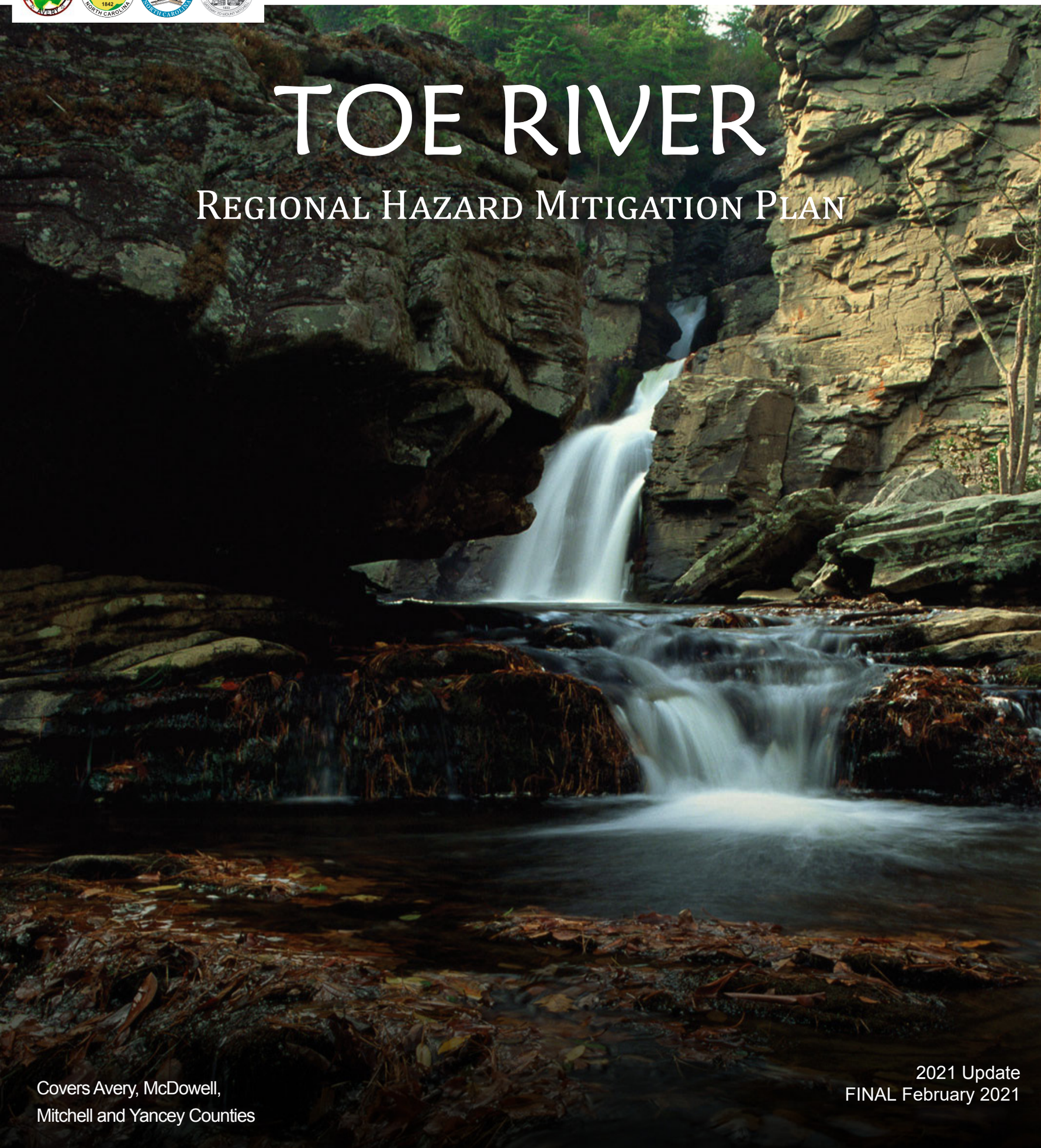
*BECOMING LESS VULNERABLE TO DISASTER*

# TOE RIVER

## REGIONAL HAZARD MITIGATION PLAN



Covers Avery, McDowell,
Mitchell and Yancey Counties

2021 Update
FINAL February 2021

**U. S. Department of Homeland Security**
Region IV
3005 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

February 1, 2021

Mr. Steve McGugan
State Hazard Mitigation Officer
Assistant Director / Mitigation Section Chief
Division of Emergency Management
NC Department of Public Safety
200 Park Offices Drive
Durham, NC 27713

Reference: Multi-Jurisdictional Hazard Mitigation Plan: Toe River Regional

Dear Mr. McGugan:

This is to confirm that we have completed a Federal review of the draft Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan for compliance with the Federal hazard mitigation planning requirements contained in 44 CFR 201.6(b)-(d). We have determined that the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan is Approvable Pending Adoption effective February 1, 2021.

In order for our office to issue formal approval of the plan, the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan must submit adoption documentation. Upon submittal of a copy of documentation of the adoption resolution(s) to our office, we will issue formal approval of the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan. Please have Toe River Regional submit a final copy of their Plan, without draft notations and track changes.

If you or the participants in the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan have any further questions or need any additional information please do not hesitate to contact Celicia A. Davis, of the Hazard Mitigation Assistance Branch, at (770) 220-5253, Dontrey L. Garnett, of the Hazard Mitigation Assistance Branch, at (770) 220-3145 or Edwardine S. Marrone, of my staff, at (404) 433-3968.

Sincerely,

Kristen M. Martinenza, P.E., CFM
Branch Chief
Risk Analysis
FEMA Region IV

**U. S. Department of Homeland Security**
Region IV
3005 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

March 15, 2021

Mr. Steve McGugan
State Hazard Mitigation Officer
Assistant Director / Mitigation Section Chief
Division of Emergency Management
NC Department of Public Safety
200 Park Offices Drive
Durham, NC 27713

Reference: Multi-Jurisdictional Hazard Mitigation Plan: Toe River Regional

Dear Mr. McGugan:

We are pleased to inform you the Toe River Regional Hazard Mitigation Plan update is in compliance with the Federal hazard mitigation planning requirements resulting from the Disaster Mitigation Act of 2000, as contained in 44 CFR 201.6. Effective March 12, 2021 the plan is approved for a period of five (5) years, to March 11, 2026.

This plan approval extends to the following participating jurisdictions that provided copies of their resolutions adopting the plan:

- Yancey County Unincorporated

The approved participating jurisdictions are hereby eligible applicants through the State for the following mitigation grant programs administered by the Federal Emergency Management Agency (FEMA):

- Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance (FMA)
- Building Resilient Infrastructure and Communities (BRIC)

National Flood Insurance Program (NFIP) participation is required for some programs.

We commend the participants of Toe River Regional Hazard Mitigation Plan update for the development of a solid, workable plan that will guide hazard mitigation activities over the coming years. Please note that all requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

We strongly encourage each community to perform an annual review and assessment of the effectiveness of their hazard mitigation plan; however, a formal plan update is required at least every five (5) years.

We also encourage each community to conduct a plan update process within one (1) year of being included in a Presidential Disaster Declaration or of the adoption of major modifications to their local Comprehensive Land Use Plan or other plans that affect hazard mitigation or land use and development. When you prepare a comprehensive plan update, it must be resubmitted through the State as a "plan update" and is subject to a formal review and approval process by our office. If the plan is not updated prior to the required five (5) year update, please ensure that the draft update is submitted at least six (6) months prior to expiration of this plan.

The State and the participants in the Toe River Regional Hazard Mitigation Plan should be commended for their close coordination and communications with our office in the review and subsequent approval of the plan. If you or Toe River Regional have any questions or need any additional information, please do not hesitate to contact Celicia A. Davis, of the Hazard Mitigation Assistance Branch, at (770) 220-5253, Dontrey L. Garnett, of the Hazard Mitigation Assistance Branch, at (770) 220-3145, or Edwardine S. Marrone, of my staff, at (404) 433-3968.

Sincerely,

Kristen M. Martinenza, P.E., CFM
Branch Chief
Risk Analysis
FEMA Region IV

**U. S. Department of Homeland Security**
Region IV
3005 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

March 18, 2021

Mr. Steve McGugan
State Hazard Mitigation Officer
Assistant Director / Mitigation Section Chief
Division of Emergency Management
NC Department of Public Safety
200 Park Offices Drive
Durham, NC 27713

Reference: Multi-Jurisdictional Hazard Mitigation Plan: Toe River Regional

Dear Mr. McGugan:

This is a follow-up to our previous correspondence of March 12, 2021, in which we approved the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan and all the participating communities that submitted their resolutions at the time of plan approval. We have recently received from your office the following resolutions for inclusion within this plan and subsequently have approved the communities under the approved Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan effective March 18, 2021:

- McDowell County, Unincorporated
- City of Marion
- Town of Old Fort

The approved participating communities are hereby eligible applicants through the State for the following mitigation grant programs administered by the Federal Emergency Management Agency (FEMA):

- Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance (FMA)
- Building Resilient Infrastructure and Communities (BRIC)

National Flood Insurance Program (NFIP) participation is required for some programs.

We commend the participants in the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan for the development of a solid, workable plan that will guide hazard mitigation activities over the coming years. Please note that all requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

We strongly encourage each community to perform an annual review and assessment of the effectiveness of their hazard mitigation plan; however, a formal plan update is required at least every five (5) years.

We also encourage each community to conduct a plan update process within one (1) year of being included within a Presidential Disaster Declaration or of the adoption of major modifications to their local Comprehensive Land Use Plan or other plans that affect hazard mitigation or land use and development.

When the Plan is amended or revised, the amendments and revisions should be incorporated into the next plan update. If the Plan is not updated prior to the required five (5) year update, please ensure that the Draft update is submitted at least six (6) months prior to expiration of this plan approval.

If you or the participants in the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan have any further questions or need any additional information, please do not hesitate to contact Celicia A. Davis, of the Hazard Mitigation Assistance Branch, at (770) 220-5253, Dontrey L. Garnett, of the Hazard Mitigation Assistance Branch, at (770) 220-3145 or Edwardine S. Marrone, of my staff, at (404) 433-3968.

Sincerely,

Kristen M. Martinenza, P.E., CFM
Branch Chief
Risk Analysis
FEMA Region IV

**U. S. Department of Homeland Security**
Region IV
3005 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

July 7, 2021

Mr. Steve McGugan
State Hazard Mitigation Officer
Assistant Director / Mitigation Section Chief
Division of Emergency Management
NC Department of Public Safety
200 Park Offices Drive
Durham, NC 27713

Reference: Multi-Jurisdictional Hazard Mitigation Plan: Toe River Regional

Dear Mr. McGugan:

This is a follow-up to our previous correspondence of March 12, 2021, in which we approved the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan and all the participating communities that submitted their resolutions at the time of plan approval. We have recently received from your office the following resolutions for inclusion within this plan and subsequently have approved the jurisdictions under the approved the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan effective July 7, 2021.

- Avery County, Unincorporated
- Village of Sugar Mountain

The approved participating communities are hereby eligible applicants through the State for the following mitigation grant programs administered by the Federal Emergency Management Agency (FEMA):

- Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities (BRIC)
- Flood Mitigation Assistance (FMA)

National Flood Insurance Program (NFIP) participation is required for some programs.

We commend the participants in the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan for the development of a solid, workable plan that will guide hazard mitigation activities over the coming years. Please note that all requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

We strongly encourage each community to perform an annual review and assessment of the effectiveness of their hazard mitigation plan; however, a formal plan update is required at least every five (5) years. We also encourage each community to conduct a plan update process within one (1) year of being included within a Presidential Disaster Declaration or of the adoption of major modifications to their local

Comprehensive Land Use Plan or other plans that affect hazard mitigation or land use and development. When the Plan is amended or revised, the amendments and revisions should be incorporated into the next plan update. If the Plan is not updated prior to the required five (5) year update, please ensure that the Draft update is submitted at least six (6) months prior to expiration of this plan approval.

If you or the participants in the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan have any further questions or need any additional information, please do not hesitate to contact Celicia Davis, of the Hazard Mitigation Assistance Branch, at (202) 997-7490, Carol Maldonado, of the Hazard Mitigation Assistance Branch, at (470) 307-6294, Hailey Peterson, of the Hazard Mitigation Assistance Branch, at (202) 655-8757 or Edwardine S. Marrone, of my staff, at (404) 433-3968.

Sincerely,

Kristen M. Martinenza, P.E., CFM
Branch Chief
Risk Analysis
FEMA Region IV

**U. S. Department of Homeland Security**
Region IV
3005 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

July 30, 2021

Mr. Steve McGugan
State Hazard Mitigation Officer
Assistant Director / Mitigation Section Chief
Division of Emergency Management
NC Department of Public Safety
200 Park Offices Drive
Durham, NC 27713

Reference: Multi-Jurisdictional Hazard Mitigation Plan: Toe River Regional

Dear Mr. McGugan:

This is a follow-up to our previous correspondence of March 12, 2021, in which we approved the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan and all the participating communities that submitted their resolutions at the time of plan approval. We have recently received from your office the following resolutions for inclusion within this plan and subsequently have approved the jurisdictions under the approved the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan, effective July 30, 2021.

- Town of Bakersville
- Town of Spruce Pine

The approved participating communities are hereby eligible applicants through the State for the following mitigation grant programs administered by the Federal Emergency Management Agency (FEMA):

- Hazard Mitigation Grant Program (HMGP)
- Building Resilient Infrastructure and Communities (BRIC)
- Flood Mitigation Assistance (FMA)

National Flood Insurance Program (NFIP) participation is required for some programs.

We commend the participants in the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan for the development of a solid, workable plan that will guide hazard mitigation activities over the coming years. Please note that all requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

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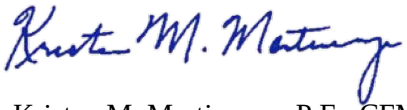
Sincerely,



Kristen M. Martinenza, P.E., CFM
Branch Chief
Risk Analysis
FEMA Region IV

**U. S. Department of Homeland Security**
Region IV
3005 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

August 5, 2021

Mr. Steve McGugan
State Hazard Mitigation Officer
Assistant Director / Mitigation Section Chief
Division of Emergency Management
NC Department of Public Safety
200 Park Offices Drive
Durham, NC 27713

Reference: Multi-Jurisdictional Hazard Mitigation Plan: Toe River Regional

Dear Mr. McGugan:

This is a follow-up to our previous correspondence of March 12, 2021, in which we approved the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan and all the participating communities that submitted their resolutions at the time of plan approval. We have recently received from your office the following resolutions for inclusion within this plan and subsequently have approved the communities under the approved Toe River Regional Hazard Mitigation Plan, effective August 5, 2021:

- Grandfather Village
- Town of Elk Park

The approved participating communities are hereby eligible applicants through the State for the following mitigation grant programs administered by the Federal Emergency Management Agency (FEMA):

- Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance (FMA)
- Building Resilient Infrastructure and Communities (BRIC)

National Flood Insurance Program (NFIP) participation is required for some programs.

We commend the participants in Toe River Regional Hazard Mitigation Plan for the development of a solid, workable plan that will guide hazard mitigation activities over the coming years. Please note that all requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

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Sincerely,

Kristen M. Martinenza, P.E., CFM
Branch Chief
Risk Analysis
FEMA Region IV

**U. S. Department of Homeland Security**
Region IV
3005 Chamblee Tucker Road
Atlanta, GA 30341

FEMA

August 27, 2021

Mr. Steve McGugan
State Hazard Mitigation Officer
Assistant Director / Mitigation Section Chief
Division of Emergency Management
NC Department of Public Safety
200 Park Offices Drive
Durham, NC 27713

Reference: Multi-Jurisdictional Hazard Mitigation Plan: Toe River Regional

Dear Mr. McGugan:

This is a follow-up to our previous correspondence of March 12, 2021 in which we approved the Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan and all the participating communities that submitted their resolutions at the time of plan approval. We have recently received from your office the following resolution for inclusion within this plan and subsequently have approved the community under the approved Toe River Regional Hazard Mitigation Plan effective August 27, 2021:

- Town of Newland

The approved participating community is hereby an eligible applicant through the State for the following mitigation grant programs administered by the Federal Emergency Management Agency (FEMA):

- Hazard Mitigation Grant Program (HMGP)
- Flood Mitigation Assistance (FMA)
- Building Resilient Infrastructure and Communities (BRIC)

National Flood Insurance Program (NFIP) participation is required for some programs.

We commend the participants in Toe River Regional Hazard Mitigation Plan for the development of a solid, workable plan that will guide hazard mitigation activities over the coming years. Please note that all requests for funding will be evaluated individually according to the specific eligibility and other requirements of the program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the programs.

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Comprehensive Land Use Plan or other plans that affect hazard mitigation or land use and development. When the Plan is amended or revised, the amendments and revisions should be incorporated into the next plan update. If the Plan is not updated prior to the required five (5) year update, please ensure that the Draft update is submitted at least six (6) months prior to expiration of this plan approval.

If you or the participants in Toe River Regional Hazard Mitigation Plan have any further questions or need any additional information, please do not hesitate to contact Celicia Davis, of the Hazard Mitigation Assistance Branch, at (202) 997-7490, Hailey Peterson, of the Hazard Mitigation Assistance Branch, at (202) 655-8757, or Edwardine S. Marrone, of my staff, at (404) 433-3968.

Sincerely,

Kristen M. Martinenza, P.E., CFM
Branch Chief
Risk Analysis
FEMA Region IV

# TABLE OF CONTENTS

# SECTION 1
# INTRODUCTION

This section provides a general introduction to the Toe River 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 floods, severe winter storms and landsides, 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 Toe River Region is located in the western mountains of North Carolina and includes the counties of Avery, McDowell, Mitchell, and Yancey. This region is vulnerable to a wide range of natural hazards such as landslides, winter storms, severe thunderstorms, and wildfires. It is also vulnerable to human-caused hazards, including chemical releases, hazardous material spills, and infectious disease. These hazards threaten the life and safety of residents and visitors in the Toe River 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 Toe River Region.

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

**FEMA Definition of Hazard Mitigation:**

*"Any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards."*

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

made. A comprehensive mitigation approach addresses hazard vulnerabilities that exist today and in the foreseeable future. Therefore, it is essential that projected patterns of future development are evaluated and considered in terms of how that growth will increase or decrease a community's overall hazard vulnerability.

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

The four counties participating in the development of the Toe River Regional Hazard Mitigation Plan first joined together in 2010 to develop the initial version of this plan. The Toe River Regional Hazard Mitigation Plan was the first regional hazard mitigation plan to be completed in the State of North Carolina. The plan became a model that NCEM used to promote regionalization of hazard mitigation plans across the entire State. Prior to that, each County was operating under individual County-level hazard mitigation plans. The plan was updated in 2015/2016 and this version serves as the second update of the regional plan. The process followed to update the plan is detailed in Section 2: Planning Process.

This first version of the regional plan drew from each of the existing County plans and documents the region's sustained efforts to incorporate hazard mitigation principles and practices into routine government activities and functions. At its core, the plan recommends specific actions to minimize hazard vulnerability and protect residents from losses to those hazards that pose the greatest risk. These mitigation actions go beyond simply recommending structural solutions to reduce existing vulnerability, such as elevation, retrofitting and acquisition projects. Local policies on community growth and development, incentives for natural resource protection, and public awareness and outreach activities are examples of other actions considered to reduce the Toe River 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, local and Tribal 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 or Tribal government applying for federal mitigation grant funds. In short, if a jurisdiction is not covered by an approved mitigation plan, it will not be eligible for mitigation grant funds. These funds include the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program, both of which are administered by the Federal Emergency Management Agency (FEMA) under the Department of Homeland Security. Communities with an adopted and federally-approved hazard mitigation plan thereby become prepositioned and more apt to receive available mitigation funds before and after the next disaster strikes.

Major federal flood insurance legislation was passed in 2012 under the Biggert-Waters Flood Insurance Reform Act (P.L. 112-141) and the subsequent Homeowner Flood Insurance Affordability Act (HFIAA) in 2014 which revised Biggert-Waters. HFIAA established the requirement that a FEMA-approved Hazard Mitigation Plan is now required if communities wish to be eligible for any of the FEMA mitigation programs. These acts made several changes to the way the National Flood Insurance Program is to be

run, including raises in rates to reflect true flood risk and changes in how Flood Insurance Rate Map (FIRM) updates impact policyholders. These acts further emphasize Congress' focus on mitigating vulnerable structures.

The Toe River Regional Hazard Mitigation Plan has been prepared in coordination with FEMA Region IV and the North Carolina Division of Emergency Management (NCEM) 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.

It is important to note that this plan was developed over a period of time that started in October of 2018 and was essentially completed with delivery of the draft plan to NCEM in October of 2019. Thus, the plan was not developed in accordance with updated FEMA Region IV Review Standards that were provided in February of 2020.

## 1.2 PURPOSE

The purposes of the Toe River Regional Hazard Mitigation Plan are to:

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

## 1.3 SCOPE

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

The geographic scope (i.e., the planning area) for the Plan includes the Counties of Avery, McDowell, Mitchell, and Yancey, as well as their incorporated jurisdictions. **Table 1.1** lists each of these counties and their participating jurisdictions.

## TABLE 1.1: PARTICIPATING AREAS IN THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN

| | |
|---|---|
| **Avery County** | |
| Banner Elk | Grandfather Village |
| Crossnore | Sugar Mountain |
| Elk Park | Newland |
| **McDowell County** | |
| Marion | Old Fort |
| **Mitchell County** | |
| Bakersville | Spruce Pine |
| **Yancey County** | |
| Burnsville | |

## 1.4 AUTHORITY

The Toe River 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 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 Final Rule published in the Federal Register, at 44 CFR Part 201 (201.6 for local mitigation planning requirements and 201.7 for Tribal planning requirements);
- 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 of 2014.

## 1.5 SUMMARY OF PLAN CONTENTS

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

Section 2: ***Planning Process***, provides a complete narrative description of the process used to prepare the Plan. This includes the identification of participants on the planning team, and 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 Toe River 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 Toe River Region. The risk assessment also attempts to define any hazard risks that may uniquely or exclusively affect specific areas of the Toe River Region.

The Risk Assessment begins by identifying hazards that threaten the Toe River Region. Next, detailed profiles are established for each hazard, building on available historical data from past hazard occurrences, spatial extent, and probability of future occurrence. This section culminates in a hazard risk ranking based on conclusions regarding the frequency of occurrence, spatial extent, and potential impact highlighted in each of the hazard profiles. In the vulnerability assessment, NCEM's Risk Management section's 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 participating jurisdictions in the Toe River Region seek to determine the most appropriate mitigation actions to pursue and implement—enabling it to prioritize and focus its efforts on those hazards of greatest concern and those structures or planning areas facing the greatest risk(s).

The ***Capability Assessment***, found in Section 7, provides a comprehensive examination of the capacity of the participating jurisdictions in the Toe River Region 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 detailed survey questionnaires for local officials and an inventory and analysis of existing plans, ordinances and relevant documents. The purpose of this assessment is to identify any existing gaps, weaknesses or conflicts in programs or activities that may hinder mitigation efforts, and to identify those activities that should be built upon in establishing a successful and sustainable local hazard mitigation program.

The *Community Profile*, *Risk Assessment*, and *Capability Assessment* collectively serve as a basis for determining the goals for the Toe River 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 hazard mitigation goal statements for the region as well as an analysis of hazard mitigation techniques for the Toe River 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 Toe River 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 Toe River Region will take to ensure the Plan's continuous long-term implementation. The procedures also include the manner in which the Plan will be regularly evaluated and updated to remain a current and meaningful planning document.

# SECTION 2
# PLANNING PROCESS

**44 CFR Requirement**

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

This section describes the planning process undertaken by the Toe River Region to update the plan in 2021. More detailed information about the planning process used to develop the initial plan and the previous update can be found in those plans which are available from NCEM and participating County Emergency Management offices.

This section consists of the following seven subsections:



## 2.1 OVERVIEW OF HAZARD MITIGATION PLANNING

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

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

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

- saving lives and property,
- saving money,
- speeding 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,
- demonstrating a firm commitment to improving community health and safety.

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

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

## 2.2 HISTORY OF HAZARD MITIGATION PLANNING IN THE TOE RIVER REGION

Prior to the development of the initial *Toe River Regional Hazard Mitigation Plan* in 2010, each of the four counties and jurisdictions participating in this Plan had previously adopted a county-level hazard mitigation plan. The FEMA approval dates for each of these plans, along with a list of the participating municipalities for each plan, are listed below:

- *Avery County Multi-Jurisdictional Hazard Mitigation Plan* (July 2005)
  - Town of Banner Elk
  - Town of Crossnore
  - Town of Elk Park
  - Town of Newland
  - Village of Sugar Mountain
  - Grandfather Village
- *McDowell County Multi-Jurisdictional Hazard Mitigation Plan* (September 2006)
  - City of Marion
  - Town of Old Fort
- *Mitchell County Multi-Jurisdictional Hazard Mitigation Plan* (April 2005)
  - Town of Bakersville
  - Town of Spruce Pine
- *Yancey County Multi-Jurisdictional Hazard Mitigation Plan* (April 2005)
  - Town of Burnsville

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

For the development of the 2010 plan, all of the aforementioned jurisdictions joined to form a regional plan. No new jurisdictions joined the process and all of the jurisdictions that previously participated in previous planning efforts participated in the development of the 2010 regional plan. The regional plan was developed in order to simplify planning efforts for the jurisdictions in the Toe River Region and allowed resources to be shared amongst the participating jurisdictions to ease the administrative duties of all of the participants by combining the four existing County-level plans into one multi-jurisdictional plan. The 2010 plan was the first regional plan in the State of North Carolina to be approved as was used as a model across the state to encourage regional plan development statewide. That success has carried over into two subsequent updates of this plan in 2016 and for this update in 2021.

## 2.3 UPDATING THE PLAN IN 2021

FEMA requires that hazard mitigation plans be updated every five years to remain eligible for federal mitigation and public assistance funding. To prepare the 2021 update to the Toe River Regional Hazard Mitigation Plan, ESP Associates, Inc. was hired by North Carolina Emergency Management to provide professional mitigation planning services. Per the contractual scope of work, the consultant team followed the mitigation planning process recommended by FEMA (Publication Series 386 and Local Mitigation Plan Review Guide) and recommendations provided by North Carolina Emergency Management (NCEM) mitigation planning staff[1]. Additionally, for the 2020 update, FEMA Community Rating System (CRS) and Community Wildfire Protection Plan (CWPP) requirements were integrated into the plan update.

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

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

| FEMA Disaster Mitigation Act Requirement | CRS Activity 510 Planning Requirement |
|---|---|
| **Phase I – Planning Process** | |
| §201.6(c)(1) | Step 1: Organize to Prepare the Plan |
| §201.6(b)(1) | Step 2: Involve the Public |
| §201.6(b)(2) & (3) | Step 3: Coordinate |
| **Phase II – Risk Assessment** | |
| §201.6(c)(2)(i) | Step 4: Assess the Hazard |
| §201.6(c)(2)(ii) & (iii) | Step 5: Assess the Problem |
| **Phase III – Mitigation Strategy** | |
| §201.6(c)(3)(i) | Step 6: Set Goals |
| §201.6(c)(3)(ii) | Step 7: Review Possible Activities |
| §201.6(c)(3)(iii) | Step 8: Draft an Action Plan |
| **Phase IV – Plan Maintenance** | |
| §201.6(c)(5) | Step 9: Adopt the Plan |
| §201.6(c)(4) | Step 10: Implement, Evaluate and Revise the Plan |

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

## TABLE 2.2 COMMUNITY WILDFIRE PROTECTION PLAN PROCESS INTEGRATION REFERENCE TABLE

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

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

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

For the development of the 2021 plan, all of the aforementioned jurisdictions that participated in the development of the 2016 plan participated in this plan's development.

The process used to prepare this updated Plan included revisiting twelve (12) major steps that were completed over the course of approximately nine months beginning in July 2019. Each of these planning steps (illustrated in **Figure 2.1**) resulted in critical work products and outcomes that collectively make up the Plan. Specific plan sections are further described in Section 1: *Introduction*.

**FIGURE 2.1: MITIGATION PLANNING PROCESS**


## 2.4 THE TOE RIVER REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

In order to guide the initial development of this Plan and subsequent updates, the Toe River counties (Avery, McDowell, Mitchell, and Yancey Counties) created the Toe River Regional Hazard Mitigation Planning Committee. The Regional Hazard Mitigation Planning Committee represents a community-based planning team made up of representatives from various county departments and municipalities and other key stakeholders identified to serve as critical partners in the planning process.

Beginning in August 2019, the Regional Hazard Mitigation Planning Committee members engaged in regular discussions as well as local meetings and planning workshops to discuss and complete tasks associated with preparing the Plan. This working group coordinated on all aspects of plan preparation and provided valuable input to the process. In addition to regular meetings, committee members routinely communicated and were kept informed through an e-mail distribution list.

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

- participate in Regional Hazard Mitigation Planning Committee meetings and workshops,
- provide best available data as required for the risk assessment portion of the Plan,
- help update the Capability Assessment section of the plan and provide copies of any mitigation or hazard-related documents for review and incorporation into the Plan,
- support the update of the Mitigation Strategy, including the review, update and adoption of regional goal statements,

- help update existing mitigation actions and design and propose any appropriate new 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, and
- support the adoption of the *2021 Toe River Regional Hazard Mitigation Plan.*

**Table 2.3** lists the members of the Regional Hazard Mitigation Planning Committee who were responsible for participating in the update of the Plan. Committee members are listed by County and then in alphabetical order by last name.

### TABLE 2.3: MEMBERS OF THE 2021 TOE RIVER REGIONAL HAZARD MITIGATION PLANNING COMMITTEE

| NAME | DEPARTMENT / AGENCY | TITLE |
|---|---|---|
| **Avery County** | | |
| Buchanan, Paul | Avery County | Emergency Management |
| Burleson, Tommy | Avery County | Inspections and Planning |
| Daniels, Bill | Village of Sugar Mountain | Maintenance Director |
| Hansel, Ben | Town of Crossnore | Town Planner |
| Phillips, Susan | Village of Sugar Mountain | Village Manager |
| Seaberg, James | Avery County | GIS |
| Smith, Debbie | Avery County | Transportation |
| Stansberry, Scott | Avery County Firefighters Association | President |
| Turbyfill, Cindy | Avery County | Assistant County Manager |
| Vance, David | Avery County | Emergency Management Director |
| **Mitchell County** | | |
| Canipe, Richard | Town of Spruce Pine | Town Manager |
| Silver, Kolby | Mitchell County | Emergency Management Director |
| **McDowell County** | | |
| Walker, Craig | McDowell County EM | Deputy Director |
| Wright, Angela | McDowell County EM | EM Assistant |
| **Yancey County** | | |
| Howell, Jeff | Yancey County | Emergency Management |
| McMahan, Jamie | Yancey County | Planning |
| **Other Stakeholders** | | |
| Clark, Susan | Toe River Health | Director |
| Greene, Russell | NCEM | Area Coordinator |
| Hall, Darla | NCEM | Western Branch EM Planner |

**Table 2.4** lists points of contact for several of the jurisdictions who elected to designate their respective county officials to represent their jurisdiction on the planning team, generally because they did not have the time or staff to be able to attend on their own. Although these members designated county officials to represent them at in-person meetings, each was still contacted throughout the planning process and

participated by providing suggestions and comments on the Plan, updates to mitigation actions and the Capability Assessment via email and phone conversations. These members are listed below by municipality.

**TABLE 2.4: MEMBERS DESIGNATING REPRESENTATIVES TO THE TOE RIVER REGIONAL HAZARD MITIGATION PLANNING TEAM**

| NAME | JURISDICTION/TITLE |
|---|---|
| **Avery County** | |
| Lyerly, Brenda | Banner Elk, Mayor |
| Boone, Jonathan | Elk Park, Mayor |
| Donovan, Robert | Grandfather Village, Mayor |
| Jaynes, Valerie | Newland, Mayor |
| **McDowell County** | |
| Heather Cotton | Marion, Planning Director |
| Renee Taylor | Old Fort, Town Clerk |
| **Mitchell County** | |
| Vines, Charles | Bakersville, Mayor |
| **Yancey County** | |
| Coletta, Lillian | Burnsville, Mayor |

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

### 2.4.1 Multi-Jurisdictional Participation

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

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

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

## 2.5 COMMUNITY MEETINGS AND WORKSHOPS

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

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

## 2.5.1 Meeting Minutes

**Meeting Minutes from Internal Kickoff Conference Call/Skype Meeting with County Leads and NCEM Representatives**
**July 23, 2019**
**Phone Call/Skype Meeting**

Following issuance of a notice to proceed from NCEM on August 29, 2018 ESP Associates reached out by email to County Emergency Management and Planning Department leads from Avery, Mitchell, McDowell and Yancey Counties, and the Western Branch Manager to introduce themselves, explain the plan update process in general and schedule a time to hold an informal internal kickoff conference call/Skype meeting.

On July 23, 2019, Nathan Slaughter, Hazard Mitigation Department Manager from ESP Associates, Inc. and Project Manager for the update of the Toe River Regional Hazard Mitigation Plan conducted a conference call/Skype meeting with the internal lead stakeholders previously mentioned above. He presented important project information about the plan update, gave a brief refresher on hazard mitigation and a reminder about the importance of the plan, provided a project overview to include key objectives, project tasks, schedule and staff, and then defined roles and responsibilities of the project consultant and the participating jurisdictions.

Following the presentation, he discussed with these stakeholders the need to set up a date, time and location for the official project kickoff meeting with the regional hazard mitigation planning committee. The lead internal stakeholders discussed potential meeting dates and locations and decided that August 27, 2019 would be the date of the meeting at the Spruce Pine Fire Station.

**Meeting Minutes from Toe River Regional Hazard Mitigation Planning Committee Kickoff Meeting**
**August 27, 2019**
**Spruce Pine Fire Station**

Spruce Pine Fire Chief, Josh Boone welcomed attendees and gave basic information about the meeting facility. Nathan Slaughter then began the meeting by welcoming the attendees and giving a brief overview of the project and the purpose of the meeting.

Mr. Slaughter led the meeting of the Regional Hazard Mitigation Planning Team and began by having attendees introduce themselves. The 15 attendees included representatives from various departments and local jurisdictions within each of the four counties participating in the plan update. All four counties were represented. Mr. Slaughter then provided an overview of the items to be discussed at the meeting

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

and briefly reviewed the agenda and presentation slide handouts. He then defined mitigation and gave a review of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

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

Mr. Slaughter then explained some of the basic concepts of mitigation. He explained how we should think about mitigation: we want to mitigate hazard impacts of existing development in the community (houses, businesses, critical facilities, etc.), and ensure that future development is conducted in a way that doesn't increase vulnerability. This can be achieved 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 with 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, the results were tabulated and shared with the group. The most mock money was spent on prevention. These results were compared against those from the previous plan development's ice breaker exercise. This helped demonstrate how priorities in mitigation actions have changed since the previous update.

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

- Coordinate between the four participating counties to update the regional plan
- Update the plan to demonstrate progress and reflect current conditions
- Complete the update before the existing plan expires on April 10, 2021
- Increase public awareness and education
- Maintain grant eligibility for participating jurisdictions
- Update the plan in accordance with Community Rating System (CRS) requirements where applicable, and
- Maintain compliance with State and Federal requirements

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

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

GIS data required for the analysis. He also reviewed the list of identified hazards and the committee agreed to maintain the previous list of hazards for the four counties.

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

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

Mr. Slaughter then reviewed the roles and responsibilities of ESP Associates, Inc, the County leads, and the participating jurisdictions. The presentation concluded with a discussion of the next steps to be taken in the project development. He encouraged meeting participants to distribute the Public Participation Survey. The next HMPT meeting was scheduled for some time in February 2020 to discuss the findings of the risk and capability assessments and to begin updating existing mitigation actions and identify new goals.

## FIGURE 2.2: TOE RIVER KICKOFF MEETING


**Meeting Minutes from Mitigation Strategy Meeting**
**February 4, 2020**
**Spruce Pine Fire Station**
**10:00 AM – Noon**

Nathan Slaughter, Project Manager from ESP Associates, began the meeting by welcoming the attendees and reviewing the meeting handouts, which included an agenda, existing plan goals for the regional plan, and a hard copy of the meeting presentation. Mr. Slaughter asked meeting attendees to introduce themselves and gave a refresher on mitigation, why we plan, and the key objectives of the

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

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

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

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

- DROUGHT: There were 18 regional drought events between 2000 and 2018, and future occurrences are likely.
- EXTREME HEAT: The average maximum temperatures from the past 48 months were shared. Future occurrences are likely.
- HAILSTORM: There have been 238 recorded events since 1962. Future occurrences are likely.
- HURRICANE AND COASTAL STORM: 42 storm tracks have come within 75 miles of the region since 1854. 31 of those were classified as a hurricane or tropical storm. Future occurrences are likely.
- LIGHTNING: Since 1996, there have been 6 reported occurrences, which resulted in 2 deaths and 9 injuries and nearly $26 thousand dollars in property damage. Future occurrences are highly likely.
- SEVERE THUNDERSTORMS: 280 severe thunderstorm events have been recorded since 1950. These events resulted in $890,000 in property damages. Future occurrences are highly likely.
- TORNADOES: There have been 8 recorded events since 1950, causing 1 injury, 1 death and $ 973,935 in property damage. Future occurrences are likely.
- WINTER STORM AND FREEZE: 655 winter weather events that resulted in over $55 million in property damage have been recorded since 1993. Future occurrences are highly likely.
- DAM AND LEVEE FAILURE: Of the 109 dams in the region, 47 are considered high hazard dams. No serious breaches have been reported, and future occurrences are unlikely.
- EROSION: Although little information could be obtained on erosion occurrences in the region, erosion was addressed in the previous plan. Future occurrences are possible.
- FLOOD: 99 flood events have occurred since 1993, resulting in over $29 million in property damage. There have also been 274 reported NFIP losses since 1978 and approximately $5.5 million in claims. There are 25 repetitive loss properties, and future occurrences are highly likely.
- EARTHQUAKE: No significant earthquake events have taken place in the region, but future occurrences are possible.
- LANDSLIDE: There have been 80 landslides reported in the region according to the North Carolina Geological Survey. Future occurrences are likely.

