine days. Although shelters were opened, some roads were impassible for up to four days. This event caused considerable disruption to business, industry, schools, and government services.

Winter storms throughout the planning area have 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.

### 5.9.4 Extent

The severity of the winter storm or blizzard can be measured in terms of amount of snow or ice accumulation, loss of human life and animal life, or by economic costs imposed by property and infrastructure loss.

The greatest 24-hour snowfall for the region was reported in Watauga County at sixty inches. Due to extreme variations in elevation throughout the region, extent totals will vary for each participating jurisdiction. The greatest amount of ice accumulation reported was up to one inch. However, greater levels of snowfall and ice accumulation are possible.

The greatest amount of property damage associated with any one event was $543,320 (2017 dollars) which occurred during a 1996 ice storm in Wilkes County. The greatest amount of crop damages was almost $2 million (2017 dollars), and occurred during a freeze event in Wilkes County. However, costlier events are possible. Further, fatalities and injuries have occurred with this hazard and are possible in the future.

### 5.9.5 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 six winter storm events each year.  Historical information indicates that winter storm events will impact the planning area each year. Therefore, this hazard was assigned a probability of “highly likely” (greater than 90% annual chance).

# *GEOLOGIC HAZARDS*

## *5.10 EARTHQUAKE*

### 5.10.1 Background

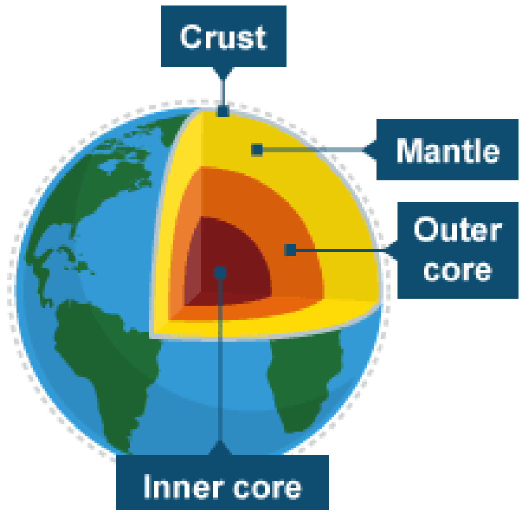
To understand the nature of earthquakes, the composition of the earth must be explored. The earth is made up of four major layers and several sub layers (Refer to **Figure 5.11** ): 1) a solid inner core, 2) a liquid outer core, 3) a semi-molten mantle, and 4) the rocky crust (the thin outermost layer of the earth).[13]  The upper portion of the mantle combined with the crust forms the lithosphere. This area is susceptible to fractures and can be thought of as a shell. The lithosphere breaks up into large slabs, known as tectonic plates. The tectonic plates are the areas where earthquakes occur.

[13] The Earth’s structure and plate movement. (2014). British Broadcasting Corporation. Retrieved December 11, 2014 from http://www.bbc.co.uk/bitesize/ks3/geography/physical_processes/plate_tectonics/revision/2/

There are approximately twelve major plates and several dozen more minor plates on the earth's crust, as shown in **Figure 5.12**. Plates are regions of the crust that continually move over the mantle. The plate boundaries are areas where plates meet, where earthquakes occur when plates grind past each other, dive under each other, or spread apart. Most earthquakes result from the release of stresses accumulated by the sudden displacement of rock in the Earth's crust along opposing plates. The areas bordering the Pacific Plate, also known as the "Pacific Ring of Fire", are at a particularly high risk since most of the largest earthquake events of the last century took place in the region. [14]

While earthquakes typically occur along plate boundaries earthquakes may also result from crustal strain, volcanism, landslides, or the collapse of caverns.

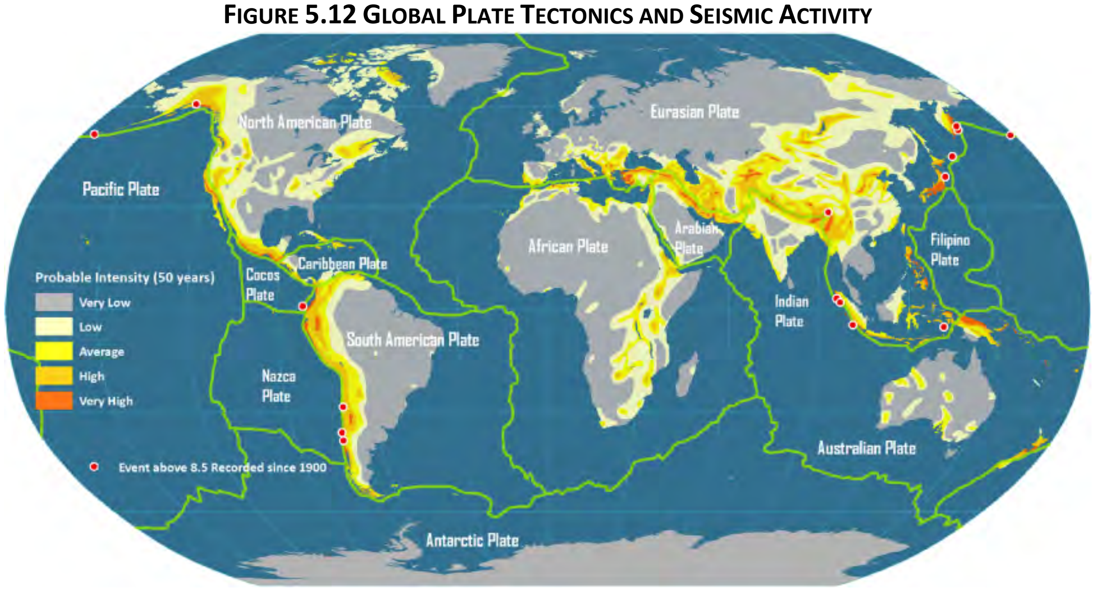
**FIGURE 5.11: THE EARTH'S SUBLAYERS**




*Source: The British Broadcasting Corporation (BBC)*

Earthquakes can affect hundreds of thousands of square miles, thus, cause damage to property measured in the tens of billions of dollars, result in loss of life, injury to hundreds of thousands of people, and disrupt the social and economic functioning of the affected area. The point where an earthquake starts is termed the focus or hypocenter and may be many miles to several hundred miles deep within the earth. The point at the surface directly above the focus is called the earthquake's epicenter. Earthquakes are measured in terms of their magnitude and intensity.

**FIGURE 5.12 GLOBAL PLATE TECTONICS AND SEISMIC ACTIVITY**



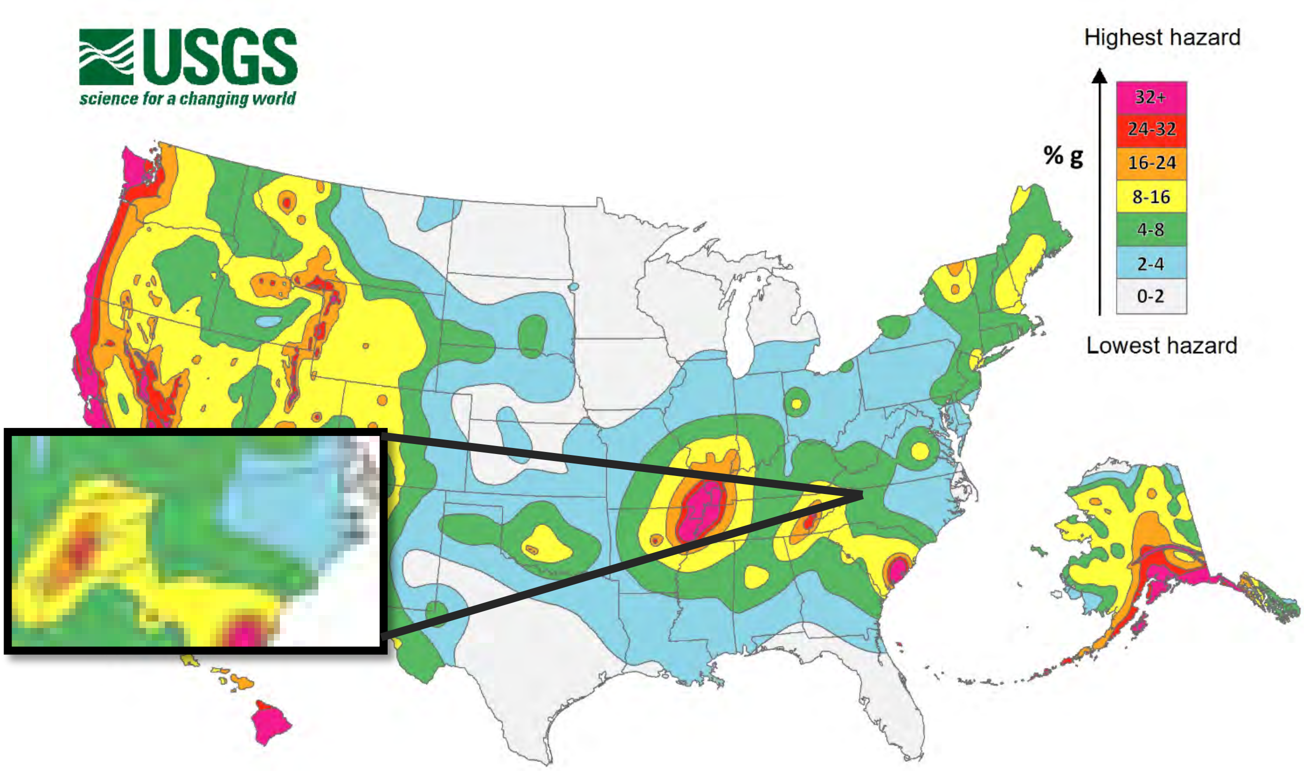

*Source: The Geography of Transport Systems*

[14] Kafka, Alan L. (2014). Why Does the Earth Quake in New England? Boston College. Retrieved December 11, 2014 from https://www2.bc.edu/~kafka/Why_Quakes/why_quakes.html

Most property damage and earthquake-related deaths are due to failure and collapse of structures from 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.

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. 5.13** shows relative seismic risk for the United States.

**FIGURE 5.13: UNITED STATES EARTHQUAKE HAZARD MAP**




*Source: United States Geological Survey*

Earthquake 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 5.25**). 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. Beginning in 2002, the USGS began using Moment Magnitude as the preferred measure of magnitude for all USGS earthquakes greater than magnitude 3.5. This was primarily due to the fact the Richter Scale has an upper bound, so large earthquakes were difficult to measure. Moment Magnitude also has a scale, but no instrument is used to measure it. Instead, factors such as the distance the earthquake travels, the area of the fault, and land that was displaced (also known as "slip") are used to measure moment magnitude. **Table 5.26** shows the Moment Magnitude Scale.

**TABLE 5.25: 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 5.26: MOMENT MAGNITUDE SCALE**

| SCALE VALUES | EARTHQUAKE EFFECTS |
|---|---|
| <3.5 | Very weak; unlikely to be felt |
| 3.5 - 5.4 | Generally felt; rarely causes damage |
| 5.4 - 6.0 | Will not cause damage to well-designed buildings; will damage poorly designed ones |
| 6.1 - 6.9 | Considered a "major earthquake" that causes a lot of damage |
| 7.0 - 7.9 | Large and destructive earthquake that can destroy large cities |
| 8 or > | Very weak; unlikely to be felt |

*Source: Federal Emergency Management Agency*

Earthquake 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 5.27**.

**TABLE 5.27: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES**

| SCALE | INTENSITY | DESCRIPTION OF EFFECTS | CORRESPONDING RICHTER 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 |

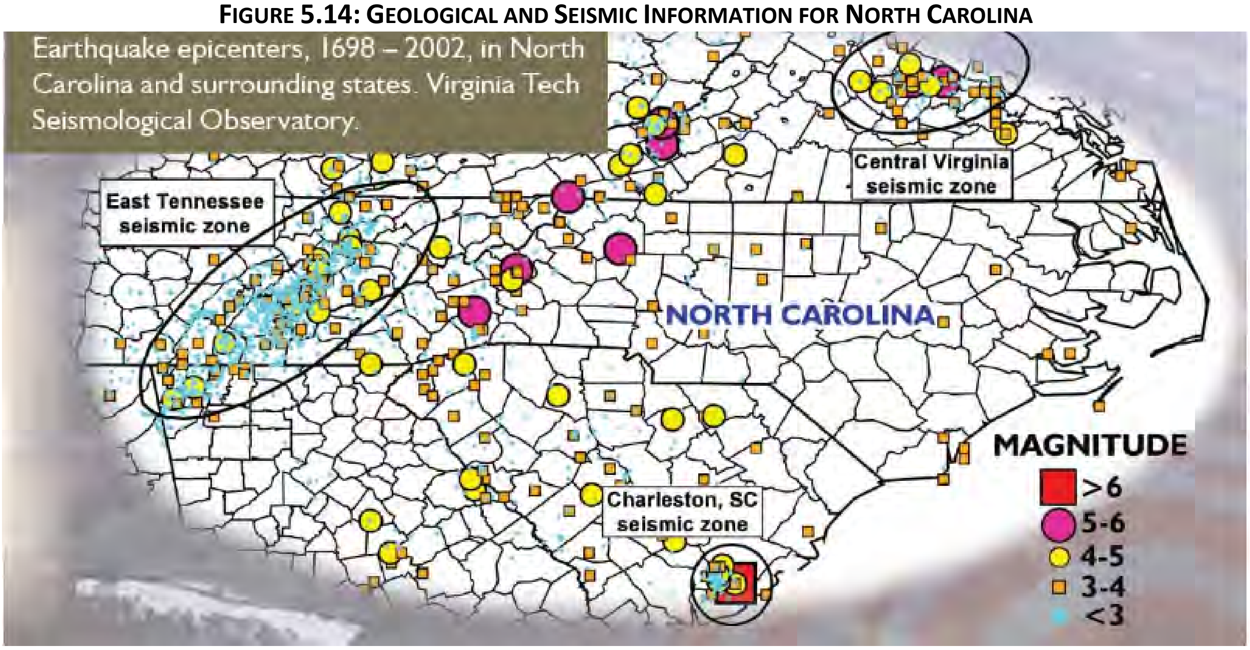
| SCALE | INTENSITY | DESCRIPTION OF EFFECTS | CORRESPONDING RICHTER MAGNITUDE |
|---|---|---|---|
| VII | VERY STRONG | Mild alarm; walls crack; plaster falls. | < 6.1 |
| VIII | DESTRUCTIVE | Moving cars uncontrollable; masonry fractures, poorly constructed buildings damaged. | |
| IX | RUINOUS | Some 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*

## 5.10.2 Location

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. Both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee can affect North Carolina. Both 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 5.14** is a map showing geological and seismic information for North Carolina.

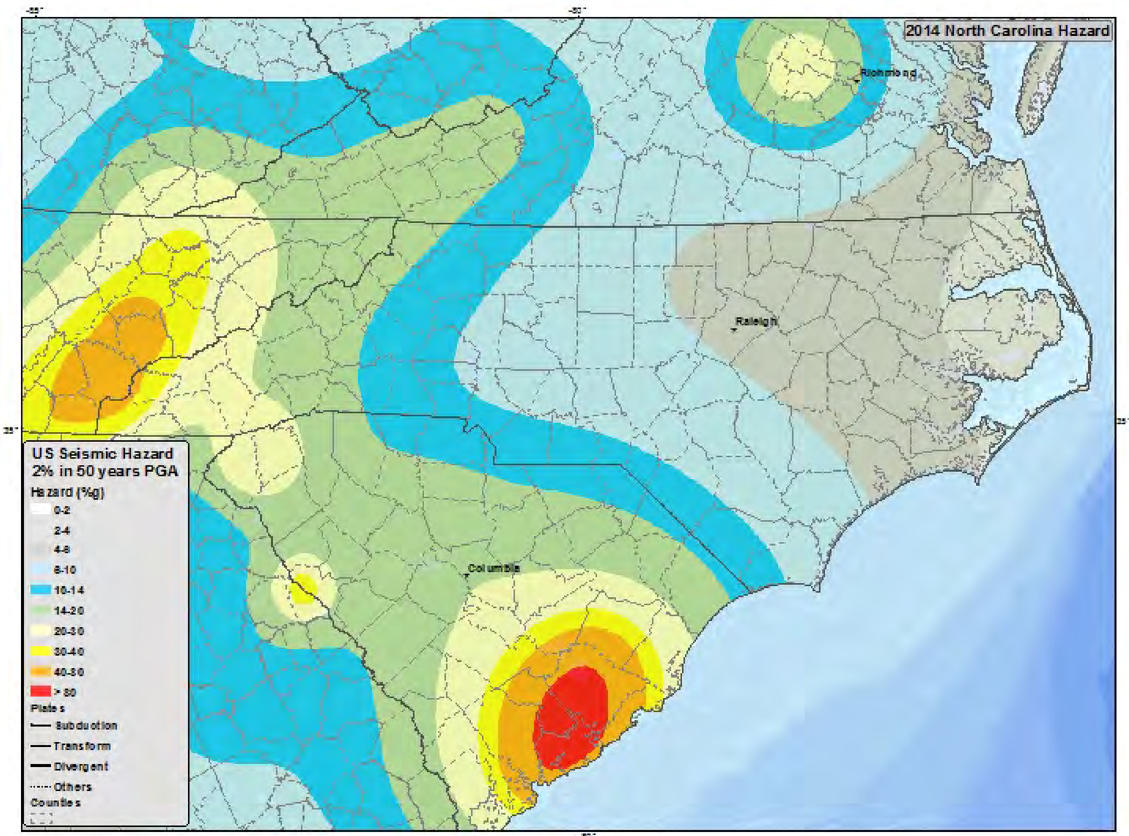
**FIGURE 5.14: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA**




*Source: North Carolina Geological Survey*

**Figure 5.15** shows the intensity level associated with the High Country Region, based on the national USGS map of peak ground acceleration (PGA) with 2-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 2-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. This map shows all the High Country Region within an approximate zone of 10 to 20 %g peak ground acceleration. This indicates that the region exists within an area of moderate seismic risk.

**FIGURE 5.15: PEAK ACCELERATION WITH 2-PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS**




*Source: USGS, 2008*

## 5.10.3 Historical Occurrences

At least 35 earthquakes are known to have affected the High Country Region since 1811. The strongest of these measured a VI on the Modified Mercalli Intensity (MMI) scale. **Table 5.28** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. **Table 5.29** presents a detailed occurrence of each event including the date, distance for the epicenter, and Modified Mercalli Intensity (if known). [15]

[15] 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.

**TABLE 5.28: SUMMARY OF SEISMIC ACTIVITY IN THE HIGH COUNTRY REGION**

| Location | Number of Occurrences | Greatest MMI Reported | Richter Scale Equivalent |
|---|---|---|---|
| **Alleghany County** | **7** | **V (slightly strong)** | **< 4.6** |
| Sparta | 7 | V | |
| Unincorporated Area | 0 | -- | |
| **Ashe County** | **9** | **IV (moderate)** | **< 4.8** |
| Jefferson | 3 | IV | |
| Lansing | 3 | III | |
| West Jefferson | 3 | IV | |
| Unincorporated Area | 0 | - | |
| **Watauga County** | **12** | **V (slightly strong)** | < 4.8 |
| Beech Mountain | 0 | -- | |
| Blowing Rock | 4 | V | |
| Boone | 8 | V | |
| Seven Devils | 0 | -- | |
| Unincorporated Area | 0 | -- | |
| **Wilkes County** | **7** | **VI (strong)** | **< 5.4** |
| North Wilkesboro | 3 | V | |
| Ronda | 1 | IV | |
| Wilkesboro | 3 | VI | |
| Unincorporated Area | 0 | -- | |
| **HIGH COUNTRY REGION TOTAL** | **35** | **VI** | **< 5.4** |

*Source: National Geophysical Data Center*

**TABLE 5.29: SIGNIFICANT SEISMIC EVENTS IN THE HIGH COUNTRY REGION (1638 -1985)**

| Location | Date | Magnitude | MMI |
|---|---|---|---|
| **ALLEGHANY COUNTY** | | | |
| Sparta | 9/28/1955 | *unknown* | III |
| Sparta | 10/28/1963 | *unknown* | III |
| Sparta | 10/29/1963 | *unknown* | III |
| Sparta | 9/10/1970 | *unknown* | IV |
| Sparta | 9/13/1976 | *unknown* | V |
| Sparta | 9/13/1976 | *unknown* | IV |
| Sparta | 7/27/1980 | *unknown* | IV |

| Location | Date | Magnitude | MMI |
|---|---|---|---|
| **ASHE COUNTY** | | | |
| Jefferson | 11/3/1928 | *unknown* | III |
| Lansing | 9/28/1955 | *unknown* | III |
| Jefferson | 11/9/1968 | *unknown* | IV |
| Jefferson | 9/10/1970 | *unknown* | IV |
| West Jefferson | 9/10/1970 | *unknown* | IV |
| Lansing | 9/10/1970 | *unknown* | III |
| West Jefferson | 11/30/1973 | 4.7 | V |
| West Jefferson | 10/22/1984 | 3.2 | III |

| Location | Date | Magnitude | MMI |
|---|---|---|---|
| **ASHE COUNTY** | | | |
| Lansing | 10/22/1984 | 3.2 | II |

| Location | Date | Magnitude | MMI |
|---|---|---|---|
| **WATAUGA COUNTY** | | | |
| Blowing Rock | 8/6/1885 | *unknown* | V |
| Boone | 8/6/1885 | *unknown* | V |
| Boone | 11/3/1928 | *unknown* | *unknown* |
| Boone | 3/8/1968 | *unknown* | IV |
| Boone | 11/20/1969 | 4.3 | III |
| Blowing Rock | 9/10/1970 | *unknown* | V |
| Boone | 9/10/1970 | *unknown* | V |
| Blowing Rock | 9/13/1976 | 3.3 | III |
| Boone | 7/27/1980 | *unknown* | II |
| Boone | 6/3/1981 | 2.3 | V |
| Blowing Rock | 10/22/1984 | 3.2 | IV |
| Boone | 10/22/1984 | 3.2 | V |

| Location | Date | Magnitude | MMI |
|---|---|---|---|
| **WILKES COUNTY** | | | |
| Wilkesboro | 8/31/1861 | *unknown* | VI |
| North Wilkesboro | 8/26/1916 | *unknown* | V |
| Wilkesboro | 11/3/1928 | *unknown* | III |
| North Wilkesboro | 9/28/1955 | *unknown* | III |
| Wilkesboro | 11/20/1969 | *unknown* | V |
| North Wilkesboro | 9/10/1970 | *unknown* | IV |
| Ronda | 9/13/1976 | *unknown* | IV |

In addition to those earthquakes specifically affecting the High Country Region, a list of 22 earthquakes that have caused damage throughout North Carolina is presented below in **Table 5.30**.

**TABLE 5.30: 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 | VI | VI |
| 12/23/1875 | Central Virginia | 5.0 | VII | VI |

| Date | Location | Richter Scale (Magnitude) | MMI (Intensity) | MMI in North Carolina |
|---|---|---|---|---|
| 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 |

*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).*

#### *Other Reported Earthquake Incidents*

According to CBS North Carolina, Wilkes County experienced two earthquakes in July of 2016, one of a 1.9 magnitude and one of a 2.4 magnitude. No damages were reported.[16]

In August of 2013, a 2.9 magnitude earthquake occurred three miles south of Boone. No injuries or damages were reported. [17]

### 5.10.4 Extent

There are several ways to measure the extent of an earthquake including magnitude and intensity experienced. The strongest earthquake epicenter recorded in the High Country Region was in 1861 in Wilkesboro (Wilkes County), which had a magnitude of about 5.1 and an intensity of VI. The strongest earthquake to impact the High Country Region occurred in 1811 in northeastern Arkansas, which had an 8.5 magnitude and an intensity of X. However, in North Carolina, it had an intensity of VI. Stronger events are possible in the county and beyond. In general, earthquakes greater than 5.0, which typically result in damage, are not common (or likely) in the area.

Another way to measure extent is by using percent-g, which is used as a way of estimating locational risk. **Figure 5.15** above illustrates this risk displaying a 10 to 20 %-g for various locations in the region.

[16] http://wncn.com/2016/07/24/earthquake-rattles-area-of-nc-near-virginia-border/

[17] http://myfox8.com/2013/08/25/minor-earthquake-rattles-boone-on-sunday/

### 5.10.5 Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting the High Country Region is unlikely. In fact, earthquake probably in general is difficult to estimate. There has been a total of 35 earthquakes that occurred in the High Country Region over 347 years. This results in a historic annual occurrence rate of 10.1 percent. Based on the historic occurrence rate, the earthquake hazard was assigned an annual probability of "likely" (between 10 to 90 percent annual chance). It should be noted that the historic rate only considers events occurring within the High Country Region, and that it is possible for earthquake events to impact the region even if they occur outside of it (see **Table 5.30** for examples). It is likely that future earthquakes resulting in light to moderate perceived shaking and damages ranging from none to very light will affect the region in the future.

## *5.11 LANDSLIDE*

### 5.11.1 Background

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation, which is driven by gravity. Natural and human-related changes in the environment can trigger landslides. These changes include 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 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.

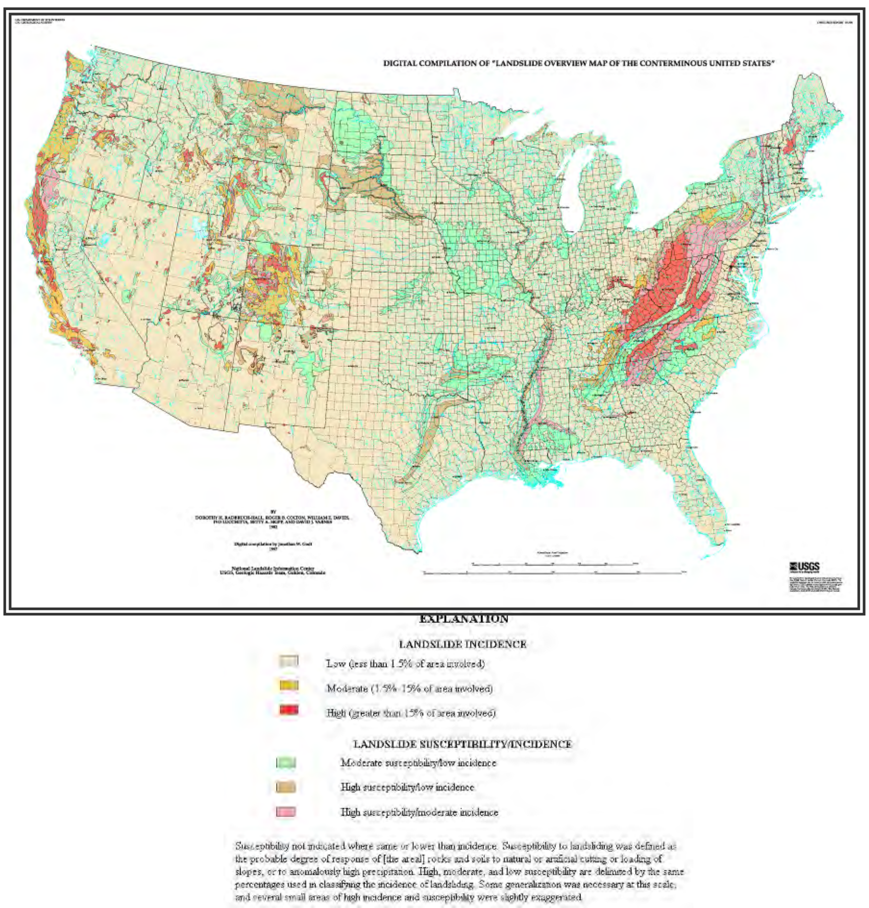
Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Some landslides move slowly and 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 (2009 dollars) in damage and between 25 and 50 deaths in the United States. **Figure 5.16** delineates areas where large numbers of landslides have occurred and areas that are susceptible to landsliding in the conterminous United States.[18]

**FIGURE 5.16: LANDSLIDE OVERVIEW MAP OF THE CONTERMINOUS UNITED STATES**




*Source: USGS*[19]

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

[19] 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.

## 5.11.2 Location

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.

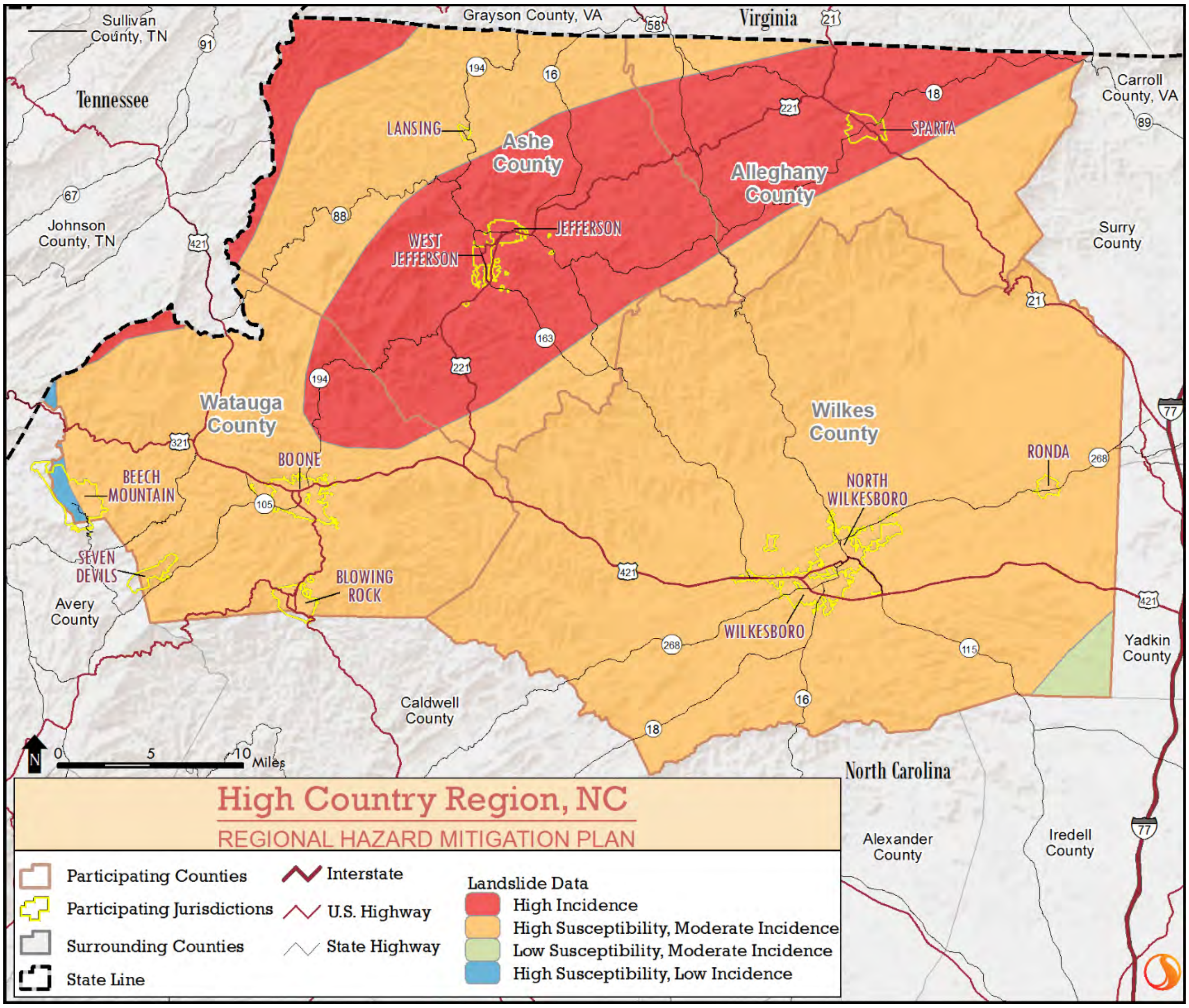
According to **Figure 5.17** below, the northern central portion of the region, including Alleghany County, Ashe County, and Watauga County, have the greatest landslide activity. **Table 5.31** describes the landslide incidence and susceptibility combinations present in the region. Most of the remaining 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.

**TABLE 5.31: LANDSLIDE INCIDENCE AND SUSCEPTIBILITY COMBINATIONS FOR THE HIGH COUNTRY REGION**

| | INCIDENCE | SUSCEPTIBILITY |
|---|---|---|
| **High** | High (More than 15% of the area involved in landsliding) | N/A |
| **High Susceptibility, Moderate Incidence** | Moderate (1.5-15% of the area involved in landsliding) | High |
| **Low Susceptibility, Moderate Incidence** | Moderate (1.5-15% of the area involved in landsliding) | Low |
| **Moderate*** | Moderate (1.5-15% of the area involved in landsliding) | N/A |
| **High Susceptibility, Low Incidence** | Low (Less than 1.5% of the area involved in landsliding | High |
| **Low*** | Low | N/A |

*Landslide incidence/susceptibility combination not present in the High Country Region

**FIGURE 5.17: LANDSLIDE SUSCEPTIBILITY MAP OF THE HIGH COUNTRY REGION**




Source: USGS

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 to map landslides and landslide deposits. More information about the study, as well as the detailed landslide maps for Watauga County, can be found at: https://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/geologic-hazards/wataunga-county-hazards-maps. 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. 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 in a high hazard area based on the Stability Index.[20] 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 cubic/yards of soil moved.

## 5.11.3 Historical Occurrences

Steep topography throughout the High Country Region makes the planning area susceptible to landslides. Most landslides are caused by heavy rainfall in the area. Building on steep slopes that was not previously possible also contributes to risk. **Table 5.32** presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey (NCGS), since 1940. It should be noted that the NCGS emphasized the dataset provided was incomplete and does not include points identified in the North Carolina Landslide Hazard Mapping Program for Watauga County or, potentially, all landslides in other counties. Therefore, there may be additional historic landslide occurrences. No damage information was provided by NCGS.

The locations of the landslide events presented in this table are presented in **Figure 5.18**.