- HAZARDOUS MATERIALS INCIDENTS: 24 serious HAZMAT events have been reported through the PHMSA. There are 7 TRI Facilities in the region. Future occurrences are possible.
- WILDFIRE: Much of the region is located in a high-risk wildland urban interface area. Future occurrences are likely.
- NUCLEAR EMERGENCY: There are no nuclear facilities within 50 miles of the region. No major historical occurrences were found, and future occurrences are unlikely.

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

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

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

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

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

Mr. Slaughter then transitioned to the Mitigation Strategy portion of the presentation. He began by reviewing some of the major concepts of mitigation and then gave the results of the icebreaker exercise from the first Regional Hazard Mitigation Planning Committee meeting, where attendees were given "money" to spend on various hazard mitigation techniques. The results were as follows:

- Prevention $107
- Emergency Services $79
- Structural Projects $46
- Public Education and Awareness $44
- Property Protection $33
- Natural Resource Protection $31

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

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and jurisdictions' websites. As of the meeting date, 134 responses had been received. Based on the preliminary results, respondents felt that flooding and severe winter storms posed the greatest threats to their neighborhood. Most did not live in a floodplain or have flood insurance, but 64.2% of all respondents did not know who to contact regarding reducing their risks to hazards.

Mr. Slaughter then indicated that each participating jurisdiction would need to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by March 4, 2020. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by March 4, 2020. Mr. Slaughter then presented sample mitigation actions for the committee members to consider to include in their plan update.

Finally, Mr. Slaughter discussed the next steps in the planning process. These included returning mitigation action updates and delivery of a draft plan in April 2020. He thanked the group for taking the time to attend and the meeting was adjourned.

## 2.6. INVOLVING THE PUBLIC

**44 CFR Requirement**

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

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

Public involvement in the development of the *Toe River Regional Hazard Mitigation Plan* was sought using two methods: (1) public survey instruments were made available in hard copy and online and (2) making copies of draft Plan deliverables available for public review on county websites and at government offices. Public meetings were held by each participating jurisdiction at the conclusion of the planning process, but prior to official plan approval and adoption. These public meetings were held at various locations throughout the planning area to ensure that citizens in each of the four participating counties were afforded an opportunity to participate in the planning process. The public participation

survey (discussed in greater detail in Section 2.6.1) was made available during the planning process at various locations throughout the Toe River counties and on each county's website.

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

### 2.6.1 Public Participation Survey

The Toe River Regional Hazard Mitigation Planning Committee was successful in getting citizens to provide input to the mitigation planning process through the use of the *Public Participation Survey*. The Public Participation Survey was designed to capture data and information from residents of the Toe River Region that might not be able to otherwise participate in the mitigation planning process.

Copies of the *Public Participation Survey* were distributed to the Regional Hazard Mitigation Planning Committee to be made available for residents to complete at local public offices. An electronic version of the survey was also posted on each county's website. Documentation of outreach efforts to advertise the survey are provided in Appendix D. A total of 134 survey responses were received, which provided valuable input for the Regional Hazard Mitigation Planning Committee to consider in the development of the plan update. Selected survey results are presented below.

- Survey respondents had been impacted by disasters in the past including floods, winter storms and hurricane remnants.
- Respondents ranked Flooding as the highest threat to their neighborhood (31.3 percent), followed by Severe Winter Weather (24.6 percent).
- 64.2 percent of respondents do not know what office to contact regarding reducing their risks to hazards.
- Emergency Services, and Public Education were ranked as the most important activities for communities to pursue in reducing risks.
- A copy of the survey can be found in Appendix B 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 mazzard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other non-profit interests to be involved in the planning process.

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

In addition to participation from a wide variety of County-level departments, additional stakeholders

that were involved in the process of developing this plan included the Avery County Firefighters Association, Avery County Health and North Carolina Emergency Management (NCEM).

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

## 2.8 DOCUMENTATION OF PLAN PROGRESS

Progress in hazard mitigation planning for the participating jurisdictions in the Toe River 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 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 Toe River Region. The actions that have been completed have been removed from the active Mitigation Action Plan found in Section 8 and are now documented in Appendix E which is separate from the main body of the plan. Additionally, over time, it has been determined by the Regional Hazard Mitigation Planning Committee that some actions are not feasible or otherwise not appropriate to continue including in the plan, so those actions have been removed.

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

# SECTION 3
# COMMUNITY PROFILE

This section of the Plan provides a general overview of the Toe River 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 Toe River Region is a rural area located within the Appalachian Mountains of western North Carolina, along the Tennessee border. For the purposes of this plan, the Toe River Region includes the counties of Avery, McDowell, Mitchell, and Yancey. An orientation map is provided as **Figure 3.1**.

The region is a popular tourist destination for a variety of outdoor activities, including hiking, rafting, kayaking, fishing, bird watching, and snow skiing. Mt. Mitchell, the highest point in the eastern United States at 6,684 feet above sea level, is located in Yancey County. Most of Grandfather Mountain, a popular tourist destination, is located within Avery County and approximately half of Avery County is located within the Pisgah National Forest. The total land area of each of the participating counties is presented in **Table 3.1**.

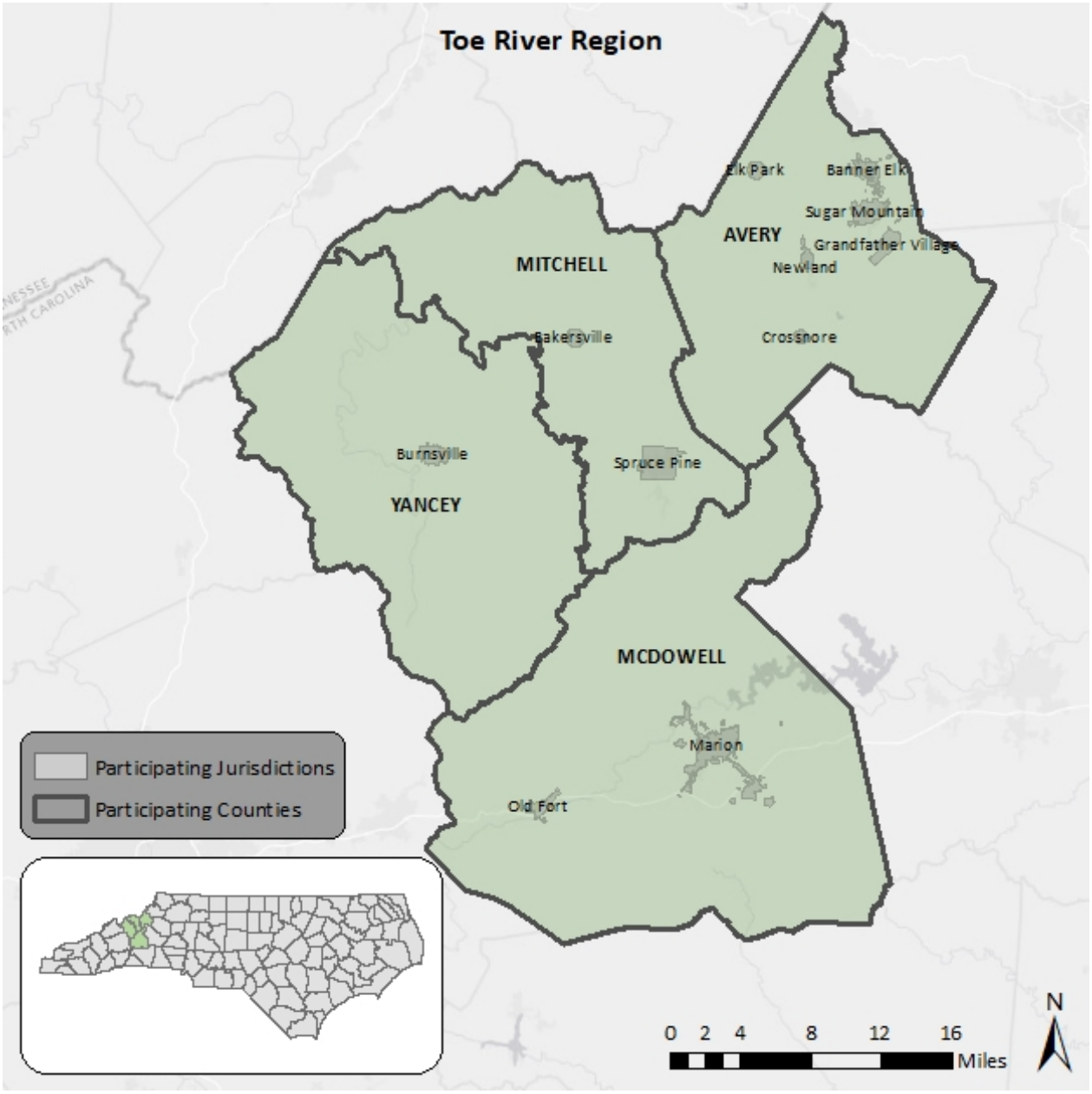
**TABLE 3.1: TOTAL AREAS OF PARTICIPATING COUNTIES**

| County | Total Land Area |
|---|---|
| Avery County | 247 square miles |
| McDowell County | 442 square miles |
| Mitchell County | 221 square miles |
| Yancey County | 312 square miles |

*Source: US Census Bureau*

The Toe River Region enjoys four distinct seasons and the climate in the Region is cooler than most other mountain communities due to its elevation. In the summer, average high temperatures (˚F) are in the mid-seventies while average low temperatures are in the mid-fifties. In the winter, average high temperatures reach the low forties while average low temperatures are in the low twenties.

**FIGURE 3.1: TOE RIVER REGION ORIENTATION MAP**




## 3.2 POPULATION AND DEMOGRAPHICS

McDowell County is the largest participating county and also has the largest population. Over half of participating jurisdictions experienced a decrease in population between 2010 and 2018. The Town of Banner Elk experienced the largest percentage increase in population of any participating jurisdiction between 2010 and 2018 with a 6.1 percent increase. Population counts from the US Census Bureau for 1990, 2000, 2010 and estimates for 2018 for each of the participating counties and jurisdictions are presented in Table **3.2**.

## TABLE 3.2: POPULATION COUNTS FOR PARTICIPATING JURISDICTIONS

| Jurisdiction | 1990 Census Population | 2000 Census Population | 2010 Census Population | 2018 Population Estimate | % Change 2010-2018 |
|---|---|---|---|---|---|
| **AVERY COUNTY** | **14,867** | **17,167** | **17,797** | **17,505** | **-1.7%** |
| Town of Banner Elk | 933 | 811 | 1,028 | 1,091 | 6.1% |
| Town of Crossnore | 271 | 242 | 192 | 187 | -2.6% |
| Town of Elk Park | 486 | 459 | 452 | 445 | -1.5% |
| Town of Newland | 645 | 704 | 698 | 686 | -1.7% |
| Village of Sugar Mountain | 132 | 226 | 198 | 197 | -0.5% |
| Grandfather Village | 34 | 73 | 25 | 24 | -4.2% |
| **MCDOWELL COUNTY** | **35,681** | **42,151** | **44,996** | **45,507** | **1.1%** |
| City of Marion | 4,765 | 4,943 | 7,838 | 7,871 | 0.4% |
| Town of Old Fort | 720 | 963 | 908 | 919 | 1.2% |
| **MITCHELL COUNTY** | **14,443** | **15,687** | **15,579** | **15,000** | **-3.7%** |
| Town of Bakersville | 332 | 357 | 464 | 452 | -2.6% |
| Town of Spruce Pine | 2,010 | 2,030 | 2,175 | 2,148 | -1.2% |
| **YANCEY COUNTY** | **15,419** | **17,774** | **17,818** | **17,903** | **0.5%** |
| Town of Burnsville | 1,482 | 1,623 | 1,693 | 1,647 | -2.7% |

*Source: US Census Bureau*

Based on the 2018 Census estimates, the median age for residents of the participating counties ranges from 43 to 47 years. The racial characteristics of the participating counties are presented in **Table 3.3**. Generally, whites make up the vast majority of the population of the region, accounting for over 92 percent of each county's population.

## TABLE 3.3: DEMOGRAPHICS OF PARTICIPATING COUNTIES

| County | White, Percent (2018) | Black or African American, Percent (2018) | American Indian or Alaska Native, Percent (2018) | Asian, Percent (2018) | Native Hawaiian or Other Pacific Islander, Percent (2018) | Persons of Hispanic Origin, Percent (2018) * | Two or More Races, Percent (2018) |
|---|---|---|---|---|---|---|---|
| AVERY | 93.2% | 4.6% | 0.7% | 0.5% | 0.1% | 5.4% | 1.0% |
| MCDOWELL | 92.8% | 3.9% | 0.8% | 1.0% | 0.1% | 6.4% | 1.4% |
| MITCHELL | 96.3% | 0.7% | 0.9% | 0.7% | 0.2% | 5.6% | 1.2% |
| YANCEY | 96.6% | 1.0% | 0.8% | 0.3% | 0.3% | 5.2% | 1.0% |

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

## 3.3 HOUSING, INFRASTRUCTURE, AND LAND USE

### 3.3.1 Housing

According to the US Census Bureau's 2017 Housing Unit Estimates, there are 55,649 housing units in the Toe River Region, most of which are single family homes. Housing information for the four participating counties is presented in **Table 3.4**. As shown in the table, Avery County has a high percentage of seasonal housing units compared to the other counties.

**TABLE 3.4: HOUSING CHARACTERISTICS OF PARTICIPATING COUNTIES**

| County | Housing Units (2010) | Housing Units (2018) | Seasonal Units, Percent (2018) | Median Home Value (2013-2017) |
|---|---|---|---|---|
| AVERY | 13,718 | 14,275 | 24.8% | $138,800 |
| MCDOWELL | 19,871 | 21,460 | 1.1% | $110,400 |
| MITCHELL | 8,340 | 8,837 | 14.5% | $140,600 |
| YANCEY | 10,558 | 11,259 | 7.5% | $139,800 |

Source: US Census Bureau

### 3.3.2 Infrastructure

**Transportation**

There are several major highways that traverse the Toe River Region. Interstate 40 runs generally east/west through McDowell County just south of Marion and connects Asheville to the west with Hickory to the east. Interstate 26 runs generally north-south along the western edge of Yancey County, connecting Asheville, NC to the south with Johnson City, TN to the north. NC Highway 226 connects Marion to Spruce Pine in Avery County. US Highway 19E runs north-south through Avery County to Spruce Pine and then east through Mitchell and Yancey Counties to Interstate 26. In addition, the Blue Ridge Parkway runs along through the southern portion of Avery County, along the border between Mitchell and McDowell Counties, and through the southern portion of Yancey County.

There are several small airports within the Toe River Region, including the Avery County Airport (Morrison Field) in Spruce Pine and the Marion Airport (Shiflet Field) in Marion. The nearest major airport to the region is the Asheville Regional Airport, which offers non-stop commercial flights to destinations across the eastern US and is located approximately 40 miles from the center of the Toe River Region.

**Utilities**

Electric power in the Toe River Region is provided by several electricity cooperatives. Rutherford Electric Membership Corporation serves the eastern half of McDowell County. The French Broad Electric Membership Corporation serves Yancey County and Mitchell County. Avery County is served by the Mountain Electric Cooperative.

Water and sewer service is provided by many of the towns in the Toe River Region, but unincorporated areas rely on septic systems and wells. The Towns of Newland, Burnsville, Old Fort, Spruce Pine, and Bakersville, along with the City of Marion, provide water and sewer service. In Yancey County, work continues on the expansion of the East Yancey Water and Sewer Project (building of a new sewer system and treatment plant east of Burnsville).

**Community Facilities**
There are a number of public buildings and community facilities located throughout the Toe River Region. According to the data collected for the vulnerability assessment (**Section 6.3.3**), there are 47 fire stations, 19 police stations, eight libraries, and 40 public schools located within the study area. Three hospitals are located in the Toe River Region. The largest is the McDowell Hospital, a 65-bed facility in Marion. Blue Ridge Regional Hospital is a 46-bed facility located in Spruce Pine. Cannon Memorial Hospital is located in Linville in Avery County and has 25 beds.

The Toe River Region contains numerous local and state parks, national forests and recreation areas, including Pisgah National Forest, Grandfather Mountain, Linville Gorge, and Mt. Mitchell. These facilities offer recreational opportunities to area residents and hundreds of thousands of visitors each year.

### 3.3.3 Land Use and Development Trends

Many areas of the Toe River Region are undeveloped or sparsely developed due to the mountainous terrain and the conservation of land in state and national protected lands. 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 where many of the study area's businesses, commercial uses, and institutional uses are located. Land uses in the balance of the study area generally consists of rural residential development, agricultural uses, and recreational areas.

As depicted in **Table 3.2**, population growth in the region has been slow. Therefore, new development has been slow to come to the region. Population growth rates shown in **Table 3.2** indicate that growth rates are slow across the region. This pattern has remained consistent since the regional plan was first developed in 2010.

While population growth and development in the region remains relatively slow, growth that is occurring is well-managed by the participating jurisdictions. The Capability Assessment found in Section 7 provides an overview of the land use tools that are in place in each jurisdiction.

## 3.4 EMPLOYMENT AND INDUSTRY

According to the North Carolina Department of Commerce Labor and Economic Analysis, in 2018, Avery County's job force consisted of 7,424 workers. The top five employers in Avery County, in order, were the Department of Public Safety, Avery County Schools, Sugar Mountain Resort INC, Avery County, and Lees McRae College. The average unemployment rate was 3.6 compared to the State rate of 3.7.

In 2018, McDowell County's total job force was 21,120. The top five employers in McDowell County were the Baxter Healthcare Corporation, NC Public Schools, Auria Solutions USA, McDowell County, and the Department of Public Safety. The average unemployment rate was 3.4 compared to the State rate of 3.7.

Mitchell County's total employment in all industries was 6,021 in 2018. The top five employers in Mitchell County were the Mitchell County Board of Education, Sibelco North America, Spruce Pine Community Hospital, Maryland Community College, and Wal-Mart. The average unemployment rate was 4.4 compared to the State rate of 3.7.

In 2018, Yancey County's total employment was 8,299. The top five employers in Yancey County were Altec Industries, Yancey County Schools, Ingles Markets, Yancey County, and Glen Raven INC. The average unemployment rate was 3.4 compared to the State rate of 3.7.

# SECTION 4
# HAZARD IDENTIFICATION

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

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

**44 CFR Requirement**

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

## 4.1 OVERVIEW

The Toe River 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 Toe River Region has included a comprehensive assessment of both types of hazards.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the participating counties in the Toe River Region (Avery County, McDowell County, Mitchell County, and Yancey County) have identified a number of hazards that are to be addressed in its Regional Hazard Mitigation Plan. These hazards were identified through an extensive process that utilized input from the Toe River Regional Hazard Mitigation Planning Committee members, research of past disaster declarations in the participating counties[1], and review of the North Carolina State Hazard Mitigation Plan (2018). To maintain consistency, the Toe River Regional Hazard Mitigation Planning Committee voted to assess the same hazards that were identified in the most recent update of the North Carolina State Hazard Mitigation Plan. Therefore, since the development of the previous version of this plan, the hazard identified and included in the plan have changed. A list of all previous hazards covered in the 2016 Toe River Regional Hazard Mitigation Plan in viewable in **Table 4.1**, along with a summary of the hazards assessed in this 2021 update. Readily available information from reputable sources (such as federal and state agencies) was also evaluated to supplement information from these key sources.

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

## TABLE 4.1: 2020 TOE RIVER REGION HAZARDS UPDATE

| 2016 Toe River Identified Hazards | | 2020 Toe River Identified Hazards | | Sub hazards covered in 2021 Plan and Explanations |
|---|---|---|---|---|
| **Atmospheric Hazards** | Drought | Drought | **Natural Hazards** | Agricultural Drought, Hydrological Drought |
| | Hailstorm | | | Assessed under "Tornadoes/Thunderstorms" |
| | Heat Wave | Excessive Heat | | |
| | Hurricane and Tropical Storm | Hurricane and Coastal Hazards | | Storm Surge associated with Hurricanes and Nor'easters, High Wind associated with Hurricanes and Nor'easters, Torrential Rain, Tornadoes Associates with Hurricanes, Severe Winter Weather associated with Nor'easters |
| | Lightning | | | Assessed under "Tornadoes/Thunderstorms" |
| | Tornado | Tornadoes/Thunderstorms | | Hailstorm, Torrential Rain associated with Severe Thunderstorms, Thunderstorm Wind, Lightning, Waterspout, High Wind |
| | Severe Thunderstorm | | | Assessed under "Tornadoes/Thunderstorms" |
| | Winter Storm and Freeze | Severe Winter Weather | | Freezing Rain, Snowstorms, Blizzards, Wind Chill, Extreme Cold |
| **Hydrologic Hazards** | Dam and Levee Failure | Dam Failures | | |
| | Erosion | | | Assessed under "Geological" |
| | Flood | Flooding | | |
| **Geologic Hazards** | Earthquake | Earthquakes | | |
| | Landslide | Geological | | Landslides, Sinkholes, Erosion |
| **Other Hazards** | Wildfire | Wildfires | **Other Hazards** | |
| | | Infectious Disease | | |
| **Other Hazards** | Hazardous Materials Incident | Hazardous Substances | **Technological Hazards** | Hazardous Materials, Hazardous Chemicals, Oil Spill |
| | Nuclear Accident | Radiological Emergency – Fixed Nuclear Facilities | | |
| | | Terrorism | | Chemical, Biological, Radiological, Nuclear, Explosive |
| | | Cyber | | |
| | | Electromagnetic Pulse | | |

## 4.2 DISASTER DECLARATIONS

Disaster declarations provide insight into the hazards that may impact the Toe River Region. Since 1973, sixteen presidential disaster declarations have been reported in the Toe River Region, which can be seen in **Table 4.2** below. This includes one major blizzard, three storms related to winter storm events, five storms related to hurricanes and tropical storms, and five storms that included flooding, landslides and mudslides.

## Table 4.2: Disaster Declaration in the Toe River Region

| Year | Disaster Number | Description | Avery County | McDowell County | Mitchell County | Yancey County |
|---|---|---|---|---|---|---|
| 1973 | 394 | SEVERE STORMS AND FLOODING | | X | | |
| 1977 | 542 | SEVERE STORMS AND FLOODING | X | X | X | X |
| 1989 | 844 | HURRICANE HUGO | X | | | |
| 1995 | 1073 | SEVERE STORMS, FLOODING, HIGH WINDS | X | | X | X |
| 1996 | 1087 | BLIZZARD OF '96 | X | X | X | X |
| 1996 | 1103 | WINTER STORM | X | | | X |
| 1998 | 1200 | SEVERE STORMS AND FLOODING | X | | X | X |
| 2002 | 1448 | SEVERE ICE STORM | | X | | |
| 2004 | 1546 | TROPICAL STORM FRANCES | X | X | X | X |
| 2004 | 1553 | HURRICANE IVAN | X | X | X | X |
| 2010 | 1871 | SEVERE WINTER STORM, FLOODING | X | X | X | X |
| 2013 | 4146 | SEVERE STORMS, FLOODING, LANDSLIDES AND MUDSLIDES | X | | X | X |
| 2013 | 4153 | SEVERE STORMS, FLOODING, LANDSLIDES AND MUDSLIDES | X | | | |
| 2018 | 4393 | HURRICANE FLORENCE | | X | | X |
| 2018 | 4412 | TROPICAL STORM MICHAEL | | X | | |
| 2020 | 4487 | COVID-19 PANDEMIC | X | X | X | X |

## 4.3 SUMMARY OF HAZARD IMPACTS SINCE PREVIOUS PLAN

Since the approval date of the previous Toe River Regional Hazard Mitigation Plan (2015), there have been 315 hazard events recorded for the region in the National Centers for Environmental Information Storm Events Database. It is important to take note of those hazard events and consider them in the *Hazard Identification* section to help ensure that the appropriate hazards are being considered in the risk assessment sections and in the Mitigation Strategy. **Table 4.3** documents the hazard events recorded. Details for some of these events are discussed in further detail in the *Hazard Profiles* section.

## Table 4.3: Summary of Hazard Events Since Previous Plan

| Hazard Type* | Number of Reported Events in Avery County | Number of Reported Events in McDowell County | Number of Reported Events in Mitchell County | Number of events recorded in Yancey County |
|---|---|---|---|---|
| Cold/Wind Chill | 9 | 1 | 9 | 9 |
| Flash Flood | 7 | 1 | 3 | 4 |
| Flood | 0 | 1 | 1 | 0 |
| Hail | 1 | 5 | 1 | 1 |
| Heavy Snow | 4 | 1 | 4 | 4 |
| High Wind | 4 | 2 | 4 | 3 |
| Lightning | 0 | 0 | 0 | 1 |
| Strong Wind | 0 | 2 | 0 | 0 |
| Thunderstorm Wind | 2 | 28 | 0 | 4 |
| Tornado | 0 | 1 | 0 | 0 |
| Tropical Storm | 0 | 1 | 0 | 0 |
| Winter Storm | 4 | 3 | 3 | 3 |
| Winter Weather | 26 | | 28 | 28 |
| **TOTAL NUMBER OF REPORTED EVENTS** | **57** | **148** | **53** | **57** |

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

## 4.4 HAZARD EVALUATION

**Table 4.4** documents the evaluation process used for determining which of the initially identified hazards are considered significant enough to warrant further evaluation in the risk assessment. For each hazard considered, the table indicates whether or not the hazard was identified as a significant hazard to be further assessed, how this determination is 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* during future evaluations and updates of the risk assessment if deemed necessary by the Regional Hazard Mitigation Planning Committee during the plan update process.

# Table 4.4: Documentation of the Hazard Evaluation Process

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | How was this determination made? | Why was this determination made? |
|---|---|---|---|
| **ATMOSPHERIC HAZARDS** | | | |
| Avalanche | NO | • Review of US Forest Service National Avalanche Center web site<br>• Review of the NC State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of the previous Toe River Regional 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 not have enough snow to produce this hazard.<br>• Avalanche was not included in the previous Toe River Regional Hazard Mitigation Plan. |
| Drought | YES | • Review of the NC State Hazard Mitigation Plan<br>• Review of the North Carolina Drought Monitor website<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • There are reports of drought conditions in nine out of the last ten years in the Toe River Region, according to the North Carolina Drought Monitor.<br>• Droughts are included as a hazard in the NC State Hazard Mitigation Plan.<br>• Drought is included in the previous Toe River Regional Hazard Mitigation Plan |
| Hailstorm | YES (Assessed under Tornadoes/Thunderstorms) | • Review of NC State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of NOAA NCEI Storm Events Database | • Hailstorm events are discussed in the state plan under the Severe Thunderstorm hazard.<br>• NCEI reports 238 hailstorm events (3/4 inch size hail to 2.75 inches) for the Toe River Region between 1958 and November 2019. For these events there are $2.4 million in property damages but no deaths or injuries. |

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | How was this determination made? | Why was this determination made? |
|---|---|---|---|
| | | • Review of the previous Toe River Regional Hazard Mitigation Plan. | • Hailstorms were included as a hazard in the previous Toe River Regional Hazard Mitigation Plan. |
| Heat Wave | NO | • Review of NOAA NCEI Storm Events Database<br>• Review of the North Carolina State Hazard Mitigation Plan<br>• Review of the previous Toe River Regional Hazardous Mitigation Plan | • NCEI does not report any extreme heat event for the Toe River counties.<br>• The NC State Hazard Mitigation Plan does include Extreme Heat as a hazard; however, extreme heat events are not experienced very often in the mountains.<br>•<br>• Heat Wave was not included as a hazard in the previous Toe River Regional Hazard Mitigation Plan. |
| 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<br>• Review of the previous Toe River Regional Hazard Mitigation Plan. | • Hurricane and tropical storm events are discussed in the state plan.<br>• NOAA historical records indicate 2 hurricanes, 29 tropical storms, and 11 tropical depressions have come within 75 miles of the Toe River Region between 1851 and 2020<br>• Five out of sixteen disaster declarations in the Toe River Region are directly related to hurricane and tropical storm events.<br>• The Hurricane and Tropical Storm hazard was addressed in the previous Toe River Regional Hazard Mitigation Plan. |

| 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? |
|---|---|---|---|
| Lightning | YES (Assessed under Tornadoes/Thunderstorms) | • Review of NC State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of NOAA NCEI Storm Events Database, NOAA lightning statistics<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • Lightning events are discussed in the state plan as part of the Tornadoes/ Thunderstorm hazard,<br>• NCDC reports 8 lightning events for the Toe River Region between July 1994 and November 2019. These events have resulted in a recorded 2 death, 9 injuries and $31,772 in property damage.<br>• Lightning is addressed as an individual hazard in the previous Toe River Regional Hazard Mitigation Plan |
| Nor'easter | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of NOAA NCEI Storm Events Database<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • Nor'easters are no longer evaluated as a separate hazard in the state plan.<br>• NCEI does not report any Nor'easter activity for the Toe River Region. However, Nor'easter may have affected the region as severe winter storms. In this case, the activity would be reported under winter storm events.<br>• This hazard was not addressed in the previous Toe River Regional Hazard Mitigation Plan. |
| Tornado (combined with Thunderstorm hazard for 2021 update) | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of NOAA NCEI Storm Events Database<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • Tornado events are discussed in the NC State Hazard Mitigation Plan. NCEI reports 8 tornado events in Toe River Region Counties between 1979 and November 2019. These events have resulted in one injury, one death, and $973,935 in property damage with the most severe being an F2.<br>• Tornadoes were addressed as hazards in the previous Toe River Regional Hazard Mitigation Plan |

| 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? |
|---|---|---|---|
| Thunderstorm (Combined with Tornado hazard for 2021 update) | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of NOAA NCEI Storm Events Database<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • Severe Thunderstorm events are discussed in the NC State Hazard Mitigation Plan.<br>• NCEI reports 280 thunderstorm events in the Toe River Region counties between 1985 and November 2019. These events have resulted in $890,000 in property damage.<br>• Severe Thunderstorm events were addressed as a hazard in the previous Toe River Regional Hazard Mitigation Plan. |
| Severe Winter Weather | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of historical presidential disaster declarations.<br>• Review of NOAA NCEI Storm Events Database<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • Severe Winter Weather (including snow storms and ice storms, etc.) are discussed in the state plan.<br>• NCEI reports that the Toe River Counties have been affected by 655 snow and ice events between 1993 and November 2019. These events resulted in over $50 million in damages but did not cause any injuries.<br>• Four of the Region's sixteen disaster declarations were directly related to winter storm events.<br>• Winter Storm events were addressed in the previous Toe River Regional Hazard Mitigation Plan. |
| **HYDROLOGIC HAZARDS** | | | |
| Dam Failure | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of North Carolina Division of Land Management web site | • Dam Failure is discussed in the state plan as a hazard of concern for Toe River Region Counties.<br>• Of the 109 dams reported on the National Inventory of Dams for the region, 48 are high hazard (44%), (High hazard is |

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | How was this determination made? | Why was this determination made? |
|---|---|---|---|
| | | • Review of U.S. Army Corps of Engineers National Inventory of Dams database<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | defined as "where failure or mis-operation will probably cause loss of human life.")<br>• The previous Toe River Regional Hazard Mitigation Plan addresses dam failure as a hazard. |
| Erosion | YES | • Review of the previous Toe Regional Hazard Mitigation Plan.<br>• Review of NC State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • The existing Toe River Regional Hazard Mitigation Plan identifies areas of concern for erosion in Avery County and Yancey County.<br>• Coastal erosion is discussed in the state plan but only for coastal areas (there is no discussion of riverine erosion). |
| Flooding | 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<br>• Review of FEMA and NCEM's flood risk data for the Toe River Region<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • The flood hazard is thoroughly discussed in the state plan.<br>• Seven out of sixteen Presidential Disaster Declarations were flood-related and an additional five were hurricane or tropical storm-related which like brought flooding issues.<br>• NCEI reports that Toe River Region Counties has been affected by 81 flood events between March 1993 and November 2019. These events in total caused no reported deaths or injuries but an estimated $28.6 million in property damages.<br>• Nearly 0.03% of the Toe River Region is located in an identified floodplain (100 or 500 year).<br>• Nearly all municipalities participate in the NFIP. |

| 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? |
|---|---|---|---|
| | | | • Flooding was addressed as a hazard in the previous Toe River Regional Hazard Mitigation Plan. |
| Storm Surge | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of the previous Toe River Regional Hazardous Mitigation Plan<br>• Review of NOAA NCEI Storm Events Database | • Given the inland location of the Toe River Region, Storm Surge will not affect the area.<br>• 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>• The previous Toe River Regional Hazard Mitigation Plans does not address storm surge as a hazard.<br>• No historical storm surge events were reported by NCEI |
| **GEOLOGIC HAZARDS** | | | |
| Earthquake | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of the previous Toe River Regional Hazardous Mitigation Plan<br>• USGS Earthquake Hazards Program web site<br>• Review of the National Geophysical Data Center<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment | • Earthquake events are discussed in the state plan and all of the participating counties in the Toe River Region are considered to be at moderate risk to an earthquake event (no counties are high risk).<br>• Earthquake was addressed as a hazard in the previous Toe River Regional Hazard Mitigation Plan.<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>• 43 events are known to have occurred in the region according to the National Geophysical |

| 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? |
|---|---|---|---|
| | | | Data Center. The greatest MMI reported was a IV.<br>• According to USGS seismic hazard maps, the peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years for the Toe River Region is approximately 5%g. FEMA recommends that earthquakes be further evaluated for mitigation purposes in areas with a PGA of 3%g or more. |
| Expansive Soils | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of USDA Soil Conservation Service's Soil Survey<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • Expansive soils are not addressed in the state plan.<br>• According to FEMA and USDA sources, the Toe River Region is located in an area that has a "little to no" clay swelling potential.<br>• The previous Toe River Regional Hazard Mitigation Plan does not identify Land Subsidence as a hazard. |
| 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<br>• Review of the previous Toe River Regional Hazard Mitigation Plan | • Landslide/Rock Fall is identified as a hazard in the state plan<br>• USGS landslide hazard maps indicate "high landslide incidence" (more than 15% of the area is involved in land sliding) for some areas in Mitchell and Yancey counties. The remaining areas are moderate or low incident with high susceptibility.<br>• Data provided by NCGS indicate 87 recorded landslide events in the Toe River Region<br>• All of the previous Toe River county hazard mitigation plans address landslides. |

| 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? |
|---|---|---|---|
| Land Subsidence | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of the previous Toe River Regional 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 Toe River counties.<br>• The previous Toe River Regional Hazard Mitigation Plan does not identify Land Subsidence as a hazard. |
| Tsunami | NO | • Review of NC State Hazard Mitigation Plan<br>• Review of previous Toe River Regional Hazard Mitigation Plan.<br>• Review of FEMA's Multi-Hazard Identification and Risk Assessment<br>• Review of FEMA "How-to" mitigation planning guidance (Publication 386-2, "Understanding Your Risks – Identifying Hazards and Estimating Losses). | • Tsunamis are not identified as a hazard in the state plan.<br>• The previous Toe River Regional Hazard Mitigation Plan does not identify tsunami as a hazard.<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 in the Toe River Region. |

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | How was this determination made? | Why was this determination made? |
|---|---|---|---|
| **OTHER HAZARDS** | | | |
| Hazardous Substances | YES | • Review of the NC State Hazard Mitigation Plan<br>• Review of the previous Toe River Regional Hazard Mitigation Plan. | • The previous Toe River Regional Hazard Mitigation Plan identified hazardous materials incident as a hazard.<br>• Review of Pipeline and Hazardous Materials Safety Administration data indicates HAZMAT incidents occurring in all of the Toe River counties.<br>• EPA Toxic Release Inventory indicates HAZMAT facilities in the Toe River Region. |
| Wildfire | YES | • Review of NC State Hazard Mitigation Plan<br>• Review of the previous Toe River Regional Hazard Mitigation Plan.<br>• Review of Southern Wildfire Risk Assessment (SWRA) Data<br>• Review of the NC Division of Forest Resources website | • Wildfires are identified in the state plan as a hazard of concern.<br>• The previous Roe River Regional Hazard Mitigation Plan identified wildfire as a hazard.<br>• According to the North Carolina Division of Forest Resources, the Toe River Region experiences an average of 32 fires each year which burn a combined 95 acres. This data also indicates that McDowell County is at an increased risk with an average of 74 fires annually which burn a combined 176 acres.<br>• Wildfire hazard risks will increase as low-density development along the urban/wildland interface increases. |
| Infectious Disease | YES | • Review of the NC State Hazard Mitigation Plan | • Although the previous Toe River Regional Hazard Mitigation Plan did not identify infectious diseases as a hazard, it is assessed in this update to maintain consistency with the NC State Hazard Mitigation Plan. |

| Natural Hazards Considered | Was this hazard identified as a significant hazard to be addressed in the plan at this time? (Yes or No) | How was this determination made? | Why was this determination made? |
|---|---|---|---|
| | | | • Infectious Disease has caused one of the sixteen disaster declarations in the Toe River Region. |
| **TECHNOLOGICAL HAZARDS** | | | |
| TerrorIsm | YES | • Review of the previous Toe River Regional Hazard Mitigation Plan.<br>• Review of the NC State Hazard Mitigation Plan<br>• Review of local official knowledge | • The previous Toe River Regional Hazard Mitigation Plan identified terror threat as a hazard.<br>• The NC State Hazard Mitigation Plan identifies terrorism as a hazard.<br>• There are a few high profiles targets in the area. |
| Radiological Emergency – Fixed Nuclear Facilities | NO | • Review of the previous Toe River Regional Hazard Mitigation Plan<br>• Review of IAEA list of fixed nuclear power stations in the United States<br>• Discussion with local officials | • The Toe River Region is located outside of the Emergency Planning Zone of all fixed nuclear sites in North Carolina. |
| Cyber | YES | • Review of the NC State Hazard Mitigation Plan | • Changing future conditions encourage the assessment of the possibility of a cyber attack with the increase in global technology |
| Electromagnetic Pulse | YES | • Review of the NC State Hazard Mitigation Plan | • Changing future conditions encourage the assessment of the possibility of an electromagnetic pulse with the increase in global technology |

## 4.4 HAZARD IDENTIFICATION RESULTS

**Table 4.5** provides a summary of the hazard identification and evaluation process noting which of the 24 initially identified hazards are considered significant enough for further evaluation through this Plan's risk assessment (marked with "☑").

### Table 4.5: Summary Results of the Hazard Identification and Evaluation Process

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

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

* * = Hazard is assessed as a sub hazard under the Tornadoes/Thunderstorms hazard.

# SECTION 5
# HAZARD PROFILES

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

- 5.1: Overview
- 5.2: Study Area
- 5.3: Drought
- 5.4: Excessive Heat
- 5.5: Hurricanes and Coastal Hazards
- 5.6: Tornadoes/Thunderstorm
- 5.7: Severe Winter Weather
- 5.8: Earthquake
- 5.9: Geological
- 5.10: Dam and Levee Failure
- 5.11: Flooding
- 5.12: Wildfire
- 5.13: Infectious Disease
- 5.14: Hazardous Substances
- 5.16: Terrorism
- 5.17: Cyber
- 5.18: Electromagnetic Pulse
- 5.19: Conclusions of Hazard Risk
- 5.20: Final Determinations

**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 Toe River 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 Toe River Regional Hazard Mitigation Planning Committee as it relates to unique historical or anecdotal hazard information for the counties in the Toe River Region or a participating municipality within them.

The following hazards were identified:

- **Natural**
  - Drought
  - Excessive Heat
  - Hurricane and Tropical Storm (including Nor'easters)
  - Tornado/Thunderstorm (including hailstorms and lightning)
  - Severe Winter Weather
  - Earthquake

- Geological (including landslides, sinkholes, and erosion)
- Dam Failure
- Flooding

- **Technological**
  - Hazardous Substances
  - Terrorism
  - Cyber
  - Electromagnetic Pulse
- **Other**
  - Wildfire
  - Infectious Disease

## 5.2 STUDY AREA

The Toe River Region includes four counties: Avery, McDowell, Mitchell, and Yancey. **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 Toe River Region.

### TABLE 5.1: PARTICIPATING JURISDICTIONS

| **Avery County** | |
|---|---|
| Banner Elk | Grandfather Village |
| Crossnore | Sugar Mountain |
| Elk Park | Newland |
| **McDowell County** | |
| Marion | Old Fort |
| **Mitchell County** | |
| Bakersville | Spruce Pine |
| **Yancey County** | |
| Burnsville | |

## FIGURE 5.1: TOE RIVER REGION BASE MAP

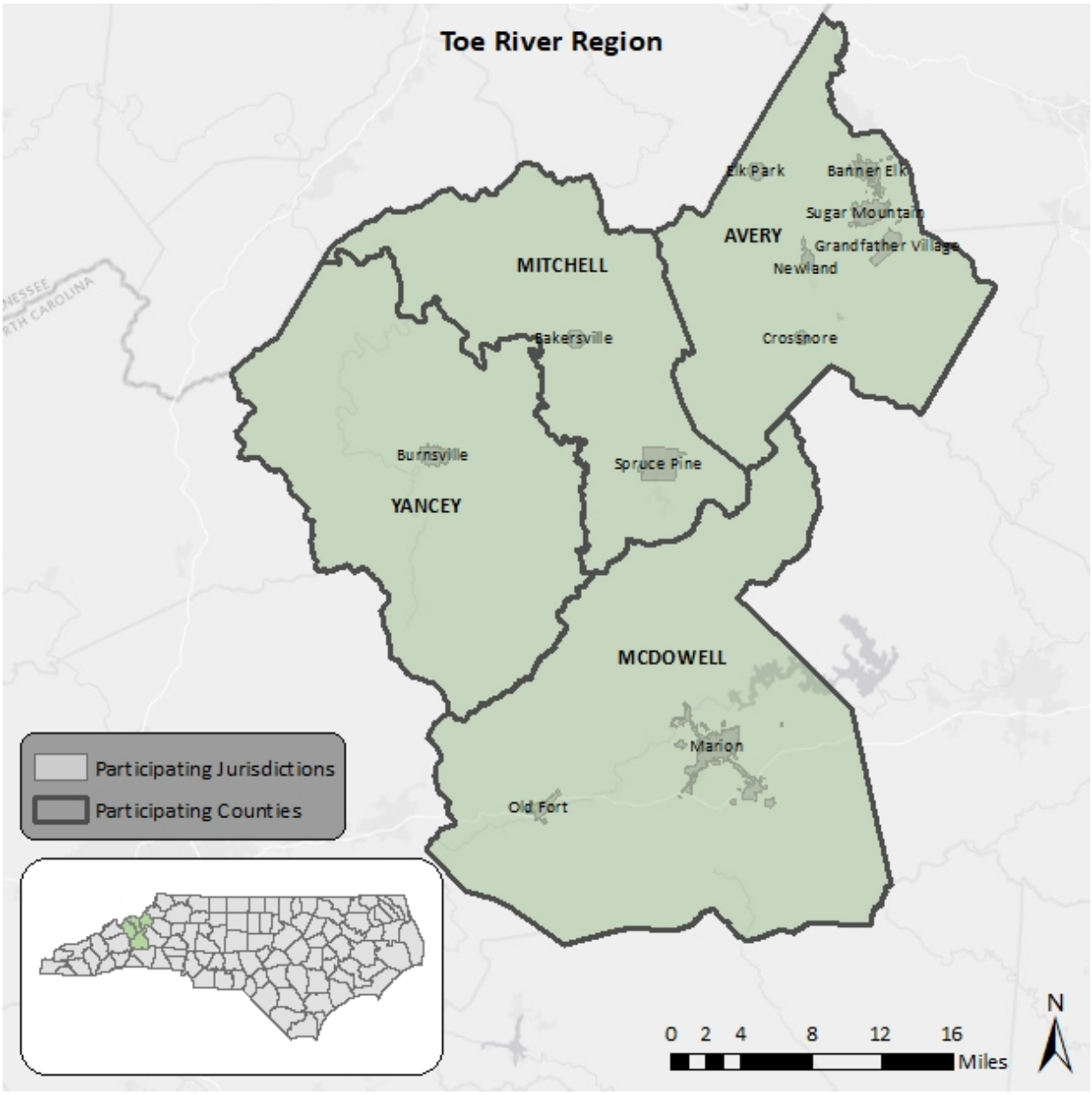



**Table 5.2** lists each significant hazard for the Toe River Region and identifies whether or not it has been determined to be a specific hazard of concern for the 11 municipal jurisdictions and each of the four county's unincorporated areas. This is the based on the best available data and information from the Toe River Regional Hazard Mitigation Planning Committee. (● = hazard of concern)

## TABLE 5.2 SUMMARY OF IDENTIFIED HAZARD EVENTS

| Jurisdiction | NATURAL | | | | | | | | | | OTHER | TECHNOLOGICAL | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Drought | Excessive Heat | Hurricane and Coastal Hazards | Tornadoes/ Thunderstorms | Severe Winter Weather | Earthquakes | Geological | Dam Failure | Flooding | Wildfires | Infectious Disease | Hazardous Substances | Radiological Emergency | Terrorism | Cyber | Electromagnetic Pulse |
| **Avery County** | | | | | | | | | | | | | | | | |
| Banner Elk | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Crossnore | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Elk Park | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Grandfather Village | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Newland | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Sugar Mountain | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Unincorporated Area | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **McDowell County** | | | | | | | | | | | | | | | | |
| Marion | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Old Fort | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Unincorporated Area | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Mitchell County** | | | | | | | | | | | | | | | | |
| Bakersville | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Spruce Pine | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Unincorporated Area | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| **Yancey County** | | | | | | | | | | | | | | | | |
| Burnsville | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Unincorporated Area | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

# Natural Hazards

## 5.3 DROUGHT

### 5.3.1 Background and Description

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

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

**TABLE 5.3: DROUGHT CLASSIFICATION DEFINITIONS**

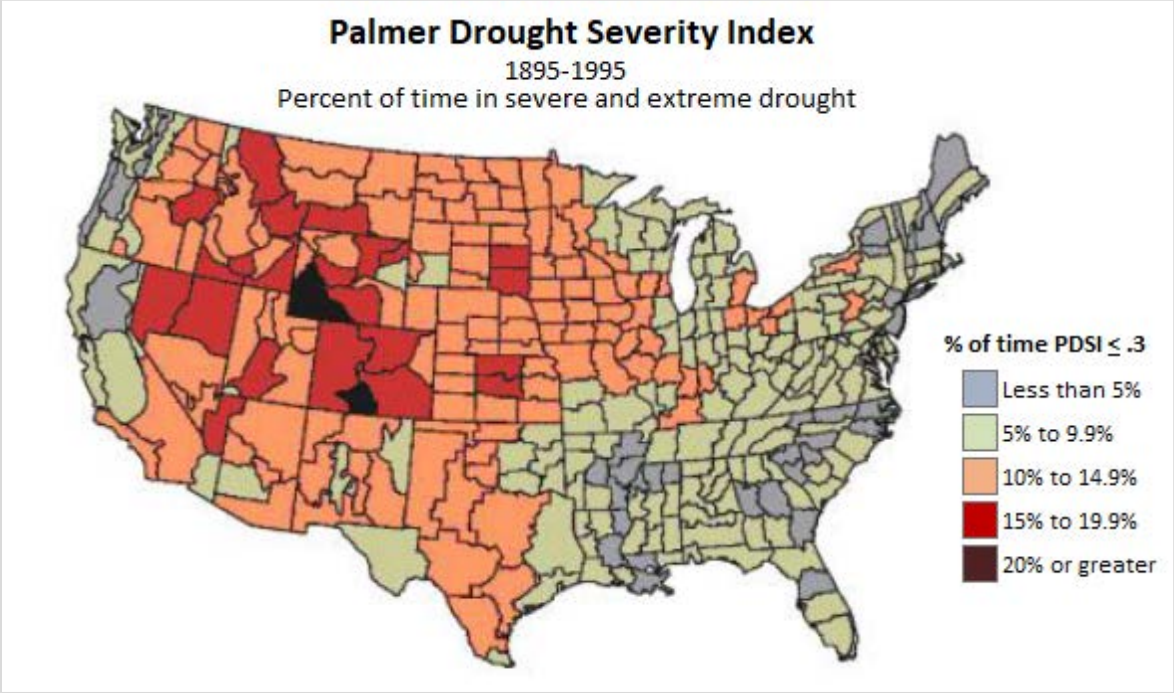
| | |
|---|---|
| **Meteorological Drought** | The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales. |
| **Hydrologic Drought** | The effects of precipitation shortfalls on stream flows and reservoir, lake,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

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

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

The Palmer Drought Severity Index (PDSI) is based on observed drought conditions and range from -0.1 (incipient dry spell) to -4.0 (extreme drought). Evident in **Figure 5.2**, the Palmer Drought Severity Index Summary Map for the United States, drought affects most areas of the United States, but is less severe in the Eastern United States.

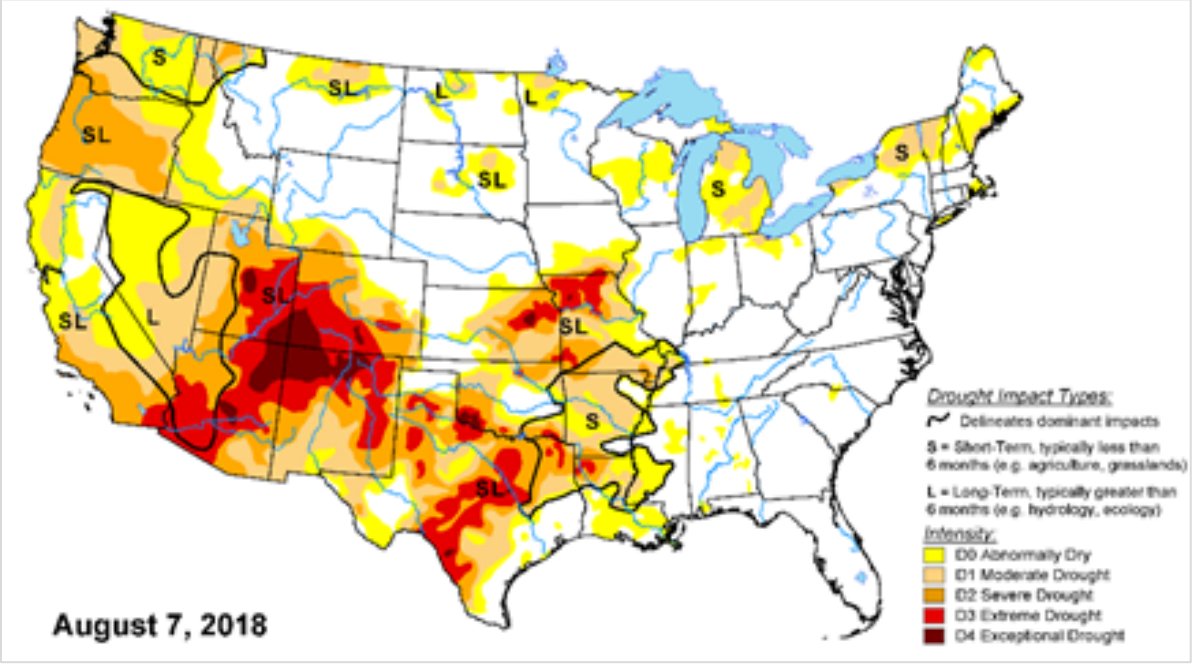
## FIGURE 5.2: PALMER DROUGHT SEVERITY INDEX SUMMARY MAP




*Source: National Drought Mitigation Center*

The figure above is the most updated version of the Palmer Drought Severity Index; however, the US Drought Monitor is updated on a weekly basis. An archived map from the summer of 2018 can be seen below in **Figure 5.3** to reflect more current drought conditions in the US.

## FIGURE 5.3: US DROUGHT MONITOR



### 5.3.2 Location and Spatial Extent

Drought typically covers a large area and cannot be confined to any geographic or political boundaries. According to the Palmer Drought Severity Index (**Figure 5.2**), Western North Carolina has a relatively low risk for drought hazard. However, local areas may experience much more severe and/or frequent drought events than what is represented on the Palmer Drought Severity Index map. Further, it is assumed that the Toe River Region would be uniformly exposed to drought, making the spatial extent potentially widespread. It is also notable that drought conditions typically do not cause significant damage to the built environment.

### 5.3.3 Historical Occurrences

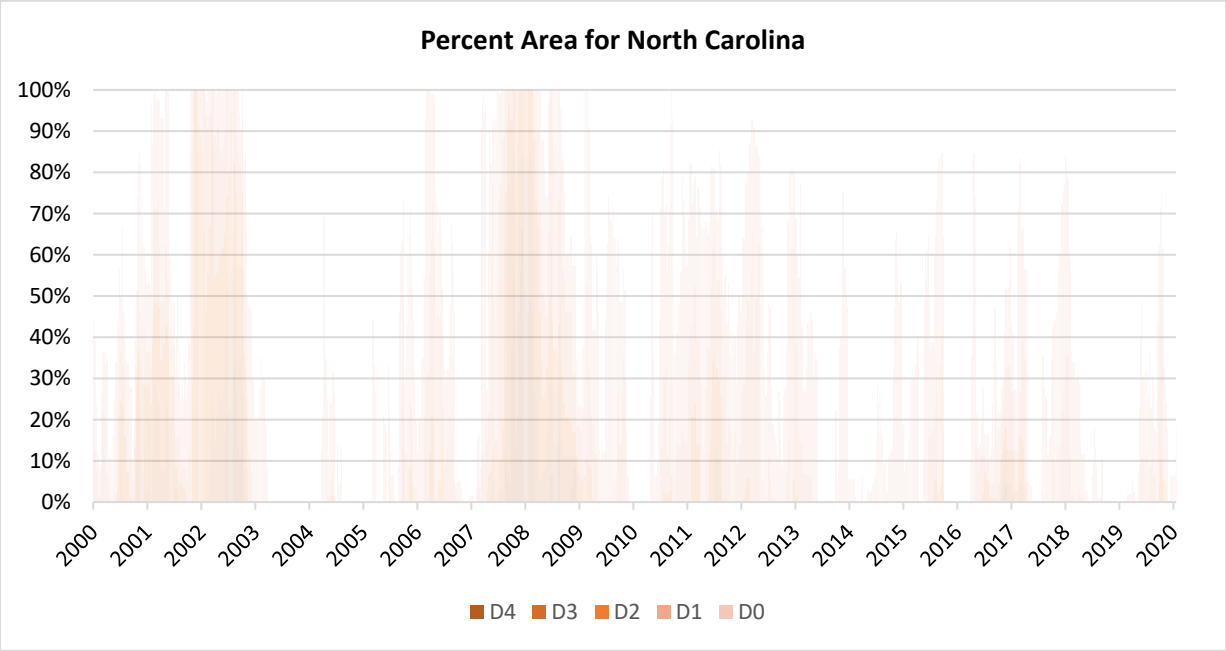
The North Carolina Drought Management Advisory Council also reports data on North Carolina drought conditions from 2000 to 2018 through the North Carolina Drought Monitor. It classifies drought conditions using the scale set by the US Drought Monitor, which classifies conditions on a scale of D0 to D4.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

**TABLE 5.4: USDM DROUGHT CLASSIFICATIONS**

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

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

## FIGURE 5.4: NORTH CAROLINA DROUGHT CONDITIONS (2000-2018)




*Source: NIDIS, Drought.gov, US Drought Portal*

According to the North Carolina Drought Monitor, all counties in the Toe River Region have had drought occurrences (including abnormally dry) seventeen of the last eighteen years (2000-2018) (**Table 5.5**). It should be noted that the North Carolina Drought Monitor also estimates what percentage of the county is in each classification of drought severity. For example, the most severe classification reported may be exceptional, but a majority of the county may actually be in a less severe condition.

## TABLE 5.5: HISTORICAL DROUGHT OCCURRENCES IN THE TOE RIVER REGION

| | Avery County | McDowell County | Mitchell County | Yancey County |
|---|---|---|---|---|
| 2000 | Extreme Drought | Extreme Drought | Exceptional Drought | Extreme Drought |
| 2001 | Extreme Drought | Extreme Drought | Extreme Drought | Extreme Drought |
| 2002 | Extreme Drought | Extreme Drought | Extreme Drought | Extreme Drought |
| 2003 | Normal | Normal | Normal | Normal |
| 2004 | Abnormally Dry | Abnormally Dry | Abnormally Dry | Abnormally Dry |
| 2005 | Moderate Drought | Moderate Drought | Abnormally Dry | Abnormally Dry |
| 2006 | Severe Drought | Severe Drought | Severe Drought | Severe Drought |
| 2007 | Exceptional Drought | Exceptional Drought | Exceptional Drought | Exceptional Drought |
| 2008 | Exceptional Drought | Exceptional Drought | Exceptional Drought | Exceptional Drought |
| 2009 | Moderate Drought | Moderate Drought | Moderate Drought | Moderate Drought |
| 2010 | Moderate Drought | Moderate Drought | Moderate Drought | Moderate Drought |
| 2011 | Abnormally Dry | Moderate Drought | Abnormally Dry | Abnormally Dry |
| 2012 | Abnormally Dry | Moderate Drought | Abnormally Dry | Abnormally Dry |
| 2013 | Abnormally Dry | Abnormally Dry | Abnormally Dry | Abnormally Dry |
| 2014 | Abnormally Dry | Normal | Abnormally Dry | Abnormally Dry |
| 2015 | Abnormally Dry | Severe Drought | Moderate Drought | Severe Drought |
| 2016 | Severe Drought | Severe Drought | Severe Drought | Extreme Drought |
| 2017 | Moderate Drought | Severe Drought | Severe Drought | Severe Drought |
| 2018 | Abnormally Dry | Abnormally Dry | Abnormally Dry | Abnormally Dry |

*Source: North Carolina Drought Monitor*

### 5.3.4 Probability of Future Occurrences

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

## 5.4 EXCESSIVE HEAT

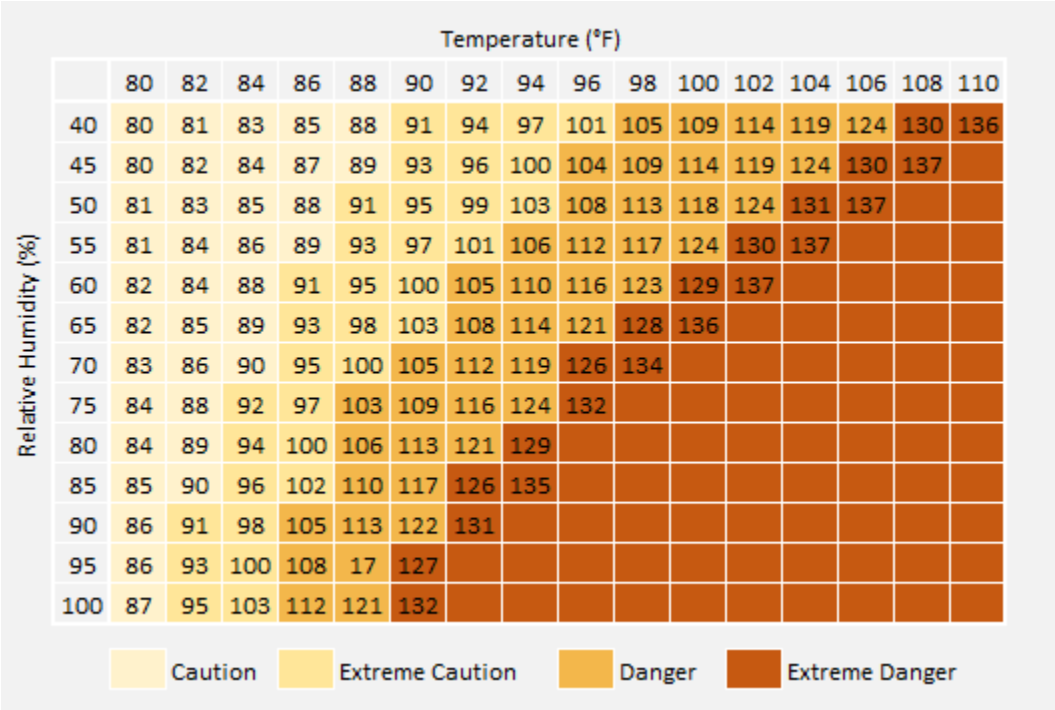
### 5.4.1 Background and Description

Excessive heat, like drought, poses little risk to property. However, excessive heat can have devastating effects on health. Excessive heat can often be referred to as "extreme heat" or a "heat wave." According to the National Weather Service, there is no universal definition for a heat wave, but the standard U.S. definition is any event lasting at least three days where temperatures reach ninety degrees Fahrenheit or higher. However, it may also be defined as an event at least three days long where temperatures are ten degrees greater than the normal temperature for the affected area. Heat waves are typically accompanied by humidity but may also be very dry. These conditions can pose serious health threats causing an average of 1,500 deaths each summer in the United States[2].

According to the National Oceanic and Atmospheric Administration, heat is the number one weather related killer among natural hazards, followed by frigid winter temperatures[3]. The National Weather Service devised the Heat Index as a mechanism to better inform the public of heat dangers. The Heat Index Chart, shown in **Figure 5.5**, uses air temperature and humidity to determine the heat index or apparent temperature. **Table 5.6** shows the dangers associated with different heat index temperatures. Some populations, such as the elderly and young, are more susceptible to heat danger than other segments of the population.

[1] *U.S. Seasonal Drought Outlook. National Weather Service Climate Prediction Center. http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php*
[2] *http://www.noaawatch.gov/themes/heat.php*
[3] *https://www.NCEI.noaa.gov/sotc/drought/201802#det-pdi*

## FIGURE 5.5: NWS HEAT INDEX CHART




*Source: NOAA, National Weather Service*

## TABLE 5.6: HEAT DISORDERS ASSOCIATED WITH HEAT INDEX TEMPERATURE

| Heat Index Temperature (Fahrenheit) | Description of Risks |
|---|---|
| **80°- 90°** | Fatigue possible with prolonged exposure and/or physical activity |
| **90°- 105°** | Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity |
| **105°- 130°** | Sunstroke, heat cramps, and heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity |
| **130° or higher** | Heatstroke or sunstroke is highly likely with continued exposure |

*Source: National Weather Service, NOAA*

In addition, NOAA has seventeen metropolitan areas participating in the Heat Health Watch/Warning System in order to better inform and warn the public of heat dangers. A Heat Health Watch is issued when conditions are favorable for an excessive heat event in the next 12 to 48 hours. A Heat Warning is issued when an excessive heat event is expected in the next 36 hours. Furthermore, a warning is issued when the conditions are occurring, imminent, or have a high likelihood of occurrence. Urban areas participate in the Heat Health Watch/Warning System because urban areas are at greater risk to heat affects. Stagnant atmospheric conditions trap pollutants, thus adding unhealthy air to excessively hot temperatures. In addition, the “urban heat island effect” can produce significantly higher nighttime

temperatures because asphalt and concrete (which store heat longer) gradually release heat at night.

### 5.4.2 Location and Spatial Extent

Extreme heat typically impacts a large area and cannot be confined to any geographic or political boundaries. Therefore, the entire Toe River Region is susceptible to extreme heat conditions.

### 5.4.3 Historical Occurrences

Data from the National Centers for Environmental Information was used to determined there were no reported historical events of excessive heat[4]. Information from the State Climate Office of North Carolina was reviewed to obtain historical temperature records in the region. Temperature information has been reported since 1871. The recorded maximum for each county can be found below in **Table 5.7.**

**TABLE 5.7: HIGHEST RECORDED TEMPERATURE**

| Location | Date | Temperature (°F) |
|---|---|---|
| **Avery County** | 6/21/1948 | 98 |
| **McDowell County** | 7/28/1952 | 106 |
| **Mitchell County** | 7/13/1914 | 95 |
| **Yancey County** | 6/25/1952 | 97 |
| **TOE RIVER REGION MAXIMUM** | -- | 106 |

*Source: State Climate Office of North Carolina*

The State Climate Office also reports average maximum temperatures in various locations in the region. **Table 5.8** shows the average maximum temperatures from 2016 to 2017 at the Burnsville observation station, which can be used as a general comparison for the region.

**TABLE 5.8: AVERAGE MAXIMUM TEMPERATURE IN BURNSVILLE, YANCEY COUNTY**

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Avg. Max (°F) | 43.2 | 55.2 | 64.2 | 66.4 | 67.5 | 76.5 | 75.9 | 74.5 | 69.3 | 64.4 | 63.1 | 53.1 |

*Source: State Climate Office of North Carolina*

### 5.4.4 Probability of Future Occurrences

Based on historical occurrence, it is assumed that all of the Toe River Region has a probability level of possible (between 1 and 10 percent annual probability) for future excessive heat events to impact the region.

[4] *These excessive heat events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional excessive heat events have occurred in the Toe River Region. As additional local data becomes available, this hazard profile will be amended.*

# 5.5 HURRICANES AND TROPICAL STORMS

## 5.5.1 Background and Description

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. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea and Gulf of Mexico during the official Atlantic hurricane season, which encompasses the months of June through November. The peak of the Atlantic hurricane season is in early to mid-September and the average number of storms that reach hurricane intensity per year in the Atlantic basin is about six (6).

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 Wind Scale (**Table 5.9**), which rates hurricane intensity on a scale of 1 to 5, with 5 being the most intense.

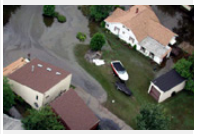
**TABLE 5.9: SAFFIR-SIMPSON WIND SCALE**

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

*Source: National Hurricane Center (2018)*

The Saffir-Simpson Scale categorizes hurricane intensity based upon maximum sustained winds, 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 5.10** 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 5.10: 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. |  |

*Sources: National Hurricane Center; Federal Emergency Management Agency*

### 5.5.2 Location and Spatial Extent

Hurricanes and tropical storms threaten the entire Atlantic and Gulf seaboard of the United States, and while coastal areas are most directly exposed to the brunt of landfalling storms, their impact is often felt hundreds of miles inland. While some elements of these storms are not a concern for the region (storm surge in particular), all areas in the region are susceptible to the wind and heavy rains associated coastal storms and nor'easters.

### 5.5.3 Historical Occurrences

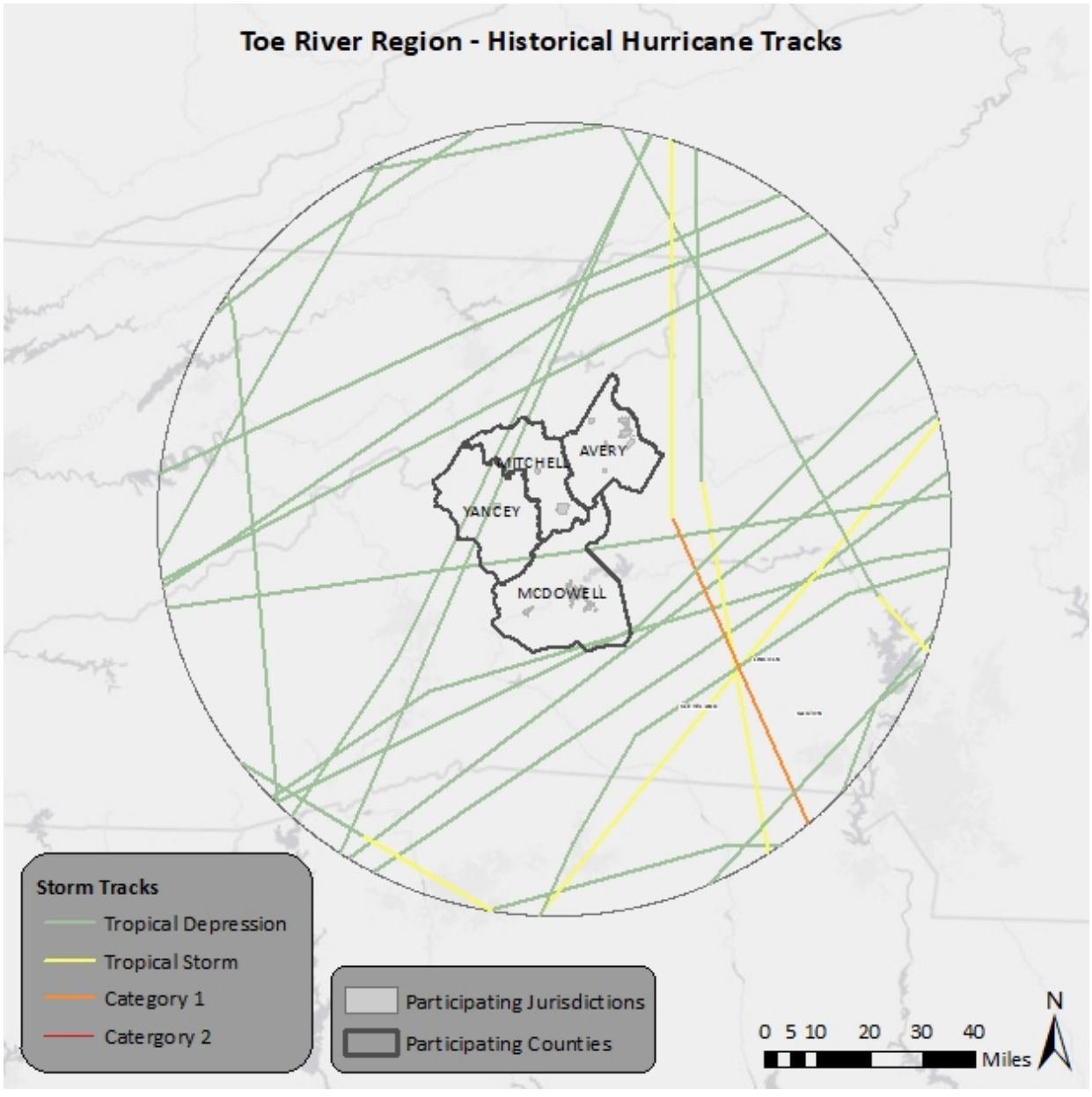
According to the National Hurricane Center's historical storm track records, 42 hurricane, tropical storm, or tropical depression tracks have passed within 75 miles of the Toe River Region since 1850.[5] This includes: three (3) hurricanes; twenty-nine (29) tropical storms; and 11 (eleven) tropical depressions.

Of the recorded storm events, 2 tropical depressions traversed directly through the Toe River Region. **Table 5.11** provides for each event the date of occurrence, name (if applicable), maximum

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

wind speed (as recorded within 75 miles of the Toe River Region) and Category of the storm based on the Saffir-Simpson Scale. **Figure 5.6** shows the track of each recorded storm.

## FIGURE 5.6: HISTORICAL HURRICANE STORM TRACKS WITHIN 75 MILES




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

## TABLE 5.11: HISTORICAL STORM TRACKS WITHIN 75 MILES (1850–2020)

| Date of Occurrence | Storm Name | Maximum Wind Speed (miles per hour) | Storm Category |
|---|---|---|---|
| **9/17/1859** | Not Named | 40 | Tropical Storm |
| **9/11/1882** | Not Named | 40 | Tropical Storm |
| **6/22/1886** | Not Named | 40 | Tropical Storm |
| **9/24/1889** | Not Named | 45 | Tropical Storm |
| **8/28/1893** | Not Named | 75 | Category 1 |
| **7/8/1896** | Not Named | 30 | Tropical Depression |
| **9/28/1901** | Not Named | 35 | Tropical Depression |
| **10/11/1902** | Not Named | 35 | Tropical Depression |
| **10/11/1905** | Not Named | 25 | Tropical Depression |
| **9/18/1906** | Not Named | 40 | Tropical Storm |
| **9/23/1907** | Not Named | 35 | Tropical Depression |
| **8/30/1911** | Not Named | 30 | Tropical Depression |
| **9/4/1913** | Not Named | 30 | Tropical Depression |
| **8/3/1915** | Not Named | 35 | Tropical Storm |
| **7/15/1916** | Not Named | 50 | Tropical Storm |
| **9/23/1920** | Not Named | 30 | Tropical Depression |
| **10/3/1927** | Not Named | 40 | Tropical Storm |
| **8/11/1928** | Not Named | 30 | Tropical Depression |
| **8/16/1928** | Not Named | 30 | Tropical Depression |
| **10/18/1932** | Not Named | 20 | Tropical Depression |
| **8/14/1940** | Not Named | 25 | Tropical Depression |
| **8/28/1949** | Not Named | 55 | Tropical Storm |
| **8/31/1952** | Able | 45 | Tropical Storm |
| **9/30/1959** | Gracie | 60 | Tropical Storm |
| **8/31/1964** | Cleo | 25 | Tropical Depression |
| **6/9/1968** | Abby | 25 | Tropical Depression |
| **9/24/1975** | Eloise | 30 | Tropical Depression |
| **9/8/1977** | Babe | 25 | Tropical Depression |
| **8/17/1985** | Danny | 30 | Tropical Depression |
| **8/29/1988** | Chris | 25 | Tropical Depression |
| **9/22/1989** | Hugo | 85 | Category 1 |
| **7/21/1994** | Not Named | 20 | Tropical Depression |
| **8/17/1994** | Beryl | 15 | Tropical Depression |
| **7/24/1997** | Danny | 20 | Tropical Depression |
| **7/2/2003** | Bill | 20 | Tropical Depression |
| **9/8/2004** | Frances | 25 | Tropical Depression |
| **9/17/2004** | Ivan | 20 | Tropical Depression |
| **9/28/2004** | Jeanne | 20 | Tropical Depression |
| **7/7/2005** | Cindy | 20 | Tropical Depression |
| **9/12/2018** | Florence | 74 | Category 1 |
| **10/10/2018** | Michael | 50 | Tropical Storm |

*Source: National Hurricane Center*

The National Centers for Environmental Information did not report any event associated with a hurricane, tropical storm, or nor'easter in the participating counties between 1950 and 2019. However, federal records indicate that disaster declarations were made in 1989 (Hurricane Hugo), 2004 (Hurricane

Ivan), and 2004 (Tropical Storm Frances).[6] Additionally, McDowell County was included in the disaster declarations for Hurricane Florence and Tropical Storm Michael.

Flooding is generally the greatest hazard of concern with hurricane and tropical storm events in the Toe River Region. However, winds can also be a concern in cases where a hurricane makes landfall in the Gulf of Mexico or South Carolina and makes it way into the North Carolina mountains, as was the case with Hurricane Hugo in 1989. Some anecdotal information is available for the major storms that have impacted that area as found below:

**Hurricane Hugo** – September 22-24, 1989
Hurricane Hugo was one of the largest storms on record in the Atlantic Basin that produced high winds and dumped heavy rains over much of North Carolina and South Carolina. Hugo reached a peak level of Category 5 on the Saffir-Simpson scale and made landfall near Isle of Palms in South Carolina as a Category 4, eventually passing over Charlotte and much of the surrounding area as a Category 1 storm. Although the storm caused its greatest damage in South Carolina, over 1,000 structures were destroyed or severely damaged in North Carolina, causing over $1 billion dollars in damages. Wind gusts reached over 40 mph and numerous trees were downed throughout much of south and western North Carolina.

**Hurricane Ivan** – September 16-18, 2004
Hurricane Ivan was one of the country's most deadly and destructive tropical storm. The storm initially made landfall in coastal Alabama as a category 5 hurricane. After Ivan made landfall in coastal Alabama, it turned, moving slowly northeastward across the southeast, spawning over 100 tornadoes and dumping heavy rains on the area. By the time the storm moved across North Carolina, Ivan had been downgraded to a tropical depression. Wind gusts reached 40 and 60 mph across the higher elevations of the Appalachians. Numerous trees were downed and flooding was widespread.

**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 much of western North Carolina 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 in many areas 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.

**Hurricane Florence** – September 12 – 15, 2018
Hurricane Florence was a long-lived Cape Verde hurricane and the wettest tropical cyclone on record in the Carolinas. As the storm moved over North Carolina, it caused record breaking storm surge of 9 to 13 feet and rainfall across the state of 20 to 30 inches, which produced catastrophic and life-threatening flooding. North Carolina reported 42 fatalities due to the hurricane and preliminary damage estimates of $16.7 billion.

**Tropical Storm Michael -** October 11, 2018
After causing catastrophic damage on the Gulf Coast, Hurricane Michael downgraded to a tropical storm and traversed North Carolina. Tropical Storm Michael caused flooding, mudslides and downed trees in the Toe River region, primarily in McDowell County.

[6] 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.

### 5.5.4 Probability of Future Occurrences

It is possible that hurricanes and tropical storms will affect the Toe River Region. Given the inland location of the region, it is more likely to be affected by remnants of hurricane and tropical storm systems (as opposed to a major hurricane) which may result in flooding or high winds. The probability of being impacted is less than coastal areas, but it still remains a real threat to the Toe River Region due to induced events like flooding and landslides. Based on historical evidence, the probability level of future occurrence is possible (between 1 and 10 percent annual probability). Given the regional nature of the hazard, all areas are equally exposed to this hazard. However, when the region is impacted, the damage could be critical, potentially impacting lives and damaging property throughout the planning area.