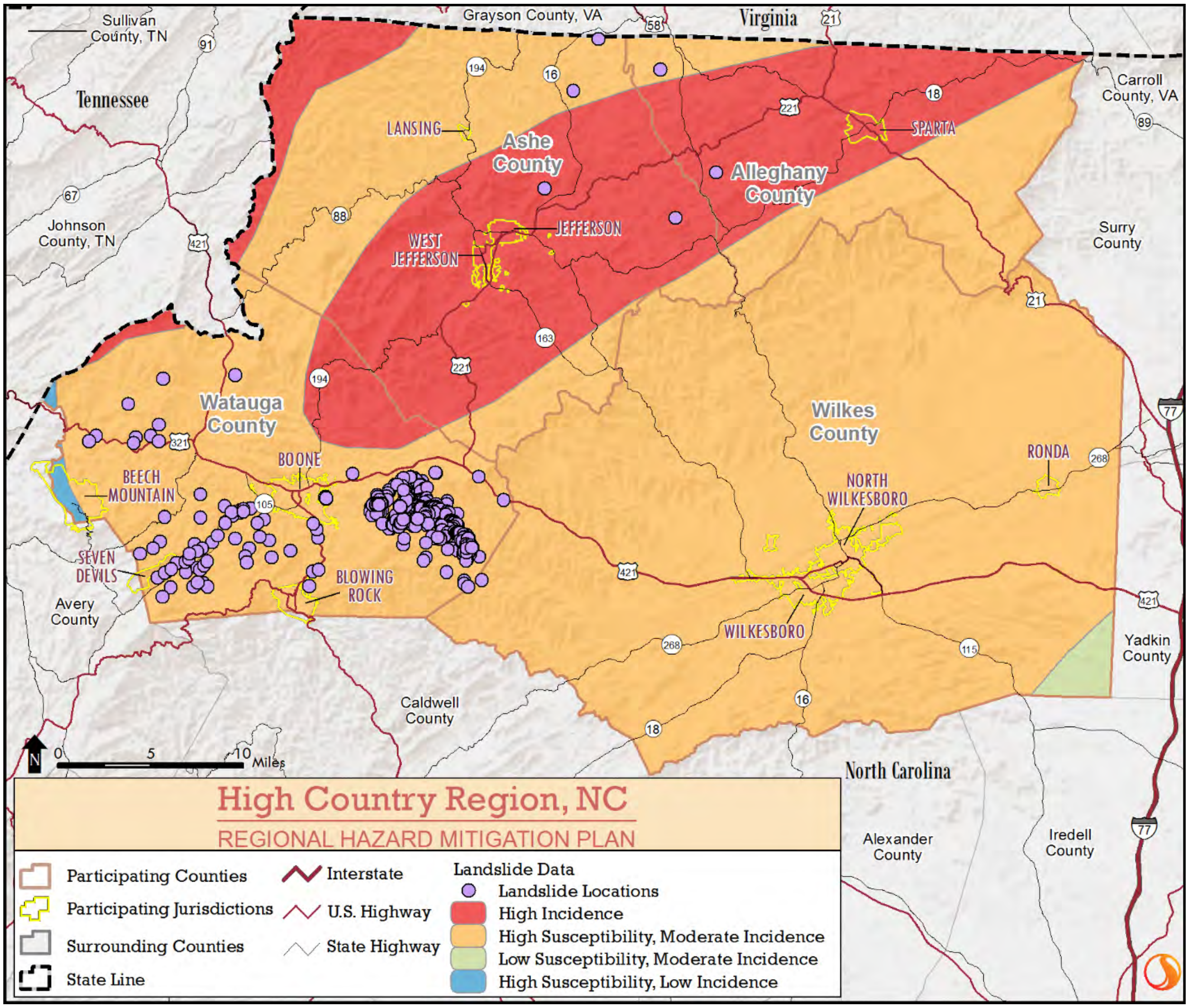
**TABLE 5.32: SUMMARY OF LANDSLIDE ACTIVITY IN THE HIGH COUNTRY REGION**

| 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*

[20]https://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/geologic-hazards/wataunga-county-hazards-maps

**FIGURE 5.18: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES IN THE HIGH COUNTRY REGION**




*Source: North Carolina Geological Survey*

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.

A small landslide in Jefferson occurred on January 17, 2017 that necessitated the evacuation of 6 local businesses for a one month period.

*Watauga County*

A 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. It should be noted Watauga County was largely deforested when the 1940 landslide event occurred. Currently, there is much more substantial tree cover, which reduces landsliding risk through ground stabilization.

### 5.11.4 Extent

Landslide extent can be measured in several different ways including amount of debris produced or level of susceptibility. Extent can be defined using the USGS Landslide Susceptibility Index. As noted above, most areas of the High Country Region are identified as high susceptibility/moderate incidence or high incidence (**Figure 5.18**).

Extent can also be measured in terms of size (i.e. length/width of landslide or cubic yards of soil moved). The August 13-14, 1940 storm caused over 2,253 landslides in Watauga County identified by the North Carolina Landslide Mapping Program previously addressed in the hazard profile. Debris flow estimates were not provided in most of the landslide occurrences reported in the North Carolina Geological Survey data (1940 occurrences). Of those reported, 2,500 cubic yards of material is the greatest amount recorded.

### 5.11.5 Probability of Future Occurrences

Based on historical information gathered from local officials and the USGS susceptibility index, the probability of future landslide events is possible (less than 10% annual probability). Although much of the deforestation that attributed to landsliding in the past in now reforested and more stable, it should be noted that the wildfires of 2016 cleared many mountainsides; when coupled with heavy rain, this could lead to unstable ground conditions. 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 of slope and modification of slopes.

# *HYDROLOGIC HAZARDS*

## *5.12 DAM AND LEVEE*

### 5.12.1 Background

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, most 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 can cause 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.

## 5.12.2 Location

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 5.33** explains these classifications.

**TABLE 5.33: NORTH CAROLINA DAM HAZARD CLASSIFICATIONS**

| Hazard Classification | Description | Quantitative Guidelines |
|---|---|---|
| Low | Interruption of road service, low volume roads | 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 Land Resources*

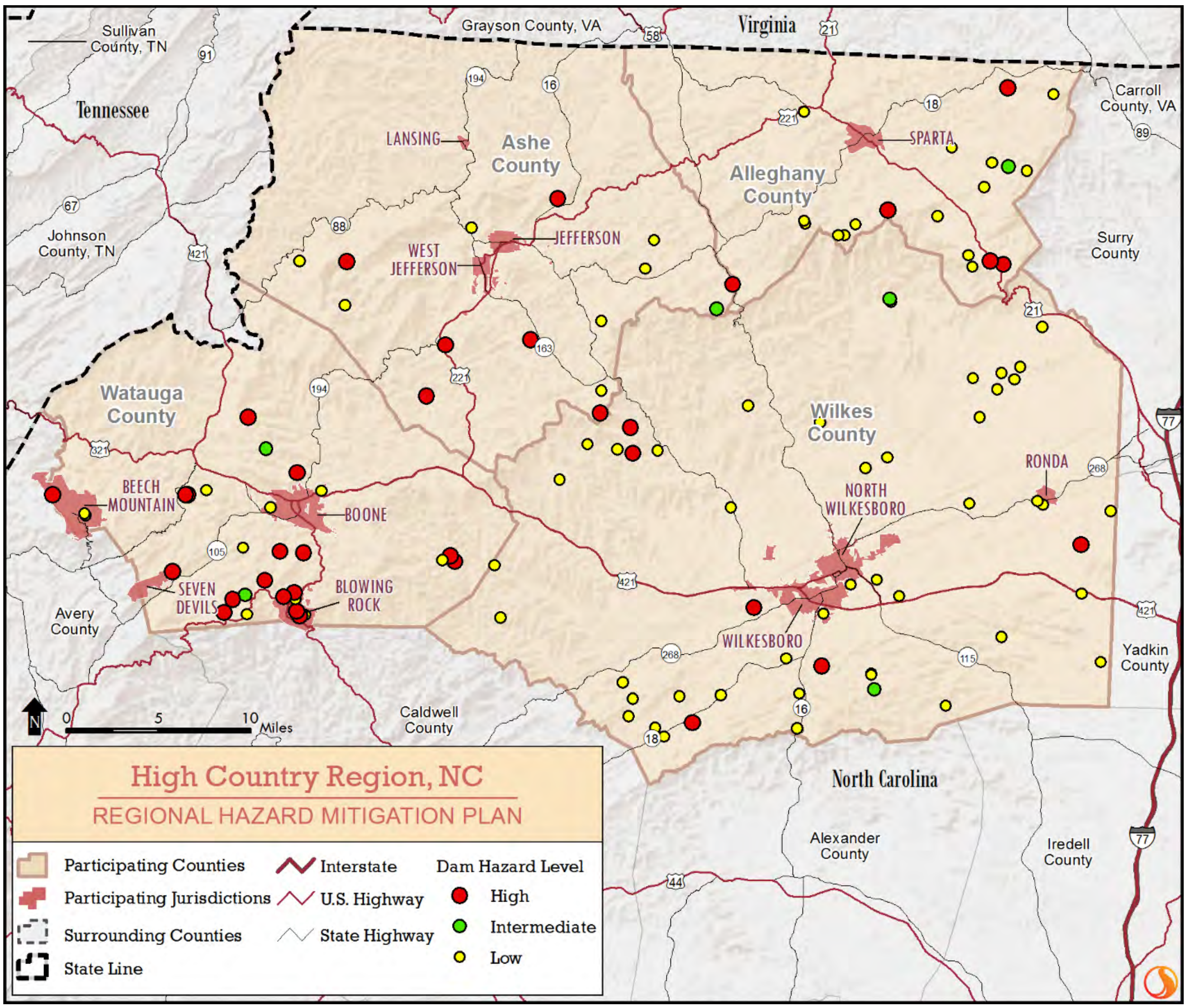
The North Carolina Division of Land Management lists 115 dams in the High Country Region.[21] **Figure 5.19** shows the dam location and the corresponding hazard ranking for each. Of these dams, 34 are classified as high hazard potential. These high hazard dams are listed in **Table 5.34**. According 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.

[21] 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.

**TABLE 5.34: SUMMARY OF HIGH HAZARD DAM LOCATIONS IN THE HIGH COUNTRY REGION**

| Location | Number of High Hazard Dams | Number of Intermediate Hazard Dams | Number of Low Hazard Dams |
|---|---|---|---|
| Alleghany County | 4 | 1 | 14 |
| Ashe County | 7 | 1 | 7 |
| Watauga County | 17 | 2 | 10 |
| Wilkes County | 6 | 2 | 44 |
| **High Country Region Total** | **34** | **6** | **75** |

**FIGURE 5.19: HIGH COUNTRY REGION DAM LOCATION AND HAZARD RANKING**



*Source: North Carolina Division of Land Resources*

**TABLE 5.35: HIGH COUNTRY REGION HIGH HAZARD DAMS**

| Dam Name | Hazard Potential | Surface Area (acres) | Max Capacity (ac-ft) | Owner Type |
|---|---|---|---|---|
| **Alleghany County** | | | | |
| High Meadows Lake Dam | High | 6 | 103 | Private |
| Mountain Lake Dam | High | 34.1 | 746 | Private |
| Roaring Gap Lake Dam | High | 50 | 1,317 | Private |
| Temple Lake Dam | High | 7 | 114 | Private |
| **Ashe County** | | | | |
| Ashe Lake Dam | High | 30.6 | 362 | Private |
| Charles Harris Dam | High | 1.4 | 12 | Private |
| Flat Rock Pond Dam | High | 2 | 13 | Private |
| Fleetwood Falls Lake Dam | High | 1.7 | 22 | Private |
| Gimlin Dam | High | 2.2 | 15 | Private |
| Indian Lake Dam | High | 2 | 15 | Private |
| Long Hope Club Dam | High | 6.4 | 67 | Private |
| Sharpe Electric Dam* | N/A | N/A | N/A | Private |
| **Watauga County** | | | | |
| Appalachian Ski Mountain Lake | High | 1.4 | 24 | Private |
| Asu/Norris Branch | High | 22 | 762 | State |
| Bass Lake | High | 25 | 306 | Federal |
| Beech Mountain Water Supply Dam | High | 605 | 200 | Local Government |
| Blowing Rock Country Club Dam | High | 1.3 | 10 | Private |
| Bright Penny Dam | High | 3 | 45 | Private |
| Devils Lake Dam | High | 4 | 74 | Private |
| New River Lake Dam | High | 3.5 | 35 | Private |
| Old Blowing Rock Water Supply | High | 5.7 | 76 | Local Government |
| Potato Hill Lake | High | 9 | 52 | Private |
| Price Lake | High | 50 | 428 | Federal |
| Rosasco Dam Lower | High | 0.7 | 11 | Private |
| Rosasco Lake Dam Upper | High | 2 | 24 | Private |
| Sweetgrass Dam | High | 20 | 439 | Private |
| Town Of Boone Water Supply Dam | High | 11 | 226 | Local Government |
| Trout Lake | High | 3 | 60 | Private |
| Trout Lake | High | 14 | 216 | Federal |
| **Wilkes County** | | | | |
| Al Beshears Dam | High | 2 | 24 | Private |
| Big Warrior Creek Dam | High | 135 | 400 | Private |
| KOA Campground Dam | High | 11 | 324 | Private |
| Miller Dam | High | 4.5 | 41 | Private |
| Oliver Dam | High | 3.4 | 25 | Private |
| W. Kerr Scott Dam | High | 2 | 153,000 | Federal |

*Source: North Carolina Division of Land Management*
*Dam not included in data from North Carolina Division of Land Management

## 5.12.3 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.

### 5.12.4 Extent

Dam Failure extent can be defined using the North Carolina Division of Land Resources criteria (**Table 5.35**). The greatest extent of Dam Failure is an incident resulting in injury or the loss of human life (classified as high-hazard). Of the 64 dams in the High Country Region, 34 are classified as high-hazard. However, of the three recorded dam breeches in the region, none resulted in death or injury.

Extent may also be defined by dam size and/or vulnerability to fail. However, this information was not available for dams in the High Country during the update of this plan. It should be noted that dams that are not federally regulated are regulated by state Dam Safety Offices. In North Carolina, this Dam Safety Program is part of the North Carolina Department of Environmental Quality.

### 5.12.5 Probability of Future Occurrence

Given the current dam inventory and historic data, a dam breach is unlikely (less than 1% 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.

## *5.13 EROSION*

### 5.13.1 Background

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 area's 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 are 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 is 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.

## 5.13.2 Location

Erosion in the High Country Region is typically caused by flash flooding events. Unlike coastal areas, where the soil is composed mainly fine grained particles such as sand, High Country soils have much greater organic matter content. Furthermore, extensive 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.

## 5.13.3 Historical Occurrences

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. In meetings with local officials it was noted that six businesses in Jefferson have been impacted by erosion, and in Lansing a stream bank stabilization project restored 1,500 feet in order to reduce erosion.

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.

## 5.13.4 Extent

The extent of erosion can be defined by the measurable rate of erosion that occurs. Data was not available to show the exact erosion rate for areas in the High Country Region, such as feet per year (a measure of extent), that is occurring in the planning area. Erosion typically happens slowly over time but may be accelerated by fast moving and/or high water levels in rivers or creeks. In the most severe situations, erosion will result in the bank of a stream of river receding or collapsing.

### 5.13.5 Probability of Future Occurrences

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% annually). However, given the low number of historical events, location, and threat to life or property, no further analysis will be done in Section 6: *Vulnerability Assessment*.

## *5.14 FLOOD*

### 5.14.1 Background

Flooding is a frequent, dangerous, and costly hazard. Globally, it accounts for 40 percent of all natural disasters and results in an average of over 6,500 deaths annually. In the U.S., flooding results in an average of 89 deaths annually. Nearly 90 percent of all presidential disaster declarations result from natural events where flooding was a major component.

Flooding is the most common environmental hazard, due to the widespread geographical distribution of valleys and coastal areas, and the population density in these areas. 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. Both of these flooding events can be brought on by severe (heavy) rain. There are several types of flooding which are presented below:

- **Flash Flooding:**
  Flash floods occur within a few minutes or hours of heavy amounts of rainfall and is capable of destroying buildings, uproot trees, and scour out new drainage channels. Heavy rains that produce flash floods can also trigger mudslides and landslides. Most flash flooding is caused by slow-moving thunderstorms or repeated thunderstorms in a local area, or by heavy rains from hurricanes and tropical storms. Although flash flooding often occurs in mountainous areas, it is also common in urban centers where much of the ground is covered by impervious surfaces.
- **Sheet Flooding:**
  Sheet flooding is a condition where storm water runoff forms a sheet of water to a depth of six inches or more. Sheet flooding and ponding are often found in areas where there are no clearly defined channels and the path of flooding is unpredictable. This type of flooding is more common to occur in flat areas. Most floodplains are adjacent to streams or oceans, although almost any area can flood under the right conditions where water may accumulate.
- **Urban Flooding:**
  Urban flooding is usually caused by heavy rain over a short period of time. As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Since

sidewalks and roads are non-absorbent, water flows down the surface of the streets, and is then dumped directly into sewers. In fact, roads and buildings generate more runoff than tropical forestland. Fixed drainage channels in urban areas may be unable to contain the runoff that is generated by relatively small but intense rainfall events. Urbanization increases runoff two to six times over what would occur on natural terrain. As a consequence, high volume of water can turn parking lots into lakes, flooding basements and businesses, and cause lakes to form in roads where drainage is poor or overwhelmed.

Urban flooding occurs where there has been development within stream floodplains. This is partly a result of the use of waterways for transportation purposes in earlier times. Sites adjacent to rivers and coastal inlets provided convenient places to ship and receive commodities. The price of this accessibility has increased flooding in the ensuing urban areas. Urbanization intensifies the magnitude and frequency of floods by increasing impermeable surfaces, amplifying the speed of drainage collection, reducing the carrying capacity of the land, and occasionally, overwhelming sewer systems.

- **Riverine Flooding:**
  Periodic flooding of lands adjacent to non-tidal rivers and streams (known as the floodplain) is a natural and inevitable occurrence. When stream flow exceeds the capacity of the normal watercourse, some of the above-normal stream flows onto adjacent lands within the floodplain. Riverine flooding is a function of precipitation levels and water runoff volumes within the watershed of a stream or river. The recurrence interval of a flood is defined as the average time interval measured in years, expected to take place between the occurrence of a flood of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

In addition to flooding types, there are several types of floodplains. All the flood types described above may occur within a floodplain. However, the flooding may not occur in a designated floodplain.

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 100-year flood and the 100-year floodplain by the 500-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.

The U.S. Army Corp of Engineers and Federal Emergency Management Agency (FEMA) have a role in defining floodplain. The U.S. Army Corps of Engineers calls a 100-year flood an Intermediate Regional Flood, while a Standard Project flood describes a major flood that could be expected to occur from a combination of severe meteorological and hydrologic conditions. Most dam and flood-related structures have been designed to meet 100-year flood conditions. FEMA develops digital Flood Insurance Rate Maps (DFIRMs) to indicate areas in the U.S. where mandatory flood insurance requirement applies (the 100-year flood). They are also used for planning purposes to identify hazard areas. Although an all-inclusive description of FEMA flood zones is not included in this document, brief descriptions of the zones appearing on the FIRMs for the counties in the region are as follows:

- **Zone A, AE:**
  Zone A is the flood insurance rate zone that corresponds to the 1.0-percent annual chance floodplains (ACF) determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations (BFEs) or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.

  Zones AE is the flood insurance rate zone that corresponds to the 1.0-percent ACFs determined in the Flood Insurance Study (FIS) by detailed methods. In most instances, BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

- **0.2-Percent Annual Chance Floodplain:**
  This area corresponds to the 0.2-percent ACF areas (or 500-year).

- **Zones B, C, and X:**
  Zones B, C, and X are the flood insurance rate zones that correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than one foot, areas of 100-year stream flooding where the contributing drainage area is less than one square mile, or areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone. Typically B and X (shaded) are moderate flood hazard areas, while C or Zone X (unshaded) or minimal flood hazards areas. Note: shade zone X is used in place of Zone B on new maps, and unshaded Zone X is used in place of Zone C on new maps. It should be noted that flooding is possible outside of any defined flood zone. In fact, areas subject to flash flooding are often not captured on the maps. In addition, the flood event may be more severe than the 100-year or 500-year flood zones. In this case, water would go beyond these anticipated areas. Further, development can also alter where water goes in terms of the amount of drainage capability and where water travels. Areas that have not flood historically should not be considered immune from such an event.

## 5.14.2 Location

Location of flooding can be defined using FEMA's DFIRM hazard maps. The High Country Region maps indicate both 1.0-percent ACF and 0.2-percent ACF areas. GIS analysis shows of the 1,735 square miles comprising the High Country Region (including the area of Alleghany County, Ashe County, Watauga County, and Wilkes County), there are over 40 square miles of land in the 1.0-percent ACF areas (Zone AE), over 17 square miles of land in the floodway, and over five square miles of land in the 0.2-percent ACF areas (Zone X), for a combined total of over 63 square miles of land floodplain areas. The floodplain area totals and effective dates for each county are presented below in **Table 5.36**. Note there are no Zone A floodplains in the High Country Region.

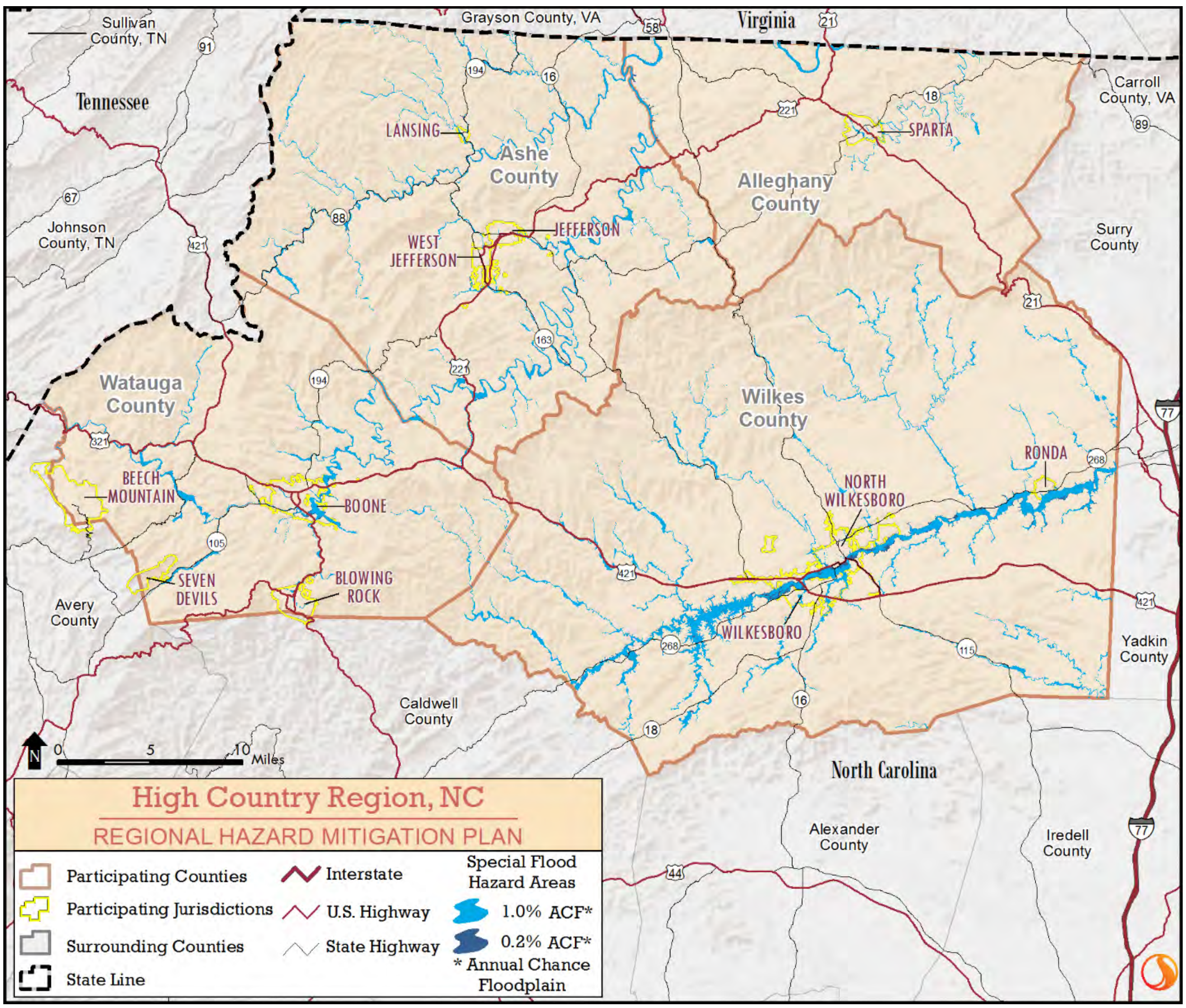
**TABLE 5.36: SUMMARY OF FLOODPLAIN AREAS IN THE HIGH COUNTRY REGION**

| Location | DFIRM Date | Floodway | 1.0% ACF | 0.2% ACF | Total |
|---|---|---|---|---|---|
| Alleghany County | 11/4/2009 | 2.78 | 2.76 | 0.62 | 6.17 |

| Location | DFIRM Date | Floodway | 1.0% ACF | 0.2% ACF | Total |
|---|---|---|---|---|---|
| Ashe County | 12/3/2009 | 5.15 | 8.76 | 1.54 | 15.45 |
| Watauga County | 12/3/2009 | 3.19 | 4.50 | 0.86 | 8.56 |
| Wilkes County | 12/3/2009 | 6.25 | 24.50 | 2.30 | 33.05 |
| HIGH COUNTRY REGION TOTAL | | 17.37 | 40.52 | 5.32 | 63.21 |

These flood zone values account for 3.6-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 5.20** 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.

**FIGURE 5.20: SPECIAL FLOOD HAZARD AREAS IN THE HIGH COUNTRY REGION**




*Source: Federal Emergency Management Agency*

## 5.14.3 Historical Occurrences

Information from the NCEI Storm Events Database was used to ascertain historical flood events. The NCEI reported a total of 228 events throughout the High Country Region since 1996. A summary of these events is presented in **Table 5.37**. These events accounted for approximately $33.3 million (2017 dollars) in property damage and nearly $275 thousand in crop damages throughout the region.[22] These events are only inclusive of those reported by NCEI. It is likely that additional events have occurred and have gone unreported. Information on flood events for each county, including date, type of flooding, and deaths and injuries, can be found in **Table 5.38**.

**TABLE 5.37: SUMMARY OF FLOOD OCCURRENCES IN THE HIGH COUNTRY REGION**

| Location | Number of Occurrences | Property Damage (2017 dollars) | Crop Damage (2017 dollars) |
|---|---|---|---|
| **Alleghany County** | **25** | **$977,561** | **$271,679** |
| Sparta | 4 | $562,754 | $0 |
| Unincorporated Area | 21 | $414,807 | $271,679 |
| **Ashe County** | **63** | **$1,190,754** | **$0** |
| Jefferson | 6 | $64,262 | $0 |
| Lansing | 4 | $6,720 | $0 |
| West Jefferson | 5 | $5,302 | $0 |
| Unincorporated County | 48 | $1,114,470 | $0 |
| **Watauga County** | **90** | **$24,182,819** | **$0** |
| Beech Mountain | 0 | $0 | $0 |
| Blowing Rock | 4 | $0 | $0 |
| Boone | 21 | $2,348,445 | $0 |
| Seven Devils | 0 | $0 | $0 |
| Unincorporated Area | 65 | $21,834,374 | $0 |
| **Wilkes County** | **50** | **$4,933,585** | **$0** |
| North Wilkesboro | 2 | $31,159 | $0 |
| Ronda | 1 | $0 | $0 |
| Wilkesboro | 2 | $0 | $0 |
| Unincorporated Area | 48 | $4,902,426 | $0 |
| **HIGH COUNTRY REGION TOTAL** | **228** | **$31,284,720** | **$271,679** |

*Source: National Climatic Data Center*

**TABLE 5.38: HISTORICAL FLOOD EVENTS IN THE HIGH COUNTRY REGION**

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | | |
| Alleghany Co. | 3/23/1993 | Flash Flood | 0/0 | $0 | $0 | -- |
| Alleghany Co. | 2/16/1995 | Flood/Flash Flood | 0/0 | $248,687 | $0 | -- |
| Crumpler | 6/11/1995 | Flash Flood | 0/0 | $0 | $0 | -- |
| Piney Creek | 6/11/1995 | Flash Flood | 0/0 | $18,653 | $0 | -- |
| Alleghany Co. | 10/5/1995 | Flash Flood | 0/0 | $0 | $0 | -- |