## 5.6 TORNADOES/THUNDERSTORMS

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

### 5.6.1 Background and Description

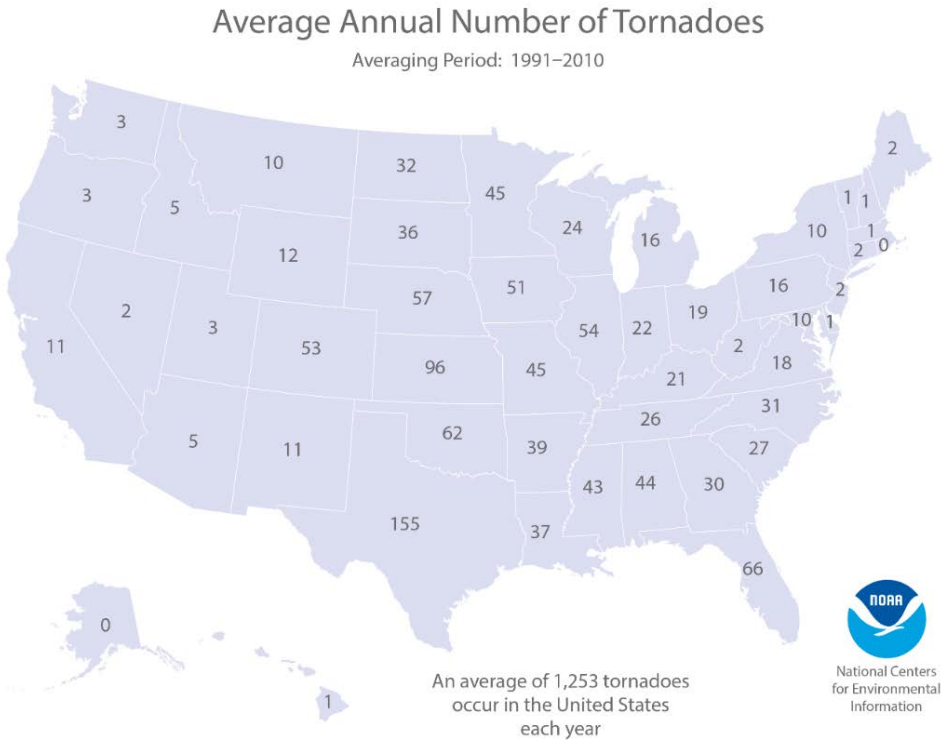
**Tornadoes**

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes and other tropical storms) when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the National Weather Service, tornado wind speeds normally range from 40 miles per hour to more than 300 miles per hour. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles.

Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries.[7] 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 5.7** shows tornado activity in the United States based on the number of recorded tornadoes per 10,000 square miles.

[7] NOAA, 2009

## FIGURE 5.7: TORNADO ACTIVITY IN THE UNITED STATES




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

The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light construction, including residential dwellings (particularly mobile homes). Tornadic magnitude is reported according to the Fujita and Enhanced Fujita Scales. Tornado magnitudes prior to 2005 were determined using the traditional version of the Fujita Scale (**Table 5.12**). Tornado magnitudes that were determined in 2005 and later were determined using the Enhanced Fujita Scale (**Table 5.13**).

## TABLE 5.12: THE FUJITA SCALE (EFFECTIVE PRIOR TO 2005)

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

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

## TABLE 5.13 THE ENHANCED FUJITA SCALE (EFFECTIVE 2005 AND LATER)

| EF-SCALE NUMBER | INTENSITY PHRASE | 3 SECOND GUST (MPH) | TYPE OF DAMAGE DONE |
|---|---|---|---|
| **F0** | GALE | 65–85 | Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages to sign boards. |
| **F1** | MODERATE | 86–110 | The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed. |
| **F2** | SIGNIFICANT | 111–135 | Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated. |
| **F3** | SEVERE | 136–165 | Roof and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted. |
| **F4** | DEVASTATING | 166–200 | Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated. |
| **F5** | INCREDIBLE | Over 200 | Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged. |

*Source: National Weather Service*

### Thunderstorms

Thunderstorms can produce a variety of accompanying hazards including wind (discussed here), hail, and lightning.[8] Although thunderstorms generally affect a small area, they are very dangerous may cause substantial property damage.

Three conditions need to occur for a thunderstorm to form. First, it needs moisture to form clouds and rain. Second, it needs unstable air, such as warm air that can rise rapidly (this often referred to as the

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

"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. Further, they can move through an area very quickly or linger for several hours.

According to the National Weather Service, more than 100,000 thunderstorms occur each year, though only about 10 percent of these storms are classified as "severe." A severe thunderstorm occurs when the storm produces at least one of these three elements: 1) Hail of three-quarters of an inch; 2) Tornado; 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 Toe River Region.

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

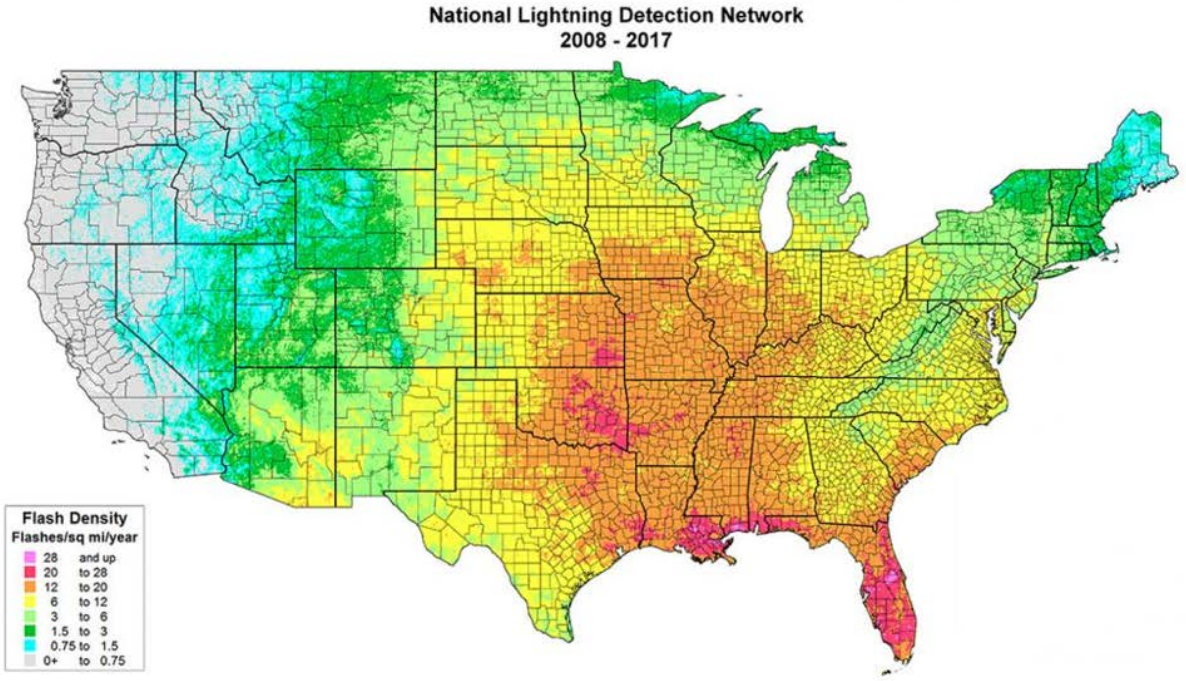
Downbursts are also possible with thunderstorm events. Such events are an excessive burst of wind in excess of 125 miles per hour. They are often confused with tornadoes. Downbursts are caused by down drafts from the base of a convective thunderstorm cloud. It occurs when rain-cooled air within the cloud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

**Lightning**

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

**Figure 5.8** shows a lightning flash density map for the years 2008-2017 based upon data provided by Vaisala's U.S. National Lightning Detection Network (NLDN®).

## FIGURE 5.8: LIGHTNING FLASH DENSITY IN THE UNITED STATES




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

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

**Hailstorms**

Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until they develop to a sufficient weight and fall as precipitation. Hail typically takes the form of spheres or irregularly-shaped masses greater than 0.75 inches in diameter. The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size. **Table 5.14** shows the TORRO Hailstorm Intensity Scale which is a way of measuring hail severity.

## TABLE 5.14: TORRO HAILSTORM INTENSITY SCALE

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

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

### 5.5.2 Location and Spatial Extent

**Tornadoes**

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

**Thunderstorm**

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. Also, the Toe River typically experiences several straight-line wind events each year. These wind events can and have caused extensive damage. It is assumed that the Toe River Region has uniform exposure to a thunderstorm event and/or straight-line winds and the spatial extent of an impact would be potentially large.

**Lightning**

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

**Hailstorms**

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

## 5.5.3 Historical Occurrences

### Tornadoes

According to the National Centers for Environmental Information, there have been a total of eight (8) recorded tornado events in the Toe River Region between 1979 and December 2018 (**Table 5.15**), resulting in nearly $797,000 in property damages.[9] In addition, one injury and one fatality were reported. The magnitude of these tornados' ranges from F0 to F2 in intensity. It is important to note that only tornadoes that have been reported are factored into this risk assessment. It is likely that a high number of occurrences have gone unreported.

**TABLE 5.15: SUMMARY OF TORNADO OCCURRENCES**

| Location | Number of Occurrences | Deaths/Injuries | Property Damage (2019) |
|---|---|---|---|
| **Avery County** | **1** | **0/1** | **$30,550** |
| Banner Elk | 0 | 0/0 | $0 |
| Crossnore | 0 | 0/0 | $0 |
| Elk Park | 0 | 0/0 | $0 |
| Grandfather Village | 0 | 0/0 | $0 |
| Newland | 0 | 0/0 | $0 |
| Sugar Mountain | 0 | 0/0 | $0 |
| Unincorporated Area | 1 | 0/1 | $30,550 |
| **McDowell County** | **5** | **1/0** | **$637,885** |
| Marion | 3 | 0/0 | $24,440 |
| Old Fort | 0 | 1/0 | $0 |
| Unincorporated Area | 2 | 0/0 | $613,445 |
| **Mitchell County** | **0** | **0/0** | **$0** |
| Bakersville | 0 | 0/0 | $0 |
| Spruce Pine | 0 | 0/0 | $0 |
| Unincorporated Area | 0 | 0/0 | $0 |
| **Yancey County** | **2** | **0/0** | **$305,500** |
| Burnsville | 0 | 0/0 | $0 |
| Unincorporated Area | 2 | 0/0 | $305,500 |
| **TOE RIVER TOTAL REGION** | **8** | **1/1** | **$973,935** |

*Source: National Centers for Environmental Information*

### Thunderstorms

Severe storms have resulted in four disaster declarations in the Toe River Region in 1973, 1977, 1995, and 1998.[10] According to NCEI, there have been 226 reported thunderstorm wind events in the Toe River Region since 1950.[11] These events caused $516,000 million in damages. There were no reports of injuries or fatalities. **Table 5.16** summarizes this information.

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*[9] 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 Toe River Region. As additional local data becomes available, this hazard profile will be amended.*

*[10] 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.*

*[11] 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 Toe River Region. As additional local data becomes available, this hazard profile will be amended.*

## TABLE 5.16: SUMMARY OF THUNDERSTORM OCCURRENCES

| Location | | Number of Occurrences | Property Damage (2019) |
|---|---|---|---|
| **Avery County** | | **44** | **$16,000** |
| | Banner Elk | 9 | $0 |
| | Crossnore | 1 | $0 |
| | Elk Park | 3 | $0 |
| | Grandfather Village | 0 | $0 |
| | Newland | 14 | $6,000 |
| | Sugar Mountain | 0 | $0 |
| | Unincorporated Area | 17 | $10,000 |
| **McDowell County** | | **174** | **$798,000** |
| | Marion | 41 | $145,000 |
| | Old Fort | 27 | $16,000 |
| | Unincorporated Area | 106 | $637,000 |
| **Mitchell County** | | **32** | **$2,000** |
| | Bakersville | 5 | $2,000 |
| | Spruce Pine | 8 | $0 |
| | Unincorporated Area | 19 | $0 |
| **Yancey County** | | **30** | **$42,000** |
| | Burnsville | 12 | $1,000 |
| | Unincorporated Area | 22 | $41,000 |
| **TOE RIVER REGION TOTAL** | | **280** | **$890,000** |

*Source: National Centers for Environmental Information*

**Lightning**

According to the National Centers for Environmental Information, there have been a total of eight (8) recorded lightning events in the Toe River Region since 1998.[12] These events resulted in over $26,000 in damages, as listed in summary **Table 5.17**. Further, lightning caused two (2) fatalities and nine (9) injuries throughout the Toe River Region.

It is certain that more than 6 events have impacted the region. Many of the reported events are those that caused damage, and it should be expected that damages are likely much higher for this hazard than what is reported.

## TABLE 5.17: SUMMARY OF LIGHTNING OCCURRENCES

| Location | Number of Occurrences | Property Damage (2009) | Deaths/Injuries |
|---|---|---|---|
| **Avery County** | **1** | **$30,550** | **0/0** |
| Banner Elk | 0 | $0 | 0/0 |
| Crossnore | 0 | $0 | 0/0 |
| Elk Park | 0 | $0 | 0/0 |
| Grandfather Village | 0 | $0 | 0/0 |
| Newland | 0 | $0 | 0/0 |
| Sugar Mountain | 0 | $0 | 0/0 |
| Unincorporated Area | 1 | $30,550 | 0/0 |
| **McDowell County** | **3** | **$0** | **0/3** |
| Marion | 1 | $0 | 0/2 |
| Old Fort | 0 | $0 | 0/0 |
| Unincorporated Area | 1 | $0 | 0/1 |
| **Mitchell County** | **2** | **$1,222** | **1/5** |
| Bakersville | 1 | $0 | 1/5 |
| Spruce Pine | 1 | $1,222 | 0/0 |
| Unincorporated Area | 0 | $0 | 0/0 |
| **Yancey County** | **2** | **$0** | **1/1** |
| Burnsville | 0 | $0 | 0/1 |
| Unincorporated Area | 1 | $0 | 1/0 |
| **TOE RIVER REGION TOTAL** | **8** | **$31,772** | **2/9** |

*Source: National Centers for Environmental Information*

**Hailstorm**

According to the National Centers for Environmental Information, 238 recorded hailstorm events have affected the Toe River Region since 1969.[13] **Table 5.18** is a summary of the hail events in the Toe River Region. **Appendix F** provides detailed information about each event that occurred in the county. In all, hail occurrences resulted in over $2.4 million in property damages, most of which were reported in McDowell County. Hail ranged in diameter from 0.75 inches to 2.75 inches. It should be noted that hail is notorious for causing substantial damage to cars, roofs, and other areas of the built environment, so it

*[12] These lightning events are only inclusive of those reported by the National Centers for Environmental Information (NCEI). It is likely that additional lightning events have occurred in the Toe River Region. The State Fire Marshall's office was also contacted for additional information but none could be provided. As additional local data becomes available, this hazard profile will be amended.*

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

is likely that damages are greater than the reported value. Further, a single storm event may have affected multiple counties.

**TABLE 5.18: SUMMARY OF HAIL OCCURRENCES**

| Location | | Number of Occurrences | Property Damage |
|---|---|---|---|
| **Avery County** | | **54** | **$0** |
| | Banner Elk | 6 | $0 |
| | Crossnore | 3 | $0 |
| | Elk Park | 3 | $0 |
| | Grandfather Village | 1 | $0 |
| | Newland | 16 | $0 |
| | Sugar Mountain | 0 | $0 |
| | Unincorporated Area | 24 | $0 |
| **McDowell County** | | **118** | **$2,405,161.10** |
| | Marion | 38 | $2,405,161.10 |
| | Old Fort | 18 | $0 |
| | Unincorporated Area | 63 | $0 |
| **Mitchell County** | | **33** | **$13,136.61** |
| | Bakersville | 7 | $0 |
| | Spruce Pine | 9 | $13,136.61 |
| | Unincorporated Area | 17 | $0 |
| **Yancey County** | | **33** | **$0** |
| | Burnsville | 16 | $0 |
| | Unincorporated Area | 17 | $0 |
| **TOE RIVER REGION TOTAL** | | **238** | **$2,406,477.71** |

*Source: National Centers for Environmental Information*

## 5.5.4 Probability of Future Occurrences

**Lightning**

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

**Thunderstorm**

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

**Tornadoes**

According to historical information, tornado events are not an annual occurrence for the region. However, given the region's location in the southeastern United States and history of tornadoes, an occurrence is possible every few years. While the majority of the reported tornado events are small in

terms of size, intensity, and duration, they do pose a significant threat should the Toe River Region experience a direct tornado strike. The probability of future tornado occurrences affecting the Toe River Region is possible (1 to 10 percent annual probability).

**Hailstorms**

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

## 5.7 SEVERE WINTER WEATHER

### 5.7.1 Background and Description

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

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

### 5.7.2 Location and Spatial Extent

Nearly the entire continental United States is susceptible to winter storm and freeze events. Some ice and winter storms may be large enough to affect several states, while others might affect limited, localized areas. The degree of exposure typically depends on the normal expected severity of local winter weather.

The Toe River Region is accustomed to severe winter weather conditions, and frequently receives winter weather during the winter months. Given the atmospheric nature of the hazard, the entire region has uniform exposure to a winter storm.

### 5.7.3 Historical Occurrences

Winter weather has resulted in four disaster declarations in the Toe River Region. This includes the Blizzard of 1996, a subsequent 1996 winter storm, a severe ice storm in 2002 and a winter storm in 2010.[14] According to the National Centers for Environmental Information, there have been a total of 655 recorded winter storm events in the Toe River Region since 1996 (**Table 5.19**).[15] These events resulted in over $50 million in damages. The property damage amounts associated with these events are obviously under reported but are the best available data at this time. These results will be updated in the future should better data become available.

**TABLE 5.19: SUMMARY OF SEVERE WINTER WEATHER EVENTS**

| Location | Number of Occurrences | Deaths / Injuries | Property Damage |
|---|---|---|---|
| Avery County | 196 | 0/0 | $50,025,000 |
| McDowell County | 63 | 0/0 | $0 |
| Mitchell County | 196 | 0/0 | $25,000 |
| Yancey County | 200 | 0/0 | $25,000 |
| **TOTAL** | **655** | **0/0** | **$50,075,000** |

*Source: National Centers for Environmental Information*

### 5.7.4 Probability of Future Occurrences

Winter storm events will remain a likely occurrence in the Toe River Region, and the probability of future occurrences is certain. According to historical information, the Toe River Region experiences an average of 26 winter storm events each year. Fortunately, large scale property damages and/or threats to human life and safety are rare with these events.

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

[15] 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 Toe River Region. In addition, the 583 events are reported by county, so many of these storms likely affected all of the counties.

# 5.8 EARTHQUAKE

## 5.8.1 Background and Description

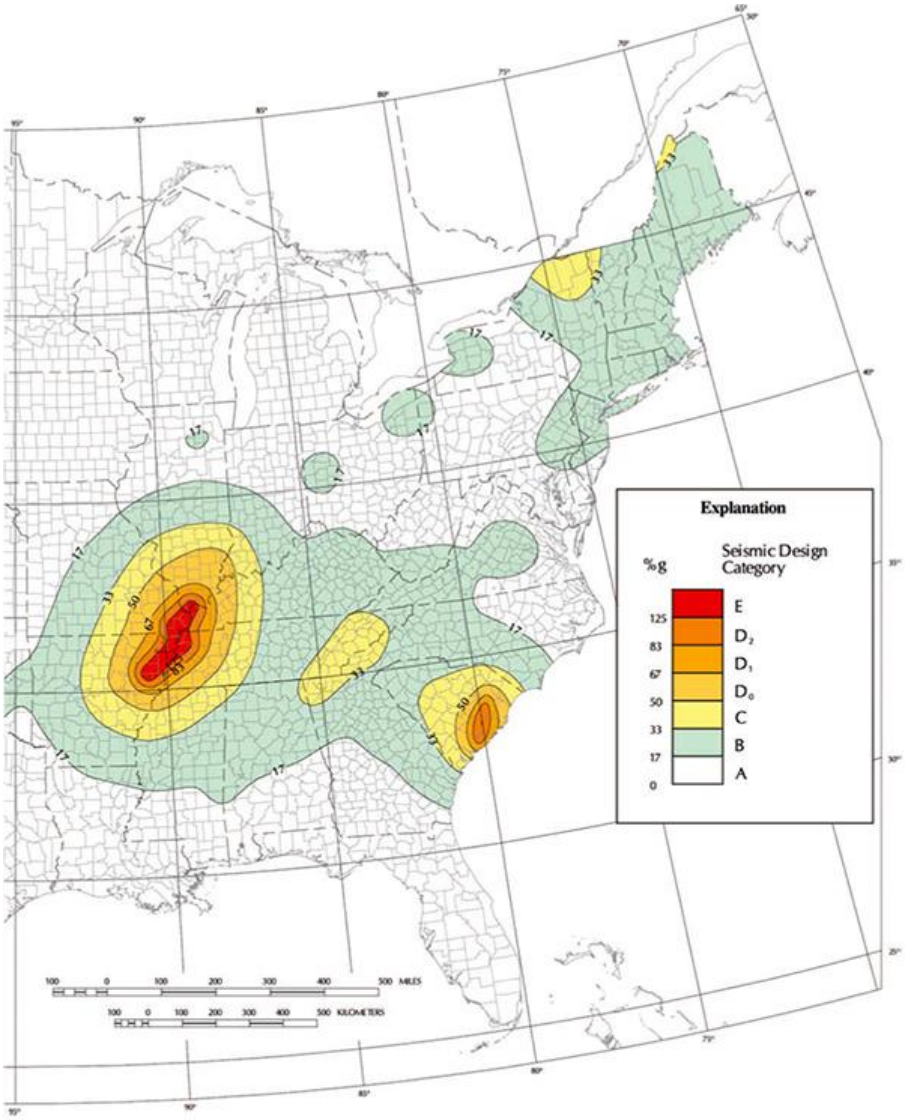
An earthquake is movement or trembling of the ground produced by sudden displacement of rock in the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides or the collapse of caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured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

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

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

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United State does face moderate risk to less frequent, less intense earthquake events. **Figure 5.9** shows relative seismic risk for the United States.

## FIGURE 5.9: UNITED STATES EARTHQUAKE HAZARD MAP




*Source: Federal Emergency Management Agency*

Earthquakes are measured in terms of their magnitude and intensity. Magnitude is measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake through a measure of shock wave amplitude (**Table 5.20)**. Each unit increase in magnitude on the Richter Scale corresponds to a 10-fold increase in wave amplitude, or a 32-fold increase in energy. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. The scale levels are typically described using roman numerals, ranging from "I" corresponding to imperceptible (instrumental) events, to "XII" for catastrophic (total destruction). A detailed description of the Modified Mercalli Intensity Scale of earthquake intensity and its correspondence to the Richter Scale is given in **Table 5.21**.

## TABLE 5.20: 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 5.21: MODIFIED MERCALLI INTENSITY SCALE FOR EARTHQUAKES

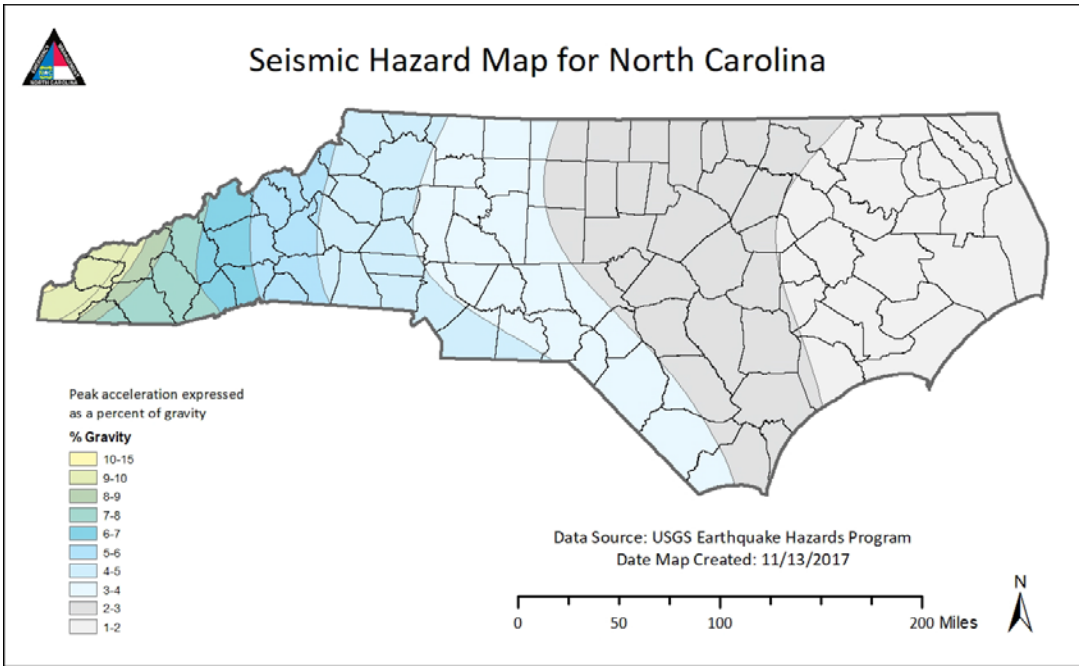
| Scale | Intensity | Description of Effects | Corresponding Richter Scale Magnitude |
|---|---|---|---|
| I | Not felt | Not felt except by a very few under especially favorable conditions. | |
| II | Weak | Felt only by a few persons at rest, especially on upper floors of buildings. | < 4.2 |
| III | Weak | Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated. | |
| IV | Light | Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. | |
| V | Moderate | Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop. | < 4.8 |
| VI | Strong | Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. | < 5.4 |
| VII | Very strong | Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. | < 6.1 |
| VIII | Severe | Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. | |
| IX | Violent | Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. | < 6.9 |
| X | Extreme | Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. | < 7.3 |

*Source: Federal Emergency Management Agency*

## 5.8.2 Location and Spatial Extent

Approximately two-thirds of North Carolina is subject to earthquakes, with the western and southeast region most vulnerable to a very damaging earthquake. The state is affected by both the Charleston Fault in South Carolina and New Madrid Fault in Tennessee. Both of these faults have generated earthquakes measuring greater than 8 on the Richter Scale during the last 200 years. In addition, there are several smaller fault lines throughout North Carolina. **Figure 5.10** is a map showing geological and seismic information for North Carolina.

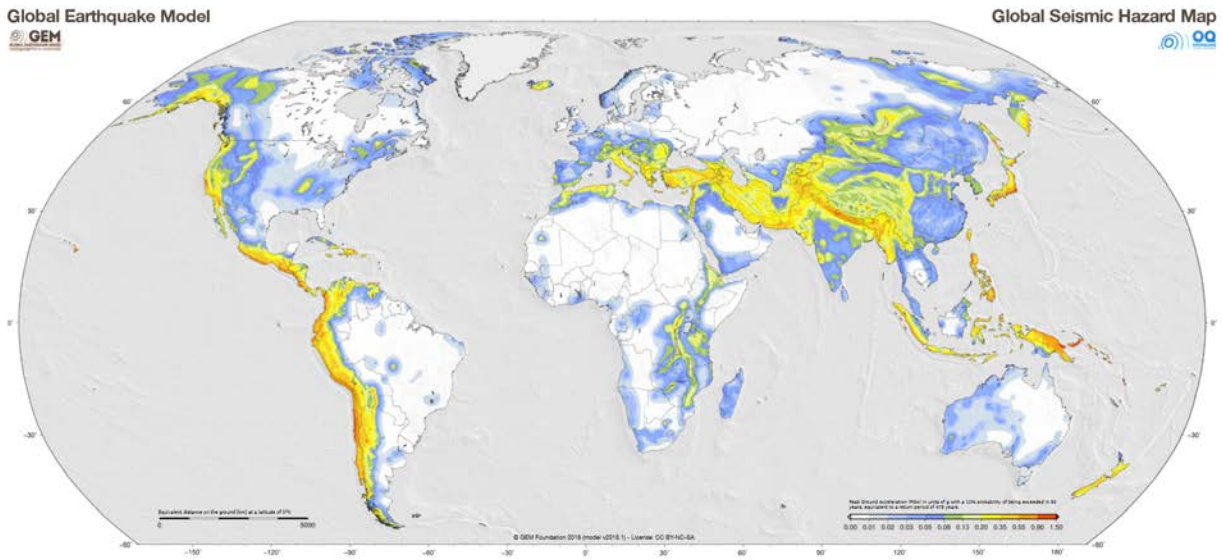
### FIGURE 5.10: GEOLOGICAL AND SEISMIC INFORMATION FOR NORTH CAROLINA




*Source: North Carolina Geological Survey*

**Figure 5.11** shows the intensity level associated with the Toe River Region, based on the national USGS map of peak acceleration with 10 percent probability of exceedance in 50 years. It is the probability that ground motion will reach a certain level during an earthquake. The data show peak horizontal ground acceleration (the fastest measured change in speed, for a particle at ground level that is moving horizontally due to an earthquake) with a 10 percent probability of exceedance in 50 years. The map was compiled by the U.S. Geological Survey (USGS) Geologic Hazards Team, which conducts global investigations of earthquake, geomagnetic, and landslide hazards. According to this map, all of the Toe River Region lies within an approximate zone of level "5" ground acceleration. This indicates that the region as a whole exists within an area of moderate seismic risk.

## FIGURE 5.11: PEAK ACCELERATION WITH 10 PERCENT PROBABILITY OF EXCEEDANCE IN 50 YEARS




*Source: Global Earthquake Model, 2018*

### 5.8.3 Historical Occurrences

At least 44 earthquakes are known to have affected the Toe River Region since 1874. The strongest of these measured a VI on the Modified Mercalli Intensity (MMI) scale. **Table 5.22** provides a summary of earthquake events reported by the National Geophysical Data Center between 1638 and 1985. Note that this data has not been updated since 1985. **Table 5.23** presents a detailed occurrence of each event including the date, distance for the epicenter, and Modified Mercalli Intensity (if known). [16]

## TABLE 5.22: SUMMARY OF SEISMIC ACTIVITY IN THE TOE RIVER REGION

| Location | Number of Occurrences | Greatest MMI Reported | Richter Scale Equivalent |
|---|---|---|---|
| **Avery County** | **~~8~~9** | **IV (moderate)** | **< 4.6** |
| Banner Elk | 3 | IV | |
| Crossnore | 2 | III | |
| Elk Park | 1 | IV | |
| Grandfather Village | 0 | - | |
| Newland | 2 | IV | |
| Sugar Mountain | 0 | - | |
| Unincorporated Area | 0 | - | |
| **McDowell County** | **11** | **V (slightly strong)** | < 4.8 |
| Marion | 5 | V | |
| Old Fort | 5 | V | |
| Unincorporated Area | 1 | III | |
| **Mitchell County** | **6** | **V (slightly strong)** | < 4.8 |
| Bakersville | 2 | V | |

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

| Location | Number of Occurrences | Greatest MMI Reported | Richter Scale Equivalent |
|---|---|---|---|
| Spruce Pine | 3 | V | |
| Unincorporated Area | 1 | III | |
| **Yancey County** | **18** | **VI (strong)** | **< 5.4** |
| Burnsville | 6 | V | |
| Unincorporated Area | 12 | VI | |
| **TOE RIVER REGION TOTAL** | **434** | **VI** | **< 5.4** |

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

In addition to those earthquakes specifically affecting the Toe River Region, a list of earthquakes that have caused damage throughout North Carolina is presented below in **Table 5.23**.

### TABLE 5.23: EARTHQUAKES WHICH HAVE CAUSED DAMAGE IN NORTH CAROLINA

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

**This event is accounted for in the Toe River 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).*

## 5.8.4 Probability of Future Occurrences

The probability of significant, damaging earthquake events affecting the Toe River Region is unlikely. However, 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. The annual probability level for the region is

estimated between 1 and 10 percent (possible). The USGS also uses historical data to predict the probability of a major earthquake within the next 50 years by county.

## 5.9 GEOLOGICAL

### 5.9.1 Background and Description

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

**Landslide**

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

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

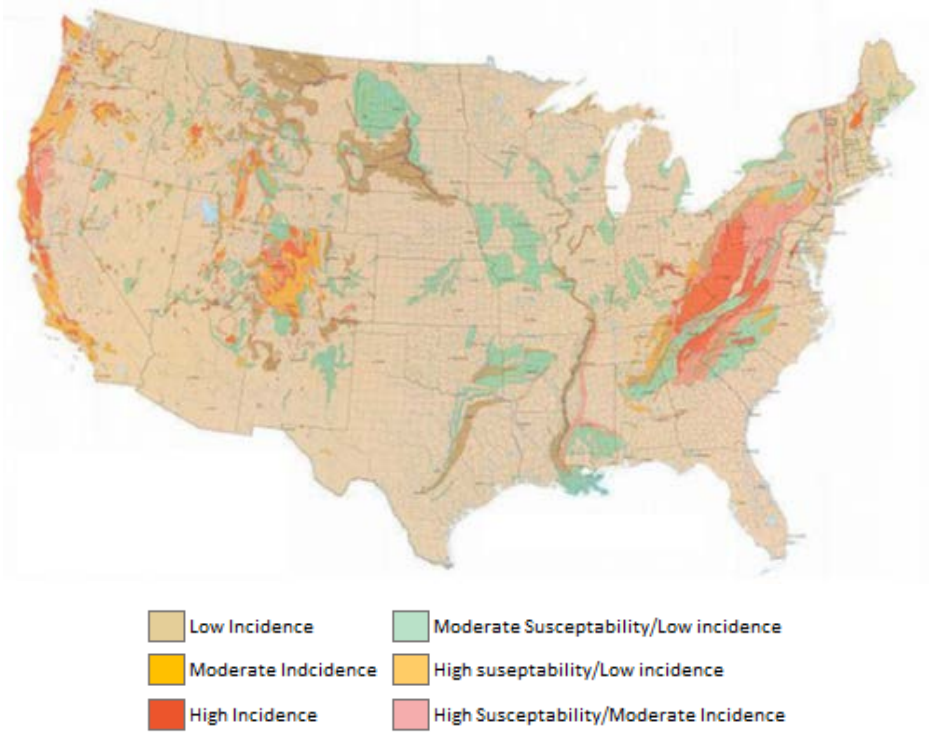
Landslides are typically associated with periods of heavy rainfall or rapid snow melt and tend to worsen the effects of flooding that often accompanies these events. In areas burned by forest and brush fires, a lower threshold of precipitation may initiate landslides. Some landslides move slowly and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

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

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

According to the United States Geological Survey, each year landslides cause $5.1 billion in damage and between 25 and 50 deaths in the United States.[17] **Figure 5.12** delineates areas where large numbers of landslides have occurred and areas which are susceptible to land sliding in the conterminous United States.[18]

## FIGURE 5.12: LANDSLIDE OVERVIEW MAP[19]




*Source: USGS*

**Sinkholes**

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

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a whole until the underground spaces just get too big. If there is not enough support

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

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

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

for the land above the spaces then a sudden collapse of the land surface can occur. These collapses can be small, or as **Figure 5.13** below shows, they can be huge and can occur where a house or road is on top[20].

## FIGURE 5.13: SINKHOLE IN NORTH CAROLINA

Source: NCEM

**Erosion**

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

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

An 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

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

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.

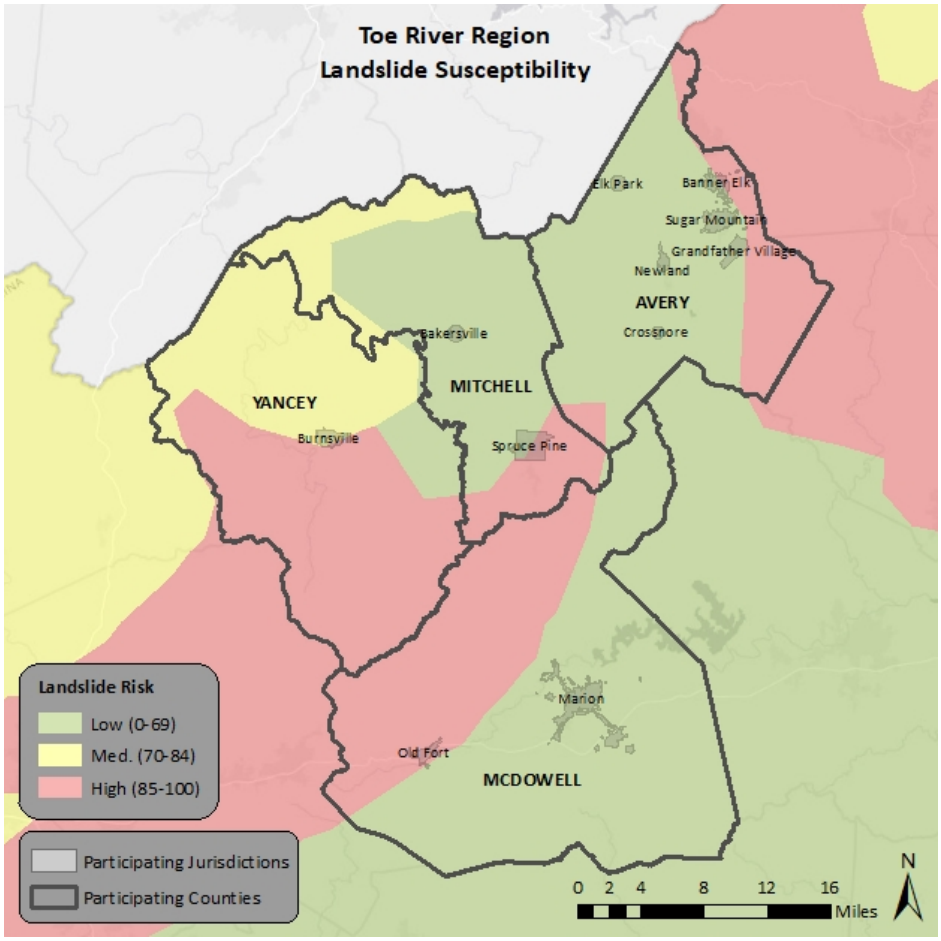
During the past 20 years, the importance of erosion control has gained the increased attention of the public. Implementation of erosion control measures consistent with sound agricultural and construction operations is needed to minimize the adverse effects associated with harmful chemicals run-off due 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.

## 5.9.2 Location and Spatial Extent

**Landslides**

Landslides are possible throughout the Toe River Region. However, some areas may experience more landslide activities than others. According to **Figure 5.14** below, the northwestern portion of the Region, including Mitchell County and Yancey County, have the greatest landslide activity. A majority of the western portion of the Region has a moderate incidence occurrence rate; a majority of the eastern portion has a low incidence record.

**FIGURE 5.14: LANDSLIDE SUSCEPTIBILITY MAP OF THE TOE RIVER REGION**

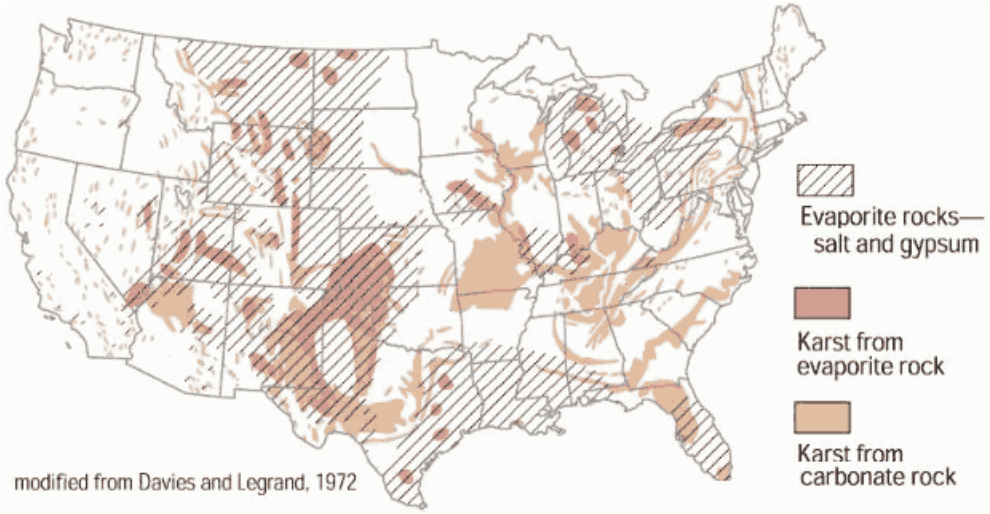



*Source: USGS*

**Sinkholes**

**Figure 5.15** below shows areas of the United States where certain rock types that are susceptible to dissolution in water occur. In these areas, the formation of underground cavities can form and catastrophic sinkholes can happen. These rock types are evaporites (salt, gypsum, and anhydrite) and carbonates (limestone and dolomite). Evaporite ricks underlines about 35 to 40 percent of the United States, though in many areas they are buried at grater depths. In some cases, sinkholes in North Carolina have been measured at up to 20 to 25 feet in depth, with similar widths.

**FIGURE 5.15: UNITED STATES GEOLOGICAL SURVEY OF KARST MODIFIED FROM DAVIES AND LEGRAND, 1972**




**Erosion**

Erosion in the Toe River Region is typically caused by flash flooding events. Unlike coastal areas, where the soil is composed mainly fine-grained particles such as sand, Toe River soils have a much greater organic matter content. Further, extensive vegetation also helps to prevent erosion in the area.

## 5.9.3 Historical Occurrences

**Landslides**

Steep topography in some areas of the Toe River 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 5.24** presents a summary of the landslide occurrence events as provided by the North Carolina Geological Survey[21]. **Table 5.25** presents damage estimates of recent slide events provided by the North Carolina Department of Transportation. The locations of the landslide events presented in the aforementioned tables are presented in **Figure 5.16.**

[21] It should be noted that the North Carolina Geological Survey (NCGS) emphasized the dataset provided was incomplete. Therefore, there may be additional historical landslide occurrences. Further, dates were not included for every event. The earliest date reported was 1940. No damage information was provided by NCGS.

## TABLE 5.24: SUMMARY OF LANDSLIDE ACTIVITY

| LOCATION | NUMBER OF OCCURRENCES |
|---|---|
| **Avery County** | **8** |
| Banner Elk | 0 |
| Crossnore | 0 |
| Elk Park | 1 |
| Grandfather Village | 0 |
| Newland | 0 |
| Sugar Mountain | 0 |
| Unincorporated Area | 7 |
| **McDowell County** | **33** |
| Marion | 1 |
| Old Fort | 7 |
| Unincorporated Area | 27 |
| **Mitchell County** | **15** |
| Bakersville | 2 |
| Spruce Pine | 9 |
| Unincorporated Area | 4 |
| **Yancey County** | **24** |
| Burnsville | 3 |
| Unincorporated Area | 21 |
| **TOE RIVER REGION TOTAL** | **80** |

*Source: North Carolina Geological Survey*

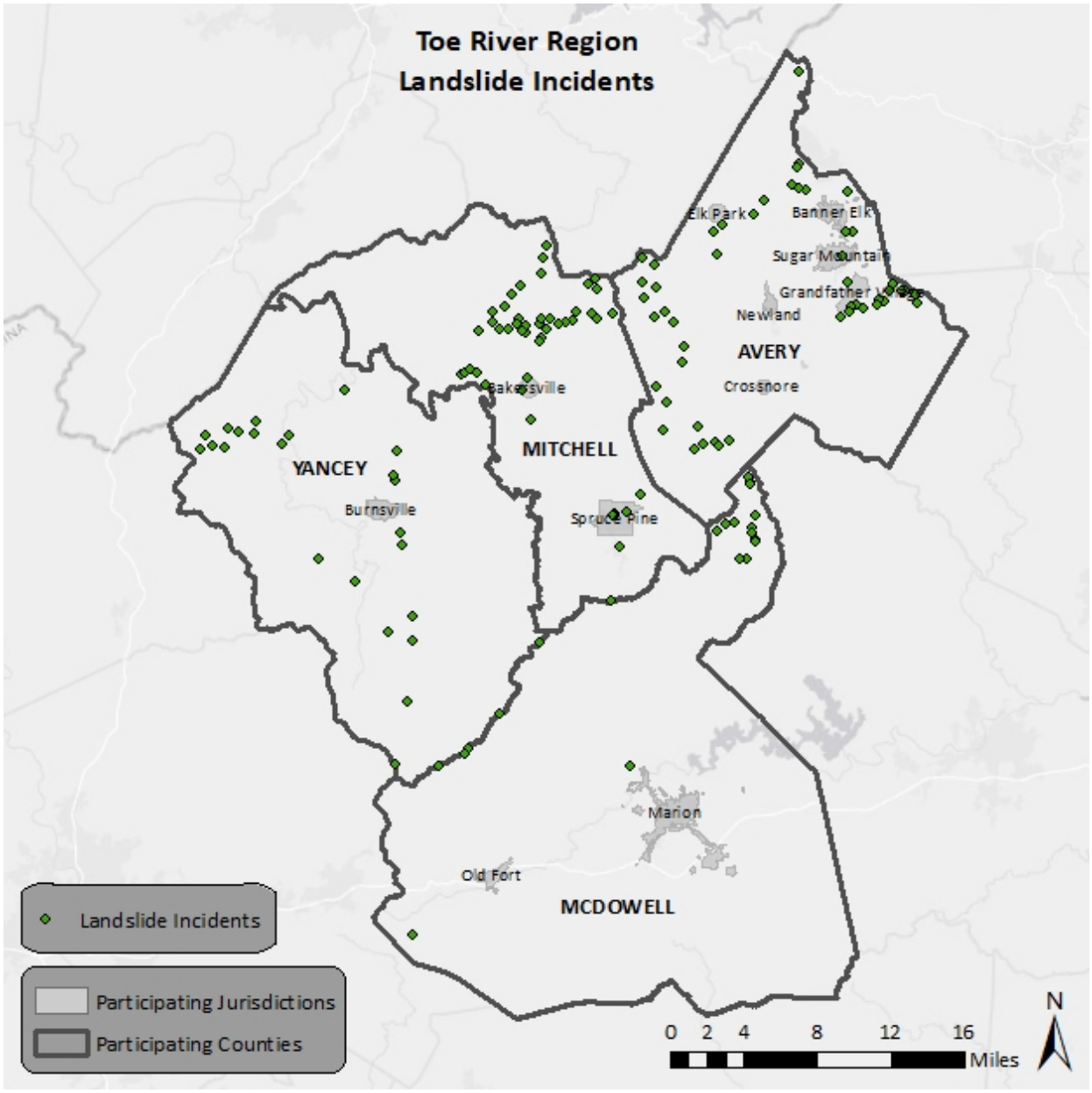
The North Carolina Department of Transportation provided damage estimates for several recent landslide occurrences in the Toe River Region. The higher damages associated with Yancey County are reflective of the information provided in the USGS Landslide Susceptibility Map (**Figure 5.1**, above). This data is used to determine an annualized loss estimate, which is presented in Section 6: Vulnerability Assessment.

## TABLE 5.25: RECENT LANDSLIDE ACTIVITY WITH ASSOCIATED DAMAGES

| LOCATION | DATE | DAMAGE |
|---|---|---|
| **Avery County** | | |
| US 221 | 01/1998 | $18,537 |
| **McDowell County** | | |
| SR 1407 | 12/2002 | $76,138 |
| **Mitchell County** | | |
| US 19E | 01/1998 | $20,556 |
| **Yancey County** | | |
| US 19 | 01/1998 | $5,104 |
| US 80 | 01/1998 | $7,258 |
| Countywide (40-50 small slides/slope failures) | 12/18/2009 | $200,000 |
| US 19W | 12/18/2009 | $75,000 |
| **TOE RIVER REGION TOTAL** | | **$402,593** |

*Source: North Carolina Department of Transportation*

## FIGURE 5.16: LOCATION OF PREVIOUS LANDSLIDE OCCURRENCES




**Sinkholes**

In North Carolina, most sinkholes occur in the southern coastal plain due to the high concentration of limestone; however, they are also common in the western part of the state and in the Toe River region. According to a search of local media outlets across the state, the western area has experienced more than 40 sinkholes over the last 20 years. There are no historical occurrences of sinkholes in the region.

**Erosion**

Most historical occurrences of erosion are seen near the coast of North Carolina, but the Toe River Region is still susceptible to the hazard. Several sources were vetted to identify areas of erosion in the Toe River Region. This includes searching local newspapers, interviewing local officials, and reviewing previous

hazard mitigation plans. Little information could be found beyond the hazard mitigation plans. Erosion was referenced in the previous Toe River Regional Hazard Mitigation Plan, but there was no recorded history of significant erosion events and it was found to be hazard with a negligible potential impact.

As depicted in the narrative discussion above, the impact of erosion on the Toe River region is limited to those areas along water courses in the region. Vulnerability would be limited to any structures and infrastructure (roads, bridges, etc.) that are located close the stream banks. There is no GIS data on where erosion is occurring and noted areas of concern are limited as well.

### 5.9.4 Probability of Future Occurrences

**Landslide**

Based on historical information and the USGS susceptibility index, the probability of future landslide events is likely (between 10 and 100 percent annual probability). Although not all years are reported for previous landslide events, using the earliest date reported (1976), results in an average of 5 landslides per year in the Toe River Region. It should also be noted that some areas in the Toe River Region have greater risk than others.

**Sinkholes**

Sinkholes have also affected parts of North Carolina in recent history, but more of those impacts have been in the southeastern region of the state, not the Toe River Region. While many sinkholes have been relatively small, it is still unlikely (between 1 and 33.3 percent annual probability) this this region will continue to be affected in the future

**Erosion**

Erosion remains a natural, dynamic and continuous process for the Toe River Region, and its probability of future occurrence is certain. The annual probability level assigned for erosion is possible (between 1 and 10 percent). However, given the lack of historical events and threat to life or property, no further analysis will be done in Section 6: *Vulnerability Assessment*.

# 5.10 DAM FAILURE

## 5.10.1 Background and Description

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

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

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

## 5.10.2 Location and Spatial Extent

The North Carolina Division of Energy, Mineral and 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 5.26** explains these classifications.

**TABLE 5.26: 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 |

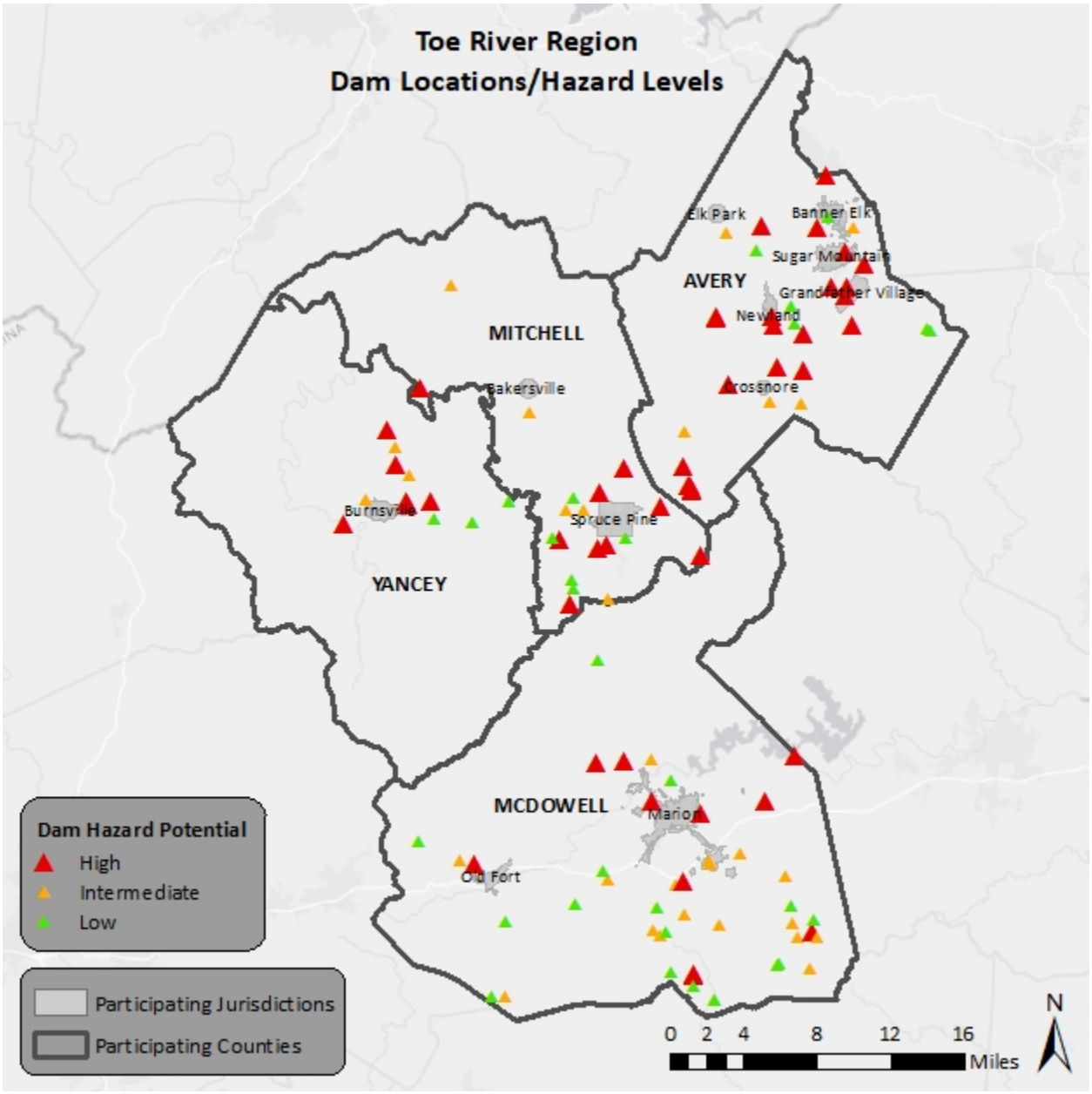
*Source: North Carolina Division of Energy, Mineral, and Land Resources*

According to the North Carolina Division of Energy, Mineral and Land Management, there are one hundred and eight (10~~8~~9) dams in the Toe River Region[22]. **Figure 5.17** shows the dam location and the corresponding hazard ranking for each. Of these dams, forty-eight~~seven~~ (4~~7~~8) are classified as high hazard potential. These high hazard dams are listed in **Table 5.27**. According to a consensus of local government

[22] *The October 1, 2018 list of high hazard dams obtained from the North Carolina Division of Energy, Mineral, and Land resources (http://portal.ncdenr.org/web/lr/dams) was reviewed and amended by local officials to the best of their knowledge.*

officials and the Mitigation Advisory Committee, there is an extremely low possibility that any of these state-recognized dams would cause any damage whatsoever should a dam breach or failure occur, despite the hazard classifications assigned to these dams by the state.

## FIGURE 5.17: TOE RIVER REGION DAM LOCATION AND HAZARD RANKING




Source: North Carolina Division of Land Resources

## TABLE 5.27: TOE RIVER REGION HIGH HAZARD DAMS

| Dam Name | Hazard Potential | Surface Area (acres) | Max Capacity (Ac-ft) | State Regulated? |
|---|---|---|---|---|
| **Avery County** | | | | |
| INVER LOCHY DAM | High | 3.00 | 75.00 | yes |
| BRUSHY CREEK #8 | High | 10.00 | 150.00 | yes |
| GRANDMOTHER DAM | High | 38.00 | 800.00 | yes |
| GRANDFATHER MTN (LOCH DORNIE) | High | 26.90 | 625.00 | yes |
| LAND HARBORS DAM | High | 150.00 | 900.00 | yes |
| BELVUE POND DAM (BREACHED) | High | 0.00 | 0.00 | yes |
| LINDECAMP POND DAM | High | 0.90 | 6.00 | yes |
| WEATHERMAN DAM | High | 1.00 | 10.00 | yes |
| BRUSHY CREEK #7 | High | 21.00 | 246.00 | yes |
| BRUSHY CREEK 6B | High | 3.00 | 42.00 | yes |
| BRUSHY CREEK 6A | High | 3.70 | 47.00 | yes |
| TRIANGLE (SECREST)DAM | High | 1.00 | 10.00 | yes |
| JOHNSON DAM | High | 1.50 | 18.00 | yes |
| KNIGHT POND DAM (BREACHED) | High | 1.00 | 10.00 | yes |
| LINVILLE RIDGE DAM | High | 1.50 | 24.00 | yes |
| WILDCAT LAKE DAM | High | 0.00 | 202.00 | yes |
| SUGAR MTN DAM (SNOW LAKE) | High | 0.70 | 11.00 | yes |
| SNYDER POND DAM (BREACHED) | High | 0.00 | 0.00 | yes |
| RHONEY VIEW POND DAM (BREACHED) | High | 0.00 | 0.00 | yes |
| WEBER POND DAM (MONTEZUMA DAM) | High | 3.0 | 30.00 | yes |
| GRANDFATHER SMALL POND | High | 0.5 | 3.0 | yes |
| **McDowell County** | | | | |
| LADY MARION DAM | High | 8.00 | 90.00 | yes |
| CATAWBA DAM (DUKE FERC) | High | 0.00 | 265182.00 | no |
| PHILLIPS LAKE | High | 40.00 | 800.00 | yes |
| 2ND BROAD RIVER W.S. #11-15 (BREVARD-ROSS) | High | 1.25 | 38.50 | yes |
| CAMP GRIER DAM | High | 3.00 | 27.00 | yes |
| MUDDY CREEK - B. S. A. | High | 20.00 | 440.00 | yes |
| MUDDY CREEK #8 | High | 7.00 | 250.00 | yes |
| 2ND BROAD RIVER W.S. #11-17(BREVARD) | High | 1.50 | 48.10 | yes |
| LAKE TAHOMA | High | 163.00 | 7800.00 | no |
| MUDDY CREEK DAM #3 | High | 6.0 | 240 | yes |
| MARION MANUFACTURING DAM | High | 1.5 | 20 | yes |
| **Mitchell County** | | | | |
| SPRUCE PINE WATER SUPPLY #1 | High | 2.00 | 50.00 | yes |
| STRAWBERRY RIDGE (BREACHED) | High | 2.00 | 32.00 | yes |
| PHILLIPS POND (BREACHED) | High | 0.00 | 0.00 | yes |
| SWISS PINE LAKE | High | 10.00 | 124.00 | yes |
| SPRUCE PINE WATER SUPPLY #2 (BREACHED) | High | 2.00 | 22.00 | yes |
| EMERALD LAKE DAM (BREACHED) | High | 0.00 | 0.00 | yes |
| ALTAPASS DAM (BREACHED) | High | 2.00 | 20.00 | yes |
| UNIMIN RED HILL QUARTZ PLANT DAM | High | 4.5 | 95.00 | yes |
| UNIMIN HAWKINS SEDIMENT BASIN 4 | High | 0.0 | 15 | yes |
| **Yancey County** | | | | |
| AYERS POND DAM | High | 0.00 | 7.00 | yes |
| CANE RIVER DAM (BREACHED) | High | 0.00 | 0.00 | yes |

| Dam Name | Hazard Potential | Surface Area (acres) | Max Capacity (Ac-ft) | State Regulated? |
|---|---|---|---|---|
| CLOUSE LAKE DAM | High | 0.50 | 30.00 | yes |
| MOONSHINE MTN RD DAM (HORTON DAM) | High | 0.50 | 8.00 | yes |
| PHOENIX POND DAM | High | 2.00 | 16.00 | yes |
| DEYTON DAM | **High** | **1.20** | **10.00** | yes |

*Source: North Carolina Division of Land Resources*

It should be noted that dam regulations for classifying dams was changed in recent history. As result, generally more dams are classified as high hazard.

## 5.10.3 Historical Occurrences

According to information from the North Carolina Division of Energy, Mineral and Land Resources, there have been a total of 11 dams have been breached in the Toe River Region. Avery County has sustained five dam breaches. Mitchell County has had five dams breach, and Yancey County has had one dam breach. There are no reports of death, injury, or property damage with any of these events. Further, there are no known levees in the Toe River counties.

**Avery County**

There has been one recorded dam failure in Avery County. On August 13th, 1940, the Anthony Lake dam following when a Category 2 Hurricane moved into the Southern Appalachian Mountains, bringing five days of unrelenting rain. Flooding was severe and led to more than $2 million worth of damage.

**McDowell County**

There has not been a significant dam failure and resulting flood along the Catawba River or Lake Takoma. However, the potential does exist.

**Mitchell County**

No information on past dam failure events was provided.

**Yancey County**

The Cane River dam was breached in the past. No information on this event was provided. As of October 2016, the Cane River Dam has been removed near Burnsville, NC.

Future plan updates will attempt to provide more context for the previously reported events.

## 5.10.4 Probability of Future Occurrence

Given the current dam inventory and historic data, a dam breech is possible (between 1 and 10 percent annual probability) in the future. However, with regular monitoring, these events can be prevented as has been demonstrated in the past. Inundation by failure of the Phillips Lake Dam would cause catastrophic damage, including loss of life and injuries, especially to those areas located along the Catawba River. In addition to local devastation, the region as a whole would be impacted.

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

failures. The 2025 update of this plan may include a much more robust analysis of dam failure vulnerability at the County level.

## 5.11 FLOODING

### 5.11.1 Background and Description

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

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

General floods are usually long-term events that may last for several days. The primary types of general flooding include riverine, coastal and urban flooding. Riverine flooding is a function of excessive precipitation levels and water runoff volumes within the watershed of a stream or river. Coastal flooding, not a concern for the Toe River Region, is typically a result of storm surge, wind-driven waves and heavy rainfall produced by hurricanes, tropical storms and other large coastal storms. Urban flooding occurs where manmade development has obstructed the natural flow of water and decreased the ability of natural groundcover to absorb and retain surface water runoff.

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

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

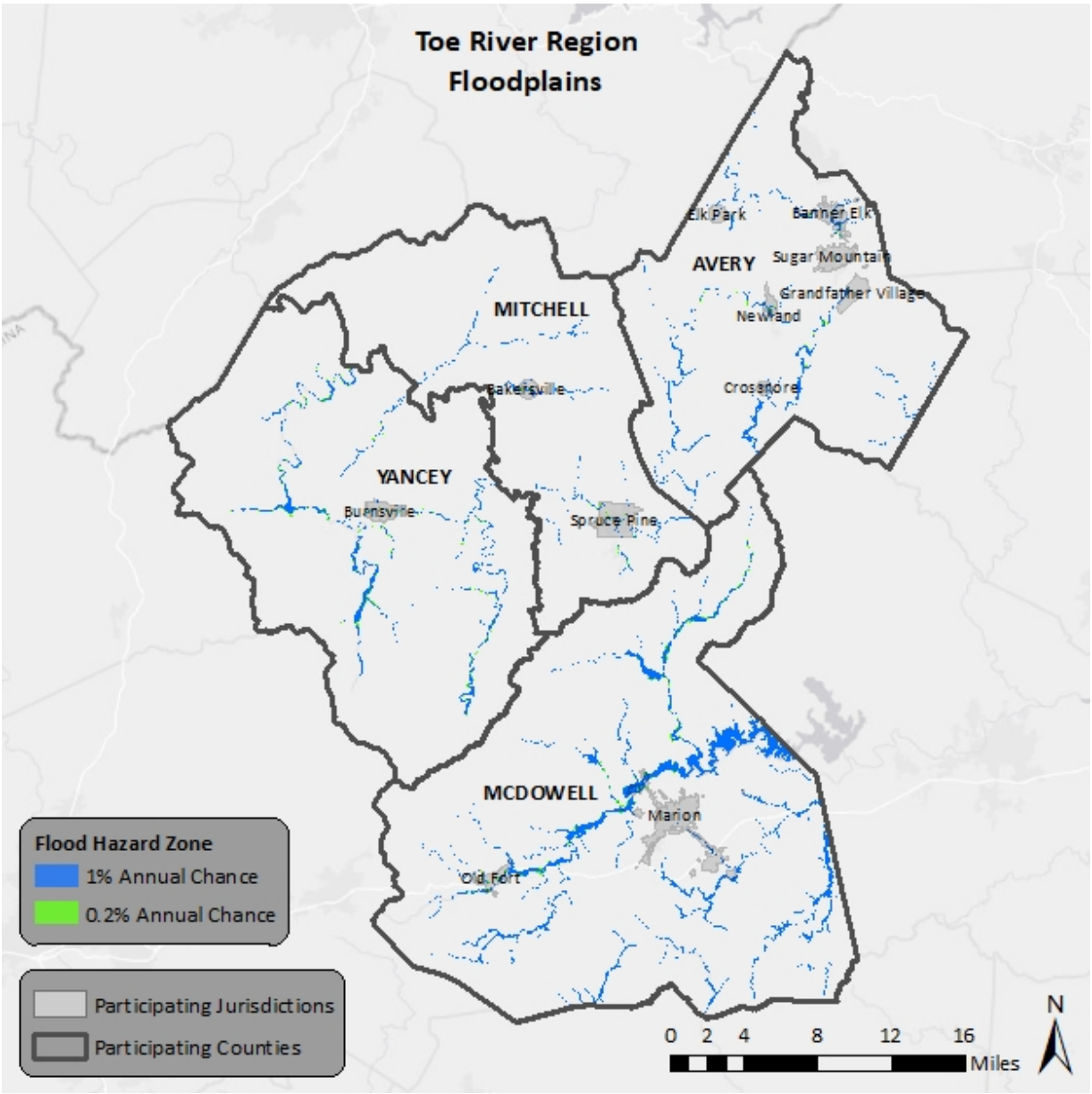
Floodplain boundaries are designated and routinely updated through Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) reports and these revisions are then shown on Flood Insurance Rate Maps (FIRMs), according to various flood hazard zones. Flood hazard zone designations will depend upon local conditions and the date when the map was issued, but all will show the 100-year or base floodplain (1-percent annual chance), as well as areas of the 500-year floodplain (0.2-percent annual chance).

### 5.11.2 Location and Spatial Extent

There are areas in the Toe River Region that are susceptible to flooding. Special flood hazard areas in the Toe River Region were mapped using Geographic Information System (GIS) and FEMA Digital Flood Insurance Rate Maps (DFIRM). **Figure 5.18** illustrates the location and extent of currently mapped special

flood hazard areas for the Toe River Region based on best available FEMA Digital Flood Insurance Rate Map (DFIRM) data.[23] This includes Zone A (1-percent annual chance floodplain), Zone AE (1-percent annual chance floodplain with elevation), Zone X500 (0.2-percent annual chance floodplain). According to GIS analysis, of the 1,219 square miles that make up the Toe River Region (including the area of Avery County, McDowell County, Mitchell County, and Yancey County), there are 0.325 square miles of land in zone A ( 1-percent annual chance floodplain), 37.815 square miles of land in zone AE (1-percent annual chance with elevation), and 2.506 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain).

## FIGURE 5.18: SPECIAL FLOOD HAZARD AREAS IN THE TOE RIVER REGION




*Source: Federal Emergency Management Agency*

[23] The county-level DFIRM data used for the Toe River Region were last updated in 2009/2010.

These flood zone values account for 0.03 percent of the total land area in the Toe River 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.

Appendix F depicts County and municipal level flood hazard maps for the region.

## 5.11.3 Historical Occurrences

Information from the National Centers for Environmental Information was used to ascertain historical flood events. The National Centers for Environmental Information reported a total of eighty-one (81) events throughout the Toe River Region since March 1993.[24] A list of these events is presented in **Table 5.28**. These events accounted for over $28.6 million in property damage due to flood events throughout the region.[25] Specific information on flood events for each county including date, type of flooding, and deaths and injuries, can be found in **Appendix F**.

### TABLE 5.28: SUMMARY OF FLOOD OCCURRENCES IN THE TOE RIVER REGION

| Location | Number of Occurrences | Deaths / Injuries | Property Damage |
|---|---|---|---|
| **Avery County** | **27** | **0/0** | **$19,742,000** |
| Banner Elk | 0 | 0/0 | $0 |
| Crossnore | 3 | 0/0 | $2,000 |
| Elk Park | 3 | 0/0 | $100,000 |
| Grandfather Village | 0 | 0/0 | $0 |
| Newland | 4 | 0/0 | $0 |
| Sugar Mountain | 0 | 0/0 | $0 |
| Unincorporated Area | 17 | 0/0 | $19,640,000 |
| **McDowell County** | **10** | **0/0** | **$275,000** |
| Marion | 2 | 0/0 | $0 |
| Old Fort | 0 | 0/0 | $0 |
| Unincorporated Area | 8 | 0/0 | $275,000 |
| **Mitchell County** | **22** | **0/0** | **$6,811,000** |
| Bakersville | 3 | 0/0 | $5,010,000 |
| Spruce Pine | 3 | 0/0 | $0 |
| Unincorporated Area | 16 | 0/0 | $1,801,000 |
| **Yancey County** | **22** | **0/0** | **$1,776,000** |
| Burnsville | 2 | 0/0 | $40,020 |
| Unincorporated Area | 20 | 0/0 | $1,736,000 |
| **TOE RIVER REGION TOTAL** | **81** | 0/0 | **$28,604,000** |

*Source: National Centers for Environmental Information*

## 5.11.4 Historical Summary of Insured Flood Losses

According to FEMA flood insurance policy records as of August 2015, there have been more than 218 flood losses reported in the Toe River through the National Flood Insurance Program (NFIP) since 1970, totaling over $4.9 million in claims payments. A summary of these figures for each Toe River county is provided in **Table 5.29**. It should be emphasized that these numbers include only those losses to structures that were insured through the NFIP policies, and for losses in which claims were sought and received. It is likely that

[24] These events are only inclusive of those reported by NCEI. It is likely that additional occurrences have occurred and have gone unreported.
[25] The total damage amount was averaged over the number of affected counties when multiple counties were involved in the flood event.

many additional instances of flood losses in the Toe River Region were either uninsured, denied claims payment, or not reported.

### TABLE 5.29: SUMMARY OF INSURED FLOOD LOSSES IN THE TOE RIVER REGION

| Location | Flood Losses | Claims Payments |
|---|---|---|
| **Avery County** | **118** | **$2,764,600** |
| Banner Elk | 6 | $85,396 |
| Crossnore | 3 | $34,480 |
| Elk Park | 1 | $2,487 |
| Grandfather Village | 0 | $0 |
| Newland | 8 | $592,999 |
| Sugar Mountain | 0 | $0 |
| Unincorporated Area | 100 | $2,049,238 |
| **McDowell County** | **33** | **$725,494** |
| Marion | 1 | $56,414 |
| Old Fort | 2 | $2,941 |
| Unincorporated Area | 30 | $666,139 |
| **Mitchell County** | **26** | **$804,186** |
| Bakersville | 11 | $196,023 |
| Spruce Pine | 5 | $291,600 |
| Unincorporated Area | 10 | $316,563 |
| **Yancey County** | **41** | **$663,389** |
| Burnsville | 4 | $70,736 |
| Unincorporated Area | 37 | $592,653 |
| **Toe River Regional Total** | **218** | **$4,957,669** |

*Source: FEMA, NFIP as of 8/31/15*

## 5.11.5 Repetitive Loss Properties

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

**Table 5.30** provides summary information about the repetitive loss properties in the Toe River region. Currently (as of November 2015), there are 25 non-mitigated repetitive loss properties located in the Toe River Region, which accounted for 62 losses and more than $1.3 million in claims payments under the NFIP. The average claim amount for these properties is $21,396. Most of these properties (18) are single family residential and the remaining seven (7) are commercial or government-owned buildings. Without mitigation, these properties will likely continue to experience flood losses.

## TABLE 5.30: SUMMARY OF REPETITIVE LOSS PROPERTIES

| Location | Number of Properties | Types of Properties | Number of Losses | Building Payments | Content Payments | Total Payments | Average Payment |
|---|---|---|---|---|---|---|---|
| **Avery County** | **13** | | **28** | **$223,788** | **$ 121,749** | **$345,564** | **$17,404** |
| Crossnore | 1 | 1 single family | 2 | $8,912 | - | $8,912 | $4,456 |
| Unincorporated Area | 12 | 11 single family, 1 non-residential | 26 | $214,876 | $121,749 | $336,652 | $12,948 |
| **McDowell County** | **4** | | **10** | **$217,672** | **$240,606** | **$458,279** | **$85,140** |
| Unincorporated Area | 4 | 2 single family, 2 non-residential | 10 | $217,672 | $240,606 | $458,279 | $85,140 |
| **Mitchell County** | **6** | | **15** | **$299,817** | **$133,014** | **$432,831** | **$57,393** |
| Bakersville | 2 | 2 non-residential | 7 | $122,406 | $61,842 | $184,248 | $26,321 |
| Unincorporated Area | 4 | 2 single-family, 2 non-residential | 8 | $177,411 | $71,172 | $248,583 | $31,072 |
| **Yancey County** | **2** | **2 single family** | **9** | **$70,191** | **$19,730** | **$81,922** | **$9,103** |
| Burnsville | 2 | 2 single family | 9 | $70,191 | $19,730 | $81,922 | $9,103 |
| Unincorporated Areas | | | | | | | |
| **Toe River Regional Total** | **25** | | **62** | **$811,470** | **$515,100** | **$1,326,570** | **$21,396** |

*Source: National Flood Insurance Program*

**These communities do not participate in the National Flood Insurance Program. Therefore, no values are reported.*

### 5.11.6 Probability of Future Occurrences

Flood events will remain a threat in the Toe River Region, and the probability of future occurrences will remain likely (between 10 and 100 percent annual probability). The probability of future flood events based on magnitude and according to best available data is illustrated in **Figure 5.18** above**,** which indicates those areas susceptible to the 1-percent annual chance flood (100-year floodplain) and the 0.2-percent annual chance flood (500-year floodplain).

# OTHER HAZARDS

## 5.12 WILDFIRES

### 5.12.1 Background and Description

A wildfire is any outdoor fire (i.e. grassland, forest, brush land) that is not under control, supervised, or prescribed.[26] 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 South Carolina, 98 percent of wildfires are human-caused. The number one cause is woods arson, followed 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. The South Carolina wildfire season runs from late winter to early spring with March being the most severe.

Many individual homes and cabins, subdivisions, resorts, recreational areas, organizational camps, businesses and industries are located within high wildfire hazard areas. Further, 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.

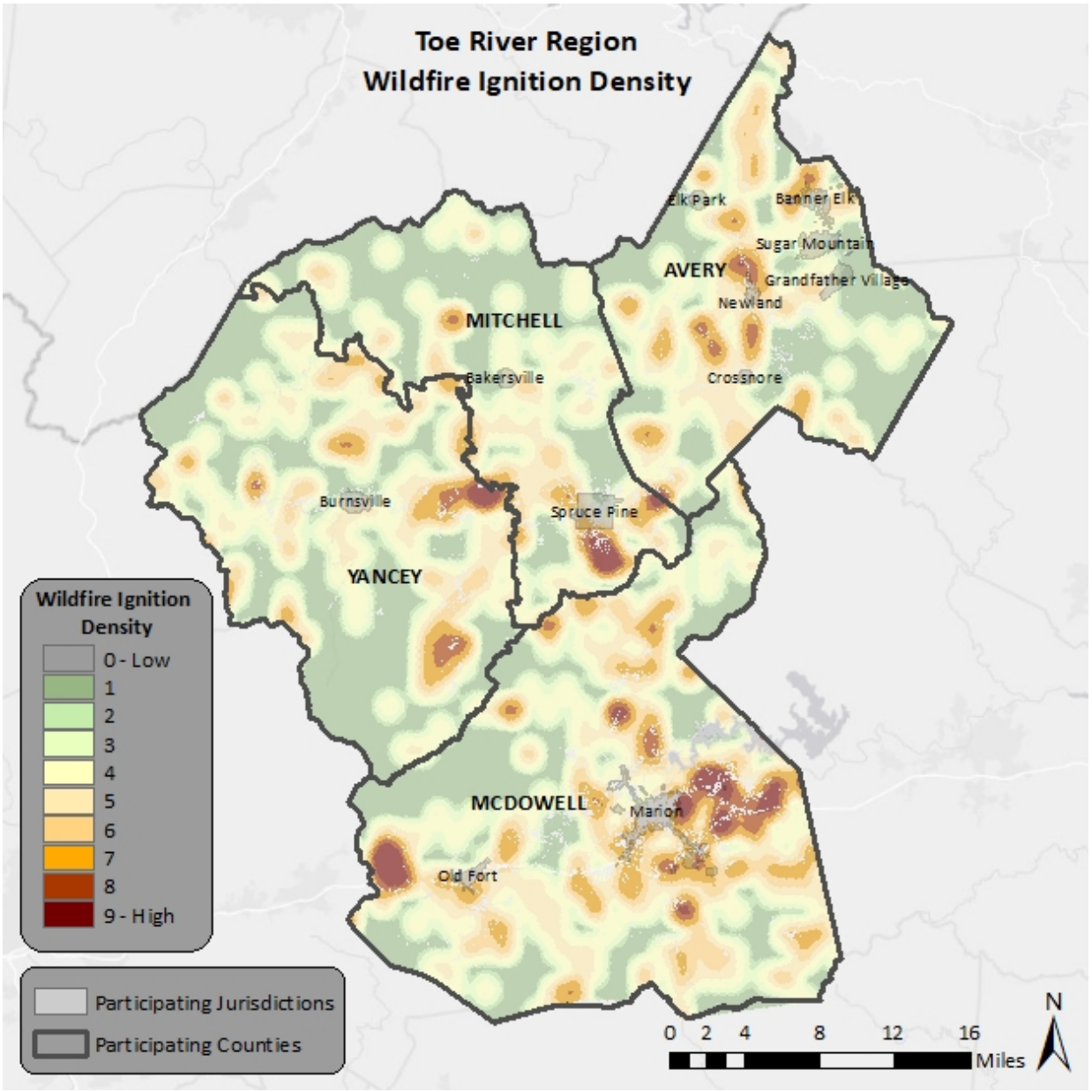
[26] Prescription burning, or "controlled burn," undertaken by land management agencies is the process of igniting fires under selected conditions, in accordance with strict parameters.