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

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | | | |
| Sparta | 1/19/1996 | Flash Flood | 0/0 | $0 | $0 | -- |
| Alleghany Co. | 8/12/1996 | Flash Flood | 0/0 | $18,111 | $0 | -- |
| Cherry Lane | 1/8/1998 | Flash Flood | 0/0 | $87,165 | $0 | Flood waters washed out a bridge on Brushy Creek near Cherry Lane. |
| Sparta | 3/20/1998 | Flash Flood | 0/0 | $0 | $0 | Piney Swamp Creek flooded Piney Swamp Road about 3 miles south of Sparta. |
| Cherry Lane | 3/20/1998 | Flash Flood | 0/0 | $0 | $0 | Brush Creek was out of its bank about 1 mile south of Cherry Lane. |
| Cherry Lane | 8/15/1998 | Flash Flood | 0/0 | $0 | $0 | Thunderstorm rains flooded and closed Route 21 near Cherry Lane. |
| Alleghany Co. | 2/22/2003 | Flood | 0/0 | $0 | $0 | Heavy rain caused small stream and urban flooding across Ashe, Alleghany, Surry, and Rockingham counties. |
| Alleghany Co. | 11/19/2003 | Flash Flood | 0/0 | $30,252 | $0 | Runoff from heavy rain flooded numerous creeks, flooding roads across Wilkes, Watauga, Alleghany, and Ashe counties. |
| Alleghany Co. | 11/19/2003 | Flood | 0/0 | $0 | $0 | Runoff from heavy rain flooded numerous creeks, flooding roads across Wilkes, Watauga, Alleghany, and Ashe counties. |
| Alleghany Co. | 9/8/2004 | Flood | 0/0 | $0 | $271,679 | Creeks and streams overflowed their banks and flooded 1150 acres of farmland resulting in crop damage. |
| Laurel Springs | 6/5/2011 | Flash Flood | 0/0 | $0 | $0 | Heavy rain caused a stream to overflow a bridge on Elk Knob Road. |
| Piney Creek | 7/4/2011 | Flash Flood | 0/0 | $0 | $0 | 2 to 3 inches of rain in a short period caused Piney Creek to flood Hwy 93. |
| Sparta | 8/18/2011 | Flash Flood | 0/0 | $0 | $0 | Route 18 was closed due to high water. Estimated rainfall of 4 to 6 inches in a few hours in and just west of Sparta. |
| Twin Oaks | 9/5/2011 | Flood | 0/0 | $0 | $0 | Prolonged heavy rainfall, totaling around 3 to 4 inches, caused a tributary of the New River to flood with water flooding a portion of Farmers Fish Camp Road. |
| Whitehead | 9/5/2011 | Flood | 0/0 | $11,941 | $0 | A prolonged period of heavy rain, totaling 3 to 4 inches, caused flooding along the Little River. Rifle Range Rd was flooded. |
| Glade Valley | 9/5/2011 | Flood | 0/0 | $0 | $0 | A period of prolonged heavy rain, totaling 3 to 4 inches, flooded Brush Creek with the water crossing Scenic Valley Road. |
| Twin Oaks | 5/15/2012 | Flash Flood | 0/0 | $0 | $0 | Fighting Creek was overflowing its banks along U.S. Highway 21 North. |
| Sparta | 6/30/2013 | Flash Flood | 0/0 | $562,754 | $0 | Runoff from heavy rain produced 2 feet of flowing water across Hwy 21, south of Sparta. The road was closed. Flood waters destroyed a portion of Halsey St. Extensive damage to one business. |
| Roaring Gap | 7/10/2013 | Flash Flood | 0/0 | $0 | $0 | Several roads were closed in the Roaring Gap area by flood waters. |
| Glade Valley | 7/27/2013 | Flood | 0/0 | $0 | $0 | Minor flooding along Brush Creek in Scenic Valley Road with a few inches of water on the road. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Ashe Co. | 1/19/1996 | Flash Flood | 0/0 | $0 | $0 | -- |
| West Jefferson | 6/9/1996 | Flash Flood | 0/0 | $0 | $0 | -- |
| Ashe Co. | 8/12/1996 | Flash Flood | 0/0 | $144,885 | $0 | -- |
| Ashe Co. | 11/8/1996 | Flash Flood | 0/0 | $18,111 | $0 | Heavy rainfall caused flooding of creeks & streams in Ashe and Watauga counties. |
| Ashe Co. | 12/1/1996 | Flood | 0/0 | $0 | $0 | A prolonged period of moderate rain resulted in numerous creeks and streams overflowing their banks in Ashe County. |
| Glendale Springs | 7/21/1997 | Flash Flood | 0/0 | $35,409 | $0 | Heavy rainfall from thunderstorms washed a 3-ft culvert, closing a road near Glendale Springs. |
| Nella | 7/22/1997 | Flash Flood | 0/0 | $123,931 | $0 | Afternoon thunderstorms produced heavy rain which damaged a road, flooded a home, and resulted in evacuations 1 mile south of Nella. |
| North Portion | 1/8/1998 | Flash Flood | 0/0 | $435,823 | $0 | Several roads were damaged from flood waters in northeastern Ashe County. |
| Nathans Creek | 3/20/1998 | Flash Flood | 0/0 | $0 | $0 | Heavy rainfall caused flooding of Nathans Creek about 1-mile northeast of Nathans Creek in eastern Ashe County. |
| Central Portion | 4/19/1998 | Flash Flood | 0/0 | $0 | $0 | In central Ashe County, Buffalo, Silas, and Beaver Creeks were flooded. |
| West Jefferson | 8/20/1999 | Flood | 0/0 | $0 | $0 | Heavy thunderstorm rain produced minor street flooding in West Jefferson. |
| Green Valley | 7/31/2000 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains caused Brush Fork to flood Green Valley lowlands. |
| Todd | 7/31/2000 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains caused the South Fork of the New River to flood 1 mile south of Todd. |
| Jefferson | 6/25/2001 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains caused numerous streams in/around Jefferson to flood. Flood waters closed several roads. |
| Ashe Co. | 7/29/2001 | Flash Flood | 0/0 | $16,047 | $0 | Heavy thunderstorm rains caused small streams & creeks to flood, washing out culverts & closing roads. Ten mudslides were reported across the county. |
| Ashe Co. | 2/22/2003 | Flood | 0/0 | $0 | $0 | Runoff from heavy rain resulted in the flooding of numerous creeks, some of which flooded roads across Wilkes, Watauga, Alleghany, and Ashe counties. |
| Ashe Co. | 11/19/2003 | Flash Flood | 0/0 | $75,629 | $0 | Heavy rain caused small stream and urban flooding across Ashe, Alleghany, Surry, and Rockingham counties. |
| Ashe Co. | 11/19/2003 | Flood | 0/0 | $0 | $0 | Runoff from heavy rain resulted in the flooding of numerous creeks, some of which flooded roads across Wilkes, Watauga, Alleghany, and Ashe counties. |
| Lansing | 6/12/2004 | Flash Flood | 0/0 | $0 | $0 | Heavy rain from a thunderstorm caused a flash flood in the Lansing area; 3 roads were washed out. Also, several roads had mudslides and trees washed onto them. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Ashe Co. | 9/8/2004 | Flood | 0/0 | $0 | $0 | Small streams & creeks flooded. The rainfall/runoff caused the South Fork of New River to flood. Several roads flooded in Fleetwood & Crumpler areas. Several homes along the South Fork of New River were isolated from flooded roads. |
| West Jefferson | 6/25/2006 | Flash Flood | 0/0 | $2,768 | $0 | Widespread heavy rains of 2 to 4 inches produced mudslides on Hwy 163, 2 miles south of West Jefferson, and Hwy 16, 4 miles southeast of Jefferson. Hwy 16S had one lane blocked by two downed trees. In Glendale Springs, an embankment washed out causing downed powerlines. |
| Jefferson | 6/25/2006 | Flash Flood | 0/0 | $2,768 | $0 | Widespread heavy rains of 2 to 4 inches produced mudslides on Hwy 163, 2 miles south of West Jefferson, and Hwy 16, 4 miles southeast of Jefferson. Hwy 16S had one lane blocked by two downed trees. In Glendale Springs, an embankment washed out causing downed powerlines. |
| Glendale Springs | 6/25/2006 | Flash Flood | 0/0 | $6,921 | $0 | Widespread heavy rains of 2 to 4 inches produced mudslides on Hwy 163, 2 miles south of West Jefferson, and Hwy 16, 4 miles southeast of Jefferson. Hwy 16S had one lane blocked by two downed trees. In Glendale Springs, an embankment washed out causing downed powerlines. |
| West Jefferson | 8/30/2006 | Flash Flood | 0/0 | $0 | $0 | Thunderstorms produced torrential rains across Ashe County. Three inches of rain in two hours caused Little Buffalo Creek to flood Doggett Road in West Jefferson. |
| Lansing | 3/28/2007 | Flash Flood | 0/0 | $6,720 | $0 | 3 to 5 inches of rain caused creek & stream banks to overflow and flash flood. One home owner was evacuated from her home due to a foot of water surrounding the house. Big Laurel Creek flooded several roads in the Creston area. A mudslide was reported on Little Horse Creek Road and NC Route 88. |
| Trout | 6/24/2007 | Flash Flood | 0/0 | $6,720 | $0 | Three Tops Road was washed out and flowing water entered a home. The lone occupant was rescued from the residence. |
| Jefferson | 7/17/2007 | Flash Flood | 0/0 | $0 | $0 | A slow moving thunderstorm produced 4 to 6 inches of rain in a 1 to 2-hour period. This amount of rain in such a short period caused the Ezra Fork Creek to overflow. |
| Shatley Springs | 8/1/2007 | Flash Flood | 0/0 | $1,344 | $0 | Heavy rains caused Silas Creek to overflow flooding nearby yards, and washed out driveways in the area. In Lansing, flood waters entered a business. |
| Creston | 6/17/2009 | Flash Flood | 0/0 | $317 | $0 | Torrential rains caused a mudslide over Highway 88 near Creston. |
| Lansing | 6/17/2009 | Flash Flood | 0/0 | $0 | $0 | Big Horse Creek overflowed and flooded the intersection of SR 1347 and 194. |
| West Jefferson | 8/1/2009 | Flash Flood | 0/0 | $2,534 | $0 | 2-4 inches of rain caused flash flooding, & washed a utility pole out of the ground. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| | | | **ASHE COUNTY** | | | |
| Nathans Creek | 8/5/2009 | Flash Flood | 0/0 | $3,800 | $0 | Little Phoenix Creek flooded a portion of Jake Blackburn Road. |
| Apple Grove | 8/5/2009 | Flash Flood | 0/0 | $5,067 | $0 | Little Horse Creek & the South Fork of Little Horse Creek flooded Little Horse Creek Road & Joe Hampton Road. |
| Ball | 8/20/2009 | Flash Flood | 0/0 | $2,534 | $0 | Mill Creek flooded its banks, resulting in the road closure of West Mill Creek Road. |
| Warrensville | 1/24/2010 | Flash Flood | 0/0 | $1,230 | $0 | Heavy rains on steep terrain prompted a Mudslide on Hwy 194N in Warrensville. |
| Jefferson | 5/16/2010 | Flash Flood | 0/0 | $61,494 | $0 | A total of 3.90 inches of rain fell during the day on the sixteenth. This amount of rain prompted flash flooding along several streams around Jefferson. |
| Scottville | 12/1/2010 | Flash Flood | 0/0 | $24,597 | $0 | Flash flooding prompted several roads to be flooded near Laurel Springs |
| Smethport | 4/16/2011 | Flash Flood | 0/0 | $0 | $0 | Heavy rains caused a mudslide on Route 88 near Radio Hill. |
| Crumpler | 4/16/2011 | Flash Flood | 0/0 | $0 | $0 | Rains caused North Fork of New River to overflow onto Mouth of Silas Creek Road. |
| Brownwood | 5/22/2011 | Flash Flood | 0/0 | $0 | $0 | A mudslide due to heavy rain closed one lane of Hwy 194 near Todd. Numerous small streams overflowed their banks. |
| Helton | 5/26/2011 | Flash Flood | 0/0 | $0 | $0 | Silas Creek was reported out of its banks from 1 to 3 inches of rain in a few hours. |
| Jefferson | 7/5/2011 | Flash Flood | 0/0 | $0 | $0 | Heavy rain of 3 to 4 inches in a few hours caused Claybank Creek to overflow |
| Scottville | 9/5/2011 | Flash Flood | 0/0 | $0 | $0 | Heavy rain from thunderstorms prompted Cranberry Creek to leave its banks at 14355 Highway 18S near the Stations Inn. |
| Riverside | 9/25/2011 | Flash Flood | 0/0 | $0 | $0 | Flash flooding along Cranberry Creek flooded Liberty Grove Church Road and other streets in the Fleetwood area. |
| Todd | 9/25/2011 | Flash Flood | 0/0 | $119,405 | $0 | Flash Flooding occurred along both Elk Creek in Todd and along Fox Creek southeast of Todd. Elk Creek flooded some roads in Todd, and Fox Creek flooded Todd Railroad Grade Road. Damage values are estimated. |
| Baldwin | 5/15/2012 | Flash Flood | 0/0 | $0 | $0 | Call Creek overflowed along Tracey Road. |
| Wagoner | 1/30/2013 | Flash Flood | 0/0 | $0 | $0 | The New River was observed flowing out of its banks and across Dog Creek Road near the community of Crumpler. |
| Baldwin | 1/30/2013 | Flash Flood | 0/0 | $0 | $0 | An observer measured nearly 4 inches of rainfall in the area, causing one foot of water to flow across Holman Road. |
| Crumpler | 1/30/2013 | Flash Flood | 0/0 | $0 | $0 | The North fork of New River was observed flowing over Silas Creek Road, which was caused by an estimated five inches of rain. |
| Creston | 1/30/2013 | Flash Flood | 0/0 | $0 | $0 | Extensive flooding along Peak Road. |
| Fig | 5/5/2013 | Flood | 0/0 | $0 | $0 | The New River overflowed a bridge near intersection of Ed Little Road & Hwy 88W. |
| Jefferson | 7/3/2013 | Flood | 0/0 | $0 | $0 | Hwy 221 closed from Jefferson to West Jefferson due to 6-in of standing water. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **ASHE COUNTY** | | | | | | |
| Beaver Creek | 7/3/2013 | Flood | 0/0 | $0 | $0 | Cole Creek overflowed at Mt. Jefferson Road & Oakwood Road. Water came near buildings at Greenfield Camp Ground. Water reached depths of 5 to 6 feet. |
| Crumpler | 7/27/2013 | Flash Flood | 0/0 | $0 | $0 | Silas Creek was flooding along Mouth of Silas Creek Road and a several people were reported to be stranded. |
| Othello | 7/27/2013 | Flood | 0/0 | $0 | $0 | South Fork of New River flooded the low water crossing on Boggs Road and Methodist Camp Road. |
| Grayson | 8/10/2013 | Flash Flood | 0/0 | $0 | $0 | The Pond Mountain Fire Department had to rescue a family from their home on Flatwoods School Road when Big Laurel Creek Flooded the area. Rainfall up to 2 inches fell in northwest Ashe county. The mountains of northwest North Carolina received excessive rainfall all summer. |
| Roten | 8/20/2013 | Flash Flood | 0/0 | $0 | $0 | Social Media reported and the Ashe County 911 Center confirmed that Rich Hill Road was flooded and closed in Creston because of flood waters from Rich Hill Creek. In addition, both the flood waters threatened a home and church. One elderly rescue also took place as a precaution. The parking lot of a Baptist Church in the area was inundated. |
| Lansing | 9/6/2014 | Flood | 0/0 | $0 | $0 | Water was flowing over a low-water crossing on Teaberry Road. |
| Fig | 4/19/2015 | Flood | 0/0 | $0 | $0 | Flood waters closed several roads including Doggett Road in West Jefferson. |
| Piney Creek | 10/3/2015 | Flood | 0/0 | $0 | $0 | 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's (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. |
| Helton | 12/2/2015 | Flood | 0/0 | $0 | $0 | Helton Creek was reported to be flooding a portion of Helton Road. |
| Baldwin | 6/2/2016 | Flash Flood | 0/0 | $10,300 | $0 | Water was over a bridge along East Mill Creek Road from flooding along Call Creek. A nearby home was also flooded. |
| Todd | 6/2/2016 | Flash Flood | 0/0 | $82,400 | $0 | Significant flooding in the Todd area damaged a portion of Route 194. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Watauga Co. | 1/19/1996 | Flash Flood | 0/0 | $0 | $0 | -- |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Watauga Co. | 8/12/1996 | Flash Flood | 0/0 | $90,553 | $0 | -- |
| Boone | 11/8/1996 | Flash Flood | 0/0 | $36,221 | $0 | -- |
| Watauga Co. | 1/7/1998 | Flash Flood | 0/0 | $0 | $0 | Flash flooding resulted in the evacuation of 7 homes in Foscoe and a nursing home in Boone and flooded numerous roads. |
| Boone | 3/20/1998 | Flash Flood | 0/0 | $87,165 | $0 | A creek in Boone flooded with numerous cars submerged in up to five feet of water at a nearby shopping mall. One person was rescued from the top of a vehicle. In addition, the South Fork of the New River near Boone was out of its banks |
| Boone | 4/19/1998 | Flash Flood | 0/0 | $0 | $0 | Kraut Creek in Boone, Cub Creek in Wilkesboro, and Elkin Creek in Elkin were flooded. The flooding of Elkin Creek resulted in road closings. |
| Boone | 6/4/1998 | Flash Flood | 0/0 | $1,045,975 | $0 | Thunderstorms produced flash flooding in the town of Boone. Several main streets were closed and water flooded most buildings. Bridges were impassable. Some residents were evacuated. |
| Boone | 7/2/1999 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains produced flash flooding in Boone, with several roads underwater and closed. |
| Boone | 7/7/1999 | Flood | 0/0 | $0 | $0 | Heavy thunderstorm rain in Boone caused minor street flooding, and Kraut Creek to overflow its banks. |
| Boone | 8/25/1999 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rain flooded roads in Reidsville, & closed many roads in Boone. |
| Shulls Mills | 11/2/1999 | Flash Flood | 0/0 | $0 | $0 | Heavy rainfall caused flash flooding of the South Fork of New River 2-miles east of Boone and flooded a road in Shulls Mills. |
| Boone | 11/2/1999 | Flash Flood | 0/0 | $0 | $0 | Heavy rainfall caused flash flooding of the South Fork of New River 2-miles east of Boone and flooded a road in Shulls Mills. |
| Southeast Portion | 11/26/1999 | Flash Flood | 0/0 | $0 | $0 | Heavy rain resulted in flooding of several creeks in southeastern Watauga County. |
| Boone | 4/3/2000 | Flood | 0/0 | $0 | $0 | Heavy rain caused street flooding in Boone, & flooded Kraut Creek in Boone. |
| Boone | 6/14/2001 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains flooded a small part of Boone, requiring several rescues. |
| Boone | 6/27/2002 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains caused a mudslide across Route 321, 2.5 miles southeast of Boone. |
| Aho | 6/8/2003 | Flash Flood | 0/0 | $15,126 | $0 | Heavy thunderstorm rains caused a partial washout of State Route 1514 near Aho and U.S. Route 321 at Aho Road. |
| Boone | 6/14/2003 | Flash Flood | 0/0 | $0 | $0 | Thunderstorms with very heavy rain brought flash flooding to the Boone area. |
| Zionville | 8/28/2003 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains caused Cove Creek to flash flood. |
| Boone | 8/28/2003 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains caused the north fork of the Ellison River to flash flood, 8 miles northwest of Boone. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Watauga Co. | 11/19/2003 | Flash Flood | 0/0 | $2,268,885 | $0 | Runoff from heavy rain resulted in the flash flooding of numerous creeks, some of which flooded roads across Wilkes, Watauga, Alleghany, and Ashe counties. |
| Watauga Co. | 11/19/2003 | Flood | 0/0 | $0 | $0 | Runoff from heavy rain caused small stream flooding of creeks, some of which flooded roads across Wilkes, Watauga, Alleghany, and Ashe counties. |
| Watauga Co. | 9/7/2004 | Flood | 0/0 | $3,965,041 | $0 | The Watauga River flooded. Homes were evacuated in the Foscoe area. Headwaters of the New River, including the Middle and East Fork also flooded. A mudslide destroyed one home in the Bamboo area. |
| Watauga Co. | 9/18/2004 | Flood | 0/0 | $7,342,669 | $0 | Heavy rain around the Foscoe area prompted flooding of small streams and mudslides the damaged several homes. |
| Boone | 1/13/2005 | Flash Flood | 0/0 | $0 | $0 | Flash flooding occurred near the Boone Mall when Kraut Creek left its banks. This flash flooding resulted in one swift water rescue. Flash flooding of the Kraut Creek & South Fork of New River overtopped several roads in town. Boone police discouraged travel. |
| Boone | 7/19/2005 | Flash Flood | 0/0 | $0 | $0 | Close to 7 inches of rain fell on Beech Mountain. Flash flooding resulted in roads closed with water and debris on them. Numerous driveways washed out. Some roadways had minor damaged. |
| Boone | 6/28/2007 | Flash Flood | 0/0 | $26,878 | $0 | Route 1114, Dewitt/Barnett Road and Route 1113 Baird Creek Road were flooded and washed out. |
| Matney | 7/27/2007 | Flash Flood | 0/0 | $26,878 | $0 | An isolated thunderstorm formed over Beech Mountain. Not only did this storm increase to severe levels with quarter size hail, it also produced rainfall of 2 to 3 inches in 1-hour. Fifteen gravel roads washed out. The main road leading into Beech Mountain was blocked by debris. |
| Perkinsville | 3/4/2008 | Flash Flood | 0/0 | $1,957,160 | $0 | Heavy rain from thunderstorms caused 1-foot of water to flood the Watauga River Bridge between Seven Devils and Grandfather Mountain. Watauga Co. Sheriff's department reported a large retaining wall at a motel in Boone had fallen due to heavy rains. Water flowing across Route 105 closed two lanes near Boone. A mudslide was reported along Clarks Creek Road in Foscoe. |
| Shulls Mills | 8/27/2008 | Flash Flood | 0/0 | $1,305 | $0 | Remnants of Tropical Storm Fay caused 5-10 inches of rain. Big Branch flooded a portion of Highway 105 near Foscoe. |
| Valle Crucis | 8/27/2008 | Flash Flood | 0/0 | $1,305 | $0 | Remnants of Tropical Storm Fay caused 5-10 inches of rain. Lost Branch flooded & waters flooded Dewitt Barnett Rd Bridge. |
| Valle Crucis | 8/27/2008 | Flash Flood | 0/0 | $1,305 | $0 | Remnants of Tropical Storm Fay caused 5-10 inches of rain. The Watauga River overflowed, flooding Watauga River Road. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Perkinsville | 7/20/2009 | Flash Flood | 0/0 | $126,677 | $0 | Flash flooding caused Winkler Creek to flood & close the Boone Mall parking lot and Boone Heights Drive. |
| Foscoe | 8/1/2009 | Flash Flood | 0/0 | $0 | $0 | Rains overflowed Spice Bottom Creek. |
| Perkinsville | 8/5/2009 | Flash Flood | 0/0 | $2,534 | $0 | Boone Creek at Boone Mall overflowed. |
| Perkinsville | 8/19/2009 | Flash Flood | 0/0 | $2,534 | $0 | Kraut Creek flooded, causing the Boone Mall entrance& parking lot to close. |
| Perkinsville | 8/20/2009 | Flash Flood | 0/0 | $3,800 | $0 | Kraut Creek overflowed its banks, causing the entrance and parking lot to the Boone Mall to be closed due to high water. |
| Perkinsville | 1/24/2010 | Flash Flood | 0/0 | $12,299 | $0 | Kraut Creek flooded the Boone Mall parking lot. Two cars were stranded. |
| Valle Crucis | 1/25/2010 | Flash Flood | 0/0 | $0 | $0 | The Watauga River Road closed from flash flooding. Flash flooding closed several other low water crossings in the county. |
| Rominger | 3/22/2010 | Flash Flood | 0/0 | $0 | $0 | Heavy rains caused flash flooding along the Watauga River. Flood waters covered a bridge near the intersection of Watauga River Road and Rominger Road. |
| Blowing Rock | 8/5/2010 | Flash Flood | 0/0 | $0 | $0 | More than six inches of water was flowing across Highway 321. |
| Valle Crucis | 8/5/2010 | Flash Flood | 0/0 | $0 | $0 | The Watauga River flooded several small roads near the river. |
| Valle Crucis | 8/5/2010 | Flash Flood | 0/0 | $0 | $0 | The Watauga River came out of its banks and caused over six inches of water to flow over New Farm Road. |
| Perkinsville | 11/30/2010 | Flash Flood | 0/0 | $0 | $0 | Boone Creek was overflowed and flooded a portion of Boone Creek Drive. |
| Blowing Rock | 11/30/2010 | Flash Flood | 0/0 | $0 | $0 | A minor rockslide blocked part of SR 105. |
| Boone Blowing Rock Airport | 11/30/2010 | Flash Flood | 0/0 | $0 | $0 | Deerfield Rd and Bamboo Rd closed from flooding on several forks of New River. |
| Foscoe | 3/6/2011 | Flood | 0/0 | $0 | $0 | Heavy rain caused flooding on several roads in the county. Some roads had a water depth of 2-feet, including Watauga River Rd. Dewitt Barnett Rd near Valle Crucis was covered with 3-feet of water. Mud, rocks, and gravel supporting the new four-lane section of U.S. Hwy 321 between Blowing Rock & Lenoir gave way in a massive mudslide dumped an estimated 30-foot long pile of debris on Kirby Mountain Road below. |
| Aho | 4/16/2011 | Flash Flood | 0/0 | $0 | $0 | Heavy rain of 3 to 4 inches caused mudslides on Niley Cook Road & Fairway Drive. Two roads were also flooded. |
| Valle Crucis | 4/16/2011 | Flash Flood | 0/0 | $0 | $0 | Heavy rains of at least 3 to 4 inches caused the Watauga river to flood State Route 194 and Dewitt Barnett Road. |
| Boone | 6/28/2011 | Flash Flood | 0/0 | $59,703 | $0 | Flash flooding caused water of a six in depth to be at the intersection of Hardin and Rivers Streets. A man had to be rescued from his vehicle. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Valle Crucis | 9/6/2011 | Flood | 0/0 | $0 | $0 | Prolonged heavy rain, totaling three to four inches, produced flooding along Brushy Fork that crossed low water bridges in Valle Crucis. |
| Hodges Gap | 9/6/2011 | Flood | 0/0 | $0 | $0 | Prolonged heavy rain, totaling three to four inches, caused Laurel Fork to flood some low water crossings near Shulls Mill. |
| Boone | 9/6/2011 | Flash Flood | 0/0 | $895,539 | $0 | Heavy rain caused flash flooding along Kraut/Boone Creek. Water inundated portions of Appalachian State University and the parking lot of Boone Mall. Several cars were flooded up to their windows in the deluge. Two water rescues were required when motorists chose to ignore cones and signs that indicated the Boone Mall parking lot was closed, and their vehicles became stalled in the water. |
| Valle Crucis | 9/6/2011 | Flash Flood | 0/0 | $11,941 | $0 | Heavy rain prompted the Watauga River to leave its banks and cause flash flooding across Dewitt Barnett Road. |
| Perkinsville | 9/25/2011 | Flash Flood | 0/0 | $5,970,261 | $0 | Flash flooding from Kraut Creek occurred along Rte 321 in and southeast of Boone to the Mall. Flash flooding along Boone Creek in the Appalachian State University resulted in flooding of several buildings on campus including Rankin Science West, Edwin Duncan Hall, and Newland Hall. Evacuations were ordered for 12 to 15 people in six apartments when dirt around a culvert washed away causing concern for structural damage to apartments. Others were ordered to shelter along Boone Docks where water surrounded, but did not flood apartments. Water inundated most of the parking lot of the Boone Mall. |
| Valle Crucis | 9/25/2011 | Flash Flood | 0/0 | $0 | $0 | Flash Flooding along the Watauga River flooded the Dewitt Barnett Road bridge where it crosses the river. |
| Boone | 11/28/2011 | Flash Flood | 0/0 | $0 | $0 | Boone Creek flooded Raley Parking lot. |
| Rominger | 11/28/2011 | Flash Flood | 0/0 | $0 | $0 | The USGS river gage at Sugar Grove (SGWN7) crested at 0400Z on the 29th (11 PM, 28th) at 10.84' its highest level in over three years (12.84, March 4, 2008). The Watauga River also flooded Dewitt Barnett Bridge in Valley Crucis. |
| Valle Crucis | 11/28/2011 | Flash Flood | 0/0 | $0 | $0 | Dewitt Barnett Bridge was flooded. |
| Boone Blowing Rock Airport | 11/28/2011 | Flash Flood | 0/0 | $0 | $0 | Deerfield Creek came out of its banks flooding Deerfield Road. |
| Blowing Rock | 3/15/2012 | Flash Flood | 0/0 | $0 | $0 | Law enforcement reported Heather Ridge Lane closed due to high water. Debris from flooding covered Highway 321 near Possum Hollow and near Green Hill. |
| Aho | 7/18/2012 | Flash Flood | 0/0 | $0 | $0 | Rock and mudslides from heavy rain occurred near Sampson Road. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Mabel | 8/5/2012 | Flash Flood | 0/0 | $11,593 | $0 | The Watauga Co. 911 reported heavy rain from thunderstorms resulted in flooding of North Fork Road at Zionsville. Part of the road washed out and had to be closed. Several inches of water were flowing over the road at this location. |
| Valle Crucis | 9/18/2012 | Flood | 0/0 | $0 | $0 | A 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. Rainfall of 6.46 inches was reported from Boone, NC. |
| Valle Crucis | 1/30/2013 | Flash Flood | 0/0 | $0 | $0 | The Watauga River overtopped a bridge on Dewitt Barnett Road. |
| Boone | 1/30/2013 | Flash Flood | 0/0 | $196,964 | $0 | The Boone Volunteer Fire Department reported 19 water-related rescues across the Boone area due to rapidly rising water. Some rescues assisted people trapped in their homes, while others assisted trapped motorists in standing water. Only 1 rescue was considered serious by rescuers. No serious injuries were reported, although a few people were treated for mild hypothermia. Numerous roads were also closed and/or damaged due to flooding. One report includes flooding on Deerfield Rd where a nearby stream overflowed. Road damages of $150,000 occurred on Roby Greene Road and Seven Oaks Road. Water entered 12 apartments at the Bavarian Village complex. Several apartments were evacuated due to a flooding-related propane leak, with no damages. At least 5.61 inches of rainfall was measured at the Watauga Medical Center. |
| Shulls Mills | 1/30/2013 | Flash Flood | 0/0 | $0 | $0 | Heavy rain caused 2-feet of water to flow over Diamond Branch Road. |
| Bowers Gap | 5/5/2013 | Flood | 0/0 | $0 | $0 | Heavy rain caused flooding of Beech Mountain Parkway and Laurel Creek Road. |
| Boone Blowing Rock Airport | 5/5/2013 | Flood | 0/0 | $0 | $0 | Heavy rain caused a bridge on Bamboo Road to become flooded. |
| Sherwood | 5/6/2013 | Flood | 0/0 | $0 | $0 | Portions of Charlie Thompson Road were closed due to flooding. |
| Rominger | 5/6/2013 | Flood | 0/0 | $0 | $0 | 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. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Blowing Rock | 5/6/2013 | Flash Flood | 0/0 | $0 | $0 | 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. |
| Vilas | 7/4/2013 | Flash Flood | 0/0 | $0 | $0 | Flooding across Linville Creek Road and a small landslide also occurred along this same road. The flooding caused by Linville creek and Brushy Fork. |
| Hodges Gap | 7/4/2013 | Flash Flood | 0/0 | $0 | $0 | Water was running over Bairds Creek Road near the Willow Valley resort caused by Upper Laurel Fork. |
| Vilas | 7/4/2013 | Flash Flood | 0/0 | $0 | $0 | Linville Creek came overflowed and 2 mudslides occurred on Linville Creek Rd. |
| Sherwood | 7/4/2013 | Flash Flood | 0/0 | $0 | $0 | A part of Sherwood Road was flooded by Vanderpool Creek. |
| Boone Blowing Rock Airport | 7/4/2013 | Flash Flood | 0/0 | $0 | $0 | Water was reported flowing over Bamboo Road from Mutton Creek. |
| Sands | 7/7/2013 | Flash Flood | 0/0 | $0 | $0 | Meat Camp Creek was reportedly washing across a bridge at Appaloosa Trail and Castle Ford Road. |
| Adams | 7/7/2013 | Flash Flood | 0/0 | $22,510 | $0 | The road was buckled near NC Route 105 and US Highway 421 by flood waters. |
| Boone | 7/7/2013 | Flash Flood | 0/0 | $0 | $0 | Two feet of water from Boone Creek flowed across the intersection of Faculty Street and Highland Drive. Boone Mall parking lot flooded along with parts of U.S. 321, King Street, among other roads. |
| Aho | 9/7/2014 | Flood | 0/0 | $0 | $0 | Heavy rain caused Aho Branch Creek to overflow onto Aho Road. |
| Boone Blowing Rock Airport | 9/7/2014 | Flood | 0/0 | $0 | $0 | Heavy rainfall caused East Fork & South Fork of New River to flood and many roadways were closed. Deerfield Road at the Moose Lodge flooded, and between State Farm Road and Blairmont Drive. Casey Lane was flooded and impassible. Bamboo Road flooded and closed from Candy Lane and Kellwood Drive. Flooding occurred in the Boone Mall parking lot. |
| Sugar Grove | 4/19/2015 | Flood | 0/0 | $0 | $0 | Several roads closed across the county for much of the day due to flooding. Several low-water crossings on the Watauga River flooded to a considerable depth, including DeWitt Barnett Rd and Guy Ford Rd. Along South Fork of New River, a low-water crossing at Roby Green Rd flooded. Watauga River Rd near Romminger was also closed by flooding from the river. |
| Boone Blowing Rock Airport | 4/19/2015 | Flash Flood | 0/0 | $0 | $0 | Flooding closed part of Bamboo Road. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WATAUGA COUNTY** | | | | | | |
| Foscoe | 9/29/2015 | Flood | 0/0 | $0 | $0 | The Watauga River flooded part 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. |
| Boone Blowing Rock Airport | 9/29/2015 | Flood | 0/0 | $0 | $0 | Flooding was reported over part of Bamboo Road. |
| Vilas | 10/3/2015 | Flood | 0/0 | $0 | $0 | 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. |
| Rominger | 11/9/2015 | Flash Flood | 0/0 | $0 | $0 | Several roads were closed with flooding at Boone Mall parking lot, sections of Deerfield Road, Bamboo Road and a section of Roby Greene Road as well as several roads close to the Watauga River. |
| Rominger | 11/19/2015 | Flash Flood | 0/0 | $0 | $0 | The Watauga River reached flood stage in a 6-hour period, cresting at 10.17 feet, just over Moderate Flood Stage of 10 feet. Several roads near the Watauga River flooded, along with low-water crossing bridges such as DeWitt Barnett Road. |
| Foscoe | 2/3/2016 | Flash Flood | 0/0 | $0 | $0 | Water overtopped several roads in the Foscoe area, including Churches Hollow, Shaw's Mill, Bamboo and Dewitt Barnett. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Wilkes County | 1/19/1996 | Flash Flood | 0/0 | $72,443 | $0 | -- |
| Wilkes County | 1/19/1996 | Flood | 0/0 | $0 | $0 | Heavy rainfall &snow melt flooded several creeks/ streams and some roads in Wilkesboro. Damage to Cub Creek Park in was estimated at $2,500. In Wilkesboro, flash flooding resulted in $17,000 in damage to a business and submerged several vehicles. In addition, there were several mud slides in Wilkes County. |
| West & North Portion | 8/12/1996 | Flash Flood | 0/0 | $144,885 | $0 | -- |
| Wilkes County | 8/12/1996 | Flood | 0/0 | $906 | $0 | -- |
| Mulberry | 8/16/1996 | Flash Flood | 0/0 | $0 | $0 | Heavy rain resulted in a road being flooded by a creek 3 miles north-northwest of Mulberry. |
| Wilkes County | 1/8/1998 | Flash Flood | 0/0 | $174,329 | $0 | Flood waters damaged some roads. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Wilkes County | 1/27/1998 | Flood | 0/0 | $0 | $0 | Heavy rainfall and snow melt resulted in minor flooding on the Yadkin River at Elkin. The Yadkin River crested a little over one foot above flood stage at Elkin. |
| South Portion | 4/17/1998 | Flash Flood | 0/0 | $1,045,975 | $0 | Rainfall caused flooding of Moravian, Cub, and Mill Creeks in the southern part of the county. Roads were washed out, damaged, or flooded. In Wilkesboro, flood waters damaged over a dozen businesses. Road damage was estimated at $500,000. |
| Wilkes County | 4/17/1998 | Flood | 0/0 | $0 | $0 | Heavy rain resulted in minor flooding on the Yadkin River in Elkin. The river crested ~2.5-feet above flood stage at Elkin. |
| Wilkesboro | 4/19/1998 | Flash Flood | 0/0 | $0 | $0 | Cub Creek in Wilkesboro, and Elkin Creek in Elkin were flooded. The flooding of Elkin Creek resulted in road closings. |
| Joynes | 8/15/1998 | Flash Flood | 0/0 | $34,866 | $0 | One mile north northwest of Joynes, in Stone Mountain State Park, creeks and streams were flooded stranding campers; paved roads, gravel roads, and several bridges were washed out. Flooding washed out numerous roads from one mile north northwest of Joynes to Traphill. Several roads were closed for a few days. |
| South Portion | 6/30/1999 | Flash Flood | 0/0 | $0 | $0 | Heavy rain in southern Wilkes County caused several creeks to flash flood. |
| South Portion | 7/9/1999 | Flash Flood | 0/0 | $0 | $0 | Several small streams and creeks, including Moravian Creek, flooded onto roads in the Thankful to Boomer area at 1645 EST. At 1710, Cub Creek and Hunting Creek flooded. |
| North Wilkesboro | 5/1/2002 | Flash Flood | 0/0 | $31,159 | $0 | Heavy thunderstorm rains flash flooding. Several roads closed & businesses reported water damage. |
| Wilkes County | 3/20/2003 | Flood | 0/0 | $0 | $0 | Moderate to heavy rain caused small stream and urban flooding in Surry, Stokes, Wilkes, and Yadkin counties. Numerous roads were flooded and closed. |
| Purlear | 7/5/2003 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains flooded and closed roads around Purlear. |
| McGrady | 7/6/2003 | Flash Flood | 0/0 | $0 | $0 | Heavy thunderstorm rains flooded and closed secondary roads around McGrady. |
| Wilkes County | 11/19/2003 | Flash Flood | 0/0 | $0 | $0 | Runoff from heavy rain resulted in the flooding of numerous creeks, some of which flooded roads across Wilkes, Watauga, Alleghany, and Ashe counties. |
| Mt Zion | 8/27/2008 | Flash Flood | 0/0 | $1,305 | $0 | Meadow Branch and Mill Creek flooded portions of Mt. Zion Road. |
| Roaring River | 8/27/2008 | Flash Flood | 0/0 | $1,305 | $0 | Roaring River flooded Cotton Mill Road. |
| Champion | 8/27/2008 | Flash Flood | 0/0 | $1,305 | $0 | Naked Creek flooded Mt. Pleasant Rd. |
| Benham | 9/8/2008 | Flash Flood | 0/0 | $0 | $0 | Little Elkin Creek came out of its banks. |
| Boomer | 5/16/2009 | Flash Flood | 0/0 | $3,800 | $0 | Excessive rainfall produced a mudslide along Highway 18 South, near Boomer. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Boomer | 5/16/2009 | Flash Flood | 0/0 | $12,668 | $0 | Flash flooding closed a 2 mile stretch along Highway 268 near the W. Kerr Scott Reservoir. A mudslide occurred which caused some trees to fall over the road. |
| Boomer | 5/16/2009 | Flash Flood | 0/0 | $31,669 | $0 | Mars Mountain Rd partially washed out and part of the guardrail washed away. |
| Boomer | 5/26/2009 | Flash Flood | 0/0 | $6,334 | $0 | Warrior Creek flooded State Route 18, 2 miles southwest of Boomer. |
| Wilkes County Airport | 5/26/2009 | Flash Flood | 0/0 | $3,166,925 | $0 | Moravian Creek flooded & closed Germantown Rd near Moravian Falls, & School St in Wilkesboro. Twenty-seven people evacuated their homes along Moravian Creek, near Germantown Rd, & six mobile homes were destroyed. Wilkesboro Community College was damaged from flooding. The grounds and several buildings were damaged. The flooded creek led to the collapse of a 150-ft by 20-ft section of U.S. Hwy 421 East exit ramp lane in Wilkesboro. |
| Windy Gap | 5/26/2009 | Flash Flood | 0/0 | $63,339 | $0 | Brier Creek washed out Mathis Farm Rd. |
| Boomer | 5/26/2009 | Flash Flood | 0/0 | $63,339 | $0 | The West Prong of Moravian Creek washed out Russell Gap Rd, SE of Boomer. |
| Windy Gap | 5/26/2009 | Flash Flood | 0/0 | $31,669 | $0 | Hunting Creek flooded SR 115 and washed out part of Lewis Church Road, about 2 to 3 miles south of Windy Gap. |
| Hendrix | 5/27/2009 | Flash Flood | 0/0 | $3,800 | $0 | Stony Fork flooded a portion of Casper-Hawkins Road in Hendrix. |
| Hendrix | 5/27/2009 | Flash Flood | 0/0 | $3,800 | $0 | A tributary of Stony Fork flooded a part of Avery-Anderson Road, about one and a half miles south-southwest of Hendrix. |
| Maple Springs | 5/27/2009 | Flash Flood | 0/0 | $3,800 | $0 | The South Prong of Lewis Fork flooded Daniel Dr, 2 miles SE of Maple Springs. |
| Fairplains | 8/1/2009 | Flash Flood | 0/0 | $0 | $0 | Mulberry Creek washed out Mulberry Creek Rd as heavy rainfall moved across the area. Estimated rainfall was 2 to 4 inches in parts of Mulberry Creek basin. |
| Mulberry | 1/24/2010 | Flash Flood | 0/0 | $1,230 | $0 | Flash flooding produced a small debris flow on Hwy 18 near. |
| Roaring River | 1/24/2010 | Flash Flood | 0/0 | $6,149 | $0 | Flash flooding caused the Cotton Mill Road bridge to be under water. |
| Darby | 8/5/2010 | Flash Flood | 0/0 | $0 | $0 | Parts of Wagon Ridge Rd & Homestead Rd were under 6 inches of rapidly flowing water from a tributary of Elk Creek. |
| Moravian Falls | 3/6/2011 | Flood | 0/0 | $0 | $0 | -- |
| Millers Creek | 5/24/2011 | Flash Flood | 0/0 | $0 | $0 | Several roads in the Millers Creek area flooded with 6 to 10 inches of moving water. Roads affected included Highway, Boone Trail, and Hensley Eller Road. |
| Fairplains | 8/20/2011 | Flash Flood | 0/0 | $597 | $0 | Mulberry Creek washed out Mulberry Creek Rd as heavy rainfall moved across the area. Estimated rainfall was 2 to 4 inches in parts of Mulberry Creek basin. |

| Location | Date | Event Type | Death/ Injuries | Property Damage (2017 dollars) | Crop Damage (2017 dollars) | Details |
|---|---|---|---|---|---|---|
| **WILKES COUNTY** | | | | | | |
| Wilkes County Airport | 5/14/2012 | Flash Flood | 0/0 | $3,478 | $0 | 6-8 inches of water flowed over a bridge on Congo Rd. The swift movement of the water swept a car into a nearby ditch. |
| Roaring River | 1/30/2013 | Flash Flood | 0/0 | $0 | $0 | Water flowed over the bridge at Arbor Grove Church Rd near Cotton Mill Rd. |
| Roaring River | 7/27/2013 | Flash Flood | 0/0 | $0 | $0 | Flash flooding was reported along Cotton Mill Road near Roaring River. |
| Summit | 7/27/2013 | Flash Flood | 0/0 | $5,628 | $0 | Heavy rain washed out parts of Fall Creek Road and a landslide closed the road. |
| Parsonville | 7/27/2013 | Flash Flood | 0/0 | $5,628 | $0 | Several water rescues occurred on Pumpkin Run Rd. The Red Cross provided shelter for 10 displaced individuals. |
| Purlear | 7/27/2013 | Flash Flood | 0/0 | $0 | $0 | The North Prong of Lewis Fork flooded and parts of Parsonville Rd were under 3 feet of water isolating the town. Flood waters surrounded several homes along. |
| Reddies River | 8/10/2013 | Flash Flood | 0/0 | $11,255 | $0 | The NC State Park Service reported a few roads leading to Rendezvous Mountain Educational State Forest washed out from heavy rainfall. Rainfall of 2.5 to 3.0 inches was common through the area. |
| Moravian Falls | 8/10/2013 | Flood | 0/0 | $0 | $0 | The Wilkes Co. 911 Center reported water overflowing County Club Rd in southern Wilkesboro due to a clogged culvert. The road was temporarily closed. |
| Boomer | 8/10/2013 | Flood | 0/0 | $0 | $0 | The Wilkes Co. 911 Center reported a clogged culvert causing water to overtop Falls Road east-northeast of Boomer. The road was temporarily closed. |
| Dockery | 8/10/2013 | Flash Flood | 0/0 | $0 | $0 | The Wilkes Co. 911 Center reported the bridge over West Prong Roaring River at Shumate Rd flooded and closed near the Traphill Road intersection. |

*Source: NCEI Storm Events Database*

### Section 5.14.3.1 Historical Summary of National Flood Insurance Program (NFIP) Losses

According to FEMA flood insurance policy records as of February 2017, there have been 248 flood losses reported in the High Country Region through the National Flood Insurance Program (NFIP) since 1970, totaling nearly $3.7 million in claims payments. The region has over 830 policies and coverage totaling over $202 million. A summary of these figures for each High Country county is provided in **Table 5.39**. It should be emphasized these numbers include only those losses to structures insured through the NFIP policies, and for losses in which claims were sought and received. It is likely many additional instances of flood loss in the High Country Region were either uninsured, denied claims payment, or not reported.

**TABLE 5.39: SUMMARY OF INSURED FLOOD LOSSES IN THE HIGH COUNTRY REGION**

| Location | NFIP Policies in Force | Insurance in Force | Flood Losses (Closed) | Claims Payments |
|---|---|---|---|---|
| **Alleghany County** | **18** | **$3,911,300** | **4** | **$86,320** |
| Sparta | 2 | $350,000 | 2 | $34,860 |
| Unincorporated Area | 16 | $3,561,300 | 2 | $51,460 |
| **Ashe County** | **180** | **$42,962,700** | **71** | **$767,510** |

| Location | NFIP Policies in Force | Insurance in Force | Flood Losses (Closed) | Claims Payments |
|---|---|---|---|---|
| Jefferson | 6 | $2,696,500 | 3 | $8,618 |
| Lansing | 5 | $679,800 | 1 | $24,194 |
| West Jefferson | 8 | $2,583,000 | 12 | $206,918 |
| Unincorporated Area | 161 | $37,003,400 | 55 | $527,780 |
| **Watauga County** | **566** | **$135,000,100** | **160** | **$2,346,220** |
| Beech Mountain | -- | -- | 0 | $0 |
| Blowing Rock | 27 | $8,575,900 | 7 | $79,460 |
| Boone | 250 | $52,162,100 | 49 | $940,935 |
| Seven Devils | -- | -- | 0 | $0 |
| Unincorporated Area | 289 | $74,262,100 | 104 | $1,325,825 |
| **Wilkes County** | **70** | **$21,106,200** | **13** | **$456,656** |
| North Wilkesboro | 15 | $4,785,400 | 0 | $0 |
| Ronda* | -- | -- | 0 | $0 |
| Wilkesboro | 22 | $10,334,800 | 11 | $452,467 |
| Unincorporated Area | 33 | $5,986,000 | 2 | $4,189 |
| **HIGH COUNTRY REGION TOTAL** | **834** | **$202,980,300** | **248** | **$3,656,706** |

*These communities do not participate in the National Flood Insurance Program. Therefore, no values are reported.
*Source: FEMA, NFIP*
*Source: https://bsa.nfipstat.fema.gov/reports/1011.htm#NCT*

### *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 (as of February 2017), there are 22 non-mitigated repetitive loss properties located in the High Country Region, which accounted for 66 losses and more than $1,500,700 in claims payments under the NFIP. The average claim amount for these properties is $22,39. This is an increase in repetitive loss properties, number of claims payments, and average claim amount since the previous plan was developed. Eleven of the 22 properties are nonresidential. Without mitigation, these properties will likely continue to experience flood losses. **Table 5.40** presents detailed information on repetitive loss properties and NFIP claims and policies for the High Country Region.

**TABLE 5.40: 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** | **$25,730** |
| 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 |

| Location | Number of Properties | Types of Properties | Number of Losses | Building Payments | Content Payments | Total Payments | Average Payment |
|---|---|---|---|---|---|---|---|
| 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 nonresidential** | **66** | **$1,104,579** | **$396,189** | **$1,500,769** | **$22,739** |

*Source: National Flood Insurance Program*

## 5.14.4 Extent

Flood extent can be measured by the amount of land and property in the floodplain as well as flood height and velocity.

Eleven percent of parcels in the High Country Region are located in the 1.0-percent or 0.2-percent annual chance flood (described further Section 6).

Flood extent, or magnitude, can also be defined by flow or discharge rate (in cubic feet per second), and height of flood waters. Flood depth and velocity are recorded via United States Geological Survey stream gages throughout the region. While a gage does not exist for each participating jurisdiction, there is one for many areas. The greatest peak discharge recorded for the area was in the Town of Wilkesboro in 1916. Water reached a discharge of 116,000 cubic feet per second and the stream gage height was recorded at 34.5 feet. The USGS drainage areas, discharge rates, and available flood stage available for the High Country Region are in **Table 5.41.**

**TABLE 5.41: HISTORIC DISCHARGE RATES IN THE HIGH COUNTRY REGION**

| Jurisdiction | Date | Peak Discharge (cfs) | Gage Height (ft) |
|---|---|---|---|
| **Alleghany County** | | | |
| Sparta | 8/17/1961 | 930 | 20.9 |

| Jurisdiction | Date | Peak Discharge (cfs) | Gage Height (ft) |
|---|---|---|---|
| **Ashe County** | | | |
| Jefferson | 8/14/1940 | 52,800 | 22.5 |
| Lansing | 8/13/1940 | 8,400 | 27.0 |
| West Jefferson | 5/26/1960 | 247 | 21.77 |
| **Watauga County** | | | |
| Elk River near Banner Elk | 8/13/1940 | 21,900 | 16.9 |
| **Wilkes County** | | | |
| North Wilkesboro | 8/14/1940 | 27,000 | 22.02 |
| Ronda | 1916 | 45,000 | 28.0 |
| Wilkesboro | July 1916 | 116,000 | 34.5 |

*Source: USGS*

### 5.14.5 Probability of Future Occurrences

Locations with designated special flood hazard areas are subject to an approximate annual probability of flooding of at least 1.0-percent. This results in varying degrees of probability across jurisdictions and the region. Flood events will remain a threat in the High Country Region. This is discussed further in Section 6 in terms of vulnerability. In general, Unincorporated Ashe County, Lansing, Unincorporated Watauga County, Boone, Wilkes County and the jurisdictions within are subject to more frequent flood events due to presence of special flood hazard boundaries.

Probability on regional level was determined using number of occurrences. With 228 flood events in 20 years (since 1996), the average rate of annual occurrence was eleven flood events. Future events can be expected to be similar or increased; thus, an annual probability of highly likely (greater than 90 percent annual probability) was assigned.

# *OTHER HAZARDS*

## *5.15 Hazardous Materials Incident*

### 5.15.1 Background

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

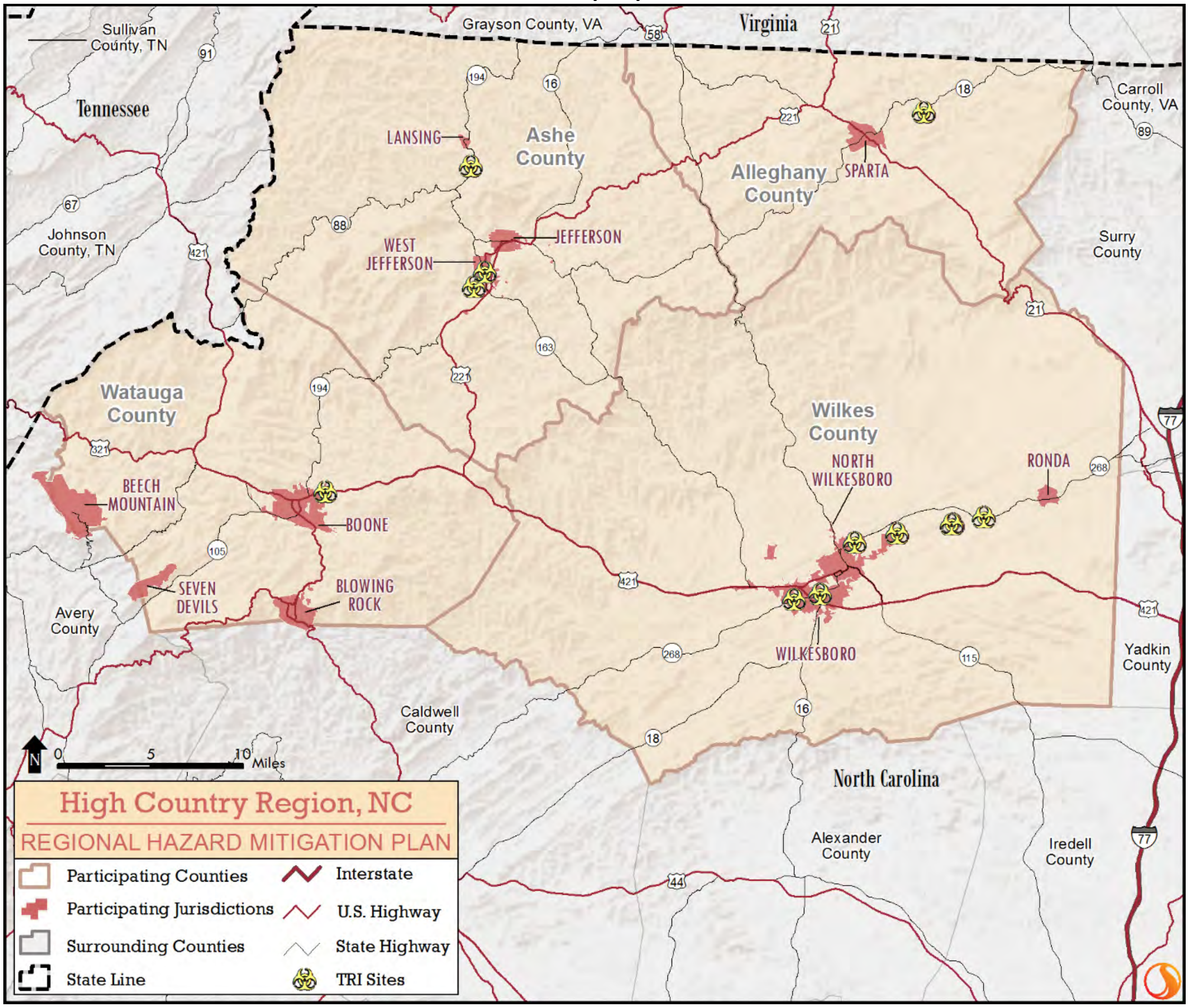
Hazardous material incidents can include the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment of a hazardous material, but exclude: (1) any release which results in exposure to poisons solely within the workplace 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.

## 5.15.2 Location

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 5.21.**

[23] FEMA, 1997.

**FIGURE 5.21: 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.

## 5.15.3 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 yellow in the table 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 materials "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 persons due to the presence of hazardous material, or
- a vehicle accident or derailment resulting in the release of a hazardous material.

**Table 5.42** presents detailed information on historic HAZMAT incidents reported in the High Country Region.

**TABLE 5.42: SUMMARY OF HAZMAT INCIDENTS IN THE HIGH COUNTRY REGION**

| Report Number | Date | City | Mode | Serious Incident? | Fatalities/ Injuries | Damages ($) | Quantity Released |
|---|---|---|---|---|---|---|---|
| **Alleghany County** | | | | | | | |
| E-2009100232 | 9/22/2009 | Roaring Gap | Highway | Yes | 0/1 | $62,600 | 740 LGA |
| **Ashe County** | | | | | | | |
| I-1998070712 | 5/28/1998 | Fleetwood | Highway | Yes | 0/0 | $438,497 | 4,288 LGA |
| I-1999020500 | 1/15/1999 | Jefferson | Highway | No | 0/0 | $0 | 2 SLB |
| I-200211118 | 10/18/2002 | West Jefferson | Highway | No | 0/0 | $500 | 20 LGA |
| I-2003060207 | 5/27/2003 | West Jefferson | Highway | No | 0/0 | $720 | 100 LGA |
| I-2010050554 | 9/30/2009 | West Jefferson | Highway | Yes | 0/0 | $20,822 | 20 LGA |
| **Watauga County** | | | | | | | |
| I-1976061075 | 5/24/1976 | Beech Mountain | Highway | No | 0/0 | $0 | 10 LGA |
| I-1976120393 | 12/9/1976 | Boone | Highway | No | 0/0 | $0 | 0 |
| I-1978061142 | 6/9/1978 | Boone | Highway | No | 0/0 | $0 | 100 LGA |
| I-1980101615 | 10/21/1980 | Boone | Highway | No | 0/0 | $0 | 1 LGA |
| I-1987080481 | 7/30/1987 | Blowing Rock | Highway | No | 0/0 | $0 | 4 LGA |
| 198908052 | 7/14/1989 | Blowing Rock | Highway | Yes | 0/0 | $0 | 3,000 LGA |
| I-1991100012 | 8/29/1991 | Sugar Grove | Highway | Yes | 0/0 | $0 | 3,650 LGA |
| I-1994020960 | 1/19/1994 | Boone | Highway | No | 0/0 | $4,975 | 100 LGA |
| I-1996020345 | 1/24/1996 | Vilas | Highway | No | 0/0 | $1,575 | 75 LGA |
| I-2001061655 | 5/18/2001 | Boone | Highway | No | 0/0 | $200 | 5 LGA |
| I-2002110547 | 11/6/2002 | Deep Gap | Highway | No | 0/0 | $2,555 | 50 LGA |
| E-2005020045 | 1/25/2005 | Boone | Highway | No | 0/0 | $40,100 | 100 LGA |
| I-2005051298 | 4/22/2005 | Boone | Highway | No | 0/0 | $0 | 40 SLB |
| E-2009090314 | 8/17/2009 | Boone | Highway | No | 0/0 | $0 | 0.5 LGA |

| Report Number | Date | City | Mode | Serious Incident? | Fatalities/ Injuries | Damages ($) | Quantity Released |
|---|---|---|---|---|---|---|---|
| X-2011090501 | 8/30/2011 | Adams | Highway | No | 0/0 | $0 | 5 SLB |
| E-2012040163 | 4/9/2012 | Boone | Highway | No | 0/0 | $3,000 | 20 LGA |
| **Wilkes County** | | | | | | | |
| I-1972070022 | 6/23/1972 | North Wilkesboro | Highway | No | 0/1 | $0 | 0 |
| I-1975120318 | 11/28/1975 | North Wilkesboro | Highway | No | 0/0 | $0 | 0 |
| I-1976010446 | 1/2/1976 | Wilkesboro | Highway | No | 0/0 | $0 | 7 LGA |
| I-1976100549 | 10/11/1976 | North Wilkesboro | Highway | No | 0/0 | $0 | 8 LGA |
| I-1977010352 | 12/30/1976 | Wilkesboro | Highway | No | 0/0 | $0 | 1 LGA |
| I-1977030858 | 2/15/1977 | Wilkesboro | Highway | Yes | 0/0 | $0 | 2,000 LGA |
| I-1979090499 | 8/10/1979 | Wilbar | Highway | No | 0/0 | $0 | 1 LGA |
| I-1981040565 | 3/25/1981 | Wilkesboro | Highway | No | 0/0 | $0 | 0 |
| I-1983110548 | 11/16/1983 | North Wilkesboro | Highway | Yes | 0/0 | $0 | 966 LGA |
| I-1983110548 | 11/16/1983 | North Wilkesboro | Highway | Yes | 0/0 | $0 | 3,200 LGA |
| I-1990050376 | 5/7/1990 | North Wilkesboro | Highway | No | 0/0 | $160 | 0.007813 LGA |
| I-1991060522 | 5/7/1991 | Wilkesboro | Highway | No | 0/0 | $100 | 0.125 LGA |
| I-1996010868 | 1/4/1996 | North Wilkesboro | Highway | No | 0/0 | $19,222 | 46 LGA |
| I-1996081247 | 8/6/1996 | North Wilkesboro | Highway | No | 0/0 | $10 | 0.5 LGA |
| I-1998071394 | 6/26/1998 | Pleasant Hill* | Highway | No | 0/0 | $0 | 120 SLB |
| I-2000120510 | 10/10/2000 | Roaring River | Highway | No | 0/0 | $350 | 2.5 LGA |
| I-2001100704 | 8/8/2001 | Roaring River | Highway | No | 0/0 | $500 | 8 LGA |
| I-2008020297 | 2/14/2008 | Wilkesboro | Highway | No | 0/0 | $0 | 75 LGA |

*Source: USDOT PHMSA*

## 5.15.4 Extent

The extent of hazardous materials incidents can be defined in terms of amount of material released. According to USDOT PHMSA, the largest hazardous materials incident reported in the region is 4,288 liquid gallons released on the roadway in Fleetwood (Ashe County). It should be noted that larger events are possible.

## 5.15.5 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. Such an event could have catastrophic consequences though an event 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.

# 5.16 Wildfire

## 5.16.1 Background

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed.[24] 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 cause 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 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.

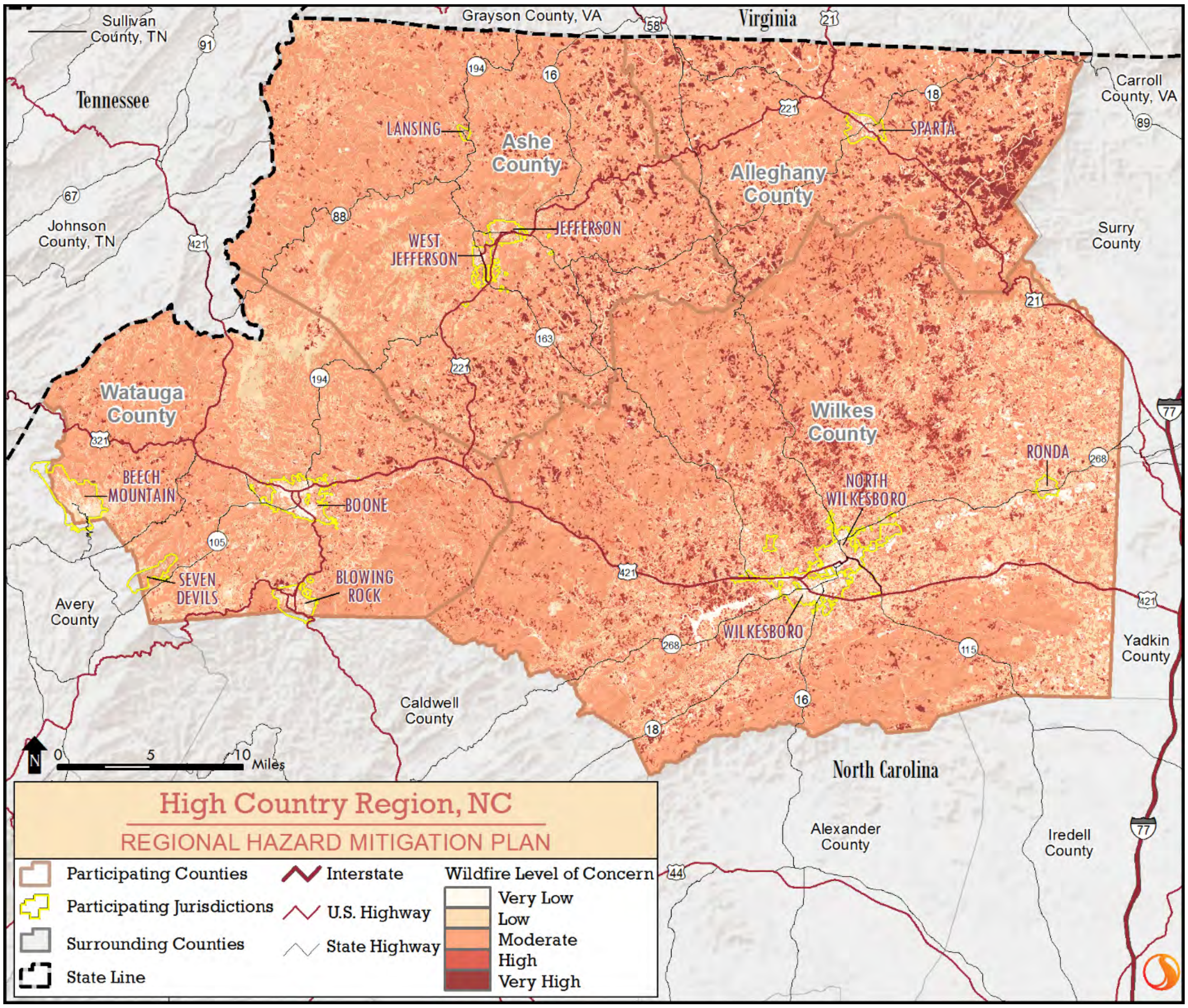
State and local governments can impose fire safety regulations on home sites and developments to help curb wildfire. Land treatment measures such as fire access roads, water storage, helipads, safety zones, buffers, firebreaks, fuel breaks, and fuel management can be designed as part of an overall fire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

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

## 5.16.2 Location

The entire region is at risk to a wildfire occurrence as shown in **Figure 5.22**, Level of Wildfire Concern based on the Southern Wildfire Risk Assessment. (Note - this map is further described in Section 6 in terms of jurisdictional vulnerability.) However, several factors influence where a fire more occur or spread. Forested areas provide significant fuel. Developed areas abutting forested areas (urban-wildfire interface) are particularly susceptible to fire hazard. This is event in the Fire Occurrence Map shown in **Figure 5.23**.

**FIGURE 5.22: WILDFIRE RISK AREAS IN THE HIGH COUNTRY REGION**

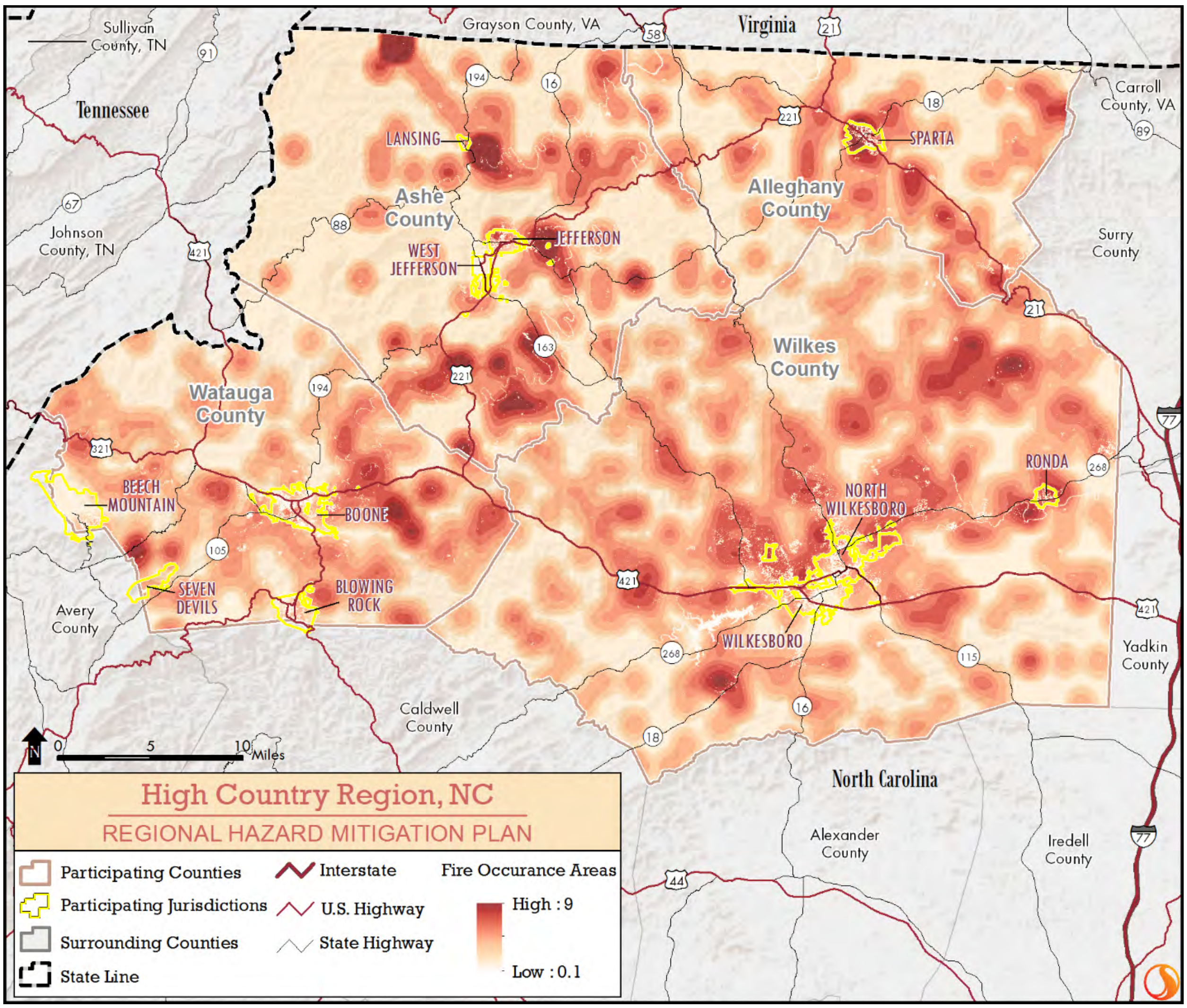



## 5.16.3 Historical Occurrences

Information from the Southern Wildfire Risk Assessment and from North Carolina Forest Services was used to ascertain historic wildfire occurrences for the High Country Region. The Southern Wildfire Risk Assessment provides Fire Occurrence Areas (FOA) based on historical fire ignitions. Data is reported as the number of fires that occur per 1,000 acres each year, and is displayed spatially. The North Carolina Forest Service provided data on the annual number of fires and annual number of acres burned per county. It should be noted that 2016 saw a spike in the number of acres burned by wildfires, particularly in Ashe in Watauga Counties. More information on the 2016 wildfires is located at the end of this section.

**Figure 5.23** shows the Fire Occurrence Areas (FOA) in the High Country Region based on data from the Southern Wildfire Risk Assessment. All counties in the High Country region contain areas considered to be of "high" fire occurrence (up to nine yearly fires per 1,000 acres). It should be noted that that towns of Sparta, Rhonda, Jefferson, Lansing, Wilkesboro, and North Wilkesboro include areas of high fire occurrence, as shown in **Figure 5.23**.

**FIGURE 5.23: HISTORIC WILDFIRE EVENTS IN THE HIGH COUNTRY REGION**




*Source: Southern Wildfire Risk Assessment*

Based on county-level data from the North Carolina Division of Forest Resources from 2002 to 2016, the High Country Region experienced an average of 109 wildfires annually which burned a combined 459 acres, on average. On average, Wilkes County had a higher annual number of fires and number of acres burned when compared to the other participating counties. Watauga County had a higher number of acres burned per fire, indicating larger fires overall than reported in the other participating counties. Alleghany County tended to have a lower number of fires and acres burned on average when compared to the rest of the region. The reported number of acres burned in 2016 in Ashe and Watauga Counties far exceed those reported for other years (456 acres in Ashe County and 1,388 acres in Watauga County).

**Table 5.43** provides a summary table for wildfire occurrences in the High Country Region. **Table 5.44** lists the number of reported wildfire occurrences in the participating counties between the years 2002 and 2016.