## 5.12.2 Location and Spatial Extent

The entire region is at risk to a wildfire occurrence. However, drought conditions may make a fire more likely in those locations. Further, areas in the urban-wildland interface are particularly susceptible to fire hazard as populations abut formerly undeveloped areas.

**Figure 5.19** shows the Wildfire Ignition Density for each county in the Toe River Region based on data from the Southern Wildfire Risk Assessment. This data represents the likelihood of wildfire igniting in the area, which is derived from historical wildfire occurrences to create an average ignition rate map.

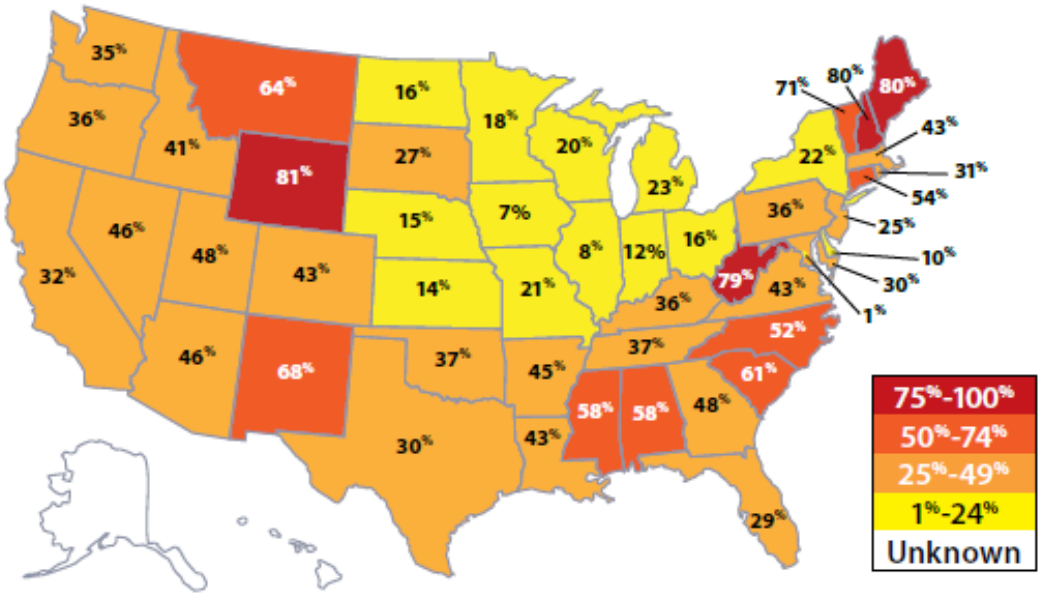
**FIGURE 5.19: WILDFIRE IGNITION DENSITY**




*Source: Southern Wildfire Risk Assessment*

Every state also has a Wildland Urban Interface (WUI), which is the rating of potential impact of wildfires on people and their homes. The WUI is not a fixed geographical location, but rather a combination of human development and vegetation where wildfires have the greatest potential to result in negative impacts. Nationally, one-third of all homes lie in the WUI, which is a growing danger. Below, **Figure 5.20** shows a map of each state's WUI. Based on the data from the US Department of Agriculture, 52% of homes in North Carolina lie within the WUI.

## FIGURE 5.20: PERCENT OF TOTAL HOMES IN THE WILDLAND URBAN INTERFACE

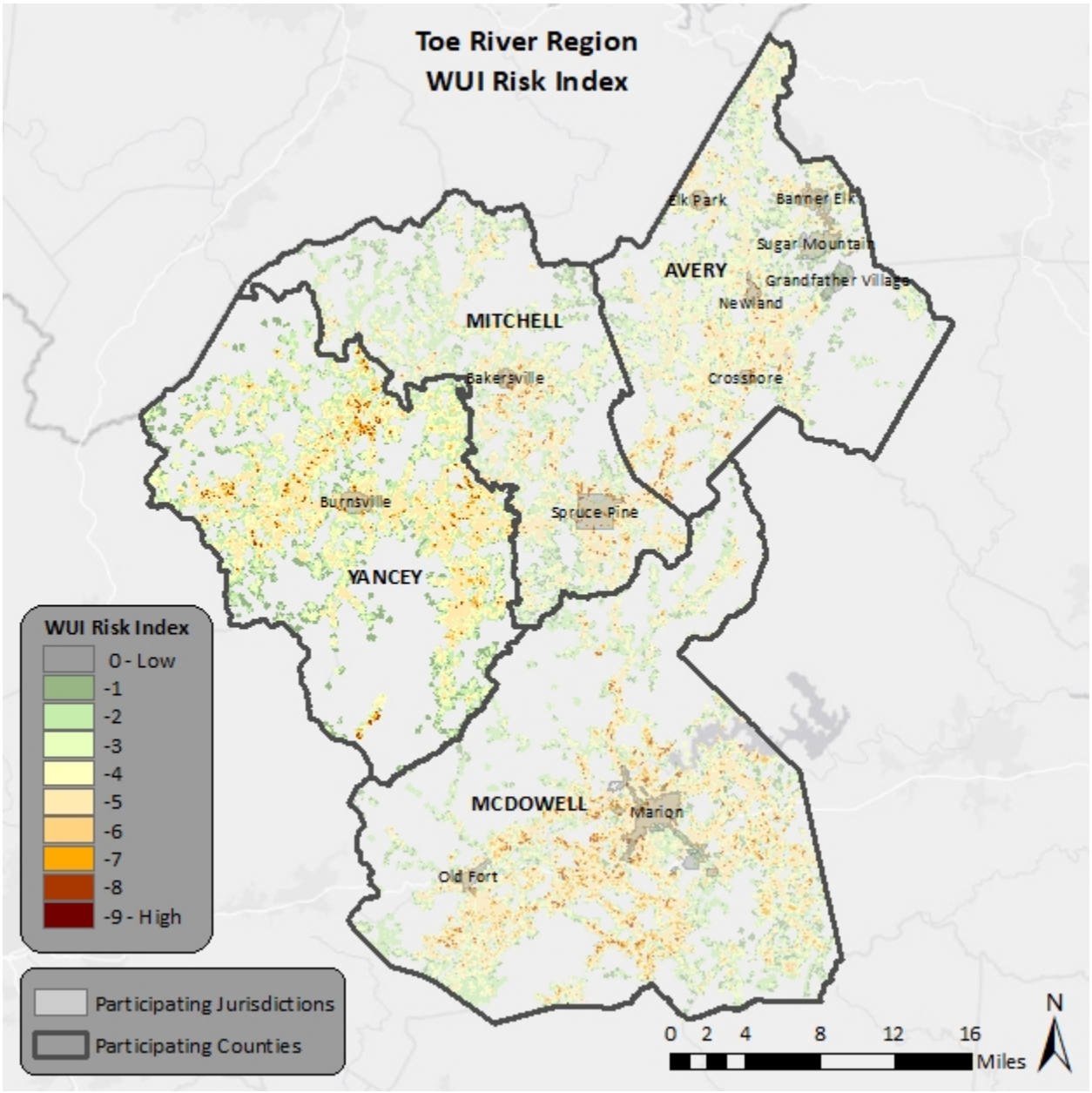



*Source: US Department of Agriculture*

Below **Figures 5.21** displays the WUI Risk Index for the counties in the Toe River Region.

Appendix G includes County and municipal-level maps depicting Wildfire Ignition Density, previous wildfire events and Wildland Urban Interface areas.

**FIGURE 5.21: TOE RIVER WILDLAND URBAN INTERFACE RISK INDEX**




*Source: Southern Wildfire Risk Assessment*

## 5.12.3 Historical Occurrences

Information from the National Association of State Foresters was used to ascertain historical wildfire events. The National Association of State Foresters reported that a total of 580 events that impacted an area greater than 1 acre have occurred throughout the Toe River Region since (2001)[27]. **Table 5.31**

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

provides a summary table for wildfire occurrences in the Toe River Region. The largest of these events was the Clear Creek Fire which occurred in McDowell in 2017 and impacted about 2,694 acres.

**TABLE 5.31: SUMMARY OF WILDFIRE OCCURRENCES (2001-2018)**

| Location | Number of Wildfires | Total Acres Burned |
|---|---|---|
| **Avery County** | **94** | **675.8** |
| Banner Elk | 2 | 7 |
| Crossnore | 1 | 1.68 |
| Elk Park | 0 | 0 |
| Grandfather Village | 0 | 0 |
| Newland | 0 | 0 |
| Sugar Mountain | 0 | 0 |
| Unincorporated Area | 91 | 667.12 |
| **McDowell County** | **255** | **9,620.36** |
| Marion | 5 | 6.5 |
| Old Fort | 1 | 1.2 |
| Unincorporated Area | 249 | 9612.66 |
| **Mitchell County** | **123** | **1,109.54** |
| Bakersville | 1 | 1.3 |
| Spruce Pine | 4 | 9.04 |
| Unincorporated Area | 118 | 1099.2 |
| **Yancey County** | **108** | **656.84** |
| Burnsville | 1 | 1.5 |
| Unincorporated Area | 107 | 655.84 |
| **Toe River Region Total** | **580** | **12,062.54** |

There is no narrative information on historical wildfires to impact the Toe River Region found in the NCEI database, the NC State Hazard Mitigation Plan, the North Carolina Forest Service or provided by local emergency managers. The main causes of previous wildfires in the Toe River Region are from

## 5.12.4 Probability of Future Occurrences

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

# 5.13 INFECTIOUS DISEASE

## 5.13.1 Background and Description

For the purpose of this plan, this section will assess infectious diseases and vector-borne diseases within the Toe River Region.

**Infectious Disease**

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

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

There have been several significant viral outbreaks from emerging diseases in recent years of both national and international importance. The Zika virus and West Nile virus are viruses that are typically passed to humans or animals by mosquitoes and made major news as emergent disease threats. Meanwhile, diseases that are spread directly between human beings such as Severe Acute Respiratory Syndrome (SARS) and Ebola have also been identified as serious threats. While each of these conditions caused a great deal of public health concern when they were first identified, SARS have virtually disappeared, West Nile virus occurs with low frequency and causes serious disease in only a very small percentage of cases, Ebola have been more or less contained and a vaccine is in development, and many people infected with Zika will not experience symptoms from the disease.

Other communicable diseases pose a much more frequent threat to the citizens of in the region. Some of the infectious diseases of greatest concern include influenza, particularly in a pandemic form, as well as norovirus, and multiple antibiotic-resistant tuberculosis. Even in one of its normal year-to-year variants, influenza (commonly referred to as “flu”) can result in serious illness and even death in young children, the elderly and immune-compromised persons. But there is always the potential risk of the emergence of influenza on one the pandemic H1N1 from, such as in the “Spanish” outbreak of 1918-1919, which killed over 50 million people worldwide. Every year, North Carolina sees hundreds of cases

of influenza, leading to hundreds of hours of lost productivity in businesses due to sick employees. Of note, a vaccine for influenza is produced every year and, according to the CDC, is highly effective in preventing the disease.

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

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

**Vector-Borne Diseases**

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

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

## 5.13.2 Location and Spatial Extent

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

## 5.13.3 Historical Occurrences

**Infectious Disease**

Information from the North Carolina Department of Health and Human services was used to monitor and track cases of the infectious disease COVID-19. A COVID – 19 Pandemic disaster declaration was declared for North Carolina on March 24, 2020. **Table 5.32** provides a summary of confirmed cases of COVID–19 in the Toe River Region.

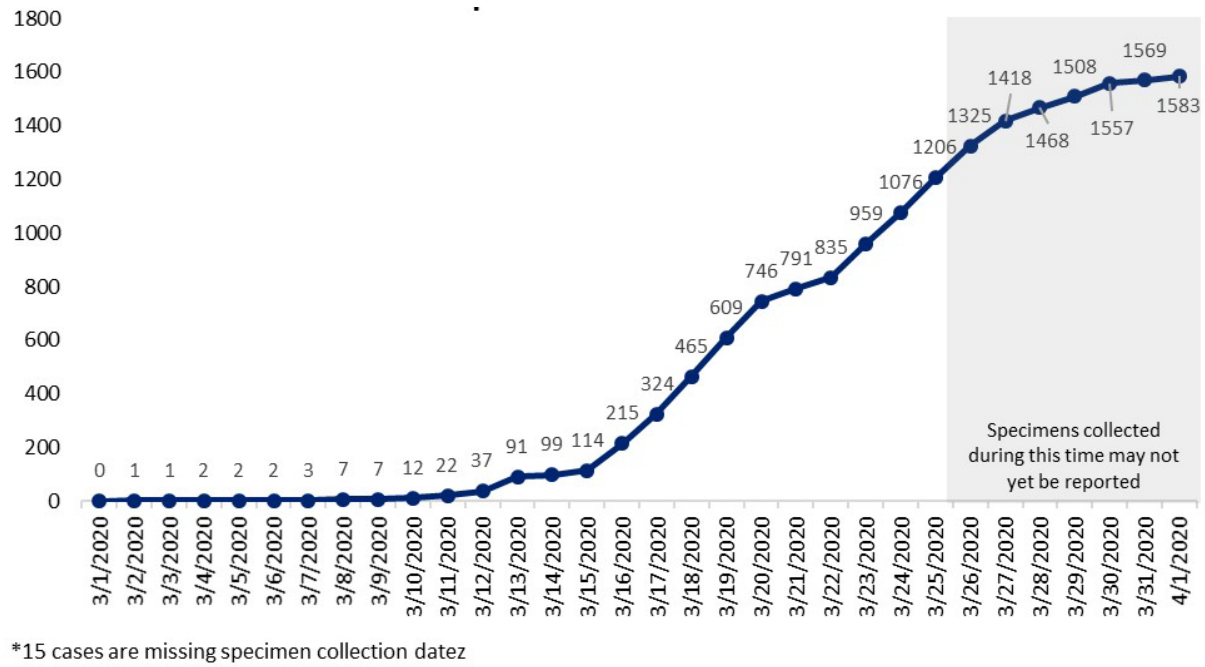
## TABLE 5.32: SUMMARY OF CONFIRMED COVID – 19 CASES IN THE TOE RIVER REGION

| Location | Number of Cases | Number of Deaths* |
|---|---|---|
| Avery County | - | - |
| McDowell County | 8 | 0 |
| Mitchell County | 1 | 0 |
| Yancey County | - | - |
| Toe River Region Total | 9 | 0 |

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

As of April 2, 2020, NC DHHS reported there were 1,857 cases of COVID – 19 in North Carolina[28]. These cases reflect cases that were tested and returned positive, including the NC State Laboratory of Public Health and reporting hospital and commercial labs. **Figure 5.22** below provides an overview of the total number of COVID-19 cases by date of specimen collection for North Carolina.

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




*15 cases are missing specimen collection datez

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

### Vector-Borne Diseases

In 2016, North Carolina state health officials encouraged citizens to take preventative measures against mosquito bites to avoid contracting the Zika virus. $477,500 dollars was allocated from the Governor's

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

yearly budget to develop an infrastructure to detect, prevent, control, and respond to the Zika virus and other vector-borne illnesses[29].

## 5.13.4 Probability of Future Occurrence

It is difficult to predict the future probability of infectious diseases due to the difficulty with obtaining information on this type of hazard. The most common and probable disease in the state has shown to be influenza; however, based on historical data, it is relatively unlikely (between 1 and 33.3 percent annual probability) that the Toe River region will experience an outbreak of infectious diseases in the future.

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

# TECHNOLOGICAL HAZARDS

## 5.14 HAZARDOUS SUBSTANCES

### 5.14.1 Background and Description

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

Hazardous material (HAZMAT) incidents can apply to fixed facilities as well as mobile, transportation-related accidents in the air, by rail, on the nation's highways and on the water. Approximately 6,774 HAZMAT events occur each year, 5,517 of which are highway incidents, 991 are railroad incidents and 266 are due to other causes.[30] 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.

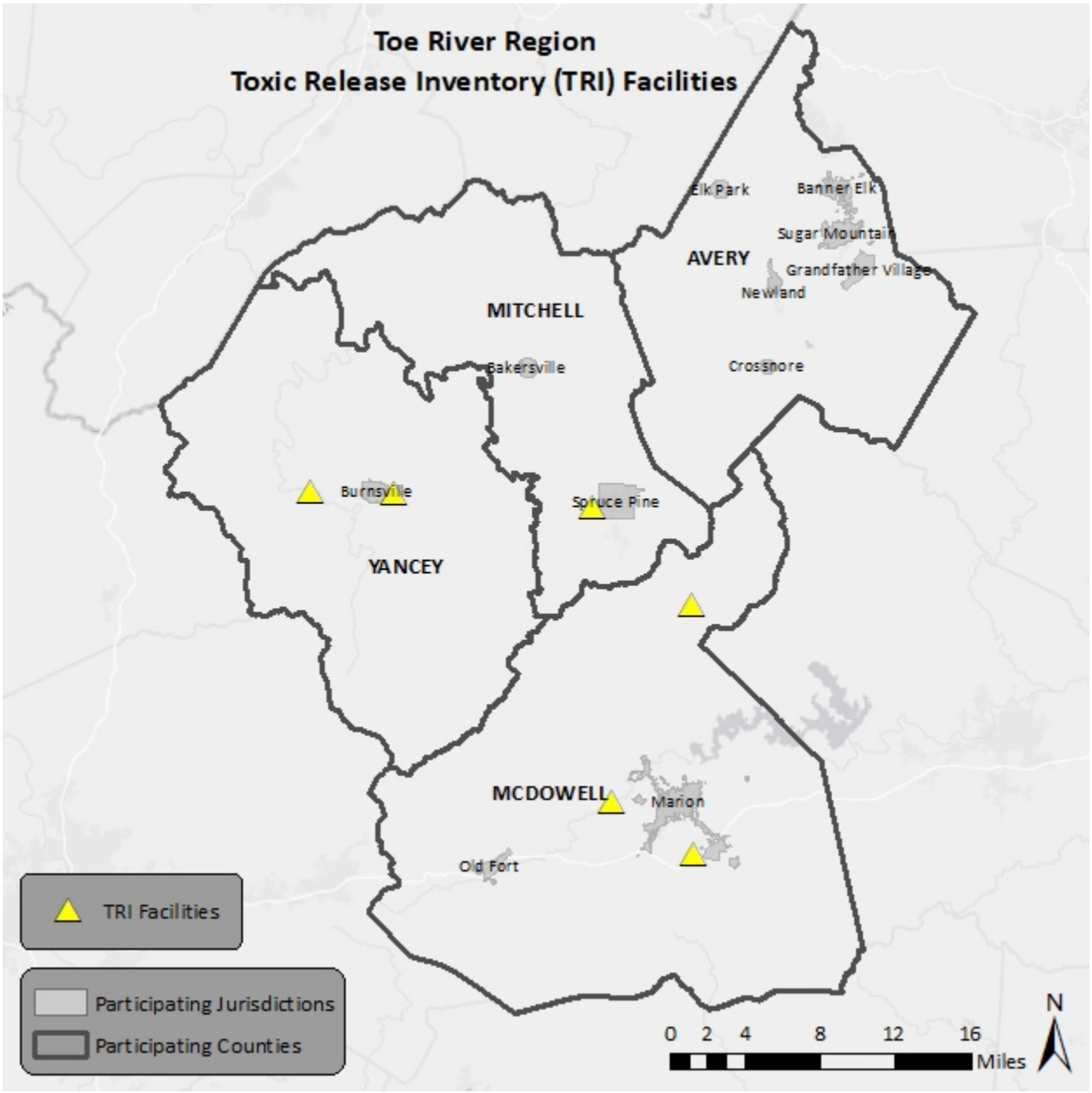
### 5.14.2 Location and Spatial Extent

As a result of the 1986 Emergency Planning and Community Right to Know Act (EPCRA), the Environmental Protection Agency provides public information on hazardous materials. One facet of this program is to collection information from industrial facilities on the releases and transfers of certain toxic agents. This information is then reported in the Toxic Release Inventory (TRI). TRI sites

[30] FEMA, 1997.

indicate where such activity is occurring. The Toe River Region has 6 TRI sites. In addition, there are two Unimin Corporation sites that the Regional Hazard Mitigation Planning Committee included in the analysis due to the presence of hydrochloric acid. These sites are shown in **Figure 5.23.**

**FIGURE 5.23: TOXIC RELEASE INVENTORY (TRI) SITES**




*Source: EPA*

## 5.14.3 Historical Occurrences

The U.S. Department of Transportation Pipeline and Hazard Materials Safety Administration (PHMSA) lists historical occurrences throughout the nation. A "serious incident" is a hazardous materials incident that involves:

- a fatality or major injury caused by the release of a hazardous material,

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

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

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

The Pipeline and Hazardous Materials Safety Administration (PHMSA) is an agency of the United States Department of Transportation that was established in 2004. The PHMSA maintains a database of hazardous materials incidents for communities across the United States. Summary results of their data for events that have occurred in the Toe River region can be found in **Table 5.33.**

### TABLE 5.33: SUMMARY OF HAZMAT INCIDENTS IN THE TOE RIVER REGION

| Location | Incidents Reported | Injuries | Fatalities | Type | Costs |
|---|---|---|---|---|---|
| **Avery County** | 7 | 0 | 0 | | $845 |
| Banner Elk | 1 | 0 | 0 | Highway | $0 |
| Crossnore | 2 | 0 | 0 | Highway | $0 |
| Elk Park | 0 | 0 | 0 | n/a | n/a |
| Grandfather Village | 0 | 0 | 0 | n/a | n/a |
| Newland | 1 | 0 | 0 | Highway | $550 |
| Sugar Mountain | 0 | 0 | 0 | n/a | n/a |
| Unincorporated Area | 3 | 0 | 0 | Highway | $295 |
| **McDowell County** | 28 | 2 | 0 | | $64,222 |
| Marion | 18 | 2 | 0 | Highway and Rail | $3,325 |
| Old Fort | 7 | 0 | 0 | Highway and Rail | $56,025 |
| Unincorporated Area | 3 | 0 | 0 | Highway | $4,872 |
| **Mitchell County** | 7 | 3 | 0 | | $286,252 |
| Bakersville | 0 | 0 | 0 | n/a | n/a |
| Spruce Pine | 5 | 1 | 0 | Highway | $14,247 |
| Unincorporated Area | 2 | 2 | 0 | Highway and Rail | $272,005 |
| **Yancey County** | 5 | 0 | 0 | | $2,264,540 |
| Burnsville | 3 | 0 | 0 | Highway | $13,540 |
| Unincorporated Area | 2 | 0 | 0 | Rail | $2,251,000 |
| **Toe River Regional Totals** | **47** | **5** | **0** | | **$2,615,859** |

*Source: U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration*

## 5.14.4 Probability of Future Occurrence

Given the location of ten toxic release inventory sites and two recorded Unimin sites in the Toe River Region, it is possible that a hazardous material incident may occur. Official noted that Unimin mobile

transport is of particular in Old Fort on Highway 221. County and town officials are mindful of this possibility and take precautions to prevent such an event from occurring.

## 5.16 TERRORISM

### 5.16.1 Background and Description

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

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

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

**Explosive**

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

**Chemical**

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

**Radiological**

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

**Biological**

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

**Nuclear**

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

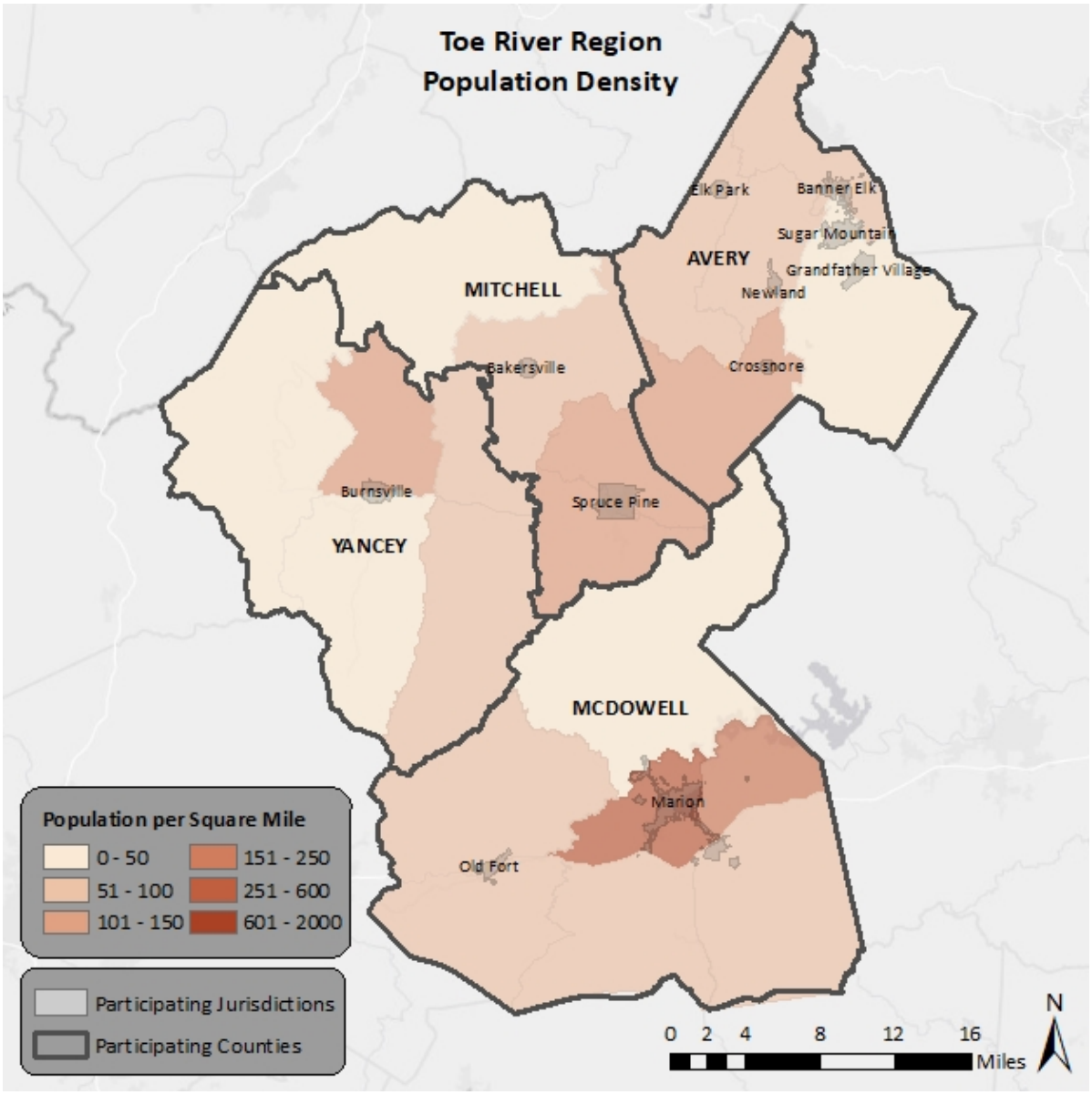
**OTHER**

Terrorism Hazard Assessment must also account for modern trends and changes. An additional "OTHER" category should be considered that includes small arms attacks, vehicle ramming attacks, edged weapon attacks, and incendiary attacks. The United States Department of Homeland Security posts terror threat levels corresponding to a certain color. This warning system is shown in **Table 5.3.**

## 5.16.2 Location and Spatial Extent

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

**FIGURE 5.24: POPULATION DENSITY**




*Source: US Census Bureau*

Furthermore, the most recent population counts of each participating county and jurisdictions can be seen in **Table 5.34** below.

**TABLE 5.34: 2018 POPULATION ESTIMATES FOR THE TOE RIVER REGION**

| Location | 2018 Population Estimate |
|---|---|
| **Avery County** | **17,505** |
| Banner Elk | 1,091 |
| Crossnore | 192 |
| Elk Park | 441 |
| Grandfather Village | 25 |
| Newland | 684 |
| Sugar Mountain | 197 |
| Unincorporated Area | 14,875 |
| **McDowell County** | **45,507** |
| Marion | 7,871 |
| Old Fort | 919 |
| Unincorporated Area | 36,717 |
| **Mitchell County** | **15,000** |
| Bakersville | 449 |
| Spruce Pine | 2,148 |
| Unincorporated Area | 12,403 |
| **Yancey County** | **17,903** |
| Burnsville | 1,647 |
| Unincorporated Area | 16,256 |
| **Toe River Region Total** | **95,915** |

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

## 5.16.3 Historical Occurrences

No extreme cases of terror attacks have previously affected the Toe River Region. However, as the population in the area continues to increase, so does the chance of an attack.

## 5.16.4 Probability of Future Occurrence

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

# 5.17 CYBER

## 5.17.1 Background and Description

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

Mitigating and preparing for cyberattacks is challenging because of how diverse and complex attacks can be. The FBI is the lead federal agency for investigating cyberattacks, overseas adversaries, and terrorists. In North Carolina, the Department of Information Technology is the lead agency that maintains Cybersecurity and Risk Management resources.

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

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

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

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

## FIGURE 5.25: PERCENTAGE AND COUNTS OF INCIDENTS PER PATTERN

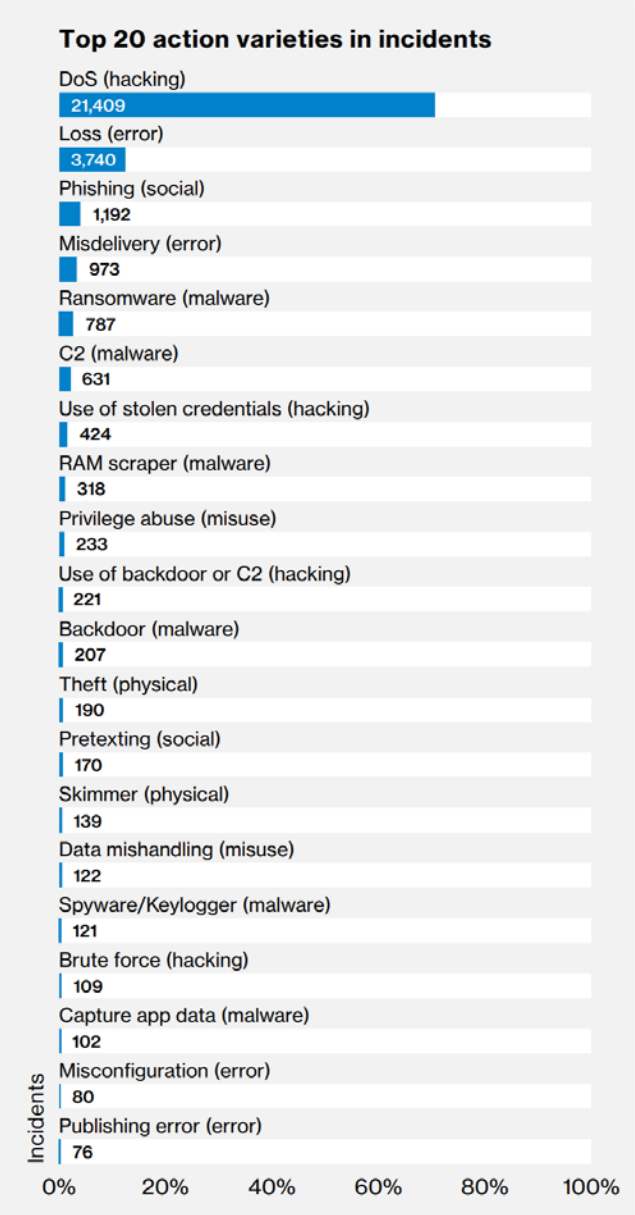



Figure 4. Top 20 threat action varieties (incidents) (n=30,362)

*Source: 2018 Verizon Data Breach Investigations Report*

### 5.17.2 Location and Spatial Extent

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

### 5.17.3 Historical Occurrences

In North Carolina and the Toe River Region, the Department of Information Technology specializes in cybersecurity and risk management. Within the department, the NC Information Sharing and Analysis

Center gathers information on cyber threats within the State raise cybersecurity. **Table 5.35** displays the North Carolina Cybercrimes and Victim Counts in 2018.

### TABLE 5.35: NORTH CAROLINA CYBERCRIMES AND VICTIM COUNTS IN 2018

| Crime Type by Victim Count | | | |
|---|---|---|---|
| *Crime Type* | *Victim Count* | *Crime Type* | *Victim Count* |
| Advanced Fee | 436 | Identity Theft | 330 |
| BEC/EAC | 430 | Investment | 47 |
| Charity | 11 | Lottery/Sweepstakes/Inheritance | 213 |
| Civil Matter | 15 | Malware/Scareware/Virus | 49 |
| Confidence Fraud/Romance | 432 | Misrepresentation | 148 |
| Corporate Data Breach | 39 | No Lead Value | 246 |
| Credit Card Fraud | 306 | Non-payment/Non-Delivery | 1,647 |
| Crimes Against Children | 28 | Other | 172 |
| Denial of Service/TDos | 28 | Overpayment | 406 |
| Employment | 391 | Personal Data Breach | 1,125 |
| Extortion | 1,219 | Phishing/Vishing/Smishing/Pharming | 947 |
| Gambling | 4 | Ransomware | 29 |
| Government Impersonation | 255 | Re-shipping | 31 |
| Hacktivist | 2 | Real Estate/Rental | 286 |
| Harassment/Threats of Violence | 330 | Spoofing | 430 |
| Health Care Related | 9 | Tech Support | 361 |
| IPR/Copyright and Counterfeit | 30 | Terrorism | 2 |
| | | | |
| Descriptors* | | | |
| Social Media | 902 | Virtual Currency | 790 |

*Source: FBI Internet Crime Compliant Center, 2018*

Although the Toe River Region have not reported any major catastrophic cyberattacks, the potential to experience one is unpredictable and can happen at any time.

## 5.17.4 Probability of Future Occurrences

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

# 5.18 ELECTROMAGNETIC PULSE

## 5.18.1 Background and Description

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

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

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

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

## 5.18.2 Location and Spatial Extent

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

## 5.18.3 Historical Occurrences

There have been no reports of EMP occurrences in the Toe River region.

## 5.18.4 Probability of Future Occurrences

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

## 5.19 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.

### 5.19.1 Hazard Extent

**Table 5.36** describes the extent of each natural hazard identified for the Toe River Region. The extent of a hazard is defined as its severity or magnitude, as it relates to the planning area.