**TABLE 5.43: SUMMARY TABLE OF ANNUAL WILDFIRE OCCURRENCES (2002 -2016)***

| | Alleghany County | Ashe County | Watauga County | Wilkes County | High Country Region |
|---|---|---|---|---|---|
| Average Number of Fires per year | 11.5 | 22.1 | 17.9 | 54.4 | 108.9 |
| Average Number of Acres Burned per year | 24.0 | 89.1 | 159.0 | 186.4 | 458.8 |
| Average Number of Acres Burned per fire | 2.1 | 4.0 | 8.9 | 3.3 | 4.2 |

*These values reflect averages over a 15 year period.
*Source: North Carolina Division of Forest Resources*

**TABLE 5.44: HISTORICAL WILDFIRE OCCURRENCES IN THE HIGH COUNTRY REGION**

| | Alleghany County | | Ashe County | | Watauga County | | Wilkes County | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **Number of Fires** | **Number of Acres Burned** | **Number of Fires** | **Number of Acres Burned** | **Number of Fires** | **Number of Acres Burned** | **Number of Fires** | **Number of Acres Burned** |
| **2002** | 16 | 73.2 | 20 | 132.4 | 33 | 96.3 | 72 | 296.6 |
| **2003** | 9 | 2.6 | 4 | 18.5 | 14 | 34.3 | 10 | 21.9 |
| **2004** | 9 | 5.3 | 16 | 29 | 18 | 74.5 | 16 | 21.9 |
| **2005** | 11 | 34.8 | 12 | 34.8 | 11 | 13.5 | 22 | 61.3 |
| **2006** | 3 | 1.2 | 46 | 162.5 | 34 | 85.1 | 85 | 732.7 |
| **2007** | 19 | 33.2 | 48 | 161 | 23 | 18.1 | 61 | 265.4 |
| **2008** | 15 | 16.3 | 28 | 49.6 | 19 | 89.5 | 42 | 424.9 |
| **2009** | 4 | 1.8 | 21 | 35.2 | 9 | 21.9 | 29 | 30 |
| **2010** | 0 | 0 | 9 | 43.9 | 19 | 45.6 | 45 | 81.3 |
| **2011** | 11 | 28.3 | 24 | 26.7 | 10 | 113.5 | 75 | 67.6 |
| **2012** | 7 | 9.7 | 14 | 16 | 17 | 189.5 | 71 | 75.3 |
| **2013** | 14 | 19.1 | 15 | 23.3 | 10 | 21.9 | 58 | 42.7 |
| **2014** | 16 | 53.1 | 26 | 56.1 | 19 | 119.4 | 91 | 196 |

| | Alleghany County | | Ashe County | | Watauga County | | Wilkes County | |
|---|---|---|---|---|---|---|---|---|
| **2015** | 12 | 17.5 | 26 | 91.25 | 17 | 73.7 | 102 | 350.5 |
| **2016** | 26 | 64.6 | 22 | 455.81 | 16 | 1,388.10 | 82 | 131.5 |

**2016 Wildfires**

In the late October through November of 2016, western North Carolina suffered from what are considered to be wildfires of historic extent. In **Watauga County**, wildfires prompted evacuations near Sampson Road and Watson Drive. One fire, the Horton Fire, started on November 21, 2016, and burned 1,450 acres before reaching 100 percent containment (see **Figure 5.24**).[25] In **Ashe County**, the Two Mile Fire burned 431 acres. One fire in Ashe County burned 100 acres in four hours, threating 24 homes, several Christmas tree farms, and several other structures.[26] **Figure 5.25** shows a fire in its early stages on the outskirts of West Jefferson, in Ashe County. Firefighting and rescue crews from all over the state traveled to western North Carolina to aid in relief efforts.[27] According to the USDA's Joint Information Center Western NC Wildfires, by November 25, 2016, nine incident management teams and over 6,000 state and federal personnel from all over the country were deployed to assist the Southeast with fire suppression, in addition to hundreds of state volunteer firefighters and emergency personnel. At the time, North Carolina alone was in use of seven airplanes, eight single engine air tankers (SEATs), six type 1 (large) helicopters, five type 2 (medium) helicopters, and three type 3 (large helicopters) to aid in fire suppression.[28] Aside from the impacts to human and environmental health

**Figure 5.25**: **The Horton Fire burns in the Sampson Area of Watauga County on November 23, 2016**

*Source: Reece, Kenneth, Watauga Online[23]*


**Figure 5.24**: **A 7-acre fire burns along Highway 221 about 5 miles from West Jefferson in Ashe County on November 20, 2016**

*Source: WOSCTV[1]*

[25] Watauga Online. (2016, December 2). Horton Fire Updates. Retrieved from http://wataugaonline.com/horton-fire-updates/

[26] http://myfox8.com/2016/11/21/ashe-county-wildfire-expected-to-reach-400-acres-by-monday-night/

[27] http://myfox8.com/2016/11/22/new-wildfire-sparks-evacuations-in-blowing-rock/

[28] UDA Forest Services Joint Information Center Western NC Wildfires. Evening Summary (2016, November 25). Retrieved from https://www.fs.usda.gov/detail/nfsnc/alerts-notices/?cid=fseprd525902

and safety, the fires had a significant impact on the region's economy, which relies heavily on tourism during the fall and winter months.[29]

## 5.16.4 Extent

Wildfire extent can be defined by the number of fires occurring in a given year or by the number of acres burned in a given year. The greatest number of fires to occur in a given year (based on data from 2002 to 2016) was in Wilkes County (102 fires in 2015) and the greatest number of acres burned occurred in Watauga County (1,388 acres in 2016).

Analyzing the data by county indicates the following wildfire hazard extent for each county.

***Alleghany County***
The greatest number of fires to occur in any year was 26 fires in 2016.
The greatest number of acres to burn in a single year also occurred in 2002 when 73 acres were burned.

***Ashe County***
The greatest number of fires to occur in any year was 48 fires in 2007.
The greatest number of acres to burn in a single year occurred in 2016 when 456 acres were burned.

***Watauga County***
The greatest number of fires to occur in any year was 34 fires in 2006.
The greatest number of acres to burn in a single year occurred in 2016 when 1,388 acres were burned.

***Wilkes County***
The greatest number of fires to occur in any year was 102 fires in 2015.
The greatest number of acres to burn in a single year occurred in 2006 when 733 acres were burned.

## 5.16.5 Probability of Future Occurrences

Wildfire events will be an ongoing occurrence in the High Country Region. The likelihood of wildfires increases during drought cycles and abnormally dry conditions. Fires could increase due to local climate and ground conditions, such as dry and windy atmospheric conditions combined with fuel buildup. 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 urban-wildland boundary. The risk will also vary due to assets. Areas in the urban-wildland 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 "highly likely" (greater than 90% percent annual probability).

[29]http://www.citizen-times.com/story/news/local/2016/11/18/outbreak-wnc-wildfires-takes-toll-wildlife-environment/93788956/

# 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 Priority Risk Index

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 5.45**. 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 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

[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.

accepted by the members of the High Country Regional Hazard Mitigation Planning Committee Planning Committee.

**TABLE 5.45: 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 | |
| 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 | |

## 5.17.2 Priority Risk Index Results

**Table 5.46** 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 5.46: SUMMARY OF PRI RESULTS FOR THE HIGH COUNTRY REGION**

| Hazard | Category/Degree of Risk | | | | | |
|---|---|---|---|---|---|---|
| | Probability | Impact | Spatial Extent | Warning Time | Duration | PRI Score |
| **Atmospheric Hazards** | | | | | | |
| Drought | Highly Likely | Minor | Moderate | More than 24 hours | More than one week | **2.6** |
| Hailstorm | Highly Likely | Minor | Moderate | Less than 6 hours | Less than 6 hours | **2.6** |
| Hurricane and Tropical Storm | Likely | Critical | Large | More than 24 hours | Less than 24 hours | **2.9** |
| Lightning | Highly Likely | Minor | Negligible | Less than 6 hours | Less than 6 hours | **2.2** |
| Tornado | Likely | Limited | Small | Less than 6 hours | Less than 6 hours | **2.4** |
| Thunderstorm Wind/High Wind | Highly Likely | Critical | Moderate | Less than 6 hours | Less than 6 hours | **3.2** |
| Winter Storm and Freeze | Highly Likely | Critical | Large | More than 24 hours | Less than one week | **3.3** |
| **Geologic Hazards** | | | | | | |
| Earthquake | Likely | Minor | Moderate | Less than 6 hours | Less than 6 hours | **2.6** |
| Landslide | Possible | Limited | Small | Less than 6 hours | Less than 6 hours | **2.1** |
| **Hydrologic Hazards** | | | | | | |
| Dam and Levee Failure | Unlikely | Critical | Moderate | More than 24 hours | Less than 6 hours | **2.0** |
| Erosion | Possible | Minor | Small | More than 24 hours | More than one week | **1.8** |
| Flood | Highly Likely | Limited | Moderate | 6 to 12 hours | Less than 24 hours | **2.9** |
| **Other Hazards** | | | | | | |
| Hazardous Materials Incident | Unlikely | Limited | Small | Less than 6 hours | Less than 24 hours | **1.9** |
| Wildfire | Highly Likely | Critical | Moderate | Less than 6 hours | More than one week | **3.5** |

## 5.17.3 Final Determinations

The conclusions drawn from the hazard profiling process for the High Country Region, including the PRI results and input from the HCRHM Planning Committee, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk, and Low Risk (**Table 5.47**). 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 5.47: CONCLUSIONS ON HAZARD RISK FOR THE HIGH COUNTRY REGION**

| | |
|---|---|
| **HIGH RISK** | Winter Storm and Freeze<br>Severe Thunderstorm/Wind Storm<br>Hailstorm<br>Hurricane and Tropical Storm<br>Flood<br>Wildfire |
| **MODERATE RISK** | Drought<br>Earthquake<br>Lightning<br>Landslide<br>Tornado<br>Hazardous Material Incident |
| **LOW RISK** | Dam and Levee Failure<br>Erosion |

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# Section 6
# VULNERABILITY ASSESSMENT

This section identifies and quantifies the vulnerability of the High Country Region to the significant hazards identified in the previous sections (Section 4: *Hazard Identification and Section 5: 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 Qualitative Vulnerability Assessment Results
- 6.6 Quantitative Vulnerability Assessment Results
- 6.7 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. In addition, the potential impact and expected amount of damages caused to these assets by each identified hazard event is assessed. The primary objective of the vulnerability assessment is to quantify exposure and the potential loss estimates for each hazard. In doing so, the High Country counties 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 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 by using a two-fold, qualitative and quantitative approach. The qualitative assessment draws on previous impacts in the and near the planning area, as well as professional judgement to determine vulnerability in the region and jurisdictions. The quantitative assessment utilizes a geographic information system (GIS)-based analysis and a risk modeling software (Hazus-MH) analysis.

## 6.2.1 Qualitative Assessment

The qualitative approach was employed for hazards that generally have the potential to impact, or occur within, the entire planning area. Or, such hazards may lack a geographic boundary or sufficient data to perform a reliable analysis. A qualitative vulnerability assessment was employed for all hazards.

Many of the hazards listed above are considered atmospheric and have the potential to affect all current and future buildings and all populations. Drought, hailstorm, lightning, thunderstorm wind, tornado, and winter storm and freeze have the potential to impact the entire High Country region.

Social vulnerability was considered for all hazards. For dam failure and erosion, historical occurrences and property damage information was not available.

## 6.2.2 Quantitative Analysis – GIS

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

- Flood
- Hazardous Materials Incident
- Landslide
- Wildfire

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 geo-referenced point locations for identified assets (critical facilities and infrastructure, special populations, etc.) when available. ESRI® ArcGIS™ 10.2 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. 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 when population by census block becomes available. The results of the analysis provided an estimate of the number of people and critical facilities, as well as the replacement value of buildings, determined to be potentially at risk to those hazards with delineable geographic hazard boundaries.

## 6.2.3 Quantitative Assessment - Hazus

A risk modeling software was used for the following hazards:

- Earthquake
- Hurricane and Tropical Storm

There are several models that exist to model hazards. Hazus-MH was used in this vulnerability assessment to address the aforementioned hazards.

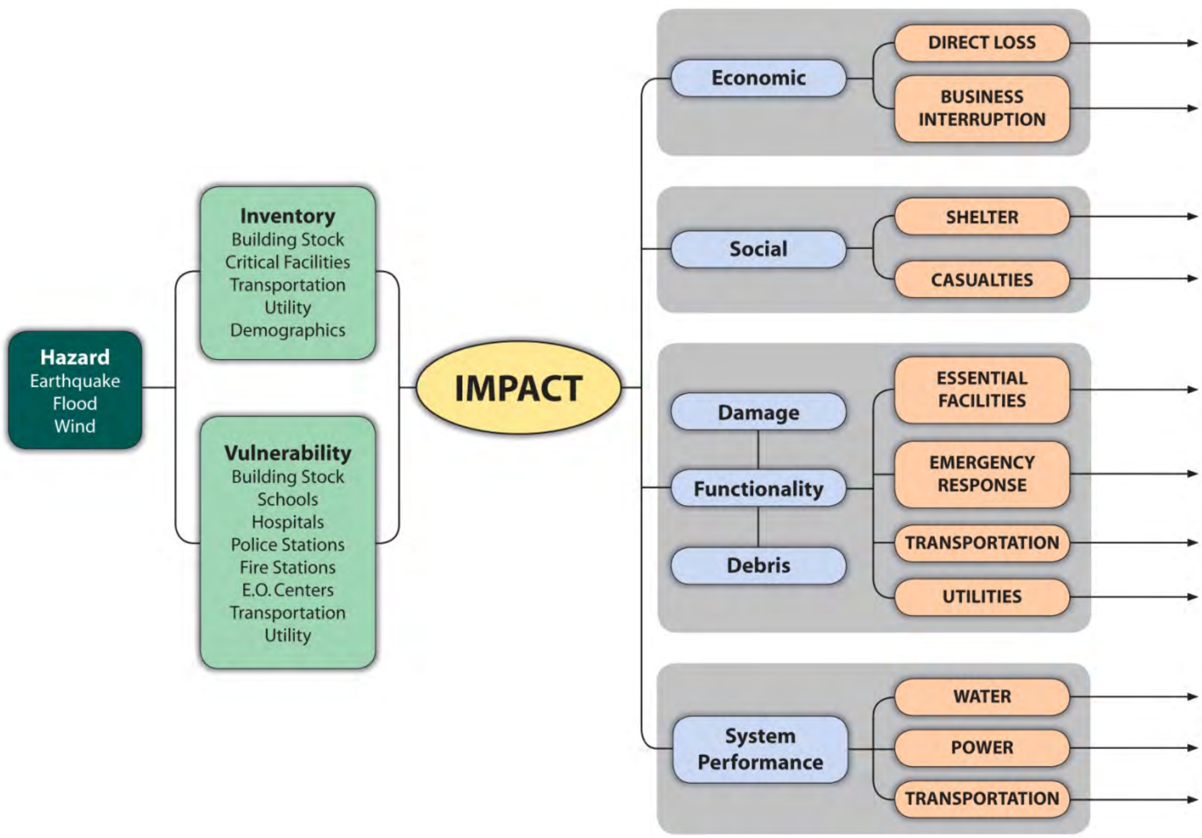
***FEMA's Hazus-MH***

Hazus-MH ("Hazus") is a standardized loss estimation software program developed by FEMA. It is built upon an integrated GIS platform to conduct analysis at a regional level (i.e., not on a structure-by-structure basis). The Hazus risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) can be modeled using the software to determine the impact (i.e., damages and losses) on the built environment.


The High Country Regional Risk Assessment utilized Hazus-MH to produce hazard damage loss estimations for hazards for the planning area. At the time this analysis was completed, Hazus-MH 3.1 was used to estimate potential damages from hurricane wind and earthquake hazards using Hazus-MH methodology. Although the program can also model losses for flood and storm surge, it was not used in this Risk Assessment.

**Figure 6.1** illustrates the conceptual model of the Hazus-MH methodology.

**FIGURE 6.1: CONCEPTUAL MODEL OF HAZUS-MH METHODOLOGY**




Hazus-MH is capable of providing a variety of loss estimation results. In order to be consistent with other hazard assessments, annualized losses are presented when possible. Some additional results based on location-specific scenarios may also be presented to provide a complete picture of hazard vulnerability.

Loss estimates provided in this vulnerability assessment are based on best available data and methodologies. The results are an approximation of risk. These estimates should be used to understand relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, non-specific locations, demographics, or economic parameters).

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

## 6.3 EXPLANATION OF DATA SOURCES

### *Earthquake*

Hazus-MH 3.1 (as described above) was used to assess earthquake vulnerability. A level 1, probabilistic scenario to estimate annualized loss was utilized. In this scenario, several return periods (events of varying intensities) are run to determine annualized loss. Default Hazus earthquake damage functions and methodology were used to determine the probability of damage for 100-, 250- 500-, 750- 1,000-, 1,500-, and 2,500-year frequency events (also known as a return period). Results are presented at the census tract level.

### *Flood*

FEMA Digital Flood Rate Insurance Maps (DFIRM) flood data was 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 were overlaid on the 100-year floodplain areas and 500-year floodplain areas. It should be noted that such an analysis does not account for building elevation.

### *Hurricane and Tropical Storm Wind*

Hazus-MH 3.1 (as described above) was used to assess wind vulnerability. For the hurricane wind analysis, a probabilistic scenario was created to estimate the annualized loss damage and probable peak wind speeds in the High Country Region. Default Hazus wind speed data, damage functions, and methodology were used in to determine the probability of damage for 100-, 500-, and 1,000-year frequency events (also known as a return period) in the scenario. Results are presented at the 2010 U.S. Census tract level.

### *Hazardous Materials Incident*

For the fixed hazardous materials incident analysis, Toxic Release Inventory (TRI) data was used. The Toxics Release Inventory is a publicly available database from the federal Environmental Protection Agency (EPA) that contains information on toxic chemical 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 expanded by the Pollution Prevention Act of 1990. Each year, facilities that meet certain activity thresholds must report their releases and other waste management activities for listed toxic chemicals to EPA and to their state or tribal entity. A facility must report if it meets the following three 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.

***Wildfire***

The data used to determine vulnerability to wildfire 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 layer, known as "Level of Concern" (LOC) was used to determine vulnerability of people and property. The LOC is presented on a scale of 1 to 100. It combines a Wildfire Susceptibility Index (WFSI) with a Fire Effects Index (FEI). The primarily purpose of the LOC data is to highlight areas of concern that may be conducive to mitigation actions. Due to the assumptions made, it is not a true probability. However, it does provide a comparison of risk throughout the region.

## 6.4 ASSET INVENTORY

An inventory of geo-referenced assets within the High Country 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 counties. Unfortunately, building footprint data was not available for any of the participating areas. 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.

   The information provided by the participating areas was supplemented with Hazus-MH 3.1 inventory data. Hazus inventory data provides an estimate of the number of the buildings in the study region. The economic exposure is also presented to be referenced with any Hazus-related results.

2. Critical Facilities: Critical facilities vary by jurisdiction. For this Vulnerability Assessment, facilities were used from Hazus-MH which includes fire stations, police station, medical care facilities, schools, and emergency operation centers. Given potential security concerns, local critical facility data was not provided for inclusion in this public document. However, a critical facility analysis was completed using Hazus-MH for the Hurricane and Earthquake hazards using Hazus-MH inventory. It should be noted that this listing is not all-inclusive for assets located in the region,

1 While potentially not all-inclusive for High Country, "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.

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.

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

**TABLE 6.1: PARCELS AND IMPROVED PROPERTY IN THE HIGH COUNTRY REGION**

| Location | Estimated Number of Parcels | Estimated Number of Improved Parcels[4] | Total Estimated Value of Improved Parcels |
|---|---|---|---|
| **Alleghany County** | **15,632** | **8,744** | **$1,253,277,000** |
| Sparta | 1,072 | 841 | $194,363,300 |
| Unincorporated Area | 14,650 | 7,903 | $1,058,913,700 |
| **Ashe County** | **38,920** | **18,089** | **$2,243,036,000** |
| Jefferson | 869 | 628 | $130,691,900 |
| Lansing | 130 | 97 | $6,895,400 |
| West Jefferson | 1,140 | 820 | $179,737,200 |
| Unincorporated Area | 36,781 | 16,544 | $1,925,711,500 |
| **Watauga County** | **46,684** | **26,186** | **$5,895,081,728** |
| Beech Mountain | 4,619 | 1,649 | $343,773,100 |
| Blowing Rock | 2,188 | 1,478 | $556,322,800 |
| Boone | 3,487 | 2,651 | $1,129,954,128 |
| Seven Devils | 737 | 333 | $77,449,900 |
| Unincorporated Area | 35,653 | 20,075 | $3,787,581,800 |
| **Wilkes County** | **64,052** | **40,910** | **$4,857,374,280** |
| North Wilkesboro | 2,876 | 2,039 | $561,633,880 |
| Ronda | 345 | 253 | $16,325,180 |
| Wilkesboro | 2,439 | 1,847 | $770,446,250 |
| Unincorporated Area | 58,392 | 36,771 | $3,508,968,970 |
| **HIGH COUNTRY REGION TOTAL** | **165,288** | **93,929** | **$12,995,492,008** |

It should be noted that Seven Devils has some property in Avery County. Parcel data was not obtained from any neighboring county, so no parcels from the land residing there was included in this analysis.

## 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 6.2** lists the population by jurisdiction according to U.S. Census American Community Survey 2015 population estimates. Estimates were not available at the census block level, limited the results to county-wide estimates. The total population in the High Country Region according to Census data was 159,211 persons. Additional population estimates are presented in Section 3: *Community Profile*.

2 Total assessed values for improvements is 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.

**TABLE 6.2: TOTAL POPULATION IN THE HIGH COUNTRY REGION**

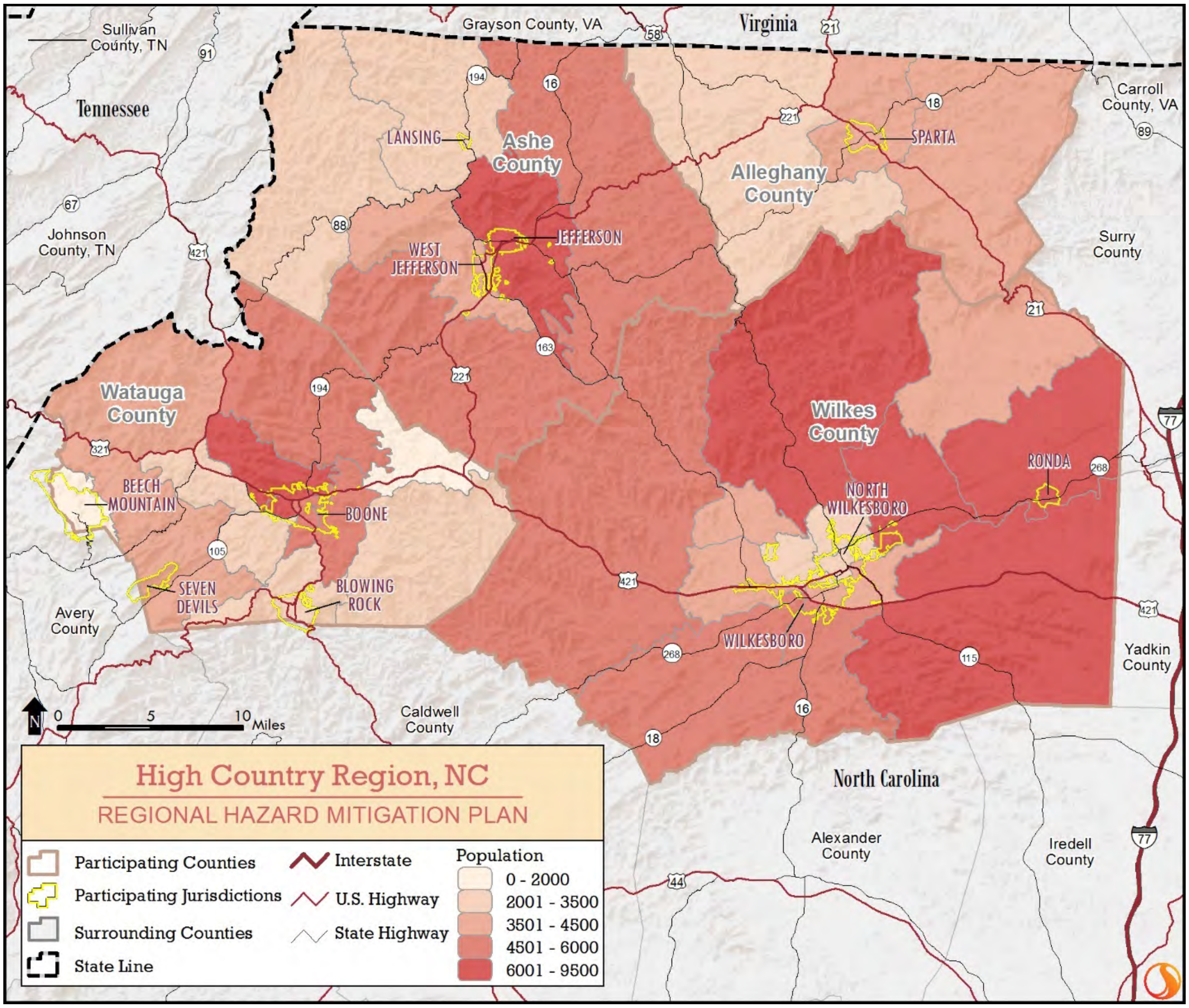
| Jurisdiction | Population (2015) |
|---|---|
| **ALLEGHANY COUNTY** | 10,911 |
| Town of Sparta | **1,802** |
| **ASHE COUNTY** | 27,114 |
| Town of Jefferson | **1,374** |
| Town of Lansing | **194** |
| Town of West Jefferson | **1,232** |
| **WATAGUA COUNTY** | 52,240 |
| Town of Beech Mountain | **571** |
| Town of Blowing Rock | **1,206** |
| Town of Boone | **17,966** |
| Town of Seven Devils | **240** |
| **WILKES COUNTY** | 68,946 |
| Town of North Wilkesboro | **4,250** |
| Town of Ronda | **461** |
| Town of Wilkesboro | **3,548** |

Source: 2015 American Community Survey

In addition, **Figure 6.2** illustrates the 2015 American Community Survey population density by census tract.[3]

3 Population by census block was not available at the time this plan was completed.

**FIGURE 6.2: POPULATION DENSITY BY CENSUS TRACTS IN THE HIGH COUNTRY REGION**




*Source: U.S. Census; American Community Survey 2015*

## 6.5 QUALITATIVE VULNERABILITY ASSESSMENT RESULTS

A qualitative analysis was performed for all hazards. As noted earlier, hazards absent of specific geographic boundaries are assumed to impact the entire planning region, including current and future buildings, or due to lack of data, analysis would not lead to credible results. Such hazards warrant a qualitative analysis but not a quantitative analysis. This includes drought, hailstorm, lightning, severe thunderstorm, tornado, winter storm and freeze, dam and levee failure, and erosion. The total region exposure, and thus risk to these hazards, is approximately $13 billion, as presented in **Table 6.1**. Potential vulnerabilities and impacts are described for each hazard below. The hazards included below are limited to those that did not include a quantitative analysis. For succinctness, qualitative considerations for hazards that permitted the quantitative analysis are included under that hazard's subsection in Section 6.6.

## 6.5.1: Drought

Drought is an atmospheric hazard and it has the potential to impact all existing and future assets, critical facilities, and populations. As previously noted, drought tends to have greater economic, environment, and social impacts than the built environment. Drought may result in the following impacts:

- Economic
  - Temporary closure of business and essential facilities (restaurants cannot operate safely without water)
  - Increase in food prices
  - Increased wildfires
  - Loss of incomes
  - Loss of hydroelectric power
- Environmental
  - Crop damage
  - Stress on wildlife
  - Increased wildfires
  - Wind erosion
  - Loss of wetlands
  - Drying ponds/lakes
- Social
  - Water conservation requirements
  - Reduced quality of life
  - Food shortages
  - Political conflicts over water rights
  - Stress

## 6.5.2: Hailstorm

For all jurisdictions in the High Country Region, all current and future buildings (including critical facilities) and populations are at risk to the hail hazard. Hail is capable of causing damage, particularly to roofs, vehicles, and exposed metal and glass. In addition, hail is capable of damaging crops, which can result in economic harm to areas or individual property owners. Hail occasionally causes injuries and even fatalities to persons unable to seek shelter during a hailstorm event.

## 6.5.3: Lightning

For all jurisdictions in the High Country Region, all current and future buildings (including critical facilities) and populations are at risk to the lightning hazard. Lightning may result in structure fire, electrical system failure, injuries, or deaths.

## 6.5.4: Severe Thunderstorm

For all jurisdictions in the High Country Region, all current and future buildings (including critical facilities) and populations are at risk to the severe thunderstorm hazard. Wind events can result in downed trees, power lines, or blown off shutters and roofs. Wind events can also damage crops and agricultural structures. Thunderstorm systems that stall and produce heavy rain can increase the severity of flooding, although these impacts are best reviewed under the flood section.

## 6.5.5: Tornado

All current and future buildings (including critical facilities) and populations within the High Country Region should be considered at risk to tornadoes. Tornadoes are capable of causing catastrophic damage to structures, injuries and deaths. Additional impacts include power failure, loss of communications, business disruption and downed trees and debris.

## 6.5.6: Winter Storm and Freeze

All current and future buildings (including critical facilities) and populations within the High Country Region should be considered at risk to winter storm events. Structural damage may also be associated with this hazard. For example, heavy snow loads that can cause roofs and trees to collapse. Deaths and injury are also possible due to exposure (e.g., hypothermia), falls, and vehicular accidents. Secondary health impacts caused by shoveling, such as a heart attack, are also possible. Additional impacts on the communities within the High Country Region include road closures, power outages, business interruption, hazardous driving conditions, frozen pipes, and fires due to improper heating. Young children or the elderly may be particularly vulnerable to winter storms resulting in power outages if a safe secondary power source is not available.

## 6.5.7: Dam and Levee Failure

Given the low number of historic dam breaches in the High Country Region, no further analysis was completed for this hazard. In addition, sophisticated dam breach plans (typically completed by the U.S. Army Corp of Engineers) have been completed for dams of concern in the region. However, it should be noted that high hazards dams can result in injuries or loss of life. In addition, flooding resulting from dam failure can cause property damage and business disruption. There 34 high hazard dams in the region as indicated in Section 5. Populations, structures, and critical facilities located near high hazard dams (See **Figure 5.19**) are considered at risk to dam failure. However, it should be noted that breaches from low and intermediate hazard dams can occur, but will likely results in less severe consquences.

## 6.5.8: Erosion

Given the low number of historical events, lack of location data, and limited threat to life and property, no further analysis was completed for erosion in this section. However, erosion can result in loss of life or injury, as well as property damage. Structures located on eroding stream banks can fall into the water, and persons or structures on unstable grounds may fall off ledges or overhangs. Populations, structures, and critical facilities located on or near eroding streambanks or ledges are considered at risk to erosion. All communities containing floodplain boundaries are at risk within the High Country Region.

# 6.6 QUANTITATIVE VULNERABILITY ASSESSMENT RESULTS

Hazards with a more definitive boundary are conducive to a more complex and detailed analysis. The hazards presented in this subsection include: hurricane and tropical storm winds, earthquake, landslide, flood, hazardous materials incident, and wildfire. With the exception of hazardous materials incident, all of these hazards are high hazard events.

## 6.6.1 Hurricane and Tropical Storm

Historical evidence indicates that the High Country Region has a significant risk to the hurricane and tropical storm hazard. There have been three disaster declarations due to hurricanes (Hurricane Hugo, Hurricane Ivan, and Tropical Storm Frances) in the region. Several tracks have come near or traversed through the High Country Region, as shown and discussed in Section 5: *Hazard Profiles*.

Hurricanes and tropical storms can cause damage through numerous additional hazards such as flooding, erosion, tornadoes, and high winds and precipitation, thus it is difficult to estimate total potential losses from these cumulative effects. The current Hazus-MH hurricane model only analyzes hurricane winds and is not capable of modeling and estimating cumulative losses from all hazards associated with hurricanes; therefore only hurricane winds are analyzed in this section. It can be assumed that all existing and future buildings and populations are at risk to the hurricane and tropical storm hazard. This represents the total exposure; the sum of all building and content asset replacement values within a county. Hazus-MH 3.1 was used to determine annualized losses for the region as shown below in **Table 6.3.** Only losses to buildings are reported, in order to best match annualized losses reported for other hazards.

**TABLE 6.3: ANNUALIZED LOSS ESTIMATES FOR HURRICANE WIND HAZARD**

| Location | Total Exposure | 1% (100yr) Loss | 1% Loss Ratio[1] | 0.2% (500yr) Loss | 0.2% Loss Ratio[1] | Annualized Loss | Annualized Loss Ratio[1] |
|---|---|---|---|---|---|---|---|
| **Alleghany County** | $2,437,433,000 | $961,900 | 0.039463% | $4,490,874 | 0.184246% | $32,518 | 0.001334% |
| **Ashe County** | $5,052,647,000 | $387,853 | 0.007676% | $5,407,409 | 0.107021% | $60,053 | 0.001188% |
| **Watauga County** | $10,962,480,000 | $186,531 | 0.001701% | $4,833,096 | 0.044087% | $95,394 | 0.000870% |
| **Wilkes County** | $10,270,772,000 | $2,971,573 | 0.028932% | $21,845,766 | 0.212698% | $208,755 | 0.002032% |
| **HIGH COUNTRY REGION TOTAL** | **$28,723,332,000** | **$4,507,857** | **0.015694%** | **$36,577,146** | **0.127342%** | **$396,719** | **0.001381%** |

*Source: Hazus-MH 3.1*
[1]Loss Ratio = (Dollar Losses ÷ Total Exposure) x 100

### *Social Vulnerability*

Given some equal susceptibility across the entire High Country Region, it is assumed that the total population is at risk to the hurricane and tropical storm hazard. Hurricanes and tropical storm events can also result in business interruption and damage to structures.

### *Critical Facilities*

The analysis did not indicate destruction of critical facilities due to hurricane. Given similar vulnerability across the High Country Region, all critical facilities are considered to be at risk. Some buildings may perform better than others in the face of such an event due to construction and age, among factors. Determining individual building response is beyond the scope of this plan. However, this plan will consider mitigation action for especially vulnerable and/or critical facilities to mitigation against the effects of the hurricane hazard.

## 6.6.2 Earthquake

As the Hazus model suggests below, and historical occurrences confirm, any earthquake activity in the area may inflict minor damage to the planning area but is unlikely to result in catastrophic, widespread losses.

For the earthquake hazard vulnerability assessment, a probabilistic scenario was created to estimate the annualized loss for the region and compare them to the total exposure. Total exposure is the sum of all building and content asset replacement values within a county. The results of the analysis reported at the U.S. Census tract level do not make it feasible to estimate losses at the jurisdiction level. Since the scenario is annualized, no building counts are provided. Losses reported included losses due to building damage, content damage, inventory loss and business interruption. **Table 6.4** summarizes the findings.

**TABLE 6.4: ANNUALIZED LOSS ESTIMATIONS FOR EARTHQUAKE HAZARD**

| Location | Total Exposure | 1% (100yr) Loss | 1% Loss Ratio[1] | 0.2% (500yr) Loss | 0.2% Loss Ratio[1] | Annualized Loss | Annualized Loss Ratio[1] |
|---|---|---|---|---|---|---|---|
| **Alleghany County** | $2,437,433,000 | $178,844 | 0.007337% | $4,155,559 | 0.170489% | $49,721 | 0.002039% |
| **Ashe County** | $5,052,647,000 | $491,968 | 0.009736% | $10,248,521 | 0.202834% | $118,063 | 0.002336% |
| **Watauga County** | $10,962,480,000 | $1,346,577 | 0.012283% | $25,516,615 | 0.232763% | $293,907 | 0.002681% |
| **Wilkes County** | $10,270,772,000 | $867,106 | 0.008442% | $18,026,923 | 0.175516% | $205,068 | 0.001996% |
| **HIGH COUNTRY REGION TOTAL** | **$28,723,332,000** | **$2,884,494** | **0.010042%** | **$57,947,617** | **0.201744%** | **$666,759** | **0.002321%** |

*Source: Hazus-MH 3.1*

[1]Loss Ratio = (Dollar Losses ÷ Total Exposure) x 100

### *Social Vulnerability*

It can be assumed that all existing future populations are at risk to the earthquake hazard. An earthquake even could impact business or result in injury or loss of life.

### *Critical Facilities*

The Hazus probabilistic analysis indicated that no critical facilities would sustain measurable damage in an earthquake event. However, all current and future critical facilities should be considered at-risk to minor damage, should an event occur.

In conclusion, an earthquake has the potential to impact all existing and future buildings, facilities, and populations in communities within the High Country Region the High Country Region. While the High Country Region may not experience a large earthquake (the greatest on record is a magnitude VI MMI), localized damage is possible with an occurrence. Earthquakes can cause damages to structures and infrastructure. Shaking that causes items to fall of walls and shelves can result in injuries or property damage. Specific vulnerabilities and impacts 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.

### 6.6.3 Landslide

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. Most areas of the High Country Region are identified as high susceptibility/moderate incidence (1.5% to 15% of the area is involved in landsliding) areas in the USGS landslide data. Additionally, portions of the study area in Alleghany, Ashe and Watauga Counties are classified as high incidence (more than 15% of the area is involved in landsliding). Small portions of Watauga and Wilkes Counties are classified as low incidence (less than 1.5% of the area is involved in landsliding). **Table 6.5** and **Table 6.6** present potential vulnerability in low incidence areas while **Table 6.7** presents vulnerability in moderate incidence areas and **Table 6.8** presents vulnerability in high incidence areas.

**TABLE 6.5: ESTIMATED PARCELS AND IMPROVED PROPERTY IN HIGH SUSCEPTIBILITY LOW INCIDENCE LANDSLIDE HAZARD AREAS** [6]

| Location | Landslide Vulnerability: High Susceptibility, Low Incidence Areas | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | 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%** |
| Jefferson | 0 | 0% | 0 | 0% | $0 | 0% |
| Lansing | 0 | 0% | 0 | 0% | $0 | 0% |
| West Jefferson | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 0 | 0% | 0 | 0% | $0 | 0% |
| **Watauga County** | **2,411** | **5%** | **705** | **3%** | **$152,083,300** | **3%** |
| Beech Mountain | 2,356 | 51% | 686 | 42% | $149,608,100 | 44% |
| 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 | 55 | 0% | 19 | 0% | $2,475,200 | 0% |
| **Wilkes County** | **0** | **0%** | **0** | **0%** | **$0** | **0%** |
| North Wilkesboro | 0 | 0% | 0 | 0% | $0 | 0% |
| Ronda | 0 | 0% | 0 | 0% | $0 | 0% |
| Wilkesboro | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 0 | 0% | 0 | 0% | $0 | 0% |

| | | | | | | |
|---|---|---|---|---|---|---|
| **HIGH COUNTRY REGION TOTAL** | **2,411** | **1%** | **705** | **1%** | **$152,083,300** | **1%** |

*Source: USGS*

**TABLE 6.6: ESTIMATED PARCELS AND IMPROVED PROPERTY IN MODERATE SUSCEPTIBILITY LOW INCIDENCE LANDSLIDE HAZARD AREAS[6]**

| Location | Landslide Vulnerability: Moderate Susceptibility, Low Incidence Areas | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | 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%** |
| Jefferson | 0 | 0% | 0 | 0% | $0 | 0% |
| Lansing | 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** | **410** | **1%** | **276** | **1%** | **$22,682,890** | **0%** |
| North Wilkesboro | 0 | 0% | 0 | 0% | $0 | 0% |
| Ronda | 0 | 0% | 0 | 0% | $0 | 0% |
| Wilkesboro | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 410 | 1% | 276 | 1% | $22,682,890 | 1% |
| **HIGH COUNTRY REGION TOTAL** | **410** | **0%** | **276** | **0%** | **$22,682,890** | **0%** |

*Source: USGS*

**TABLE 6.7: ESTIMATED PARCELS AND IMPROVED PROPERTY IN HIGH SUSCEPTIBILITY MODERATE INCIDENCE LANDSLIDE HAZARD AREAS[6]**

| Location | Landslide Vulnerability: High Susceptibility, Moderate Incidence Areas | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **8,211** | **53%** | **4,118** | **47%** | **$671,478,200** | **54%** |
| Sparta | 1,072 | 100% | 841 | 100% | $194,363,300 | 100% |
| Unincorporated Area | 7,139 | 49% | 3,277 | 41% | $477,114,900 | 45% |
| **Ashe County** | **11,758** | **30%** | **5,327** | **29%** | **$480,942,400** | **21%** |
| Jefferson | 0 | 0% | 0 | 0% | $0 | 0% |
| Lansing | 130 | 100% | 97 | 100% | $6,895,400 | 100% |
| West Jefferson | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 11,628 | 32% | 5,230 | 32% | $474,047,000 | 25% |
| **Watauga County** | **41,752** | **89%** | **24,140** | **92%** | **$5,553,083,128** | **94%** |
| Beech Mountain | 2,263 | 49% | 963 | 58% | $194,165,000 | 56% |
| Blowing Rock | 2,188 | 100% | 1,478 | 100% | $556,322,800 | 100% |
| Boone | 3,487 | 100% | 2,651 | 100% | $1,129,954,128 | 100% |

| | | | | | | |
|---|---|---|---|---|---|---|
| Seven Devils | 737 | 100% | 333 | 100% | $77,449,900 | 100% |
| Unincorporated Area | 33,077 | 93% | 18,715 | 93% | $3,595,191,300 | 95% |
| **Wilkes County** | **63,642** | **99%** | **40,634** | **99%** | **$4,834,691,390** | **100%** |
| North Wilkesboro | 2,876 | 100% | 2,039 | 100% | $561,633,880 | 100% |
| Ronda | 345 | 100% | 253 | 100% | $16,325,180 | 100% |
| Wilkesboro | 2,439 | 100% | 1,847 | 100% | $770,446,250 | 100% |
| Unincorporated Area | 57,982 | 99% | 36,495 | 99% | $3,486,286,080 | 99% |
| **HIGH COUNTRY REGION TOTAL** | **125,363** | **76%** | **74,219** | **79%** | **$11,540,195,118** | **81%** |

*Source: USGS*

**TABLE 6.8: ESTIMATED PARCELS AND IMPROVED PROPERTY IN HIGH INCIDENCE LANDSLIDE HAZARD AREAS** [6]

| Location | Landslide Vulnerability: High Incidence Areas | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **7,421** | **47%** | **4,626** | **53%** | **$581,798,800** | **46%** |
| Sparta | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 7,421 | 51% | 4,626 | 59% | $581,798,800 | 55% |
| **Ashe County** | **27,162** | **70%** | **12,762** | **71%** | **$1,762,093,600** | **79%** |
| Jefferson | 869 | 100% | 628 | 100% | $130,691,900 | 100% |
| Lansing | 0 | 0% | 0 | 0% | $0 | 0% |
| West Jefferson | 1,140 | 100% | 820 | 100% | $179,737,200 | 100% |
| Unincorporated Area | 25,153 | 68% | 11,314 | 68% | $1,451,664,500 | 75% |
| **Watauga County** | **2,521** | **5%** | **1,341** | **5%** | **$189,915,300** | **3%** |
| 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 | 2,521 | 7% | 1,341 | 7% | $189,915,300 | 5% |
| **Wilkes County** | **0** | **0%** | **0** | **0%** | **$0** | **0%** |
| North Wilkesboro | 0 | 0% | 0 | 0% | $0 | 0% |
| Ronda | 0 | 0% | 0 | 0% | $0 | 0% |
| Wilkesboro | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 0 | 0% | 0 | 0% | $0 | 0% |
| **HIGH COUNTRY REGION TOTAL** | **37,104** | **22%** | **18,729** | **20%** | **$2,533,807,700** | **18%** |

*Source: USGS*

It should be noted that Seven Devils has some property in Avery County. Parcel data was not obtained from any neighboring county, so no parcels from the land residing there was included in this analysis.

### *Social Vulnerability*

Given high susceptibility across the entire High Country Region, it is assumed that the total population is at risk.

[6] As noted in Section 6.4, no building-specific data, such as building footprints, was available to determine buildings at risk. As a result of this data limitation, at risk parcels and their associated improved value of the structure were used.

Twenty-two percent of parcels, and 20-percent of improved parcels, in the High Country Region are located on lands with a high incidence of landslides. In addition, 76 percent of parcels, and 79 percent of improved parcels, are in areas of high susceptibility to landslides (moderate incidence).

In conclusion, a landslide has the potential to impact all existing and future buildings, facilities, and populations in the High Country Region, though some areas are at a higher risk than others. For example, steep slopes and modified slopes bear a greater risk than flat areas. Specific vulnerabilities for these 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.

## 6.6.4 Flood

Historical evidence indicates that the High Country Region is susceptible to flood events. A total of 228 flood events have been reported by the National Centers for Environmental Information resulting in $33.3 million (2017 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 6.9** presents the potential at-risk property in the 1.0-percent ACF flood hazard area, while **Table 6.10** presents the potential at-risk properties in the combined 1.0-percent and 0.2-percent ACF hazard areas. Both the number of parcels and the approximate value are presented.

**TABLE 6.9: ESTIMATED RISK TO PARCELS AND IMPROVED PROPERTY TO THE 1.0-PERCENT ACF FLOOD HAZARD[6]**

| Location | 1.0-percent ACF | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **905** | **6%** | **492** | **6%** | **$72,582,400** | **6%** |
| Sparta | 136 | 13% | 87 | 10% | $17,119,500 | 9% |
| Unincorporated Area | 769 | 5% | 405 | 5% | $55,462,900 | 5% |
| **Ashe County** | **5,475** | **14%** | **2,796** | **15%** | **$328,997,000** | **15%** |
| Jefferson | 59 | 7% | 42 | 7% | $18,444,500 | 14% |
| Lansing | 63 | 48% | 51 | 53% | $3,656,200 | 53% |
| West Jefferson | 99 | 9% | 79 | 10% | $20,792,900 | 12% |
| Unincorporated Area | 5,254 | 14% | 2,624 | 16% | $286,103,400 | 15% |
| **Watauga County** | **3,451** | **7%** | **2,202** | **8%** | **$627,009,300** | **11%** |
| Beech Mountain | 0 | 0% | 0 | 0% | $0 | 0% |
| Blowing Rock | 103 | 5% | 62 | 4% | $27,082,400 | 5% |
| Boone | 516 | 15% | 366 | 14% | $310,908,200 | 28% |
| Seven Devils | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 2,832 | 8% | 1,774 | 9% | $289,018,700 | 8% |
| **Wilkes County** | **6,075** | **9%** | **3,581** | **9%** | **$723,236,540** | **15%** |
| North Wilkesboro | 424 | 15% | 259 | 13% | $165,160,740 | 29% |
| Ronda | 31 | 9% | 21 | 8% | $1,941,020 | 12% |

| | | | | | | |
|---|---|---|---|---|---|---|
| Wilkesboro | 300 | 12% | 210 | 11% | $161,172,760 | 21% |
| Unincorporated Area | 5,320 | 9% | 3,091 | 8% | $394,962,020 | 11% |
| **HIGH COUNTRY REGION TOTAL** | **15,906** | **10%** | **9,071** | **10%** | **$1,751,825,240** | **12%** |

*Source: FEMA DFIRM*

**TABLE 6.10: ESTIMATED RISK TO PARCELS AND IMPROVED PROPERTY TO THE 0.2-PERCENT ACF FLOOD HAZARD (COMBINED 1.0-PERCENT AND 0.2-PERCENT FLOOD HAZARD AREAS)[6]**

| Location | Combined 1.0-Percent and 0.2-Percent | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **971** | **6%** | **514** | **6%** | **$75,657,200** | **6%** |
| Sparta | 139 | 13% | 90 | 11% | $17,475,000 | 9% |
| Unincorporated Area | 832 | 6% | 424 | 5% | $58,182,200 | 5% |
| **Ashe County** | **5,758** | **15%** | **2,935** | **16%** | **$350,967,200** | **16%** |
| Jefferson | 60 | 7% | 43 | 7% | $18,524,000 | 14% |
| Lansing | 71 | 55% | 58 | 60% | $4,018,200 | 58% |
| West Jefferson | 111 | 10% | 89 | 11% | $26,753,200 | 15% |
| Unincorporated Area | 5,516 | 15% | 2,745 | 17% | $301,671,800 | 16% |
| **Watauga County** | **3,736** | **8%** | **2,406** | **9%** | **$735,638,000** | **12%** |
| Beech Mountain | 0 | 0% | 0 | 0% | $0 | 0% |
| Blowing Rock | 116 | 5% | 67 | 5% | $27,989,300 | 5% |
| Boone | 595 | 17% | 435 | 16% | $399,435,300 | 35% |
| Seven Devils | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 3,025 | 8% | 1,904 | 9% | $308,213,400 | 8% |
| **Wilkes County** | **6,375** | **10%** | **3,775** | **9%** | **$769,427,550** | **16%** |
| North Wilkesboro | 513 | 18% | 316 | 15% | $192,149,830 | 34% |
| Ronda | 40 | 12% | 28 | 11% | $2,369,310 | 15% |
| Wilkesboro | 348 | 14% | 246 | 13% | $171,957,930 | 22% |
| Unincorporated Area | 5,474 | 9% | 3,185 | 9% | $402,950,480 | 11% |
| **HIGH COUNTRY REGION TOTAL** | **16,840** | **10%** | **9,630** | **10%** | **$1,931,689,950** | **14%** |

*SOURCE: FEMA DFIRM, LOCAL PARCEL DATA, GIS ANALYSIS*

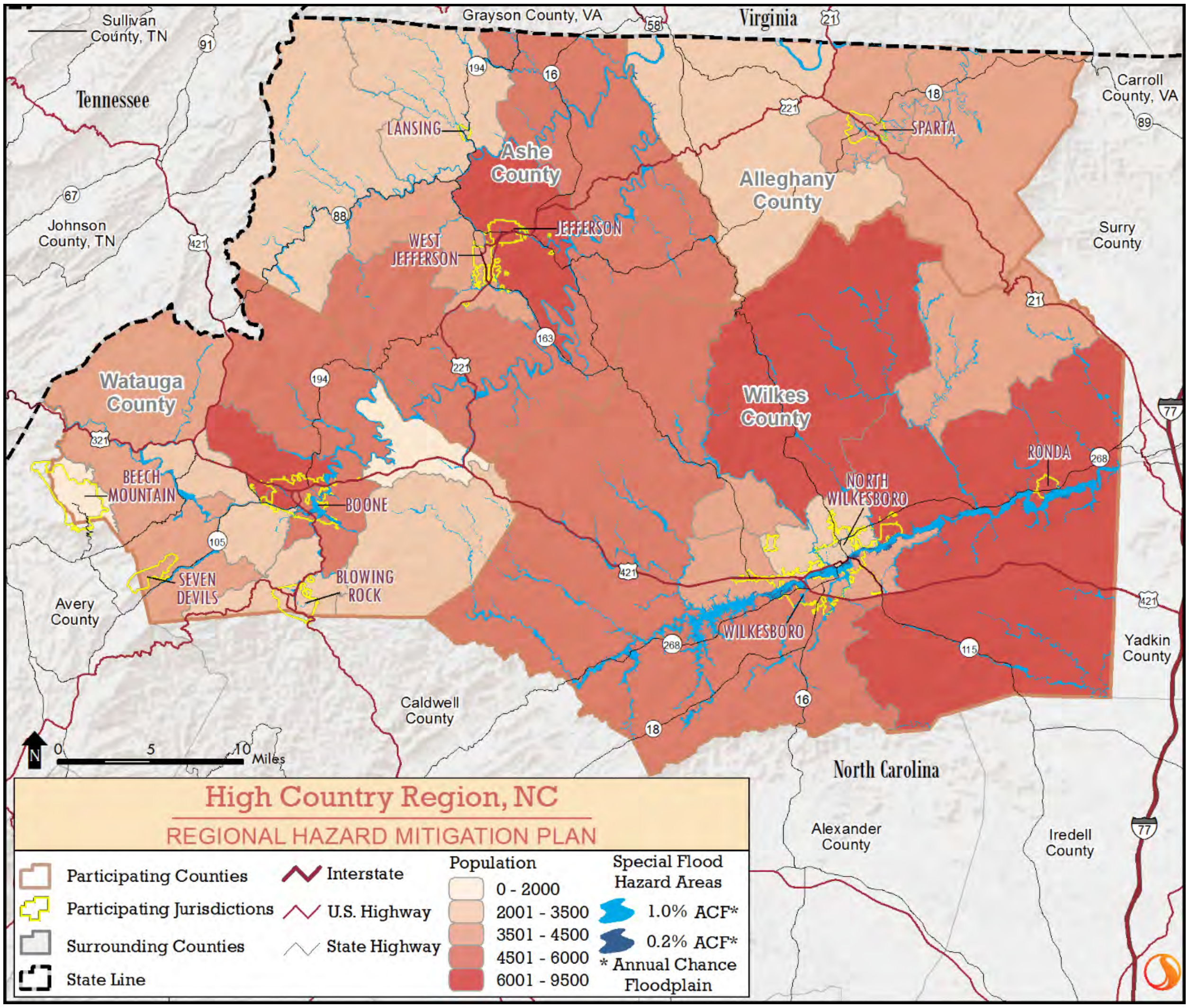
It should be noted that Seven Devils has some property in Avery County. Parcel data was not obtained from Avery County, so no parcels from the land residing there was included in this analysis.

### *Social Vulnerability*

Since 2015 population was only available at the tract level, it was difficult to determine a reliable figure on population at risk to flood. **Figure 6.3** is presented to gain a better understanding of at-risk population. There are areas of concern in eastern North Wilkesboro, southwestern Wilkesboro, and the southern part of Ronda. Furthermore, eastern areas of Boone may warrant further investigation.

[6] As noted in Section 6.4, no building-specific data, such as building footprints, was available to determine buildings at risk. As a result of this data limitation, at risk parcels and their associated improved value of the structure were used.

**FIGURE 6.3 : POPULATION DENSITY NEAR FLOODPLAINS**




*Source: FEMA DFIRM, U.S. Census; American Community Survey 2015*

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 1.0-percent annual chance floodplain and 0.2-percent annual chance floodplain as provided by FEMA. It is certainly possible more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations are outside the scope of this assessment but will be considered during future plan updates.

Impacts of flood include business interruption, mold issues, and damaged contents and equipment, to name a few. Just a few inches of water in a building could cause damage to flooring and foundation structure that cost thousands of dollars to repair. If the water rises more than a few inches in a structure, electrical systems and appliances could be compromised. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions. Repetitive flood events can result in significant business and personal interruption, (i.e., repeat evacuations), and increased damages to structures over time, such as mold or wood rot.

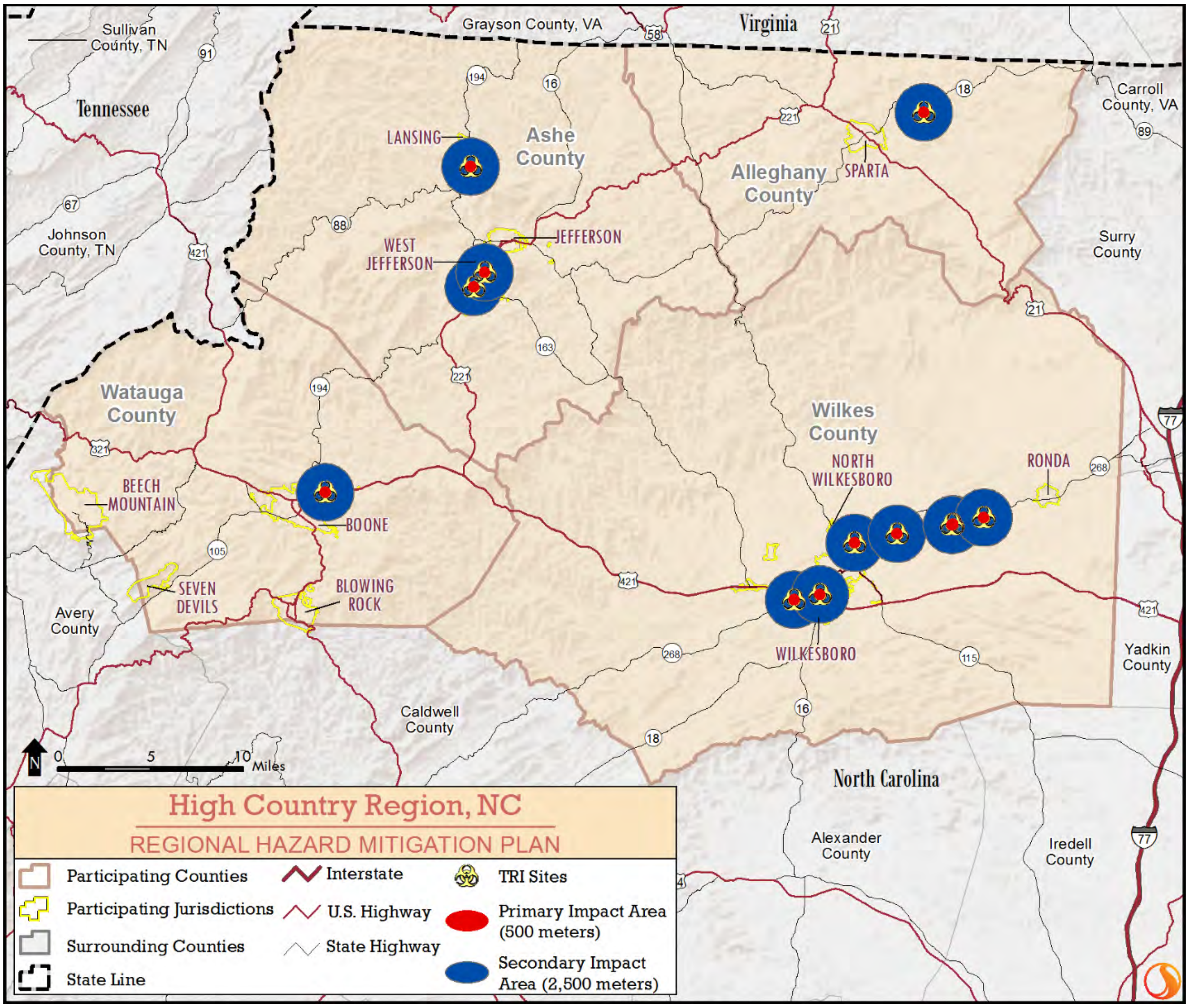
### 6.6.5 Hazardous Materials Incident

Although historical evidence and existing Toxic Release Inventory sites indicate that the High Country Region is susceptible to hazardous materials events, there are few reports of damage. Most hazardous materials 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 materials 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 analysis was used for fixed and mobile areas. In both scenarios, two sizes of buffers—500 and 2,500 meters—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and 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 6.4.** 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 6.5** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table 6.11** (fixed sites) and **Table 6.12** (mobile sites).[4]

[4] Note that parcels included in the 2,500 meter analysis are also included in the 500 meter analysis.

**FIGURE 6.4 : TRI SITES WITH BUFFERS IN THE HIGH COUNTRY REGION**




*Source: EPA*

**TABLE 6.11: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS (FIXED SITES)[5]**

| Location | 500-meter Buffer – Fixed Sites | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **39** | **0%** | **20** | **0%** | **$4,743,700** | **0%** |
| Sparta | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 39 | 0% | 20 | 0% | $4,743,700 | 0% |
| **Ashe County** | **411** | **1%** | **283** | **2%** | **$44,516,600** | **2%** |
| Jefferson | 0 | 0% | 0 | 0% | $0 | 0% |
| Lansing | 0 | 0% | 0 | 0% | $0 | 0% |
| West Jefferson | 247 | 22% | 171 | 21% | $31,172,900 | 17% |
| Unincorporated Area | 164 | 0% | 112 | 1% | $13,343,700 | 1% |

[5] As noted in Section 6.4, no building-specific data, such as building footprints, was available to determine buildings at risk. As a result of this data limitation, at risk parcels and their associated improved value of the structure were used.

| Location | 500-meter Buffer – Fixed Sites | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Watauga County** | **120** | **0%** | **78** | **0%** | **$18,866,000** | **0%** |
| Beech Mountain | 0 | 0% | 0 | 0% | $0 | 0% |
| Blowing Rock | 0 | 0% | 0 | 0% | $0 | 0% |
| Boone | 92 | 3% | 60 | 2% | $16,140,000 | 1% |
| Seven Devils | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 28 | 0% | 18 | 0% | $2,726,000 | 0% |
| **Wilkes County** | **767** | **1%** | **576** | **1%** | **$213,223,890** | **4%** |
| North Wilkesboro | 84 | 3% | 66 | 3% | $19,692,550 | 4% |
| Ronda | 0 | 0% | 0 | 0% | $0 | 0% |
| Wilkesboro | 375 | 15% | 282 | 15% | $141,210,140 | 18% |
| Unincorporated Area | 308 | 1% | 228 | 1% | $52,321,200 | 1% |
| **HIGH COUNTRY REGION TOTAL** | **1,337** | **1%** | **957** | **1%** | **$281,350,190** | **2%** |

| Location | 2,500-meter Buffer – Fixed Sites | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **524** | **3%** | **283** | **3%** | **$28,539,900** | **2%** |
| Sparta | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 524 | 4% | 283 | 4% | $28,539,900 | 3% |
| **Ashe County** | **4,231** | **11%** | **2,516** | **14%** | **$402,368,100** | **18%** |
| Jefferson | 76 | 9% | 57 | 9% | $8,309,900 | 6% |
| Lansing | 122 | 94% | 92 | 95% | $6,613,100 | 96% |
| West Jefferson | 1,137 | 100% | 818 | 100% | $178,681,300 | 99% |
| Unincorporated Area | 2,896 | 8% | 1,549 | 9% | $208,763,800 | 11% |
| **Watauga County** | **2,373** | **5%** | **1,657** | **6%** | **$402,754,100** | **7%** |
| Beech Mountain | 0 | 0% | 0 | 0% | $0 | 0% |
| Blowing Rock | 0 | 0% | 0 | 0% | $0 | 0% |
| Boone | 1,092 | 31% | 801 | 30% | $255,321,000 | 23% |
| Seven Devils | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 1,281 | 4% | 856 | 4% | $147,433,100 | 4% |
| **Wilkes County** | **8,757** | **14%** | **6,217** | **15%** | **$1,476,402,790** | **30%** |
| North Wilkesboro | 2,031 | 71% | 1,474 | 72% | $440,191,430 | 78% |
| Ronda | 0 | 0% | 0 | 0% | $0 | 0% |
| Wilkesboro | 2,306 | 95% | 1,772 | 96% | $757,074,410 | 98% |
| Unincorporated Area | 4,420 | 8% | 2,971 | 8% | $279,136,950 | 8% |
| **HIGH COUNTRY REGION TOTAL** | **15,885** | **10%** | **10,673** | **11%** | **$2,310,064,890** | **16%** |

**FIGURE 6.5 : MOBILE HAZMAT BUFFERS IN THE HIGH COUNTRY REGION**

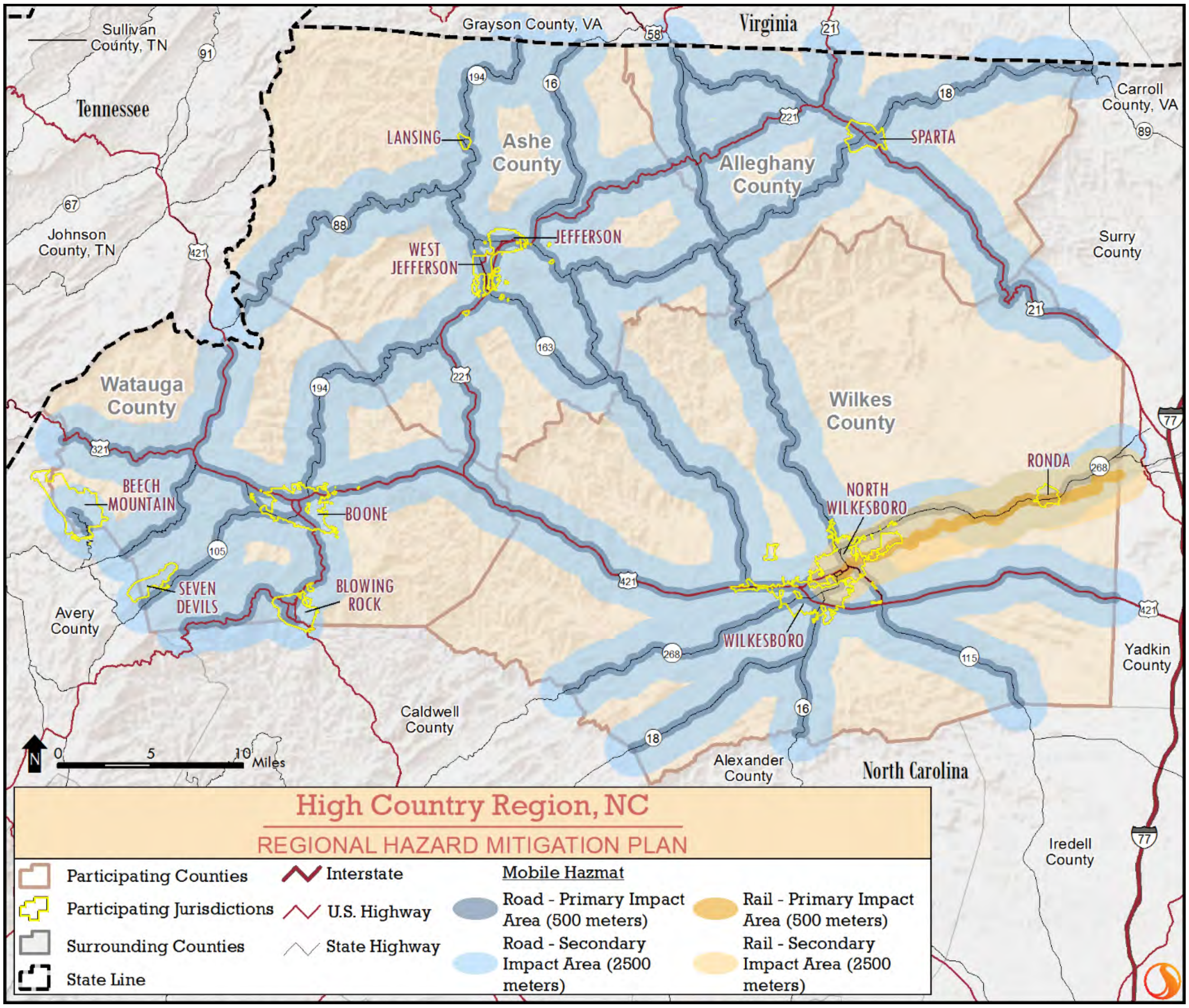



**TABLE 6.12: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS MATERIALS SPILL (MOBILE ANALYSIS)**[6]

| Location | 500-meter Buffer - Roads | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **4,671** | **30%** | **2,999** | **34%** | **$434,190,800** | **35%** |
| Sparta | 1,005 | 94% | 785 | 93% | $157,903,900 | 81% |
| Unincorporated Area | 3,666 | 25% | 2,214 | 28% | $276,286,900 | 26% |
| **Ashe County** | **11,602** | **30%** | **6,246** | **35%** | **$865,738,200** | **39%** |
| Jefferson | 678 | 78% | 494 | 79% | $109,351,300 | 84% |
| Lansing | 130 | 100% | 97 | 100% | $6,895,400 | 100% |
| West Jefferson | 905 | 79% | 668 | 81% | $150,612,800 | 84% |
| Unincorporated Area | 9,889 | 27% | 4,987 | 30% | $598,878,700 | 31% |
| **Watauga County** | **15,553** | **33%** | **10,018** | **38%** | **$2,577,300,928** | **44%** |