**TABLE 5.36 EXTENT OF TOE RIVER REGION HAZARDS**

| Natural Hazards | |
|---|---|
| Drought | Drought extent is defined by the North Carolina Drought Monitor Classifications which include Abnormally Dry, Moderate Drought, Severe Drought, Extreme Drought, and Exceptional Drought (page 5:5). According to the North Carolina Drought Monitor Classifications, the most severe drought condition is Exceptional. The participating jurisdictions have received this ranking twice in the sixteen-year reported history (2007, 2008). Extreme Drought conditions were reported in 2000, 2001 and 2002. |
| Excessive Heat | The extent of excessive heat can be defined by the maximum temperature reached. The highest temperature recorded in the Toe River Region is 106 degrees Fahrenheit (last reported on June 27, 1954).<br>• Avery County: 98°F<br>• McDowell County: 106°F<br>• Mitchell County: 95°F<br>• Yancey County: 97°F |
| Hurricane and Coastal Hazards | Hurricane extent is defined by the Saffir-Simpson Scale which classifies hurricanes into Category 1 through Category 5 (Table 5.9). The greatest classification of hurricanes to traverse directly through the Toe River Region was<br>Hurricane Gracie in 1959 which reached a maximum wind speed of 53 knots in the region and Hurricane Hugo in 1989 which carried tropical force winds of 48 knots. Although the region is much more likely to be impacted by the remnants<br>of a hurricane or tropical storm, these events demonstrate that more intense storms can and have impacted the region directly. |
| Tornadoes/ Thunderstorms | Tornadoes: Tornado hazard extent is measured by tornado occurrences in the US provided by FEMA (Figure 5.7) as well as the Fujita/Enhanced Fujita Scale (Tables 5.12 and 5.13). The greatest magnitude reported was an F4 (last reported on May 5, 1989). It should be noted that an F5 tornado is possible.<br>• Avery County: F2<br>• McDowell County: F2<br>• Mitchell County: None<br>• Yancey County: F1<br>Thunderstorms: Thunderstorm extent is defined by the number of thunder events and wind speeds reported. According to a 63-year history from the National Centers for Environmental Information, severe storms have resulted in four disaster declarations in the Toe River Region in 1973, 1977, 1995, and 1998. It should be noted that future events may exceed these historical occurrences. |

| | |
|---|---|
| | • Avery County: 55 knots<br>• McDowell County: 87 knots<br>• Mitchell County: 55 knots<br>• Yancey County: 60 knots<br>Lightning: According to the Vaisala flash density map (Figure 5.15), the majority of the Toe River Region is located in an area that experiences 5 to 6 lightning flashes per square kilometer per year. It should be noted that future lightning occurrences may exceed these figures.<br>Hailstorms: Hail extent can be defined by the size of the hail stone. The largest hail stone reported in the Toe river Region was 4.5 inches (reported April 3, 1974). It should be noted that future events may exceed this.<br>• Avery County: 2.75 inches<br>• McDowell County: 2.00 inches<br>• Mitchell County: 1.75 inches<br>• Yancey County: 2.50 inches |
| Severe Winter Weather | The extent of winter storms can be measured by the amount of snowfall received (in inches). The greatest 24-hour snowfall reported in the region, which is the record for the state as well, was 36 inches in March 13, 1993. Due to extreme variations in elevation throughout the region, extent totals will vary for each participating jurisdiction and reliable data on snowfall totals is not available.<br>• Avery County: 21 inches<br>• McDowell County: 14 inches<br>• Mitchell County: 16 inches<br>• Yancey County: 36 inches |
| Earthquakes | Earthquake extent can be measured by the Richter Scale (Table 5.19) and the Modified Mercalli Intensity (MMI) scale (Table 5.20) and the distance of the epicenter from the Toe River Region. According to data provided by the National Geophysical Center, the greatest MMI to impact the region was reported on May 5, 1981 with an MMI of VI with a correlating Richter Scale measurement of approximately 3.5.<br>• Avery County: IV<br>• McDowell County: V<br>• Mitchell County: V<br>• Yancey County: VI |
| Geological | Landslide: As noted above in the landslide profile, the landslide data provided by the North Carolina Geological survey is incomplete. This provides a challenge when trying to determine an accurate extent for the landslide hazard. However, when using the USGS landslide susceptibility index, extent can be measured with incidence, which is between moderate and high. There is also susceptibility throughout the region.<br>Sinkhole: The western part of North Carolina and the Toe River region is susceptible to sinkholes; however, there are no historical records of sinkholes in the region.<br>Erosion: The extent of erosion can be defined by the measurable rate of erosion that occurs. There are no erosion rate records available for the Toe River Region. |
| Dam Failure | Dam failure extent is defined using the North Carolina Division of Land Resources criteria (Table 5.25). Of the 108 dams in Toe River Region, 47 are classified as high hazard.<br>• Avery County: 21<br>• McDowell County: 11<br>• Mitchell County: 9<br>• Yancey County: 6 |
| Flooding | Flood extent is measured by the amount of land and property in the floodplain. There are approximately 1,219 square miles in the Toe River Region. Of these, there are approximately 0.325 square miles of land in Zone A ( 1-percent annual chance floodplain), |

| | |
|---|---|
| | 37.815 square miles of land in Zone AE (1-percent annual chance with elevation), and 2.506 square miles of land in zone X500 (0.2-percent annual chance floodplain/500-year floodplain). The amount of land in the floodplain accounts for 0.03 percent of the total land area in the Toe River Region.<br><br>The greatest depth of flood waters reported in the region was recorded after the 2004 floods. Waters for that event were estimated to be 21 feet above the normal channel of the river. That event serves as the "flood of record" for the region. "Average" flood events typically include flood waters 4-10 feet above flood stage.<br><br>The depth of flood waters varies across the region, but generally it is not so much the depth of the floodwaters that causes a problem, but the velocity that causes the most problems. Flash flood waters in mountainous terrain such as that of the Toe River region can be very dangerous and often deadly. |
| **Other Hazards** | |
| Wildfires | Wildfire data was provided by the North Carolina Division of Forest Resources and is reported annually by county. Analyzing the data by county indicates the following wildfire hazard extent for each county.<br>• ***Avery County:***<br>The greatest number of fires to occur in any year was 15 in 2006.<br>The greatest number of acres in a single year occurred in 2016 when 126.75 acres were burned.<br>• ***McDowell County:***<br>The greatest number of fires to occur in any year was 28 in 2016.<br>The greatest number of acres in a single year occurred in November 20, 2016 when 2693.66 acres were burned.<br>• ***Mitchell County:***<br>The greatest number of fires to occur in any year was 16 in 2016.<br>The greatest number of acres in a single year occurred in October 26, 2001 when 156 acres were burned.<br>• ***Yancey County:***<br>The greatest number of fires to occur in any year was 14 in 2002<br>The greatest number of acres in a single year occurred in April 22, 2002 when 128 acres were burned.<br>Although this data lists the extent that has occurred, larger and more frequent wildfires are possible throughout the region. |
| Infectious Disease | There is no available method for determining dollar losses due to infectious diseases at this time; however, $477,500 dollars was allocated from the Governor's yearly budget in 2016 for preventative measures regarding the Zika Virus. The entire Toe River is susceptible to infectious diseases such as the flu, which kills hundreds of people annually. |
| **Technological Hazards** | |
| Hazardous Materials Incident | According to USDOT PHMSA, the largest hazardous materials incident reported in the region was 9,528 LGA on April 15, 2005 in Old Fort. It should be noted that larger events are possible. |
| Radiological Emergency – Fixed Nuclear Facilities | Although there is no history of a nuclear accident at the Oconee Nuclear Stations, other events across the globe and in the United States in particular indicate that an event is possible. Since several national and international events were Level 7 events on the INES, the potential for a Level 7 event at Oconee is possible. |
| Terrorism | Although no severe terrorism attacks have been reported in the Toe River region, the entire area is still at risk to a future event. Densely populated areas, such as cities, are considered more susceptible. Terror events have the potential to affect the human population, buildings and infrastructure, and the economy in the region. |

| | |
|---|---|
| Cyber | No cyber-attacks have been historically reported in the Toe River region. Technology usage, however, is increasing. A cyber-attack could potentially devastate the region's economy and could have lasting negative impacts. |
| Electromagnetic Pulse | Electromagnetic Pulse (EMP) occurrences have not taken place in the Toe River region, but the risk still exists. If an EMP were to occur, the effects would negatively impact first responders and communication efforts and may cause panic within the area. |

## 5.19.2 Priority Risk Index

In order to draw some meaningful planning conclusions on hazard risk for the Toe River 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 Toe River 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 Toe River Region to consider as part of their proposed mitigation strategy.

The prioritization and categorization of identified hazards for the Toe River 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 Toe River Regional Hazard Mitigation Planning Committee (TRRHMPC) in gaining consensus on the determination of those hazards that pose the most significant threat to the Toe River 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 Toe River 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[31], as summarized in **Table 5.37**. 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 Toe River Region, the highest PRI value is 3.3 (winter storm and freeze hazard). Prior to being finalized, PRI values for each identified hazard were reviewed and accepted by the members of the TRRHM Planning Committee.

[31] The Regional Hazard Mitigation Planning Committee, based upon any unique concerns or factors for the planning area, may adjust the PRI weighting scheme during future plan updates.

## TABLE 5.37: PRIORITY RISK INDEX FOR THE TOE RIVER 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 | |

## 5.20.3 Priority Risk Index Results

Table **5.38** 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 TRRHM Planning Committee. The results were then used in calculating PRI values and making final determinations for the risk assessment.

### TABLE 5.38: SUMMARY OF PRI RESULTS FOR THE TOE RIVER REGION

| Hazard | Sub hazard(s) Assessed | Category/Degree of Risk | | | | | |
|---|---|---|---|---|---|---|---|
| | | Probability | Impact | Spatial Extent | Warning Time | Duration | PRI Score |
| **Natural Hazards** | | | | | | | |
| Drought | | Likely | Minor | Large | More than 24 hours | More than one week | 2.5 |
| Excessive Heat | | Possible | Minor | Large | More than 24 hours | Less than one week | 2.1 |
| Hurricane and Coastal Hazards | | Possible | Critical | Large | More than 24 hours | Less than 24 hours | 2.0 |
| Tornadoes/ Thunderstorms | Hailstorm, Lightning | Highly Likely | Limited | Moderate | Less than 6 hours | Less than 6 hours | 3.2 |
| Severe Winter Weather | | Highly Likely | Critical | Large | More than 24 hours | Less than one week | 3.3 |
| Earthquakes | | Possible | Limited | Small | Less than 6 hours | Less than 6 hours | 2.1 |
| Geological | Landslide, Sinkholes, Erosion | Highly Likely | Critical | Small | Less than 6 hours | Less than 6 hours | 2.8 |
| Dam Failure | | Unlikely | Critical | Moderate | More than 24 hours | Less than 6 hours | 2 |
| Flooding | | Highly Likely | Limited | Moderate | 6 to 12 hours | Less than 24 hours | 2.9 |
| **Other Hazards** | | | | | | | |
| Wildfires | | Likely | Minor | Small | Less than 6 hours | Less than one week | 2.2 |
| Infectious Disease | | Unlikely* | Minor | Small | More than 24 hours | More than 1 week | 1.5 |
| **Technological Hazards** | | | | | | | |
| Hazardous Substances | | Possible | Limited | Small | Less than 6 hours | Less than 24 hours | 2.2 |
| Radiological Emergency | Fixed Nuclear Facilities | Unlikely | Critical | Small | 6 to 12 hours | Less than 1 week | 1.9 |
| Terrorism | | Unlikely | Critical | Small | Less than 6 hours | Less than 6 hours | 2.1 |
| Cyber | | Possible | Critical | Large | Less than 6 hours | Less than 1 week | 3 |
| Electromagnetic Pulse | | Unlikely | Minor | Large | 12 to 24 hours | Less than 6 hours | 1.7 |

*This category was assigned before the COVID-19 Pandemic in 2020.

## 5.20 FINAL DETERMINATIONS

The conclusions drawn from the hazard profiling process for the Toe River Region, including the PRI results and input from the Regional Hazard Mitigation Planning Committee, resulted in the classification of risk for each identified hazard according to three categories: High Risk, Moderate Risk and Low Risk (**Table 5.39**). 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 Toe River 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 5.39: CONCLUSIONS ON HAZARD RISK FOR THE TOE RIVER REGION

| | |
|---|---|
| **HIGH RISK** | Severe Winter Weather<br>Tornadoes/Thunderstorms<br>Cyber<br>Flood |
| **MODERATE RISK** | Geological Hazards (Landslide)<br>Drought<br>Earthquakes<br>Hazardous Material Incident<br>Wildfire |
| **LOW RISK** | Excessive Heat<br>Terrorism<br>Hurricane and Coastal Hazards<br>Dam and Levee Failure<br>Radiological Emergency<br>Electromagnetic Pulse<br>Infectious Disease |

# SECTION 6
# VULNERABILITY ASSESSMENT

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

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

**44 CFR Requirement**

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

## 6.1 OVERVIEW

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

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

## 6.2 METHODOLOGY

This vulnerability assessment was conducted using three distinct methodologies: (1) A stochastic risk assessment; (2) a geographic information system (GIS)-based analysis; and (3) a risk modeling software

analysis. Each approach provides estimates for the potential impact of hazards by using a common, systematic framework for evaluation, including historical occurrence information provided in the *Hazard Identification* and *Hazard Profiles* sections. A brief description of the three different approaches is provided on the following pages.

### 6.2.1 Stochastic Risk Assessment

The stochastic risk assessment methodology was applied to analyze hazards of concern that were outside the scope of the GIS-based risk assessment and NCEM's Risk Management Tool. This involves the consideration of annualized loss estimates and impacts of current and future buildings and populations. Annualized loss is the estimated long-term weighted average value of losses to property in any single year in a specified geographic area (i.e., municipal jurisdiction or county). This methodology is applied primarily to hazards that do not have geographically-definable boundaries and are therefore excluded from spatial analysis through GIS. A stochastic risk methodology was used for the following hazards:

- Geological
- Tornadoes/Thunderstorms
- Severe Winter Weather
- Hazardous Substances

With the exception of Hazardous Substances, the hazards listed above are considered natural and have the potential to affect all current and future buildings and all populations. **Table 6.1** provides information about all improved property in the Toe River region that is vulnerable to these hazards. For all hazards annualized loss estimates were determined using the best available data on historical losses from sources including NOAA's National Centers for Environmental Information records, the previous Toe River Regional Hazard Mitigation Plan, and local knowledge. Annualized loss estimates were generated by totaling the amount of property damage over the period of time for which records were available, and calculating the average annual loss. Given the standard weighting analysis, losses can be readily compared across hazards providing an objective approach for evaluating mitigation alternatives.

For the dam failure[1], drought, excessive heat, infectious disease, radiological emergency, terrorism, cyber, EMP, and geological hazards, no data with historical property damages was available. Therefore, a detailed vulnerability assessment could not be completed for these hazards at this time.

The results for these hazards are found at the end of this section in **Table 6.26**.

### 6.2.2 GIS-Based Analysis

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

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

[1] As noted in Section 5: *Hazard Profiles*, dam failure could be catastrophic to structures and populations in the inundation area. Appendix I includes some detailed information about the vulnerability associated with the Lady Marion Dam. However, due to lack of more data for other dams at this time, no additional analysis was performed during this update. Further, USACE and NCDQ also complete separate dam failure plans to identify risk and response measures. More information on those analyses can be obtain by contacting USACE and NCDEQ. Additional dam failure vulnerability analysis will be conducted during the 2026 update of this plan if there is sufficient data and methodology to do so.

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

### 6.2.3 Risk Management Tool

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

The Risk Assessment produced by the Risk Tool will also identify high-risk structures in the planning area and estimate cost by types of mitigation projects (wind retrofits, elevation, acquisition, mitigation reconstruction) and benefit-cost estimates by type of mitigation. The mitigation tool is only meant to begin the process of thinking about problem areas where mitigation may be of interest to the jurisdiction and property owners. It is also designed to drive mitigation actions that are specific, measurable, attainable, realistic and timely.

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

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

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

A list of the hazards assessed by the RMT follows:

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

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

**Hazard Prioritization**

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

## 6.3 EXPLANATION OF DATA SOURCES

### Hurricane and Coastal Hazards

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

### Tornadoes/Thunderstorms

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

### Earthquakes

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

### Geological (Landslide)

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

### Flooding

FEMA Digital Flood Insurance Rate Maps (DFIRMs) were used to determine flood vulnerability. DFIRM data can be used in ArcGIS for mapping purposes and, they identify several features including floodplain boundaries and base flood elevations. Identified areas on the DFIRM represent some features of a Flood Insurance Rate Maps including

the 100-year flood areas (1.0-percent annual chance flood), and the 500- year flood areas (0.2-percent annual chance flood). For the vulnerability assessment, local parcel data and critical facilities were overlaid on the 100-year floodplain areas and 500-year floodplain areas. This data was also supplemented with the NCEM RMT data, which assessed structure type and vulnerable populations within the floodplain areas. It should be noted that such an analysis does account for building elevation.

### Wildfires

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

### Hazardous Substances

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

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

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

## 6.4 ASSET INVENTORY

An inventory of geo-referenced assets within Avery, McDowell, Mitchell, and Yancey Counties and jurisdictions was compiled in order to identify and characterize those properties potentially at risk to the identified hazards[2]. 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

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

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:

- **Improved Property -** Includes all improved properties in the Toe River Region according to local parcel data provided by the counties. The information has been expressed in terms of the number of parcels and total assessed value of improvements (buildings) that may be exposed to the identified hazards.
- **Critical Facilities** - Critical facilities vary by jurisdiction. Each county provided data from their respective critical facilities that were used in this section. Identified critical facilities are fire stations, police stations, medical care facilities, schools, government facilities, emergency operation centers, or other important buildings. It should be noted that this listing is not all-inclusive for assets located in the region, but it is anticipated that it will be expanded during future plan updates as more geo-referenced data becomes available for use in GIS analysis.

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

**Table 6.1** lists the number of parcels, total value of parcels, total number of parcels with improvements, and the total assessed value of improvements for participating areas of the Toe River Region (study area of vulnerability assessment)[3].

**TABLE 6.1: IMPROVED PROPERTY IN THE TOE RIVER REGION**

| Location[4] | Number of Parcels | Total Assessed Value of Parcels | Estimated Number of Buildings | Total Assessed Value of Improvements |
|---|---|---|---|---|
| **Avery County** | **23,447** | **$1,506,230,090** | **12,481** | **$2,493,451,813** |
| Banner Elk | 1,004 | $98,972,694 | 559 | $143,457,229 |
| Crossnore | 164 | $3,512,200 | 109 | $38,323,100 |
| Elk Park | 379 | $7,575,800 | 273 | $19,888,700 |
| Grandfather Village | 386 | $94,403,600 | 279 | $185,229,300 |
| Newland | 515 | $27,964,100 | 372 | $70,121,074 |
| Sugar Mountain | 1,073 | $57,459,400 | 446 | $114,791,300 |
| Unincorporated Area | 19,926 | $1,216,342,296 | 10,443 | $1,921,641,110 |
| **McDowell County** | **32,070** | **$1,676,115,150** | **17,448** | **$2,463,467,663** |
| Marion | 4,001 | $200,180,950 | 2,997 | $476,042,982 |
| Old Fort | 623 | $22,970,580 | 381 | $70,088,380 |
| Unincorporated Area | 27,446 | $1,452,963,620 | 14,070 | $1,917,336,301 |
| **Mitchell County** | **17,536** | **$883,487,700** | **9,190** | **$1,278,642,200** |
| Bakersville | 318 | $10,650,800 | 255 | $41,086,000 |
| Spruce Pine | 1,394 | $47,928,800 | 1,008 | $183,627,300 |
| Unincorporated Areas | 17,218 | $872,836,900 | 8,935 | $1,237,556,200 |
| **Yancey County** | **16,899** | **$1,205,299,147** | **10,588** | **$1,273,895,772** |
| Burnsville | 966 | $64,384,450 | 783 | $130,175,105 |

[3] 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. It should also be noted that, due to record keeping, some duplication is possible thus potentially resulting in an inflated value exposure for an area.

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

| Location[4] | Number of Parcels | Total Assessed Value of Parcels | Estimated Number of Buildings | Total Assessed Value of Improvements |
|---|---|---|---|---|
| Unincorporated Area | 15,933 | $1,140,914,697 | 9,805 | $1,143,720,667 |
| **Toe River Regional Total** | **89,952** | **$5,271,132,087** | **49,707** | **$7,509,457,448** |

*Source: Local governments*

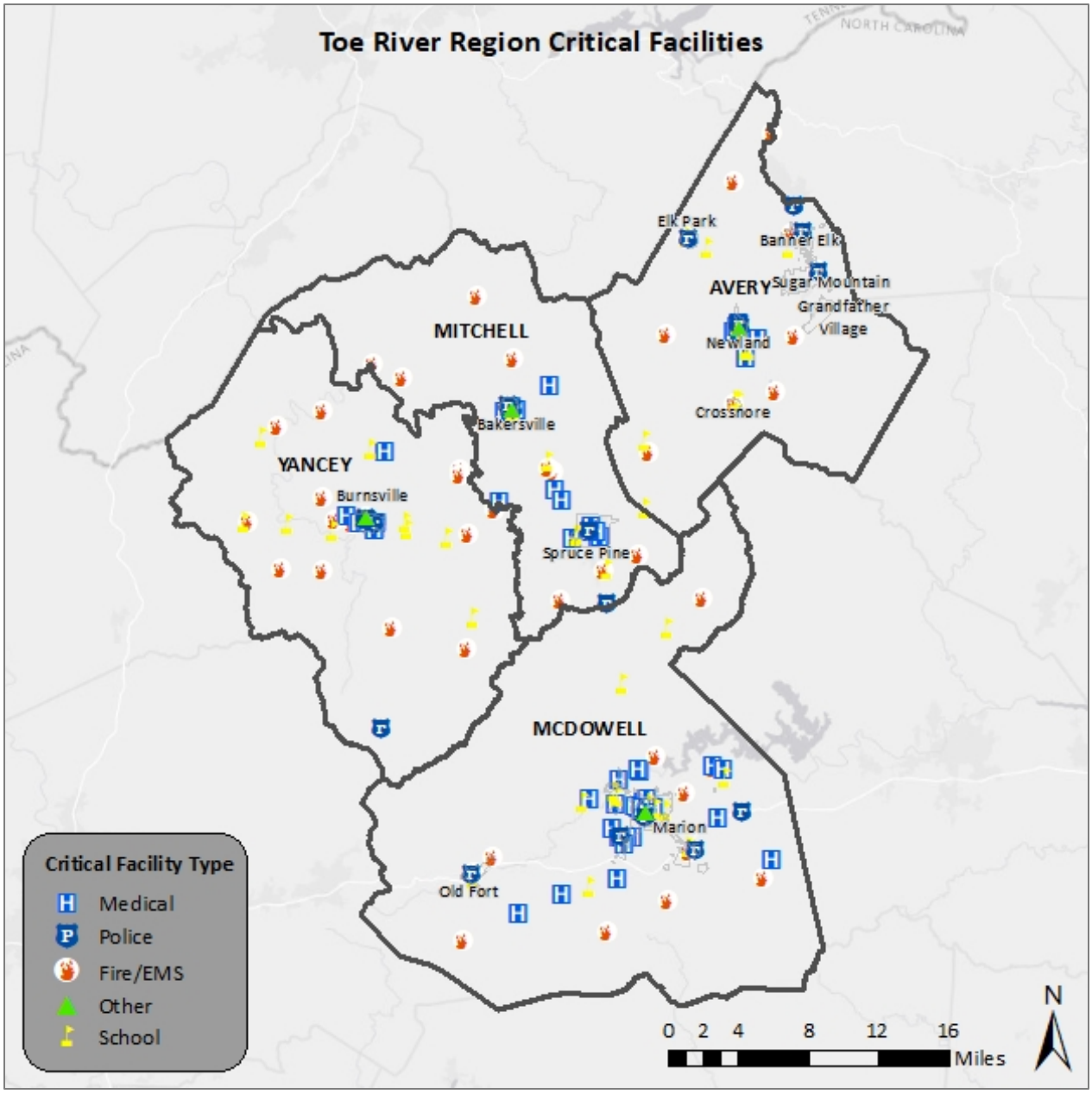
The following table lists the fire stations, police stations, emergency operations centers (EOCs), medical care facilities, schools, and other critical facilities located in the Toe River Region. Local governments at the county level provided a majority of the data for this analysis. In addition, **Figure 6.2** shows the locations of essential facilities in the Toe River Region. **Table 6.26**, at the end of this section, shows a complete list of the critical facilities by name, as well as the hazards that affect each facility. As noted previously, this list is not all inclusive and only includes information provided by the counties.

## TABLE 6.2: TOE RIVER REGION CRITICAL FACILITY INVENTORY

| Location | Fire/EMS Stations | Police Stations | Medical Care Facilities | Schools | Other |
|---|---|---|---|---|---|
| **Avery County** | **14** | **7** | **7** | **13** | **1** |
| Banner Elk | 2 | 1 | 0 | 1 | 0 |
| Crossnore | 1 | 0 | 0 | 1 | 0 |
| Elk Park | 2 | 1 | 0 | 1 | 0 |
| Grandfather Village | 0 | 0 | 0 | 0 | 0 |
| Newland | 2 | 3 | 4 | 1 | 1 |
| Sugar Mountain | 0 | 1 | 0 | 0 | 0 |
| Unincorporated Area | 7 | 1 | 3 | 9 | 0 |
| **McDowell County** | **15** | **5** | **29** | **12** | **1** |
| Marion | 5 | 2 | 15 | 4 | 1 |
| Old Fort | 1 | 1 | 0 | 1 | 0 |
| Unincorporated Area | 9 | 2 | 14 | 7 | 0 |
| **Mitchell County** | **11** | **4** | **17** | **6** | **1** |
| Bakersville | 1 | 2 | 3 | 2 | 1 |
| Spruce Pine | 1 | 1 | 8 | 2 | 0 |
| Unincorporated Areas | 9 | 1 | 6 | 2 | 0 |
| **Yancey County** | **16** | **5** | **11** | **9** | **1** |
| Burnsville | 2 | 4 | 9 | 0 | 1 |
| Unincorporated Area | 14 | 1 | 2 | 9 | 0 |
| **Toe River Regional Total** | **56** | **21** | **64** | **40** | **4** |

*Source: Local governments*

## FIGURE 6.1: CRITICAL FACILITIES IN THE TOE RIVER REGION




*Source: Local governments*

## 6.4.2 Social Vulnerability

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

**Table 6.3** lists the population by county according to U.S. Census 2010 population estimates. The population estimates are updated using the most recent vintage tables dated July 1, 2018. The total population in the Toe River Region according to Census data is 95,915.

### TABLE 6.3: TOTAL POPULATION IN THE TOE RIVER REGION

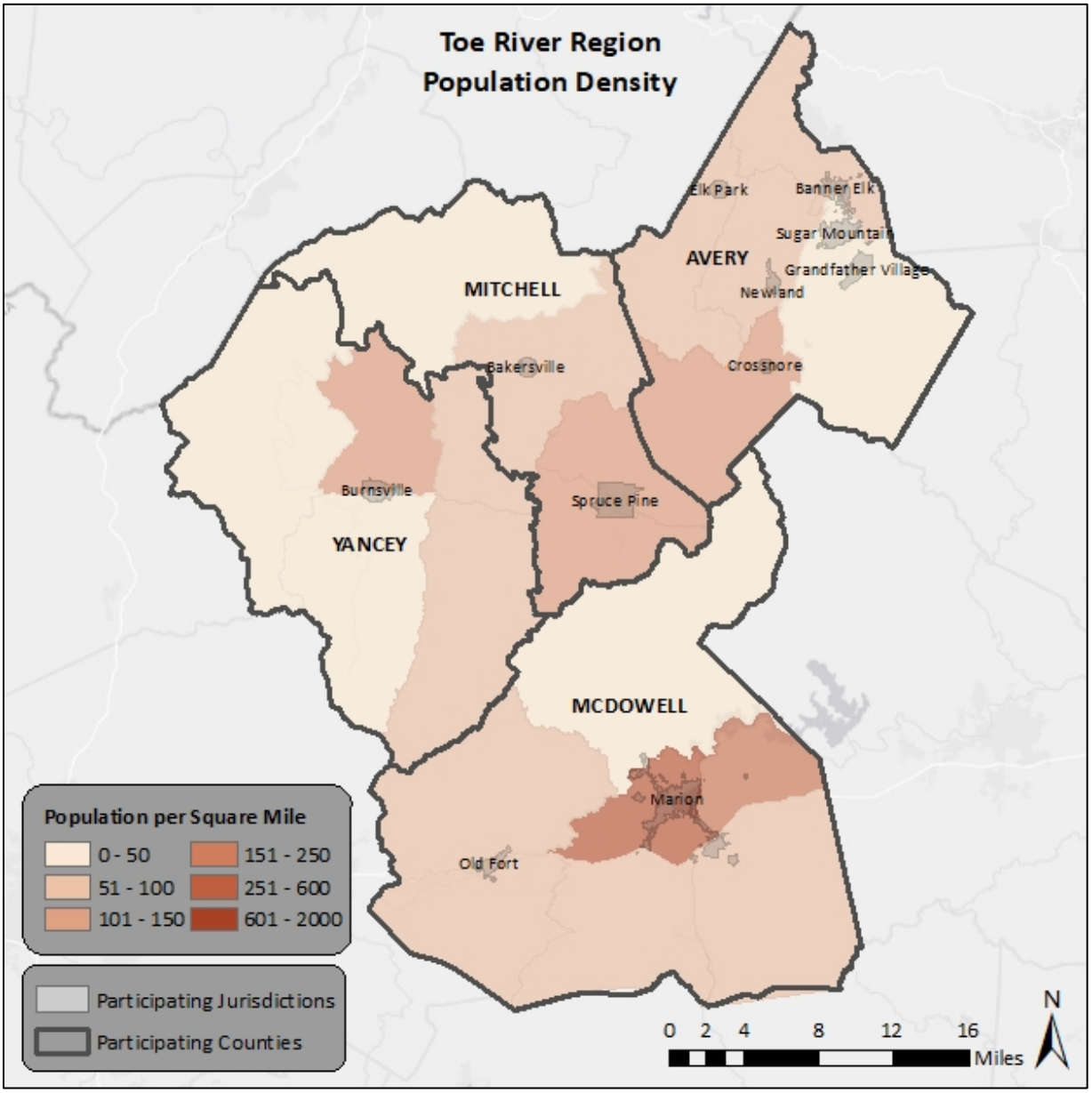
| Location | 2018 Population Estimates |
|---|---|
| Avery County | 17,505 |
| McDowell County | 45,507 |
| Mitchell County | 15,000 |
| Yancey County | 17,903 |
| **Toe River Regional Total** | **95,915** |

*Source: US Census Bureau*

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

In addition, **Figures 6.3** illustrates the population density by census tract for each county in the region as it was reported by the US Census Bureau in 2010 and updated with 2017 population estimates.

**FIGURE 6.2: POPULATION DENSITY IN AVERY COUNTY**



### 6.4.3. Development Trends and Changes in Vulnerability

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

**TABLE 6.4: BUILDING COUNTS FOR THE TOE RIVER REGION**

| Location | Total Housing Units (2017) | Units Built 2010 or Later | % Building Stock Built Post-2010 |
|---|---|---|---|
| **Avery County** | **14,110** | **235** | **1.7%** |
| Banner Elk | 608 | 3 | 0.5% |
| Crossnore | 104 | - | 0.0% |
| Elk Park | 337 | - | 0.0% |
| Grandfather Village | 426 | 4 | 0.9% |
| Newland | 466 | 32 | 6.9% |
| Sugar Mountain | 1,732 | 2 | 0.1% |
| Unincorporated Area | 10,437 | 194 | 1.9% |
| **McDowell County** | **21,196** | **806** | **3.8%** |
| Marion | 3,070 | 151 | 4.9% |
| Old Fort | 510 | 13 | 2.5% |
| Unincorporated Area | 17,616 | 642 | 3.6% |
| **Mitchell County** | **8,800** | **109** | **1.2%** |
| Bakersville | 278 | - | 0.0% |
| Spruce Pine | 955 | - | 0.0% |
| Unincorporated Areas | 7,567 | 109 | 1.4% |
| **Yancey County** | **11,170** | **272** | **2.4%** |
| Burnsville | 997 | 62 | 6.2% |
| Unincorporated Area | 10,173 | 210 | 2.1% |
| **Toe River Regional Total** | **55,276** | **1,422** | **2.6%** |

*Source: US Census Bureau*

**Table 6.5** shows population growth estimates for the region from 2010 to 2017 based on the US Census Annual Estimates of Resident Population and 2017 population estimates.

**TABLE 6.5: POPULATION GROWTH FOR THE TOE RIVER REGION**

| Location | 2010 | 2012 | 2014 | 2016 | 2018 | % Change 2010-2018 |
|---|---|---|---|---|---|---|
| **Avery County** | **17,765** | **17,576** | **17,615** | **17,423** | **17,505** | **-1.5%** |
| Banner Elk | 1,020 | 1,049 | 1,125 | 1,092 | 1,091 | 7.0% |
| Crossnore | 191 | 191 | 191 | 185 | 187 | -2.1% |
| Elk Park | 451 | 444 | 443 | 443 | 445 | -1.3% |
| Grandfather Village | 25 | 24 | 25 | 24 | 24 | -4.0% |
| Newland | 700 | 691 | 688 | 683 | 686 | -2.0% |
| Sugar Mountain | 200 | 198 | 197 | 196 | 197 | -1.5% |
| Unincorporated Area | 15,178 | 14,979 | 14,946 | 14,800 | 14,875 | -2.0% |
| **McDowell County** | **45,098** | **45,003** | **45,018** | **44,882** | **45,507** | **0.9%** |
| Marion | 8,153 | 8,051 | 7,962 | 7,712 | 7,871 | -3.5% |
| Old Fort | 907 | 908 | 907 | 908 | 919 | 1.3% |
| Unincorporated Area | 36,038 | 36,044 | 36,149 | 36,262 | 36,717 | 1.9% |

| Location | 2010 | 2012 | 2014 | 2016 | 2018 | % Change 2010-2018 |
|---|---|---|---|---|---|---|
| **Mitchell County** | **15,507** | **15,321** | **15,166** | **14,991** | **15,000** | **-3.3%** |
| Bakersville | 469 | 464 | 456 | 451 | 452 | -3.6% |
| Spruce Pine | 2,230 | 2,202 | 2,180 | 2,156 | 2,148 | -3.7% |
| Unincorporated Areas | 12,808 | 12,655 | 12,530 | 12,384 | 12,400 | -3.2% |
| **Yancey County** | **17,806** | **17,624** | **17,546** | **17,618** | **17,903** | **0.5%** |
| Burnsville | 1,693 | 1,669 | 1,651 | 1,633 | 1,647 | -2.7% |
| Unincorporated Area | 16,113 | 15,955 | 15,895 | 15,985 | 16,256 | 0.9% |
| **Toe River Regional Total** | **96,176** | **95,524** | **95,345** | **94,914** | **95,915** | **-0.3%** |

*Source: US Census Bureau*

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

## 6.5 VULNERABILITY ASSESSMENT RESULTS

As noted earlier, only hazards with a specific geographic boundary, modeling tool, or sufficient historical data allow for further analysis. Those results are presented here. All other hazards are assumed to impact the entire planning region (drought, excessive heat, hailstorm, lightning, and severe winter weather) or, due to lack of data, analysis would not lead to credible results (sinkholes, erosion, dam failure, infectious disease, terrorism, cyber, EMP). The total region exposure for critical facilities is presented in **Table 6.26**.
The annualized loss estimate for all hazards is presented at the end of this section in **Table 6.25.**

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

### 6.5.1. Hurricane and Coastal Hazards

Historical evidence indicates that the Toe River Region has a significant risk to the hurricane and tropical storm hazard, mostly due to the location of the state of North Carolina as a coastal state. In recent years, there have been several disaster declarations from hurricanes in the region. The most recent hurricane experienced by the region was Hurricane Michael in 2018. Many more storm tracks have come near or traversed through the region, as shown and discussed in Section 5: *Hazard Profiles.*

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

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

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

#### TABLE 6.6: BUILDING VULNERABILITY TO HURRICANE WINDS

| Location | Pre-Firm Buildings at Risk | Residential Buildings at Risk | | Commercial Buildings at Risk | | Public Buildings at Risk | | Total Buildings at Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Damages | Number | Damages | Number | Damages | Number | Damages |
| **Avery County** | **11,107** | **13,677** | **$1,218,165** | **904** | **$233,723** | **388** | **$64,936** | **14,969** | **$1,516,824** |
| Banner Elk | 789 | 1,083 | $111,190 | 131 | $43,118 | 77 | $9,159 | 1,291 | $163,467 |
| Crossnore | 89 | 90 | $36,874 | 12 | $210 | 29 | $2,082 | 131 | $39,166 |
| Elk Park | 262 | 278 | $14,273 | 16 | $892 | 19 | $1,001 | 313 | $16,166 |
| Grandfather Village | 242 | 294 | $65,054 | 11 | $18,084 | 0 | $- | 305 | $83,139 |
| Newland | 391 | 343 | $29,010 | 101 | $9,088 | 32 | $5,824 | 476 | $43,921 |
| Sugar Mountain | 470 | 444 | $46,691 | 35 | $11,900 | 4 | $714 | 483 | $59,305 |
| Unincorporated Area | 8,864 | 11,145 | $915,073 | 598 | $150,431 | 227 | $46,156 | 11,970 | $1,111,660 |
| **McDowell County** | **26,761** | **25,344** | **$1,828,718** | **1,188** | **$456,213** | **212** | **$203,279** | **26,744** | **$2,488,210** |
| Marion | 3,309 | 2,862 | $248,248 | 358 | $132,467 | 84 | $37,109 | 3,304 | $417,824 |
| Old Fort | 594 | 535 | $28,553 | 51 | $28,186 | 8 | $1,516 | 594 | $58,255 |
| Unincorporated Area | 22,858 | 21,947 | $1,551,917 | 779 | $295,560 | 120 | $164,654 | 22,846 | $2,012,131 |
| **Mitchell County** | **10,943** | **10,409** | **$742,664** | **543** | **$119,071** | **114** | **$66,171** | **11066** | **$927,907** |
| Bakersville | 279 | 218 | $14,942 | 46 | $3,950 | 15 | $961 | 279 | $19,854 |
| Spruce Pine | 937 | 837 | $74,744 | 191 | $21,114 | 32 | $4,423 | 1,060 | $100,281 |
| Unincorporated Areas | 9,727 | 9,354 | $652,978 | 306 | $94,007 | 67 | $60,787 | 9,727 | $807,772 |
| **Yancey County** | **9,923** | **13,116** | **$996,046** | **443** | **$128,407** | **98** | **$56,932** | **13657** | **$1,181,387** |
| Burnsville | 718 | 715 | $73,035 | 153 | $15,327 | 22 | $2,780 | 890 | $91,143 |
| Unincorporated Area | 9,205 | 12,401 | $923,011 | 290 | $113,080 | 76 | $54,152 | 12,767 | $1,090,244 |
| **Toe River Regional Total** | **50,654** | **62,546** | **$4,785,593** | **3,078** | **$937,414** | **812** | **$391,318** | **66,436** | **$6,114,328** |

*Source: NCEM Risk Management Tool*

## TABLE 6.7: POPULATION VULNERABILITIES TO HURRICANE WINDS

| Location | Elderly at Risk | Children at Risk | Total at Risk |
|---|---|---|---|
| **Avery County** | **3,039** | **758** | **17,477** |
| Banner Elk | 265 | 66 | 1,522 |
| Crossnore | 31 | 8 | 178 |
| Elk Park | 78 | 19 | 451 |
| Grandfather Village | 4 | 1 | 25 |
| Newland | 112 | 28 | 643 |
| Sugar Mountain | 33 | 8 | 189 |
| Unincorporated Area | 2,516 | 628 | 14,469 |
| **McDowell County** | **7,348** | **2,587** | **44,824** |
| Marion | 1,284 | 452 | 7,833 |
| Old Fort | 124 | 44 | 759 |
| Unincorporated Area | 5,940 | 2,091 | 36,232 |
| **Mitchell County** | **3,224** | **761** | **15,396** |
| Bakersville | 100 | 24 | 480 |
| Spruce Pine | 389 | 92 | 1,855 |
| Unincorporated Areas | 2,735 | 645 | 13,061 |
| **Yancey County** | **3,591** | **834** | **17,428** |
| Burnsville | 342 | 79 | 1,660 |
| Unincorporated Area | 3,249 | 755 | 15,768 |
| **Toe River Regional Total** | **17,202** | **4,940** | **95,125** |