[6] As noted in Section 6.4, no building-specific data, such as building footprints, was available to determine buildings at risk. As a result of this data limitation, at risk parcels and their associated improved value of the structure were used.

| Location | 500-meter Buffer - Roads | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| Beech Mountain | 1,254 | 27% | 636 | 39% | $138,390,500 | 40% |
| Blowing Rock | 1,450 | 66% | 983 | 67% | $335,766,900 | 60% |
| Boone | 2,817 | 81% | 2,205 | 83% | $989,242,528 | 88% |
| Seven Devils | 45 | 6% | 30 | 9% | $6,818,600 | 9% |
| Unincorporated Area | 9,987 | 28% | 6,164 | 31% | $1,107,082,400 | 29% |
| **Wilkes County** | **17,866** | **28%** | **12,549** | **31%** | **$2,170,347,170** | **45%** |
| North Wilkesboro | 1,975 | 69% | 1,496 | 73% | $443,572,660 | 79% |
| Ronda | 231 | 67% | 175 | 69% | $12,923,230 | 79% |
| Wilkesboro | 1,904 | 78% | 1,450 | 79% | $632,631,340 | 82% |
| Unincorporated Area | 13,756 | 24% | 9,428 | 26% | $1,081,219,940 | 31% |
| **HIGH COUNTRY REGION TOTAL** | **49,692** | **30%** | **31,812** | **34%** | **$6,047,577,098** | **42%** |

| Location | 2,500-meter Buffer - Roads | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **11,615** | **74%** | **6,885** | **79%** | **$1,049,140,300** | **84%** |
| Sparta | 1,072 | 100% | 841 | 100% | $194,363,300 | 100% |
| Unincorporated Area | 10,543 | 72% | 6,044 | 76% | $854,777,000 | 81% |
| **Ashe County** | **30,155** | **77%** | **14,039** | **78%** | **$1,840,222,200** | **82%** |
| Jefferson | 869 | 100% | 628 | 100% | $130,691,900 | 100% |
| Lansing | 130 | 100% | 97 | 100% | $6,895,400 | 100% |
| West Jefferson | 1,140 | 100% | 820 | 100% | $179,737,200 | 100% |
| Unincorporated Area | 28,016 | 76% | 12,494 | 76% | $1,522,897,700 | 79% |
| **Watauga County** | **38,366** | **82%** | **22,141** | **85%** | **$5,143,379,628** | **87%** |
| Beech Mountain | 4,418 | 96% | 1,608 | 98% | $336,956,100 | 98% |
| Blowing Rock | 2,188 | 100% | 1,478 | 100% | $556,322,800 | 100% |
| Boone | 3,487 | 100% | 2,651 | 100% | $1,129,954,128 | 100% |
| Seven Devils | 737 | 100% | 333 | 100% | $77,449,900 | 100% |
| Unincorporated Area | 27,536 | 77% | 16,071 | 80% | $3,042,696,700 | 80% |
| **Wilkes County** | **43,283** | **68%** | **28,603** | **70%** | **$3,847,619,570** | **79%** |
| North Wilkesboro | 2,816 | 98% | 2,023 | 99% | $555,684,370 | 99% |
| Ronda | 345 | 100% | 253 | 100% | $16,325,180 | 100% |
| Wilkesboro | 2,439 | 100% | 1,847 | 100% | $770,446,250 | 100% |
| Unincorporated Area | 37,683 | 65% | 24,480 | 67% | $2,505,163,770 | 71% |
| **HIGH COUNTRY REGION TOTAL** | **123,419** | **75%** | **71,668** | **76%** | **$11,880,361,698** | **83%** |

| Location | 500-meter Buffer - Railroads | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **0** | **0%** | **0** | **0%** | **$0** | **0%** |
| Sparta | 0 | 0% | 0 | 0% | $0 | 0% |
| Unincorporated Area | 0 | 0% | 0 | 0% | $0 | 0% |

| Location | 500-meter Buffer - Railroads | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Ashe County** | **0** | **0%** | **0** | **0%** | **$0** | **0%** |
| Jefferson | 0 | 0% | 0 | 0% | $0 | 0% |
| Lansing | 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** | **1,590** | **2%** | **1,077** | **3%** | **$257,350,010** | **5%** |
| North Wilkesboro | 738 | 26% | 533 | 26% | $187,767,260 | 33% |
| Ronda | 218 | 63% | 165 | 65% | $12,525,370 | 77% |
| Wilkesboro | 3 | 0% | 3 | 0% | $1,759,020 | 0% |
| Unincorporated Area | 631 | 1% | 376 | 1% | $55,298,360 | 2% |
| **HIGH COUNTRY REGION TOTAL** | **1,590** | **1%** | **1,077** | **1%** | **$257,350,010** | **2%** |

| Location | 2,500-meter Buffer - Railroads | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | 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%** |
| Jefferson | 0 | 0% | 0 | 0% | $0 | 0% |
| Lansing | 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** | **10,053** | **16%** | **7,031** | **17%** | **$1,140,358,450** | **23%** |
| North Wilkesboro | 2,592 | 90% | 1,885 | 92% | $519,348,840 | 92% |
| Ronda | 345 | 100% | 253 | 100% | $16,325,180 | 100% |
| Wilkesboro | 1,051 | 43% | 818 | 44% | $255,637,210 | 33% |
| Unincorporated Area | 6,065 | 10% | 4,075 | 11% | $349,047,220 | 10% |
| **HIGH COUNTRY REGION TOTAL** | **10,053** | **6%** | **7,031** | **7%** | **$1,140,358,450** | **8%** |

### *Social Vulnerability*

Given high susceptibility across the entire High Country Region, it is assumed that the total population is at risk. It should be noted that areas of population concentration (near Boone, West Jefferson, and Wilkesboro, for example) may be at an elevated risk due to a greater burden to evacuate population quickly.

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 area at the highest risk, though all areas carry some vulnerability due to variations in condition that could alter the impact area (direction and speed of wind, volume of release, etc). HAZMAT events can result in injuries, death, property damage, business interruption, and in some cases, evacuations or sheltering in place.

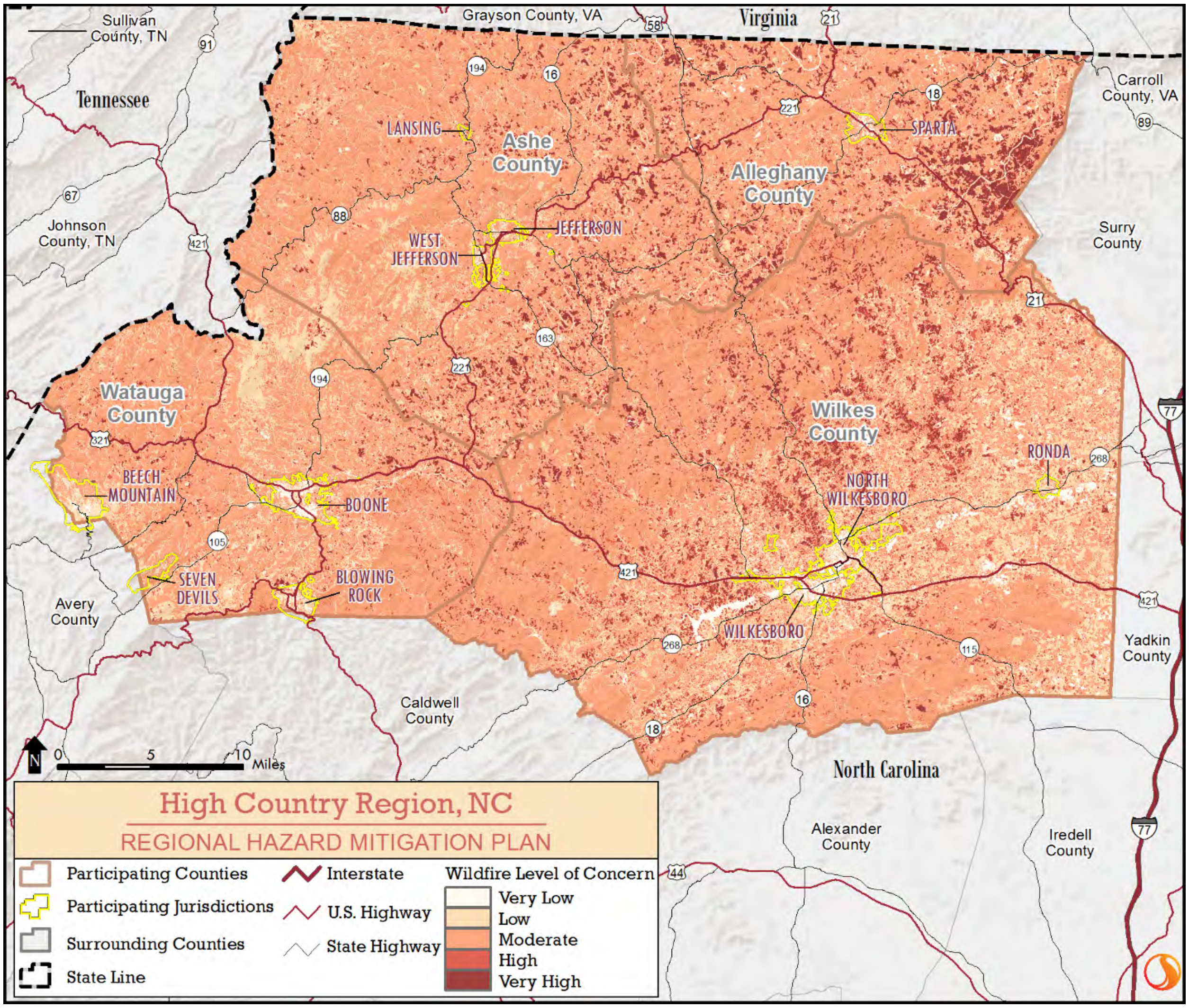
## 6.6.6 Wildfire

To estimate exposure to wildfire, the approximate number of parcels and their associated improved value was determined using GIS analysis. For the critical facility analysis, areas of concern (i.e. areas with high risk to wildfires) were intersected with critical facility locations. The data used to identify high risk areas was obtained from the Southern Wildfire Risk Assessment's Fire Intensity Scale. The Fire Intensity Scale combines areas of significant fuel hazards and associated dangerous fire behavior potential. The potential wildfire intensity is classified as follows:

- **Class 1, Very Low**: Very small, discontinuous flames, usually less than 1 foot in length; very low rate of spread; no spotting. Fires are typically easy to suppress by firefighters with basic training and non- specialized equipment.
- **Class 2, Low**: Small flames, usually less than two feet long; small amount of very short range spotting possible. Fires are easy to suppress by trained firefighters with protective equipment and specialized tools.
- **Class 3, Moderate**: Flames up to 8 feet in length; short-range spotting is possible. Trained firefighters will find these fires difficult to suppress without support from aircraft or engines, but dozer and plows are generally effective. Increasing potential for harm or damage to life and property.
- **Class 4, High**: Large Flames, up to 30 feet in length; short-range spotting common; medium range spotting possible. Direct attack by trained firefighters, engines, and dozers is generally ineffective, indirect attack may be effective. Significant potential for harm or damage to life and property.
- **Class 5, Very High**: Very large flames up to 150 feet in length; profuse short-range spotting, frequent long-range spotting; strong fire-induced winds. Indirect attack marginally effective at the head of the fire. Great potential for harm or damage to life and property.

**Figure 6.6** shows the areas of concern and their class rankings. Initially provided as raster data, it was converted to a polygon for analysis. Each county contains some lands where the value falls into the very high or high risk categories. Alleghany and Wilkes Counties both have the majority of their parcels (and improvements) located in areas of high to very high wildfire risk. Watauga County has the lowest percentage of parcels and improvements located in high to very high wildfire risk areas. **Table 6.13** shows the number of improved parcels in wildfire areas of concern for each county in the region.

**FIGURE 6.6: WILDFIRE RISK AREAS IN THE HIGH COUNTRY REGION**




*Source: Southern Wildfire Risk Assessment Data*

**TABLE 6.13: VULNERABILITY OF IMPROVED PROPERTY TO WILDFIRE AREAS OF CONCERN [7]**

| Location | High to Very High Wildfire Risk Areas | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Alleghany County** | **8,760** | **56%** | **5,046** | **58%** | **$805,960,500** | **64%** |
| Sparta | 519 | 48% | 410 | 49% | $120,902,800 | 62% |
| Unincorporated Area | 8,241 | 56% | 4,636 | 59% | $685,057,700 | 65% |
| **Ashe County** | **17,366** | **45%** | **8,970** | **50%** | **$1,142,309,100** | **51%** |
| Jefferson | 344 | 40% | 255 | 41% | $74,352,200 | 57% |
| Lansing | 35 | 27% | 26 | 27% | $2,537,500 | 37% |
| West Jefferson | 443 | 39% | 308 | 38% | $108,523,300 | 60% |
| Unincorporated Area | 16,544 | 45% | 8,381 | 51% | $956,896,100 | 50% |

[7] As noted in Section 6.4, no building-specific data, such as building footprints, was available to determine buildings at risk. As a result of this data limitation, at risk parcels and their associated improved value of the structure were used.

| Location | High to Very High Wildfire Risk Areas | | | | | |
|---|---|---|---|---|---|---|
| | Parcels at Risk* | | Improved Parcels* (i.e., buildings) | | Value of Improvements* | |
| | Number | % | Number | % | Value | % |
| **Watauga County** | **15,690** | **34%** | **9,832** | **38%** | **$2,305,104,700** | **39%** |
| Beech Mountain | 318 | 7% | 174 | 11% | $44,879,100 | 13% |
| Blowing Rock | 744 | 34% | 496 | 34% | $214,086,500 | 38% |
| Boone | 1,029 | 30% | 772 | 29% | $422,381,500 | 37% |
| Seven Devils | 204 | 28% | 117 | 35% | $25,154,800 | 32% |
| Unincorporated Area | 13,395 | 38% | 8,273 | 41% | $1,598,602,800 | 42% |
| **Wilkes County** | **40,597** | **63%** | **26,782** | **65%** | **$3,097,895,160** | **64%** |
| North Wilkesboro | 927 | 32% | 607 | 30% | $225,407,130 | 40% |
| Ronda | 193 | 56% | 146 | 58% | $10,023,760 | 61% |
| Wilkesboro | 855 | 35% | 591 | 32% | $409,767,750 | 53% |
| Unincorporated Area | 38,622 | 66% | 25,438 | 69% | $2,452,696,520 | 70% |
| **HIGH COUNTRY REGION TOTAL** | **82,413** | **50%** | **50,630** | **54%** | **$7,351,269,460** | **52%** |

It should be noted that Seven Devils has some property in Avery County. Parcel data was not obtained from Avery County, so no parcels from the land residing there was included in this analysis.

***Social Vulnerability***

Although 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.

In conclusion, a wildfire event has the potential to impact many existing and future buildings, critical facilities, and populations in the High Country Region. Smoke inhalation may cause impacts on the population including increased respiratory illnesses. Wildfires can result in damaged or destroyed structures and agricultural lands, business interruptions, and evacuations. Businesses in the High Country Region that rely heavily on mountain tourism may be especially hard hit during and after wildfire events.

## 6.7 CONCLUSIONS ON HAZARD VULNERABIILTY

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 the High Country 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 atmospheric hazards including drought, hailstorm, hurricane and tropical storm, lightning, thunderstorm wind, tornado, and winter storm and freeze. Meanwhile, vulnerability varies across jurisdictions for hazards such as landslide, wildfire, flood and dam failure as indicated in the preceding analysis. Localized conditions may also increase vulnerability including: built up fuel or weather conditions for wildfire, increasing impervious surfaces for flood, and increased development for landslide through loss of ground stabilization. Further, some buildings may be more vulnerable to all hazards based on locations, construction, and building type.

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# Section 7
# CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of 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

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## 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.

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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

During the previous development of this plan in 2012 (the first iteration of the regional plan), a detailed survey of existing plans and policies was undertaken. This information was then used to score each jurisdiction's capability. The results was a numerical score of capability, similar to a grade. In this version of the plan, however, capabilities were reviewed similar to previous efforts but a numerical score on capability was not provided. There were numerous reasons for this revised approach, but it was primarily driven by receipt of conflicting information. Thus, rather focusing on a number for which capability could be graded, actual gaps or achievements in capability were tracked based on received and researched information.

For this version of the plan, a Capability Assessment Review Form 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 was distributed to each participating jurisdiction.[2] 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 was evaluated by each point of contact. The current political climate, an important consideration for any local planning or decision making process, was also evaluated with respect to hazard mitigation. Capability information for the region was also updated based on information found in plans and local government websites.

At a minimum, 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 information 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 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 Review Form 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, and

[2] A copy of the Capability Assessment Review Form can be found in Appendix B.

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. The status of each capability item is indicated with a symbol:

- 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;
- A "C" indicates the item is covered by the county; and
- A red symbol (✓, *, C) indicates that the given item is new to the 2017 plan;

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 | ALLEGHANY COUNTY | Sparta | ASHE COUNTY | Jefferson | Lansing | West Jefferson | WATAUGA 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 (or Parks & Rec/Greenway | | | | | ✓ | | ✓ | ✓[3] | | ✓ | | | | | |
| Stormwater Management Plan/Ordinance | | ✓ | | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | | | |
| Natural Resource Protection Plan | | | | | | | | | | ✓ | | | | | |
| Flood Response Plan | | | | | | | | | | | | | | | |
| Emergency Operations Plan | ✓ | C | ✓ | C | C | C | ✓ | | | ✓ | | ✓ | ✓ | ✓ | ✓ |
| Continuity of Operations Plan | | | | | | | | | | | | | | | |

[3] Beech Mountain Comprehensive Parks and Recreation Master Plan

| Planning / Regulatory Tool | ALLEGHANY COUNTY | Sparta | ASHE COUNTY | Jefferson | Lansing | West Jefferson | WATAUGA COUNTY | Beech Mountain | Blowing Rock | Boone | Seven Devils | WILKES COUNTY | North Wilkesboro | Ronda | Wilkesboro |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Evacuation Plan | | | ✓ | C | C | C | | ✓ | | | | | | | |
| Disaster Recovery Plan | | | | | | | | | | | | | | | |
| Capital Improvements Plan | | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ |
| Economic Development Plan | ✓ | ✓ | | | | | ✓ | | | ✓ | | | ✓ | | ✓ |
| Historic Preservation Plan | | | ✓ | | ✓[4] | | | | | ✓ | | | | | ✓ |
| Flood Damage Prevention Ordinance | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| Zoning Ordinance | ✓[5] | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Subdivision Ordinance | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| 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.

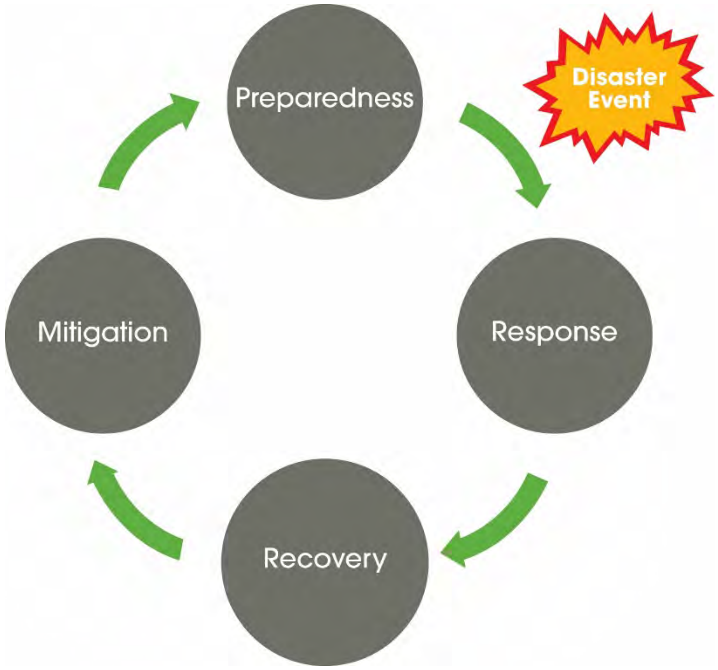
## 7.3.2 Emergency Management

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 a disaster event 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.

[4] National Historic District formed in 2011.

[5] Alleghany County Property Rights Protection Ordinance

**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 Review Form evaluated 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.

1. Each of the four counties participating in this multi-jurisdictional plan has previously adopted hazard mitigation plans prior to participating in the regional planning effort.

***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.

1. 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.

1. Alleghany County, Ashe County, Watauga County, and Wilkes County each maintain emergency operations plans through their respective Emergency Management Departments.
2. Wilkes County's emergency operations plan covers the participating jurisdictions of North Wilkesboro, Ronda, and Wilkesboro.
3. Alleghany County's emergency operation plan covers the participating jurisdiction of Sparta.
4. Ashe County's emergency operations plan covers the participating jurisdictions of Jefferson, Lansing, and West Jefferson.
5. 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.

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

***Evacuation Plan:*** An evacuation plan provides an evacuation strategy for all or part(s) of a jurisdiction in the event that a life safety threat or hazard occurs or is projected to occur. The evacuation plan is meant to facilitate the safe, timely, and efficient evacuation of an area. An evacuation plan provides a general outline of the expected roles, responsibilities, and evacuation-related response activities during an evacuation.

1. Ashe County adopted an evacuation plan. The plan covers the participating jurisdictions of Jefferson, Lansing, and West Jefferson.

2. The Town of Beech Mountain adopted an evacuation plan.

## 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 Review Form 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.

1. Alleghany County and the Town of Sparta have adopted land development plans.
2. 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.
3. Watauga County updated its comprehensive plan with the Citizens' Plan for Watauga. The participating jurisdictions of Beech Mountain, Blowing Rock, Boone, and Seven Devils also maintain comprehensive plans.
4. Wilkes County has adopted the Wilkes County Growth Management Plan. The participating jurisdictions of North Wilkesboro and Wilkesboro have also adopted comprehensive plans.
5. Lansing is in the processing of developing a comprehensive land use plan.
6. Beech Mountain has adopted a comprehensive land use plan (Beech Mountain Comprehensive Plan 2013-2030).

***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.

1. 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.
2. The Town of North Wilkesboro completed a capital improvement plan as part of a comprehensive sewer system assessment and improvement schedule.
3. Watauga County maintains a capital improvements plan. The participating jurisdictions of Beech Mountain, Blowing Rock, Boone, and Seven Devils also maintain their own capital improvements plans.
4. The Town of Sparta has adopted a capital improvement plan.

***Economic Development Plan***: An economic development plan is intended to provide a comprehensive overview of a community's economy. An economic development plan can set policies for a community's economic growth and identify strategies, programs, and projects to improve and maintain a community's economy.

1. Alleghany County, the Town of Sparta, Watauga County, Boone, North Wilkesboro, and Wilkesboro have adopted economic development 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.

1. Ashe County has adopted a historic preservation plan.
2. Lansing formed a National Historic District in 2011.
3. Boone has adopted a historic preservation plan.
4. The Town of Wilkesboro in Wilkes County has adopted Local Historic Preservation District Design Guidelines to provide guidance to property owners in planning exterior changes and to Historic Preservation Commission members in evaluating proposed changes.

***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.

1. Alleghany County has a Property Rights Protection Ordinance that functions much like a zoning ordinance, however it only has one type of use district, "open use." The Town of Sparta has adopted a zoning ordinance that is administered by the Town Manager.
2. Ashe County does not have a zoning ordinance. The Towns of Jefferson and West Jefferson have adopted zoning ordinances.
3. 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.
4. 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.
5. Lansing adopted a zoning ordinance.
6. Alleghany County has adopted the Alleghany County Property Rights Protection Ordinance.

***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.

1. 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 also has an adopted subdivision ordinance.
2. 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.

3. 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.
4. 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.
5. The Town of Sparta adopted a subdivision ordinance.

***Unified Development Ordinance (UDO)***: A unified development ordinance is a local tool that combines traditional zoning and subdivision ordinances, along with other local regulations (e.g., design guidelines, sign regulation, stormwater management), into one document. UDOs can be used to improve efficiency and clarity in the land development process and to eliminate conflicting regulations.

1. The towns of Blowing Rock, Seven Devils, and Boone have adopted unified development ordinances.

***Building Codes, Fire 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.

1. 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 and fire code except for the Town of Ronda. The building code is enforced by each county’s building inspector.
2. 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).6 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

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

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 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. Of note, nearly every jurisdiction with reported flood claims in the 2012 plan has had additional claims over the past 5 years.

**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 | 16 | $3,561,300 | 2 | $51,459.92 |
| Sparta | 7/3/86 | 11/4/09 | 2 | $350,000 | 2 | $34,860.10 |
| **ASHE COUNTY** | 8/16/88 | 12/3/09 | 161 | $37,003,400 | 55 | $527,780.02 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Jefferson | 8/16/88 | 12/3/09 | 6 | $2,696,500 | 3 | $8,618.01 |
| Lansing | 8/5/86 | 12/3/09 | 5 | $679,800 | 1 | $24,194.26 |
| West Jefferson | 6/4/87 | 12/3/09 | 8 | $2,583,000 | 12 | $206,917.50 |
| **WATAUGA COUNTY** | 6/18/80 | 12/3/09 | 289 | $74,262,100 | 104 | $1,325,825.42 |
| Beech Mountain | 3/12/04 | (NSFHA) | -- | -- | -- | -- |
| Blowing Rock | 6/1/78 | 12/3/09 | 27 | $8,575,900 | 7 | $79,459.59 |
| Boone | 9/28/79 | 12/3/09 | 250 | $52,162,100 | 49 | $940,935.46 |
| Seven Devils | 4/13/98 | (NSFHA) | -- | -- | -- | -- |
| **WILKES COUNTY** | 3/31/03 | 12/3/09 | 33 | $5,986,000 | 2 | $4,188.58 |
| North Wilkesboro | 2/15/78 | 12/3/09 | 15 | $4,785,400 | -- | -- |
| Ronda | 7/03/86 | 12/3/09 | -- | -- | -- | -- |
| Wilkesboro | 6/1/87 | 12/3/09 | 22 | $10,334,800 | 11 | $452,467.02 |

(NSFHA) – No Special Flood Hazard Area, all Zone C
Source: NFIP claims and policy information as of 3/31/2017; NFIP Community Status information as of 3/31/2017.

***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.

1. 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.

**Continued Compliance with the NFIP**

This following plans and tools demonstrate a jurisdiction's commitment to ongoing NFIP compliance (based on Table 7.1 results). Zoning measures may also help a community maintain compliance. Further, all municipalities remain in good standing with the program.

***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.

1. All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance or floodplain management plan. All counties and municipalities participating in this hazard mitigation plan, with the exception of Ronda and Seven Devil (no special flood hazard area) also participate in the NFIP and they all have adopted flood damage prevention regulations.

***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.

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

***Natural Resource Protection Plan:*** A natural resource protection plan identifies the lands containing natural resources (e.g., forests, streams, wildlife habitat) within a jurisdiction, and provides policies for protecting those resources. These plans can also include regulations or guidelines for altering or developing land containing natural resources.

1. Boone has adopted a natural resource plan.

***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.

1. 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.
2. The Town of Beech Mountain has adopted the Beech Mountain Comprehensive Parks and Recreation Master Plan.
3. Lansing has adopted an open space management plan.
4. Watauga County has adopted the Watauga County Parks and Recreation Comprehensive Systemwide Plan 2010-2019
5. Boone has adopted the Boone Area Outdoor Recreation Plan (2011).

***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.

1. The Town of Sparta in Alleghany County has adopted a stormwater management ordinance.
2. The Towns of Jefferson, Lansing, and West Jefferson in Ashe County have adopted stormwater management plans.
3. 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 Review Form 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 Review Form results for the High Country Region with regard to relevant staff and personnel resources. A symbol was used to indicate the presence of a staff member(s) in that jurisdiction with the specified knowledge or skill.

- A checkmark (✓) indicates the presence of a staff member(s) in that jurisdiction;
- An asterisk (*) indicates that the resource is currently being considered;
- A "C" indicates the resource or skillset is provided by the county; and
- A red symbol (✓, *, C) indicates that the resource is new or now available (since the 2017 plan).

## 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 | ✓ | ✓ | ✓ | | C | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| Engineers or professionals trained in construction practices related to buildings and/or infrastructure | ✓ | ✓ | ✓ | | C | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| Planners or engineers with an understanding of natural and/or human-caused hazards | ✓ | ✓ | ✓ | | C | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| Emergency Manager | ✓ | | ✓ | | C | | ✓ | | | | | ✓ | | | |
| Floodplain Manager | ✓ | ✓ | ✓ | | C | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ |
| Land Surveyors | | | | | | | | ✓ | | ✓ | | | | | |
| Scientists familiar with the hazards of the community | ✓ | | | | | | ✓ | | | | | ✓ | | | |
| Staff with education or expertise to assess the community's vulnerability to hazards | ✓ | ✓ | ✓ | ✓ | C | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Personnel skilled in GIS and/or HAZUS | ✓ | C | ✓ | | C | | ✓ | ✓ | ✓ | ✓ | | ✓ | | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 Review Form 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. The status of each capability item is indicated with a symbol indicates that the given fiscal resource is locally available for hazard mitigation purposes (including match funds for state and federal mitigation grant funds:

- A checkmark (✓) indicates that the given item is currently available and being used;
- An asterisk (*) indicates that the given item is currently under consideration;
- A "C" indicates the item is provided by the county; and
- A red symbol (✓, *, C) indicates that the given item is new to the 2017 plan.

**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 Review Form 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.).

1. 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.

2. 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."
3. Beech Mountain made the following statement in the Review Form: "*Where such matters fall under the responsibility or authority of a local government, the Town of Beech Mountain is committed to providing for the safety and security of its residents, visitors, and other stakeholders by applying sound planning and preparedness to mitigate the impact of future hazard events. Beech Mountain continues to expand and partner with regional jurisdictions and agencies to provide the highest level of service, security and protection in all aspects of public safety.*"

## 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.

Of note, all of the participating jurisdictions lack a Disaster Recovery Plan and most lack an Economic Development Plan. With the results of this plan's risk assessment, all of the jurisdictions will know where disasters are likely to occur and what is at risk. Preparing a plan pre-disaster for how to recover and rebuild in those areas that complements the economic development strategy is a small investment with potentially large rewards. Recovery will be smarter and faster with a recovery plan in place and can further the jurisdiction's economic development goals.

It is recognized that Ashe County has nearly 200 homes insured under the NFIP. Participation in the Community Rating System could be worthwhile as having a CRS rating of 8 or better will result in significant dollars remaining in the community. However, this decision must be carefully considered and committed to at the local level given the need for program administration.

Lastly, there is clear indication from this capability assessment exercise, the hazard mitigation plan update process, and recent hazard events (such as the 2016 wildfires) that the region, counties, and jurisdictions generally work together to assist in meeting needs. This is will likely continue to pay dividends in the face of future events.

### 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 HCRHMPC considered not only each jurisdiction's level of hazard risk, but also their existing capability to minimize or eliminate that risk.

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# 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 Team (HCRHMPT) 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 structures).

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

Beginning with the 2012 and continuing with the current plan, High Country Regional plan, the HCRHMPC members were tasked with establishing a priority for each action. This was instructed at the second HCRHMPC meeting. Prioritization of the proposed mitigation actions was based on the following six factors:

- Effect on overall risk to life and property
- Ease of implementation
- Political and community support
- A general economic cost/benefit review[1]
- Funding availability
- Continued compliance with the NFIP

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.

[1] Only a general economic cost/benefit review was considered by the HCRHMPC through the process of selecting and prioritizing mitigation actions. Mitigation actions with "high" priority were determined to be the most cost effective and most compatible with the participating jurisdictions' unique needs. A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

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 developed five goal statements for local hazard mitigation planning in the region during the previous plan development process. In order to formulate regional goals, the existing goals from each local hazard mitigation plan were reviewed and combined. During the 2017 plan update process, these goals were reviewed at the kickoff and mitigation strategy meetings. No changes were made during the 2017 update. The final goals for the 2017 plan are presented in Table 8.1.

**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 High Country 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., windproofing, 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 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 HCRHMPC 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 2017 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 2017 planning process.

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# Section 9

# MITIGATION ACTION PLAN

This section describes the planning process undertaken by the High Country Region in the development of its 2017 Regional Hazard Mitigation Plan. It consists of the following two subsections:

- 9.1 Overview
- 9.2 Mitigation Action Plans

| 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).

The Mitigation Action Plan is organized by mitigation strategy category (Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, or Public Education and Awareness). The following are the key elements described in the Mitigation Action Plan:

- Hazard(s) Addressed—Hazard which the action addresses.
- Relative Priority—High, moderate, or low priority as assigned by the jurisdiction.
- Lead Agency/Department—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 (2017)—Indication of completion, progress, deferment, or no change since the previous 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**

| Location | Page | Number of Mitigation Actions |
|---|---|---|
| **Alleghany County** | **9:3** | **20** |
| Sparta | 9:7 | 6 |
| **Ashe County** | **9:9** | **86** |
| Jefferson | 9:32 | 25 |
| Lansing | 9:37 | 30 |
| West Jefferson | 9:44 | 25 |
| **Watauga County** | **9:49** | **18** |
| Beech Mountain | 9:42 | 8 |
| Blowing Rock | 9:59 | 8 |
| Boone | 9:57 | 8 |
| Seven Devils | 9:59 | 8 |
| **Wilkes County** | **9:61** | **26** |
| North Wilkesboro | 9:68 | 17 |
| Ronda | 9:72 | 16 |
| Wilkesboro | 9:76 | 17 |

# Alleghany County Mitigation Action Plan

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **Prevention** | | | | | | | | |
| P-1 | Locate additional food drop areas throughout the county. | Winter Storm | Moderate | County Mapping Coordinator; County Emergency Management Coordinator | Unknown | State; Federal | Update as necessary | 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 | Ongoing | NWS has changed its warning procedures to be more user friendly, local stations have adopted this. |
| 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 | Ongoing | County Emergency Management is working to secure potable water supplies to be distributed at PODS. |
| 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 | Ongoing | Fire Departments have published ads in local newspaper promoting dry hydrants. Also have several certified water points and signage marking their locations. |
| 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 | Update as necessary | Completed. Still making 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. |
| 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 | Ongoing | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | County is working on ordinance which addresses demo of abandoned structures. Otherwise no opportunities have presented 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 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 | Ongoing | New Action. |
| **Natural Resource Protection** | | | | | | | | |
| NRP-1 | Acquire unbuildable properties from willing landowners through N.C. Cleanwater Management Trust Fund to develop as a park or greenway. | Flood; Dam Failure | Moderate | County Planner | Unknown | State; Federal | Ongoing | County developed "Veterans Park" on designated floodplain land in 2016. |
| **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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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. |
| ES-3 | Continue to provide training and equipment to volunteer firefighters on the latest technology in firefighting techniques. | Wildfire | Moderate | County Fire Inspector; County Fire Commissioner | Unknown | Local; State; Federal | Ongoing as needed | County has a certified instructor. All departments meet OSFM standards for annual training. Haz-Mat exercise was conducted Fall 2016 for local VFD's. |
| ES-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 | New Action. |
| **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 | Ongoing as needed | Some property owners have restored streams on private property with monies available through Coop Extension. Otherwise no changes. |
| **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 | Ongoing as needed | County EM pushes out information to the public regularly via local newspaper, particularly during severe weather preparedness week. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as needed | New maps and ordinance adopted in 2008. County has certified FPM. Information is available at county offices. There has 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 | Ongoing as needed | 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 |
| 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 | Ongoing as needed | Public is involved in the planning process during the survey period, and plan is reviewed during open commissioner meetings. There has been limited political will to complete this action over the last five years |
| PEA-5 | 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 | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Update as necessary | Completed. Still making the public more aware of the new maps. |
| **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 | Ongoing as necessary | New Action. |
| **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 | 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 | New Action. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Ongoing as necessary | 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 the last five years |
| 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 | Annually | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 (2017) |
|---|---|---|---|---|---|---|---|---|
| P-5 | Designate preferred growth areas and develop area plans for target locations. | All | Low | County Planning | Unknown | Staff Time | In progress | The Ashe County Planning Department and Planning Board are developing a land use plan that will address areas of growth and development. This action can be rolled into P-6 (comprehensive planning). |
| P-6 | Update or develop comprehensive land use plan. | All | Moderate | County Planning | Unknown | Staff Time | Ongoing as necessary | 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 land use plan is in a draft stage and could be completed and approved in less than two years. (mew text) |
| 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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as necessary | Planning staff attended a discovery meeting back in 2015 to discussion revisions of the current flood maps adopted in 2009. Revisions will be made by NC Department of Public Safety and will be reviewed and adopted at the local level when available. In addition, the local Flood Control Ordinance will need to be revised concurrently. (new text) |
| 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-10 | Review Town of West Jefferson's (developed between 1993-1995) storm water management program that increased water quality and mitigated against flooding caused by storm water and urban flooding, to be used as an achievable model for a county storm water management program. | Flood | Moderate | County Floodplain Manager | Unknown | Staff Time | Ongoing as necessary | West Jefferson has partially implemented this action. 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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. |
| 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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| P-14 | Develop a plan for creating new GIS layer to map roads or areas of a road that retain water. Correspondingly, keeping drains cleaned or constructing more drains in town areas in order to have a greater capacity to carry water off roads. | Flood | Low | Town Maintenance Departments; NCDOT | Unknown | Staff Time | Ongoing as necessary | Ongoing. Emergency Management has developed excel spreadsheets sorted by fire district that outline these areas. |
| P-15 | Determine the reason(s) why each road becomes flooded or damaged (i.e. debris in adjacent stream leading to blockage and overflow, overwhelmed storm drain, road in floodplain). | Flood | High | Town Maintenance Departments | Unknown | Staff Time | 2017 | Postponed – Insufficient staff to conduct study. |
| P-16 | Identify potential mitigation activities, based on damage assessment, and prioritize locations for mitigation. | Flood | Moderate | County Emergency Management | Unknown | Staff Time | Ongoing as necessary | Ongoing. Analyzed damage reports from recent disasters but did not identify any feasible mitigation measures that are not already included in our plan. |
| 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 | In progress/ Ongoing as necessary | Ongoing. Floodplain permits and elevation certificates are required for ever structure constructed within the 100-year floodplain. |
| 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 | Ongoing as necessary | Ongoing. All construction is required to meet the most current NC Building Code standards on wind-resistance. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as necessary | Ongoing. 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 | Ongoing as necessary | 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-ways. |
| P-22 | Encourage or require the conservation of water as necessary. | Drought | High | County Emergency Management | Unknown | Staff Time | Ongoing as necessary | Ongoing. Conservation measure techniques are issued to the public when needed. (new text) |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| P-23 | Establish burning bans as necessary. | Drought | High | NC Forestry Service | Unknown | Staff Time | Ongoing as necessary | NC Forest Service and local Fire Marshal issue burning bans when needed. Last one was issued briefly in November 2016. |
| P-24 | Work with Fire Departments and Forestry services to assess the effects of droughts. | Drought | High | County Emergency Management | Unknown | Staff Time | Ongoing as necessary | Coordinated with NC Forest Service to assess wildfire risk in November 2016. Additional studies may be necessary. |
| 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 | Initially 2006, now dependent on funding. | Postponed. Lack of technical expertise, staff and funding. |
| P-26 | Restrict development along ridgelines or hill tops. | Landslide | High | County Planning | Unknown | Staff Time | Ongoing as necessary | No change in status of action item. 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 | Ongoing as necessary | NCDOT has made repairs to five areas within last five years that are susceptible to land/rock slides. |
| 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 | Ongoing as necessary | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as necessary | Ongoing. Structures are inspected during construction to ensure adherence to NC Building Codes. (new text) |
| P-30 | Ensure that property owners follow all rules and regulations set forth for Dam operation and repairs. | Dam Failure | High | NCDENR | Unknown | Staff Time | Ongoing as necessary | The EM office maintains Dam Safety Plans for all local dams under state jurisdiction. |
| **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 | 2017 | The Town is currently exploring options to relocate the plant. |
| 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 | Ongoing as necessary | Completed and ongoing. 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. |
| 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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| PP-4 | Explore buyout programs for structures in known high hazard areas. | Flood | Low | County Floodplain Manager | Unknown | Staff Time | Ongoing as necessary | 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 | Ongoing as necessary | 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 | 2022 | Ongoing as staff time permits and as the Habitat for Humanity and Meals on Wheels budgets permit. Requires continued coordination. There has been limited political will to complete this action over the last five years |
| PP-7 | Coordinate with Carolina Cross Connection to assist citizens with minor home repairs as an ongoing mitigation effort. | Winter Storm | Moderate | County Emergency Management; County Planning | Unknown | Staff Time | Annual | Each year the EM office emails out flyers and informs the public of the services. |
| 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 | Monthly | The FSA sends out monthly newsletters with informational materials. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Monthly | The FSA sends out monthly newsletters with informational materials. |
| PP-10 | Apply for Community Development Block Grants to bring low-income housing units up to minimum building code standards. | Earthquake | Moderate | County Planning | Unknown | Staff Time | Ongoing as necessary | The County has participated in the Scattered Site Housing Rehabilitation from the NC Department of Commerce that paid to make repairs to aging homes. However, this program was discontinued in 2014. There has been no political will for the last 5 years to complete this action. |
| 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 | Ongoing as necessary | Completed. |
| 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 | Ongoing as necessary | New Action. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **Natural Resource Protection** | | | | | | | | |
| NRP-1 | Whenever possible preserve natural wetlands, designate conservation corridors, especially along streams through acquisition or conservation easements. | All | Moderate | County Planning | Unknown | Staff Time | Ongoing | 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 | 2015; ongoing as necessary | Continue to support local agencies that conduct stream/river bank restoration work like the New River Conservancy. Begin tracking and reporting restoration work by local agencies and private land owners and provide GIS data on work. |
| 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 | Ongoing as needed | 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-1 | Update Emergency operations plan. | All | High | County Emergency Management | Unknown | Staff Time | Annual | The EOP was approved on March 20, 2017 and is reviewed annually and updated as needed. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| ES-2 | Identify, upgrade, map emergency shelters throughout county and municipalities and designate at least one emergency shelter in each municipality. | All | Moderate | County Emergency Management | Unknown | Staff Time | Ongoing as necessary | Shelter locations have been identified in Jefferson and West Jefferson and on the outskirts of Lansing. Upgrade and mapping have been cost prohibitive. |
| ES-3 | 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 | Ongoing as necessary | 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. |
| 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 | 2017 | Postponed/Deferred. A workable solution has not been obtained. |
| 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 | Ongoing as necessary | Weather information is tracked and broadcast to the public via email and social media as well as traditional media types. |
| ES-6 | Coordinate response/recovery efforts with other communities and counties. | Winter Storm | High | County Emergency Management | Unknown | Staff Time | Ongoing as necessary | EM works closely with surrounding counties during all hazards. |
| 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 | Ongoing as necessary | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| ES-8 | Ensure that the existing community warning systems are adequate. | Tornado; Hurricane; Severe Storm | High | County Emergency Management | Unknown | Staff Time | Ongoing as necessary | 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 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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as necessary | 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 | Ongoing as necessary | Municipal fire departments and maintenance crews have made fire hydrant evaluations a part of their regular training and preparedness program. |
| 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 | Ongoing as necessary | 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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| ES-12 | Coordinate fire-fighting response with other communities. | Wildfire | Moderate | County Fire Departments | Unknown | Staff Time | Ongoing as necessary | Ongoing. Each fire department has mutual aid agreements in place with adjacent jurisdictions. |
| ES-13 | Using Small Town Economic Prosperity Demonstration Program (STEP) Implementation grant, the Town of Lansing will seek to install fire hydrants on the town's secondary (back) streets. | Wildfire | High | Town of Lansing Administration | Unknown | Staff Time | 2012 | There has been no political will to complete this action during the last 5 years. |
| **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 | 2012 | 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 | 2015/ongoing as needed | NCDOT has replaced eight bridges or culverts. Three are in various stages of construction or repair. Fourteen were planned by 2015 and more are expected for the future. |
| S-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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Ongoing | 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. |
| PEA-2 | Publish a special section in the local newspaper with emergency information. Include telephone numbers of local emergency service organizations. | All | Moderate | County Emergency Management | Unknown | Staff Time | Ongoing | Completed and ongoing. *Be Ready in 2008* was a public service article that encouraged all of our citizens to make a resolution to prepare for emergencies. Additional articles and letters to the editor that addressed a variety of natural hazards along with specific preparation methods for each were published in the local newspaper. |
| 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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-6 | Work with the curriculum directors of both private and public schools to add flood disaster prevention information. | Flood | Moderate | County Floodplain Manager | Unknown | Staff Time | Ongoing | There has been no political will to complete this action during the last 5 years. |
| 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. |
| PEA-8 | Compile winter storm hazard mitigation information and post information through Public Service Announcement. | Winter Storm | Moderate | County Emergency Management | Unknown | Staff Time | Ongoing | There has been no political will to complete this action during the last 5 years. |
| PEA-9 | Work with curriculum directors of both the public and private schools to add winter storm disaster prevention information. | Winter Storm | Moderate | County Emergency Management | Unknown | Staff Time | 2012 | There has been no political will to complete this action during the last 5 years. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Completed. On December 13, 2007, an article ran in the local paper informing the public of an update to County and emergency phone numbers. |
| 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 | Ongoing | There has been no political will to complete this action during the last 5 years. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as needed | 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 | Ongoing as needed | 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 | Ongoing as needed | Local NC Forest Service staff provides education to school aged children from the Smokey the Bear Program during an annual $5^{th}$ 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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-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 | Ongoing as needed | 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-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 | 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-19 | Provide educational material to citizens regarding ways to reduce the potential impacts of droughts through Public Service Announcement. | Drought | Moderate | County Emergency Management | Unknown | Staff Time | Ongoing as needed | Numerous drought-related news releases and articles were published in two local newspapers through the 2006-2008 drought conditions. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | 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. |
| PEA-21 | Explore the possibility of developing an internet-based emergency information website. | Drought | 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-22 | Provide educational material to citizens on what to do during an earthquake through Public Service Announcement | Earthquake | Moderate | County Emergency Management | Unknown | Staff Time | Completed; Ongoing as needed | A series of articles and letters to the editor that addressed a variety of natural hazards along with specific preparation methods for each were published in the local newspaper. In addition, the EM Office keeps a variety of disaster preparedness materials accessible in public offices. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| PEA-23 | Prepare and conduct basic education programs and provide materials for residents of concerns during/after an earthquake. | Earthquake | Moderate | County Emergency Management | Unknown | Staff Time | Ongoing as needed | A series of articles and letters to the editor that addressed a variety of natural hazards along with specific preparation methods for each were published in the local newspaper. In addition, the EM Office keeps a variety of disaster preparedness materials accessible in public offices. Additional trainings will be conducted as necessary. |
| 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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| PEA-25 | 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 and Freeze | High | County Emergency Management | Unknown | Staff Time | Ongoing as needed | Ongoing. A series of articles and letters to the editor that addressed a variety of natural hazards along with specific preparation methods for each were published in the local newspaper. In addition, the EM Office keeps a variety of disaster preparedness materials accessible in public offices. |

## 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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. |
| 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 | 2017 | Addressing by Keeping drains cleaned so debris do not build up and cause unnecessary flooding. |
| P-3 | Keep drains cleaned or construct additional drains in town areas to increase water carrying capacity. | Flood | High | Town Maintenance | Unknown | Staff Time | Ongoing as needed | Maintenance at all times to keep those drains cleaned. |
| 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 as needed | Must meet specks before permit is issued. |
| P-5 | Enforce conservation of water when required. | Drought | High | Town; Town Fire Department | Unknown | Staff Time | Annual; Ongoing as needed | Send out mailings annually. |
| P-6 | Enforce burning bans when established. | Drought | High | Town; Town Fire Department | Unknown | Staff Time | Ongoing as needed | 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 | Ongoing as needed | 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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| P-8 | Assist the Ashe County Building Inspection Office in enforcing 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 | Moderate | Town Administration | Unknown | Staff Time | Completed; Ongoing | All new structures must meet these codes. |
| P-9 | Assist 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 Administration | Unknown | Staff Time | Completed; Ongoing. | All new structures must meet these codes. |
| 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 | Ongoing. | This action requires continuous coordination and enforcement, and is therefore ongoing. (new text) |
| **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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as needed | New Action. |
| **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 | Ongoing as needed | Continuous coordination with emergency management. |
| 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 | Ongoing as needed | Ongoing determination of most appropriate emergency routes based on conditions. |
| 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 | Ongoing as needed | Work together with emergency management. |
| 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 | Ongoing as needed | This action is ongoing pending available staff time and funding. |
| ES-5 | Ensure that fire hydrants are functioning properly. | Wildfire | High | Town Maintenance; Town Fire Department | Unknown | Staff Time | Ongoing as needed | Ongoing. Hydrants are checked regularly. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| ES-6 | Coordinate fire-fighting response with other communities. | Wildfire | High | Town Fire Department | Unknown | Staff Time | Ongoing. | This action requires continuous coordination and staff time as fire incidents occur and is therefore ongoing. (new text) |
| ES-7 | 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 | New Action. |
| **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 | ongoing | Ongoing planning and bank control 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 | Ongoing | Ongoing in connection with emergency management. |
| 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 | Ongoing | Ongoing in connection with emergency management. |
| 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 | Ongoing | New Action. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing Annually | New Action. |

## 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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. |
| 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 | 2017 | 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. (new text) |
| P-4 | Enforce conservation of water when required. | Drought | High | Town Fire Department | Unknown | Staff Time | Ongoing as needed | 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 | Ongoing as needed | More community awareness being made by posting signage in new park area. Additional enforcement may be required as needed. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as needed | This action is applicable during periods of drought conditions and was completed over the last 5 year. However, need may arise again in the future. |
| 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 | Ongoing as needed | Education being done with new business owners at time of application for water/sewer services. |
| 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 | Ongoing as needed | Working to Make sure every new business or property owner is referred to the County Inspection Office as soon as possible. Additional enforcement may be necessary. |
| P-9 | Ensure that property owners follow all rules and regulations set forth for dam operation and repairs. | Dam Failure | Moderate | NCDENR | Unknown | Staff Time | Deleted | Deleted. This action is not necessary or feasible in the town. |
| **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 | Ongoing | Not feasible at this time due to all town owned property being in the floodplain and lack of funds. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | 2020+ | 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. |
| 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). |
| 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. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| PP-7 | 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. | Flood | High | Town Administration | Unknown | Staff Time | Completed | Completed. Made a Computer Tech center available for residents and purchased a sound system for use at festivals. (new text) |
| 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 | In progress | New Action. 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 | Ongoing | New Action. |
| **Natural Resource Protection** | | | | | | | | |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| NRP-1 | Restoration of Big Horse Creek streambank with 30 foot buffers | Erosion | High | Town Administration | $110,000 | US Fish and Wildlife/Fish America Grant and County and local funds | 2016-2019 | New Action. 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 root bases on the streambank and more appropriate sloping for the preservation of the flood-prone 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 | Ongoing as needed | Continually referring residents to local radio 93.5 FM for severe weather warnings. (new text) |
| ES-2 | Review and evaluate snow and ice removal plans for each city/county. Evaluate priority routes. | Winter Storm | High | NCDOT | Unknown | Staff Time | Ongoing as needed | Maintenance Technician begins removal at 3 inches of snowfall on any town maintained street. |
| 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 | Ongoing as needed | In communication with County Emergency Management Patty Gambill at onset of possible threat. |
| 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 Board of Alderman | Unknown | Staff Time | Deleted | Deleted. No buildings of this size in the area. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| ES-5 | Coordinate fire-fighting response with other communities. | Wildfire | High | Town Fire Department | Unknown | Staff Time | Ongoing as needed | Fire Chief to make sure he and the assistant Fire Chiefs are in direct communication with County Emergency Management Patty Gambill. |
| ES-6 | Using a Small Town Economic Prosperity Demonstration Program (STEP) Implementation Grant, the Town of Lansing will seek to install fire hydrants on the town's secondary (back) streets. | Wildfire | High | Town Administration | Unknown | Staff Time | N/A | Deleted. Not feasible due to the lack of funds available and the size of the current system pipes and lack of political will |
| ES-7 | 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 | New Action. |
| **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 | Ongoing as needed | 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 | Ongoing as needed | 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 | Ongoing as needed | More community meetings being held for education and information. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Deleted | Deleted. Not feasible due to lack of funds and small town size. |

## 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **Prevention** | | | | | | | | |
| P-1 | Identify potential mitigation activities, based on damage assessment, and prioritize locations for mitigation. | Flood | High | Town | Unknown | Staff Time | Completed | Completed. |
| 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 | 2017 | 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 | Ongoing as needed | NCDOT added three storm drains at Long St & S Jefferson Ave. additional drains may be necessary to maximize capacity. |
| P-4 | Provide information on the Town of West Jefferson's (developed between 1993-1995) Storm Water Management program that increased water quality and mitigated against flooding caused by storm water and urban flooding, for the country to use as an achievable model of a county storm water management program. | Flood | Moderate | Town Administration | Unknown | Staff Time | Completed | 2011 – NCDOT milled and resurfaced Jefferson Ave in 2011 and now the street has 6" curb & gutter along our sidewalks. Also, Obrien & Gere completed an analysis of potential site identification for storm water structures |
| P-5 | 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 | Completed | The town reviewed and updated our sign ordinance in July 2013. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| P-6 | Enforce conservation of water when required. | Drought | High | Town; Town Fire Department | Unknown | Staff Time | Ongoing as needed | 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 | Ongoing as needed | 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 | Ongoing as needed | Coordinate w/Fire departments/emergency management as needed |
| P-9 | Assist the Ashe County Building Inspections 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 Administration | Unknown | Staff Time | Completed; Ongoing as needed | Town issues zoning permits which is required for building permits. Town contracts with county for building inspections |
| P-10 | Assist the Ashe County Building Inspection Office in mitigation 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 Administration | Unknown | Staff Time | Completed; Ongoing as needed | town issues zoning permits which is required for building permits. Town contracts with county for building inspections |
| 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 | Ongoing as needed | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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. |
| 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 | Ongoing | New Action. |
| **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 | Ongoing | Ongoing. Coordinated with Emergency Management during winter storm events |
| 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 | Ongoing | Ongoing. NCDOT assists w/downtown snow removal |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as necessary | 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 | Ongoing as necessary | 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 | All flowed and tested 2016-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 | Ongoing as necessary | 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 to formalize this agreement further. |
| ES-7 | 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 | New Action. |
| **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 | Ongoing as needed | Ongoing. Work through Emergency Management. There has been no political will to advance this action further over the past 5 years. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing as needed | 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 | Ongoing as needed | New Action - Work through Emergency Management |
| 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 | Ongoing Annually | New Action. Work through 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **Prevention** | | | | | | | | |
| P-1 | Prune vegetation near power lines. | Winter Storm; Freeze; Wind; Wildfire | High | Electric utility providers; County Emergency Management | Unknown | Private | November 1, 2015 | Completed. CUTS company prunes vegetation on a full-time basis. (new text) |
| P-2 | Clear debris from streams. | Flood | High | Community; County Emergency Management; Other organizations | Unknown | Private; Public | Ongoing as needed | Volunteer groups schedule multiple stream clean-ups throughout the year. |
| P-3 | Prevent construction of new public buildings within the identified floodplain. | Flood | Low | Governing boards | Unknown | None required | As needed | Construction in floodplain approved or denied 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 | Ongoing as needed | Some bridges and culverts have been repaired potential for others in the future. |
| P-5 | Integrate GIS and HAZUS-MH technology. | All | High | County Information Technology; County GIS; County Emergency Management | Unknown | Federal and State programs/grants | November 1, 2015 | Completed. GIS has been added. |
| 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 | Ongoing as needed | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| P-7 | Expand disaster tracking capability. | All | Low | County Emergency Management | Unknown | In house | Ongoing | There has been no political will to advance this action further over the past 5 years, but we are currently exploring different programs and resources. |
| P-8 | Create land use maps with hazard overlays. | All | Moderate | County Emergency Management; County GIS | Unknown | Grant sources | November 1, 2015 | Completed. |
| **Property Protection** | | | | | | | | |
| PP-1 | Bury power lines. | Winter Storm; Freeze; Wind; Flood; Wildfire | Low | Electric utility providers | Unknown | Private | Postponed. | 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 | November 1, 2017 | Several planned to be completed by November 1, 2017; Ongoing as 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 | Ongoing | New Action. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **Emergency Services** | | | | | | | | |
| ES-1 | Constant revision and distribution of resource list. | All | Moderate | County Emergency Management; County Fire Marshal; County EMS | Unknown | Homeland Security monies; In house | Annually | Completed. Updated every year. |
| ES-2 | Create interagency communications system. | All | Moderate | Watauga Sheriff's Office, NC State Highway Patrol | Unknown | Public; Grants | November 1, 2015 | 3 towers completed;<br><br>Communications study currently underway. |
| ES-3 | Additional interagency training. | All | Moderate | County Emergency Management; County EMS | Unknown | Homeland Security monies | November 1, 2015 | Completed. Monthly meetings and training occurring. |
| ES-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 | New Action. |
| **Public Education and Awareness** | | | | | | | | |
| PEA-1 | Educate the public on the importance of being prepared for a disaster | All | High | County Emergency Management; County EMS | Unknown | Federal and State programs/grants | November 1, 2015 | County EM participates in multiple education events throughout the year. |
| PEA-2 | Improve public awareness. | All | High | County Emergency Management | Unknown | Federal and State programs/grants | November 1, 2015 | Public awareness messages are given out frequently by multiple avenues. |
| 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 | November 1, 2015 | LEPC and other groups currently working on public education ideas and tactics. |

## 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **Prevention** | | | | | | | | |
| P-1 | Make efficient repairs to potential problems such as culverts and bridges. | Flood; Earthquake | Low | NCDOT; municipalities; Private developments | Unknown | Private; Public | Ongoing | 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. There has been no political will to formalize this this action (e.g., programming) over the past 5 years. |
| P-2 | Prevent construction of new public buildings within the identified floodplain. | Flood | Low | Governing boards | Unknown | None required | As needed | 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 | Ongoing | A cross reference to the Hazard Mitigation Plan is included in the Town's Comprehensive Plan adopted in 2013. Additional integration is necessary. There has been no political will to advance this action further over the past 5 years. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **Property Protection** | | | | | | | | |
| PP-1 | Pave or gravel roads at stream crossings. | Flood; Winter Storm | Low | NCDOT; municipalities; Public and private developments | Unknown | Private | Ongoing | The Town expends approximately $80,000 per year on gravel restabilization and $250,000 per year on resurfacing. An effort is 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 | Ongoing | New Action. |
| **Emergency Services** | | | | | | | | |
| ES-1 | 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 | New Action. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Ongoing | 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 or opportunities may arise |
| 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 | Ongoing Annually | An elected officials workshop is scheduled for late Fall 2017. |

## 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **Prevention** | | | | | | | | |
| P-1 | Make efficient repairs to potential problems such as culverts and bridges. | Flood; Earthquake | Low | NCDOT; municipalities; Private developments | Unknown | Private; Public | Ongoing | 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 | Deferred | 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 | Ongoing | 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 | Ongoing | Several roads have been upgraded, more to be done in the future as funding allows. There has been no political will to advance this action further over the past 5 years. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | New Action. |
| **Emergency Services** | | | | | | | | |
| ES-1 | 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 | 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 | Ongoing | Several public programs scheduled throughout the year. There has been no political will to formalize this action further over the past 5 years. |
| 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 | Ongoing Annually | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **Prevention** | | | | | | | | |
| P-1 | Make efficient repairs to potential problems such as culverts and bridges. | Flood; Earthquake | Low | NCDOT; municipalities; Private developments | Unknown | Private; Public | Ongoing | 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 | As needed | This is done 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 | Ongoing. | 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 | Ongoing | 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 | Ongoing | New Action. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **Emergency Services** | | | | | | | | |
| ES-1 | 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 | 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 | Ongoing | Several public programs scheduled throughout the year. |
| 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 | Ongoing Annually | Working with County EM and the state to provide these classes. |

# 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **Prevention** | | | | | | | | |
| P-1 | Make efficient repairs to potential problems such as culverts and bridges. | Flood; Earthquake | Low | NCDOT; municipalities; Private developments | Unknown | Private; Public | Ongoing | 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 | Deferred | 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 | Ongoing | 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 | Ongoing | 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 | Ongoing | New Action. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **Emergency Services** | | | | | | | | |
| ES-1 | 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 | 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 | Ongoing | Several public programs scheduled throughout the year. |
| 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 | Ongoing Annually | Working with County EM and the state to provide these classes. |

## Wilkes County Mitigation Action Plan

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Ongoing/In progress | Ongoing. GIS overlays and Data collection continuing. |
| 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/ongoin g | 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 | Ongoing | Ongoing. 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | In the process of Implementing this. |
| 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 | Ongoing | Put on hold for lack of funding ad 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 | Ongoing | 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 | Ongoing | Put on hold due to lack 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | Ongoing. Forest Service is currently working on Forest Management plans monitoring and dealing with forest pest and invasive species. |
| **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 | Ongoing | 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 | Ongoing | Put on hold for lack 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | 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 | Ongoing | Completed. Maintenance Ongoing |
| 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 | Ongoing | Put on hold for lack of funding. (new text) |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | 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 | Ongoing | Wilkes County continues to evaluate the situation and funding source. Have added part time. 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 | Ongoing | 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 | Ongoing | Wilkes County met with NCFS to discuss options. Additional work is necessary to formalize this planning and response. |
| 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 | Ongoing | Wilkes County has met with local Fire Departments over the past 5 years to discuss techniques and technologies. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | 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 | Ongoing | 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 | Ongoing | 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 |
| ES-11 | 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 | New Action. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Ongoing | 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 |
| 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 | Ongoing as needed | This process is ongoing by means of the NC Forestry, County Fire Marshall's Office and local fire departments. Bringing in interested organizations to educate property owners. |
| 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 | Ongoing as needed | This process is ongoing by means of the NC Forestry, County Fire Marshall's Office and local fire departments. |
| PES-4 | 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 | Ongoing as needed | Forestry Service is providing information to landowners annually as they work and meet with landowners. This information is also made available to the landowners on the Forestry Website. |

## 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Ongoing as needed | Delayed due to lock 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 | Ongoing as needed | 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 | Ongoing as needed | Ongoing but lack of staffing 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 | Ongoing as needed | 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | 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 | Ongoing | Working with WCC continuing to provide training. There has been limited political will to complete this action over the last five years. |
| 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. |
| 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 | Ongoing | Ongoing met with NC wildlife officials on 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | Delayed due to lack of staffing. |
| 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 | Ongoing | Ongoing process, met with state and local officials. 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 | Ongoing | 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. |
| 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 | Ongoing | 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 | Ongoing | Working on software issues. 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| ES-9 | 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 | New Action. |
| **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 | Ongoing | Ongoing NC Forestry has provided educational opportunities for the public. Additional and ongoing training is necessary for this action. |
| 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 | Ongoing | NC Forestry has provided educational opportunities for the public. Additional and ongoing training is necessary for this action. |
| 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 | Ongoing | Forestry Service has provided educational opportunities for the public. |

## 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Ongoing | Delayed due to lack of funding. |
| 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 | Ongoing / in progress | GIS Data layers under development. |
| 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 | Ongoing | Have met with local officials but there has been limited political will to complete this action. |
| **Property Protection** | | | | | | | | |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | 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 | Ongoing/in progress | 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 | Ongoing | Delayed due to the act of funding. |
| 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 | Ongoing | Working with WCC to continue training. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | 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 | Originally July 1, 2008, now ongoing. | Ongoing 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 | Ongoing | Ongoing 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 | Ongoing | Ongoing Working with cc to provide training. There has been limited political will to complete this action over the last 5 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 | Ongoing | Delayed due to software compatibility issues. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| ES-9 | 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 | New Action. |
| **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 | Ongoing | 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 | Ongoing | Ongoing NCFS is providing educational opportunities to the public. Additional training resources will be needed. |
| 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 | Ongoing | Ongoing 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| **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 | Ongoing | Delayed due to lack of funding. |
| 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 | Ongoing | Delayed due to lack of funding. |
| 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 | Ongoing | Delayed due to lack of staffing. |
| 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 | Ongoing | Ongoing. 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | 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 | Ongoing | Working with WCC to provide training. Additional training will be necessary. |
| 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 | Ongoing | Delayed due to lack of funding. 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 | Ongoing | Ongoing 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 (2017) |
|---|---|---|---|---|---|---|---|---|
| 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 | Ongoing | Delayed due to lack of staffing. |
| 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 | Ongoing | Ongoing 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 | Ongoing | Ongoing met with local and state to discuss options but there has been limited political will to complete this action. |
| 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 | Ongoing/in progress | Ongoing. 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 | Ongoing | Delayed due to software compatibility issues. |

| Action # | Description | Hazard(s) Addressed | Relative Priority | Lead Agency/ Department | Estimated Cost | Potential Funding Sources | Implementation Schedule | Implementation Status (2017) |
|---|---|---|---|---|---|---|---|---|
| ES-9 | 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 | New Action. |
| **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 | Ongoing/in progress | NCFS has provided educational opportunities for the public but additional trainings are necessary |
| 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 | Ongoing/in progress | Ongoing NCFS has provided educational opportunities for the public but additional trainings are necessary |
| 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 | Ongoing/ in progress | Ongoing NCFS has provided educational opportunities for the public but additional trainings are necessary |

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# Section 10

# PLAN MAINTENANCE

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

| 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.<br><br>***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 previous four plans were adopted (Alleghany County in 2011, Ashe County in 2010, Wilkes County in 2005, and Watauga County in 2004), and since the development of the initial regional plan in 2012, 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 High Country 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 High Country 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 High Country 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 which includes the counties of Alleghany, Ashe, Watauga, and Wilkes. The Ashe County Emergency Management Coordinator will be responsible for reconvening the High Country Regional Hazard Mitigation Planning Committee for these reviews.

**Five Year Plan Review**

The Plan will be thoroughly reviewed by the High Country 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 High Country county 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. The Ashe County Emergency Management Coordinator will be responsible for reconvening the High Country Regional Hazard Mitigation Planning Committee and conducting the five-year review.

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 the North Carolina Division of Emergency Management (NCDEM) for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

**Disaster Declaration**

Following a disaster declaration, the High Country Regional Hazard Mitigation Plan may be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of the Ashe County Emergency Management Coordinator to reconvene the High Country Regional Hazard Mitigation Planning Committee 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 High Country 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, the High Country county(s) 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 the North Carolina Division of 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 High Country 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 High Country 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 High Country 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 High Country 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 High Country Regional Hazard Mitigation Planning Committee for further revision; or
- Defer the amendment request back to the High Country Regional Hazard Mitigation Planning Committee for further consideration and/or additional hearings.

## 10.3 CONTINUED PUBLIC INVOLVEMENT

| 44 CFR Requirement |
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| ***44 CFR Part 201.6(c)(4)(iii):***<br>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 High Country 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 High Country Regional Hazard Mitigation Planning Committee;
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place;
- Utilizing the High Country county websites to advertise any maintenance and/or periodic review activities taking place or actions that the public can take to reduce risks; and
- Keeping copies of the Plan in public libraries and emergency management offices.

## 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 2017. That said, the jurisdictions 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 2017 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 2015 when lead points of contact from each of the four participating counties began having conversations about the updating process. These conversations were facilitated by the NCEM Area Coordinator and Mitigation Staff in Raleigh, NC, and included discussion about the need to apply for a grant to update the plan. Once the grant was obtained, early conversations in 2016 centered around more detailed components of the planning process such as which county would lead the process and would the counties seek consultant assistance for updating the plan. These early conversations led to a successful update and will be used in future updates of the plan.

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