*Source: NCEM Risk Management Tool*

**SOCIAL VULNERABILITY**

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

**CRITICAL FACILITIES**

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

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

## 6.5.2 Tornadoes/Thunderstorms

### Tornadoes

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

**TABLE 6.8: BUILDING VULNERABILITY TO THE TORNADOES HAZARD**

| Location | Pre-Firm Buildings at Risk | Residential Buildings at Risk | | Commercial Buildings at Risk | | Public Buildings at Risk | | Total Buildings at Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Damages | Number | Damages | Number | Damages | Number | Damages |
| **Avery County** | **11,254** | **13,888** | **$2,115,504,742** | **904** | **$605,836,080** | **388** | **$229,734,082** | **15,180** | **$2,951,074,90** |
| Banner Elk | 804 | 1,105 | $219,268,596 | 131 | $100,992,601 | 77 | $45,371,030 | 1,313 | $365,632,227 |
| Crossnore | 92 | 94 | $31,749,348 | 12 | $2,084,264 | 29 | $13,661,368 | 135 | $47,494,980 |
| Elk Park | 271 | 288 | $26,045,309 | 16 | $6,329,712 | 19 | $6,583,517 | 323 | $38,958,538 |
| Grandfather Village | 242 | 294 | $106,769,964 | 11 | $28,964,104 | - | $0 | 305 | $135,734,069 |
| Newland | 404 | 357 | $34,164,515 | 101 | $55,051,488 | 32 | $28,114,793 | 490 | $117,330,796 |
| Sugar Mountain | 471 | 446 | $81,770,995 | 35 | $41,433,984 | 4 | $3,913,078 | 485 | $127,118,056 |
| Unincorporated Area | 8,970 | 11,304 | $1,615,736,015 | 598 | $370,979,927 | 227 | $132,090,296 | 12,129 | $2,118,806,23 |
| **McDowell County** | **26,857** | **25,440** | **$2,792,311,757** | **1,188** | **$1,478,248,521** | **212** | **$303,784,866** | **26,840** | **$4,574,345,14** |
| Marion | 3,324 | 2,877 | $381,447,238 | 358 | $325,984,486 | 84 | $107,780,339 | 3,319 | $815,212,064 |
| Old Fort | 598 | 539 | $66,697,605 | 51 | $189,493,198 | 8 | $8,276,821 | 598 | $264,467,624 |
| Unincorporated Area | 22,935 | 22,024 | $2,344,166,914 | 779 | $962,770,837 | 120 | $187,727,706 | 22,923 | $3,494,665,45 |
| **Mitchell County** | **11,052** | **10,518** | **$1,264,180,559** | **543** | **$359,528,785** | **114** | **$122,476,735** | **11,175** | **$1,746,186,08** |
| Bakersville | 281 | 220 | $35,048,025 | 46 | $12,727,762 | 15 | $5,924,796 | 281 | $53,700,583 |
| Spruce Pine | 964 | 864 | $115,164,511 | 191 | $99,256,851 | 32 | $23,391,547 | 1,087 | $237,812,910 |
| Unincorporated Areas | 9,807 | 9,434 | $1,113,968,023 | 306 | $247,544,172 | 67 | $93,160,392 | 9,807 | $1,454,672,58 |
| **Yancey County** | **10,150** | **13,419** | **1,644,998,471** | **443** | **$385,916,802** | **98** | **$88,387,426** | **13,960** | **$2,119,302,69** |
| Burnsville | 722 | 721 | $101,116,237 | 153 | $92,888,865 | 22 | $9,659,302 | 896 | $203,664,404 |
| Unincorporated Area | 9,428 | 12,698 | $1,543,882,234 | 290 | $293,027,937 | 76 | $78,728,124 | 13,064 | $1,915,638,29 |
| **Toe River Regional Total** | **59,313** | **63,265** | **7,816,995,529** | **3,078** | **2,829,530,188** | **812** | **$744,383,109** | **67,155** | **$11,390,908,82** |

*Source: NCEM Risk Management Tool*

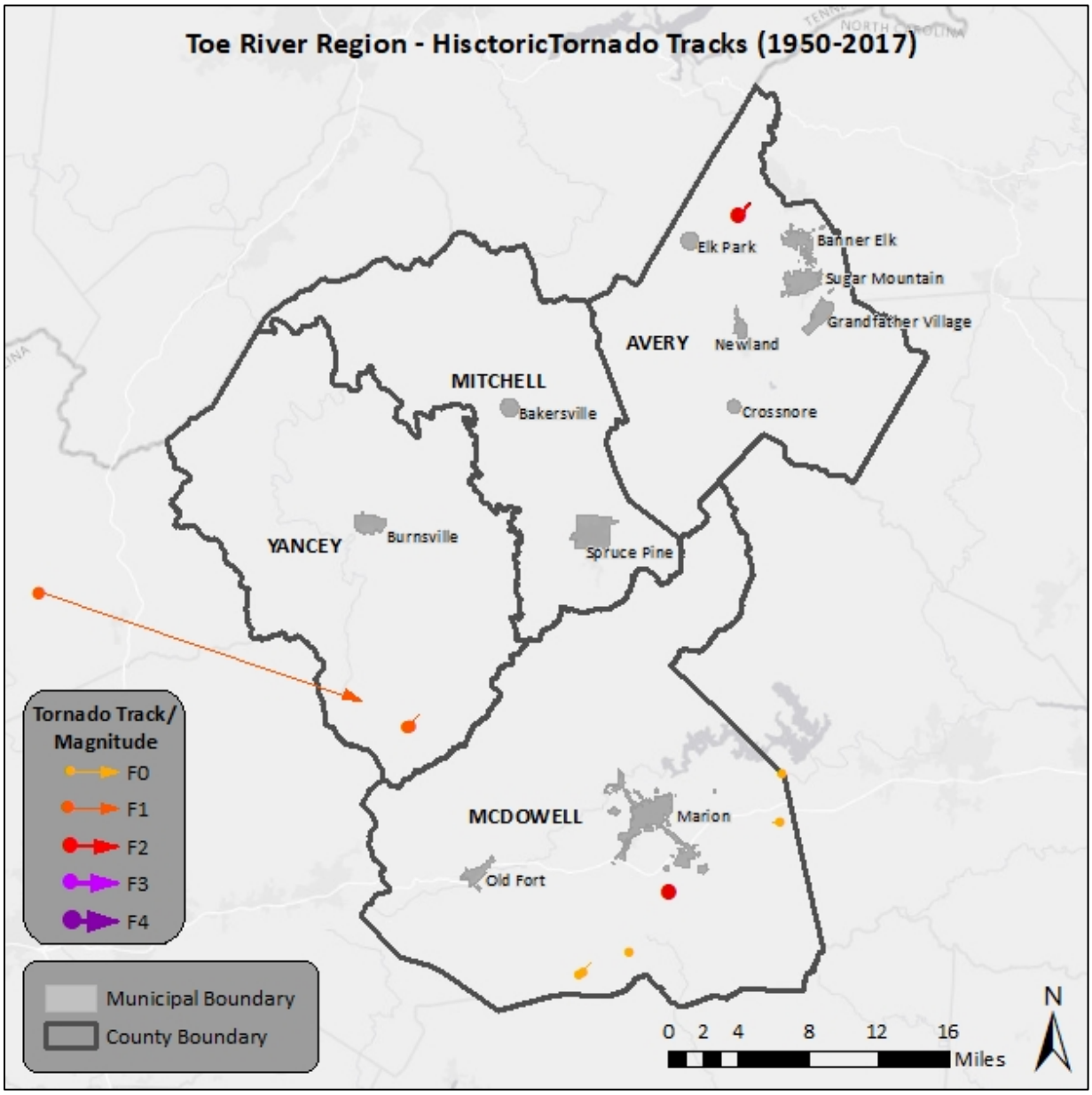
### TABLE 6.9: POPULATION VULNERABILITY TO THE TORNADOES HAZARD

| Location | Elderly at Risk | Children at Risk | Total at Risk |
|---|---|---|---|
| **Avery County** | **3,088** | **770** | **17,763** |
| Banner Elk | 270 | 67 | 1,552 |
| Crossnore | 32 | 8 | 186 |
| Elk Park | 81 | 20 | 467 |
| Grandfather Village | 4 | 1 | 25 |
| Newland | 116 | 29 | 669 |
| Sugar Mountain | 33 | 8 | 190 |
| Unincorporated Area | 2,552 | 637 | 14,674 |
| **McDowell County** | **7,377** | **2,596** | **44,998** |
| Marion | 1,291 | 454 | 7,874 |
| Old Fort | 125 | 44 | 765 |
| Unincorporated Area | 5,961 | 2,098 | 36,359 |
| **Mitchell County** | **3,260** | **770** | **15,570** |
| Bakersville | 101 | 24 | 484 |
| Spruce Pine | 401 | 95 | 1,914 |
| Unincorporated Areas | 2,758 | 651 | 13,172 |
| **Yancey County** | **3,672** | **853** | **17,819** |
| Burnsville | 345 | 80 | 1,674 |
| Unincorporated Area | 3,327 | 773 | 16,145 |
| **Toe River Regional Total** | **17,397** | **4,989** | **96,150** |

*Source: NCEM Risk Management Tool*

A map of historical tornado points of origin and paths can be seen in **Figure 6.7.**

## FIGURE 6.3: HISTORICAL TORNADO TRACKS




*Source: NOAA*

## Thunderstorms

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

## TABLE 6.10: BUILDING VULNERABILITY TO THUNDERSTORM WINDS

| Location | Pre-Firm Buildings at Risk | Residential Buildings at Risk | | Commercial Buildings at Risk | | Public Buildings at Risk | | Total Buildings at Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Damages | Number | Damages | Number | Damages | Number | Damages |
| **Avery County** | **8,966** | **11,298** | **$3,396,393** | **598** | **$749,583** | **227** | **$223,906** | **12,123** | **$4,369,882** |
| Banner Elk | 804 | 1,105 | $426,560 | 131 | $213,034 | 77 | $36,643 | 1,313 | $676,237 |
| Crossnore | 92 | 94 | $110,274 | 12 | $569 | 29 | $8,063 | 135 | $118,906 |
| Elk Park | 271 | 288 | $58,551 | 16 | $2,616 | 19 | $4,543 | 323 | $65,710 |
| Grandfather Village | 242 | 294 | $236,236 | 11 | $97,112 | 0 | $0 | 305 | $333,348 |
| Newland | 404 | 357 | $101,414 | 101 | $31,143 | 32 | $24,026 | 490 | $156,583 |
| Sugar Mountain | 471 | 446 | $163,886 | 35 | $62,164 | 4 | $3,243 | 485 | $229,292 |
| Unincorporated Area | 6,682 | 8,714 | $2,299,472 | 292 | $342,945 | 66 | $147,388 | 9,072 | $2,789,806 |
| **McDowell County** | **22,935** | **22,024** | **$5,515,163** | **779** | **$1,484,705** | **120** | **$846,541** | **22,923** | **$7,846,408** |
| Marion | 3,324 | 2,877 | $896,931 | 358 | $631,675 | 84 | $149,503 | 3,319 | $1,678,108 |
| Old Fort | 598 | 539 | $109,501 | 51 | $83,146 | 8 | $3,724 | 598 | $196,370 |
| Unincorporated Area | 19,013 | 18,608 | $4,508,731 | 370 | $769,884 | 28 | $693,314 | 19,006 | $5,971,930 |
| **Mitchell County** | **9,807** | **9,434** | **$2,378,318** | **306** | **$457,902** | **67** | **$308,131** | **9,807** | **$3,144,352** |
| Bakersville | 281 | 220 | $67,906 | 46 | $17,026 | 15 | $2,742 | 281 | $87,673 |
| Spruce Pine | 964 | 864 | $277,001 | 191 | $76,790 | 32 | $13,279 | 1,087 | $367,070 |
| Unincorporated Areas | 8,562 | 8,350 | $2,033,411 | 69 | $364,086 | 20 | $292,110 | 8,439 | $2,689,609 |
| **Yancey County** | **9,428** | **12,698** | **$3,410,294** | **290** | **$590,116** | **76** | **$272,216** | **13,064** | **$4,272,626** |
| Burnsville | 722 | 721 | $249,588 | 153 | $51,446 | 22 | $8,033 | 896 | $309,068 |
| Unincorporated Area | 8,706 | 11,977 | $3,160,706 | 137 | $538,670 | 54 | $264,183 | 12,168 | $3,963,558 |
| **Toe River Regional Total** | **51,136** | **55,454** | **$14,700,168** | **1,973** | **$3,282,306** | **490** | **$1,650,794** | **57,917** | **$19,633,268** |

*Source: NCEM Risk Management Tool*

## TABLE 6.11: POPULATION VULNERABILITY TO THUNDERSTORM WINDS

| Location | Elderly at Risk | Children at Risk | Total at Risk |
|---|---|---|---|
| **Avery County** | **2,551** | **637** | **14,666** |
| Banner Elk | 270 | 67 | 1,552 |
| Crossnore | 32 | 8 | 186 |
| Elk Park | 81 | 20 | 467 |
| Grandfather Village | 4 | 1 | 25 |
| Newland | 116 | 29 | 669 |
| Sugar Mountain | 33 | 8 | 190 |
| Unincorporated Area | 2,015 | 504 | 11,577 |
| **McDowell County** | **5,961** | **2,098** | **36,359** |
| Marion | 1,291 | 454 | 7,874 |
| Old Fort | 125 | 44 | 765 |
| Unincorporated Area | 4,545 | 1,600 | 27,720 |
| **Mitchell County** | **2,758** | **651** | **13,172** |
| Bakersville | 101 | 24 | 484 |
| Spruce Pine | 401 | 95 | 1,914 |
| Unincorporated Areas | 2,256 | 532 | 10,774 |
| **Yancey County** | **3,327** | **773** | **16,145** |
| Burnsville | 345 | 80 | 1,674 |

| Location | Elderly at Risk | Children at Risk | Total at Risk |
|---|---|---|---|
| Unincorporated Area | 2,982 | 693 | 14,471 |
| **Toe River Regional Total** | **14,597** | **4,159** | **80,342** |

*Source: NCEM Risk Management Tool*

**SOCIAL VULNERABILITY**

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

**CRITICAL FACILITIES**

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

## 6.5.3. Earthquakes

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

### TABLE 6.12: BUILDING VULNERABILITY TO THE EARTHQUAKE HAZARD

| Location | Pre-Firm Buildings at Risk | Residential Buildings at Risk | | Commercial Buildings at Risk | | Public Buildings at Risk | | Total Buildings at Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Damages | Number | Damages | Number | Damages | Number | Damages |
| **Avery County** | **11,254** | **13,888** | **$4,522,047** | **904** | **$2,464,047** | **388** | **$1,042,007** | **15,180** | **$8,028,101** |
| Banner Elk | 804 | 1,105 | $485,552 | 131 | $478,819 | 77 | $192,700 | 1,313 | $1,157,071 |
| Crossnore | 92 | 94 | $93,026 | 12 | $9,722 | 29 | $62,861 | 135 | $165,609 |
| Elk Park | 271 | 288 | $76,716 | 16 | $31,513 | 19 | $32,025 | 323 | $140,254 |
| Grandfather Village | 242 | 294 | $232,422 | 11 | $91,828 | - | $- | 305 | $324,250 |
| Newland | 404 | 357 | $84,405 | 101 | $266,164 | 32 | $136,196 | 490 | $486,765 |
| Sugar Mountain | 471 | 446 | $194,235 | 35 | $153,801 | 4 | $17,843 | 485 | $365,879 |
| Unincorporated Area | 8,970 | 11,304 | $3,355,691 | 598 | $1,432,200 | 227 | $600,382 | 12,129 | $5,388,273 |
| **McDowell County** | **26,857** | **25,440** | **$6,446,158** | **1,188** | **$6,182,510** | **212** | **1,398,200** | **26,840** | **14,026,868** |
| Marion | 3,324 | 2,877 | $1,108,585 | 358 | $1,500,854 | 84 | $562,378 | 3,319 | $3,171,817 |
| Old Fort | 598 | 539 | $238,639 | 51 | $821,009 | 8 | $55,306 | 598 | $1,114,954 |
| Unincorporated Area | 22,935 | 22,024 | $5,098,934 | 779 | $3,860,647 | 120 | $780,516 | 22,923 | $9,740,097 |
| **Mitchell County** | **11,052** | **10,518** | **$3,031,141** | **543** | **$1,620,014** | **114** | **$609,972** | **11,175** | **$5,261,127** |
| Bakersville | 281 | 220 | $106,276 | 46 | $64,841 | 15 | $32,243 | 281 | $203,360 |
| Spruce Pine | 964 | 864 | $320,395 | 191 | $500,344 | 32 | $124,494 | 1,087 | $945,232 |
| Unincorporated Areas | 9,807 | 9,434 | $2,604,470 | 306 | $1,054,829 | 67 | $453,235 | 9,807 | $4,112,535 |
| **Yancey County** | **10,150** | **13,419** | **$4,072,693** | **443** | **$1,744,372** | **98** | **$442,242** | **13,960** | **$6,259,307** |
| Burnsville | 722 | 721 | $356,514 | 153 | $431,912 | 22 | $49,732 | 896 | $838,158 |
| Unincorporated Area | 9,428 | 12,698 | $3,716,179 | 290 | $1,312,460 | 76 | $392,510 | 13,064 | $5,421,149 |
| **Toe River Regional Total** | **59,313** | **63,265** | **$18,072,039** | **3,078** | **$12,010,943** | **812** | **$3,492,421** | **67,155** | **$33,575,403** |

*Source: NCEM Risk Management Tool*

### TABLE 6.13: POPULATION VULNERABILITY TO THE EARTHQUAKE HAZARD

| Location | Elderly at Risk | Children at Risk | Total at Risk |
|---|---|---|---|
| **Avery County** | **3,088** | **770** | **17,763** |
| Banner Elk | 270 | 67 | 1,552 |
| Crossnore | 32 | 8 | 186 |
| Elk Park | 81 | 20 | 467 |
| Grandfather Village | 4 | 1 | 25 |
| Newland | 116 | 29 | 669 |
| Sugar Mountain | 33 | 8 | 190 |
| Unincorporated Area | 2,552 | 637 | 14,674 |
| **McDowell County** | **7,377** | **2,596** | **44,998** |
| Marion | 1,291 | 454 | 7,874 |
| Old Fort | 125 | 44 | 765 |
| Unincorporated Area | 5,961 | 2,098 | 36,359 |
| **Mitchell County** | **3,260** | **770** | **15,570** |
| Bakersville | 101 | 24 | 484 |
| Spruce Pine | 401 | 95 | 1,914 |
| Unincorporated Areas | 2,758 | 651 | 13,172 |
| **Yancey County** | **3,672** | **853** | **17,819** |
| Burnsville | 345 | 80 | 1,674 |
| Unincorporated Area | 3,327 | 773 | 16,145 |
| **Toe River Regional Total** | **17,397** | **4,989** | **96,150** |

*Source: NCEM Risk Management Tool*

**SOCIAL VULNERABILITY**

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

**CRITICAL FACILITIES**

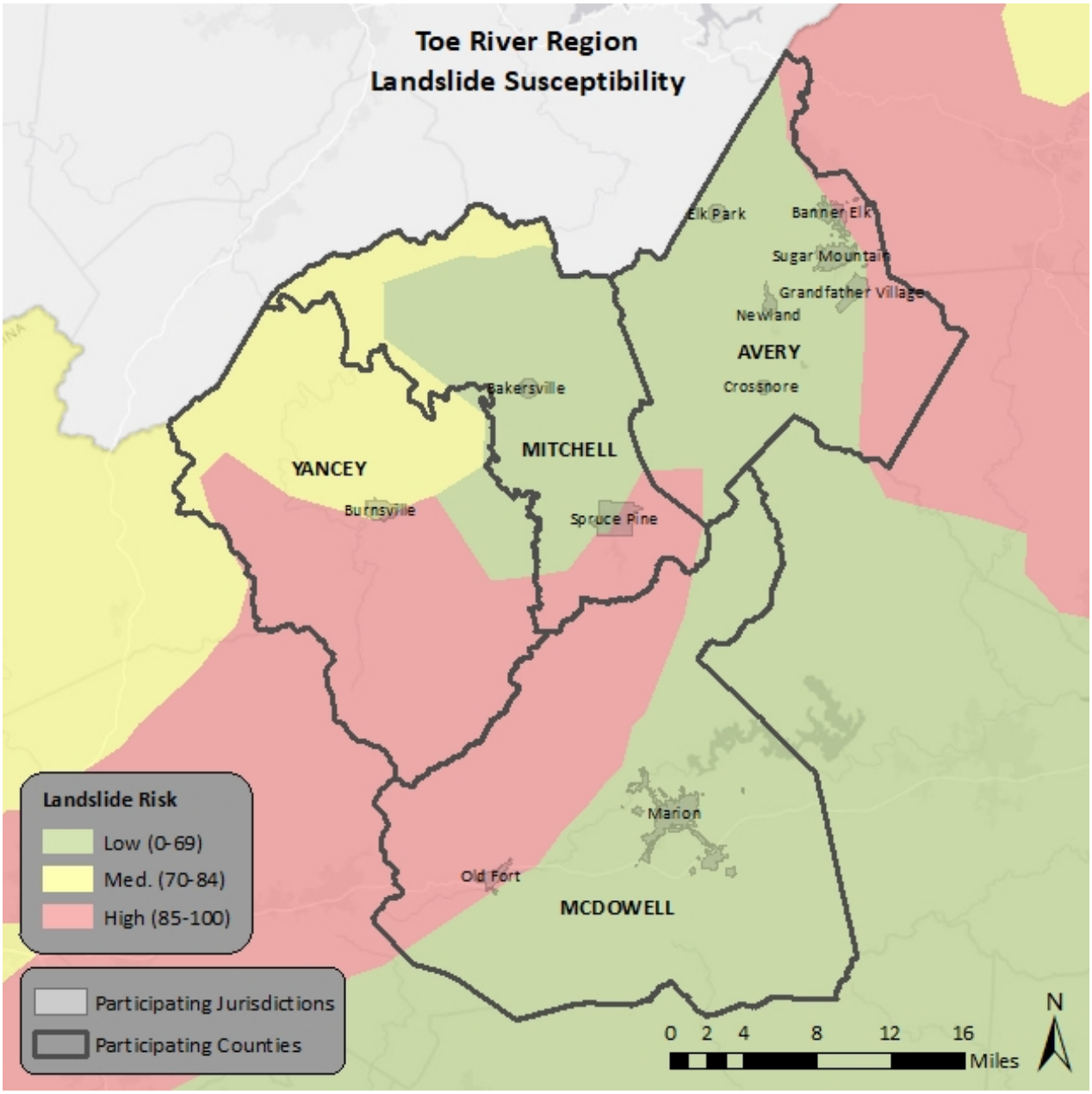
All critical facilities should still be considered at-risk to minor damage should an event occur. A list of all individual critical facilities in the region can be found in **Table 6.26**.

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

## 6.5.4. Geological (Landslide)

GIS analysis was used to complete the vulnerability assessment for landslides in the Toe River Region. **Figure 6.8** shows the location of moderate and high-risk levels according to the USGS Landslide Susceptibility Index.

### FIGURE 6.4: LANDSLIDE RISK IN THE TOE RIVER REGION




*Source: USGS*

The incidence levels (high and moderate) were used to identify different areas of concern for the analysis below. The potential dollar value of exposed land and property total can be determined using the USGS Landslide Susceptibility Index (detailed in Section 5: *Hazard Profiles*), county level tax parcel data, and GIS analysis. **Table 6.14** presents the potential at-risk property where available.

## TABLE 6.14: TOTAL POTENTIAL AT-RISK PARCELS FOR THE GEOLOGICAL (LANDSLIDE) HAZARD

| Location | Number of Parcels at Risk | | Number of Improvements at Risk | | Total Value of Improvements at Risk ($) | |
|---|---|---|---|---|---|---|
| **Incidence Level** | **Moderate** | **High** | **Moderate** | **High** | **Moderate** | **High** |
| **Avery County** | **0** | **3,760** | **0** | **1,690** | **$0** | **$443,534,900** |
| Banner Elk | 0 | 342 | 0 | 192 | $0 | $50,538,200 |
| Crossnore | 0 | 0 | 0 | 0 | $0 | $0 |
| Elk Park | 0 | 0 | 0 | 0 | $0 | $0 |
| Grandfather Village | 0 | 12 | 0 | 3 | $0 | $6,035,700 |
| Newland | 0 | 0 | 0 | 0 | $0 | $0 |
| Sugar Mountain | 0 | 0 | 0 | 0 | $0 | $0 |
| Unincorporated Area | 0 | 3,406 | 0 | 1,495 | $0 | $386,961,000 |
| **McDowell County** | **0** | **4,764** | **0** | **2,580** | **$0** | **$404,365,311** |
| Marion | 0 | 1 | 0 | 0 | $0 | $0 |
| Old Fort | 0 | 0 | 0 | 0 | $0 | $0 |
| Unincorporated Area | 0 | 4,763 | 0 | 2,580 | $0 | $404,365,311 |
| **Mitchell County** | **1,246** | **4,982** | **732** | **2,948** | **$153,370,500** | **$450,564,300** |
| Bakersville | 906 | 0 | 742 | 0 | $122,698,685 | $0 |
| Spruce Pine | 0 | 0 | 0 | 0 | $0 | $0 |
| Unincorporated Areas | 340 | 4,982 | 0 | 2,948 | $0 | $450,564,300 |
| **Yancey County** | **6,840** | **8,371** | **4,241** | **5,299** | **$472,310,325** | **$728,434,972** |
| Burnsville | 0 | 85 | 0 | 58 | $0 | $22,309,080 |
| Unincorporated Area | 6,840 | 8,286 | 0 | 5,241 | $0 | $706,044,892 |
| **Toe River Regional Total** | **8,086** | **21,877** | **4,973** | **12,517** | **$625,680,825** | **$2,026,899,483** |

*Source: United States Geological Survey, Local governments*

**SOCIAL VULNERABILITY**

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

**CRITICAL FACILITIES**

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

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

## 6.5.5 Flooding

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

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

## TABLE 6.15: ESTIMATED EXPOSURE OF PARCELS TO THE FLOODING HAZARD

| Location | 1% Annual Chance of Flooding (100-year) | | | 0.2% Annual Chance of Flooding (500-year) | | |
|---|---|---|---|---|---|---|
| | Approx. Number of Parcels | Approx. Number of Improved Buildings | Approx. Improved Value of Buildings | Approx. Number of Parcels | Approx. Number of Improved Buildings | Approx. Improved Value of Buildings |
| **Avery County** | **2,216** | **1,333** | **$293,014,791** | **2,295** | **1,385** | **$300,212,091** |
| Banner Elk | 212 | 126 | $34,394,104 | 224 | 132 | $37,384,704 |
| Crossnore | 52 | 43 | $27,172,100 | 60 | 47 | $27,627,200 |
| Elk Park | 148 | 111 | $7,128,900 | 148 | 111 | $7,128,900 |
| Grandfather Village | 25 | 4 | $9,988,800 | 25 | 4 | $9,988,800 |
| Newland | 95 | 68 | $23,115,087 | 110 | 78 | $24,267,787 |
| Sugar Mountain | - | - | $- | - | - | $- |
| Unincorporated Area | 1,684 | 981 | $191,215,800 | 1,728 | 1,013 | $193,814,700 |
| **McDowell County** | **3,728** | **1,703** | **$455,004,250** | **3,818** | **1,770** | **$471,200,120** |
| Marion | 182 | 117 | $70,767,220 | 193 | 125 | $71,494,970 |
| Old Fort | - | - | $- | - | - | $ - |
| Unincorporated Area | 3,546 | 1,586 | $384,237,030 | 3,625 | 1,645 | $399,705,150 |
| **Mitchell County** | **1,357** | **805** | **$198,018,300** | **1,428** | **860** | **$205,453,600** |
| Bakersville | 125 | 108 | $20,963,800 | 155 | 136 | $24,641,100 |
| Spruce Pine | - | - | $ - | - | - | $- |
| Unincorporated Areas | 1,232 | 697 | $177,054,500 | 1,273 | 724 | $180,812,500 |
| **Yancey County** | **2,195** | **1,488** | **$195,488,410** | **2,390** | **1,627** | **$214,452,100** |
| Burnsville | 120 | 95 | $16,850,580 | 148 | 118 | $23,478,630 |
| Unincorporated Area | 2,075 | 1,393 | $178,637,830 | 2,242 | 1,509 | $190,973,470 |
| **Toe River Regional Total** | **9,496** | **5,329** | **$1,141,525,751** | **9,931** | **5,642** | **$1,191,317,911** |

*Source: FEMA DFIRM*

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

## TABLE 6.16: BUILDING VULNERABILITY TO 100-YEAR FLOOD

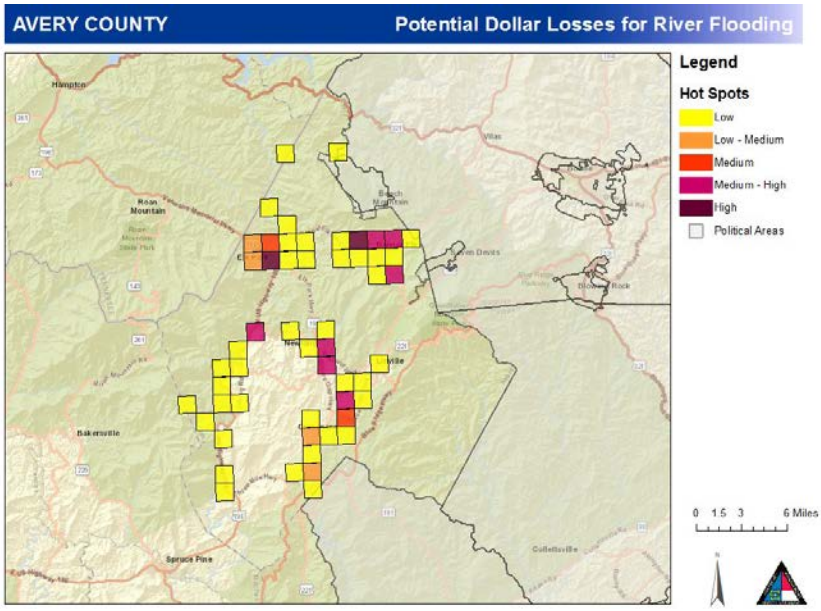
| Location | Pre-Firm Buildings at Risk | Residential Buildings at Risk | | Commercial Buildings at Risk | | Public Buildings at Risk | | Total Buildings at Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Damages | Number | Damages | Number | Damages | Number | Damages |
| **Avery County** | **423** | **452** | **$2,686,505** | **56** | **$1,578,849** | **10** | **$488,870** | **518** | **$4,754,224** |
| Banner Elk | 39 | 34 | $652,309 | 16 | $656,107 | 1 | $5,164 | 51 | $1,313,580 |
| Crossnore | 11 | 10 | $26,470 | 1 | $399 | 2 | $77,735 | 13 | $104,604 |

| Location | Pre-Firm Buildings at Risk | Residential Buildings at Risk | | Commercial Buildings at Risk | | Public Buildings at Risk | | Total Buildings at Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Damages | Number | Damages | Number | Damages | Number | Damages |
| Elk Park | 47 | 49 | $330,620 | 2 | $13,040 | 1 | $1,299 | 52 | $344,959 |
| Grandfather Village | 0 | 0 | $- | 0 | $- | 0 | $- | 0 | $- |
| Newland | 27 | 17 | $24,755 | 13 | $237,917 | 1 | $40,612 | 31 | $303,284 |
| Sugar Mountain | 0 | 0 | $- | 0 | $- | 0 | $- | 0 | $- |
| Unincorporated Area | 299 | 342 | $1,652,351 | 24 | $671,386 | 5 | $364,060 | 371 | $2,687,797 |
| **McDowell County** | **577** | **534** | **$4,181,394** | **40** | **$1,923,075** | **2** | **$37,456** | **576** | **$6,141,924** |
| Marion | 53 | 42 | $226,668 | 9 | $229,685 | 2 | $37,456 | 53 | $493,808 |
| Old Fort | 28 | 22 | $154,392 | 6 | $1,140,866 | 0 | $- | 28 | $1,295,258 |
| Unincorporated Area | 496 | 470 | $3,800,334 | 25 | $552,524 | 0 | $- | 495 | $4,352,858 |
| **Mitchell County** | **217** | **175** | **$1,812,684** | **38** | **$2,052,651** | **4** | **$64,642** | **217** | **$3,929,977** |
| Bakersville | 44 | 27 | $556,772 | 16 | $482,631 | 1 | $27,363 | 44 | $1,066,766 |
| Spruce Pine | 9 | 2 | $4,328 | 7 | $1,097,371 | 0 | $- | 9 | $1,101,699 |
| Unincorporated Areas | 164 | 146 | $1,251,584 | 15 | $472,649 | 3 | $37,279 | 164 | $1,761,512 |
| **Yancey County** | **153** | **139** | **$1,355,691** | **48** | **$1,549,786** | **2** | **$25,488** | **189** | **$2,930,966** |
| Burnsville | 65 | 30 | $287,265 | 36 | $1,183,308 | 0 | $- | 66 | $1,470,573 |
| Unincorporated Area | 88 | 109 | $1,068,426 | 12 | $366,478 | 2 | $25,488 | 123 | $1,460,393 |
| **Toe River Regional Total** | **1,370** | **1,300** | **$10,036,274** | **182** | **$7,104,361** | **18** | **$616,456** | **1,500** | **$17,757,091** |

*Source: NCEM Risk Management Tool*

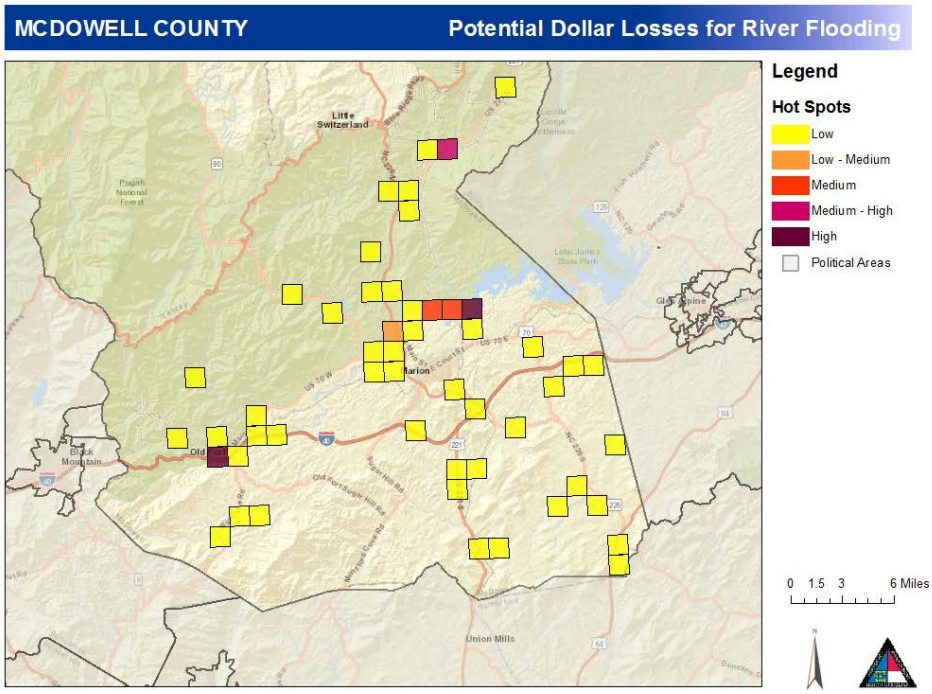
**Figures 6.9 – 6.12** below display visual hotspots of potential dollar losses for the flood hazard in each county in the region.

## FIGURE 6.5: POTENTIAL LOSSES FOR FLOODING IN AVERY COUNTY



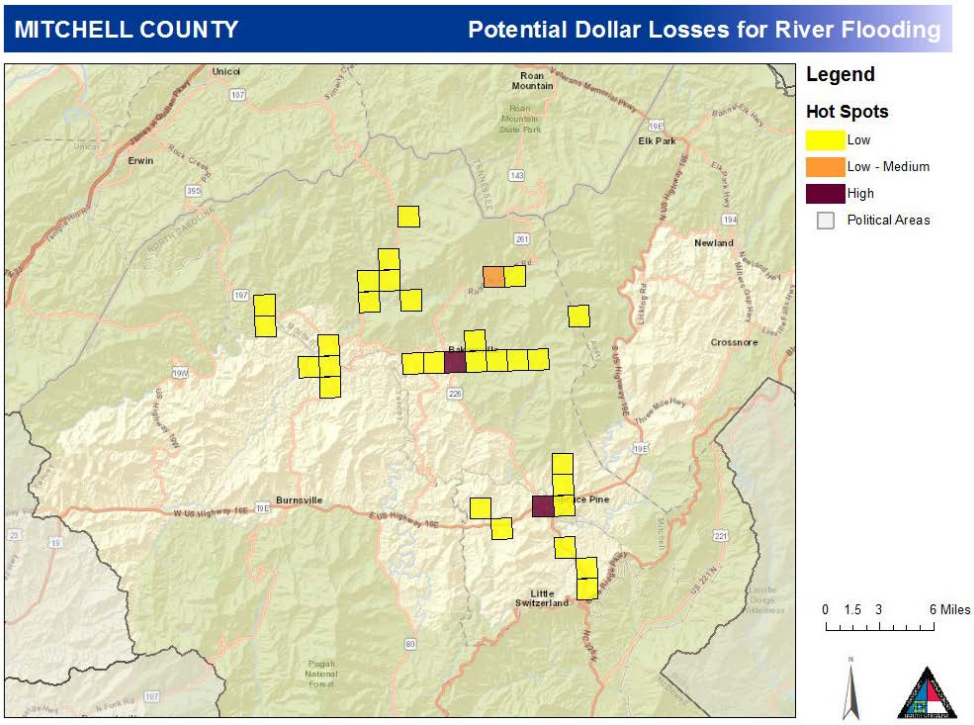

*Source: NCEM Risk Management Tool*

## FIGURE 6.6: POTENTIAL LOSSES FOR FLOODING IN MCDOWELL COUNTY



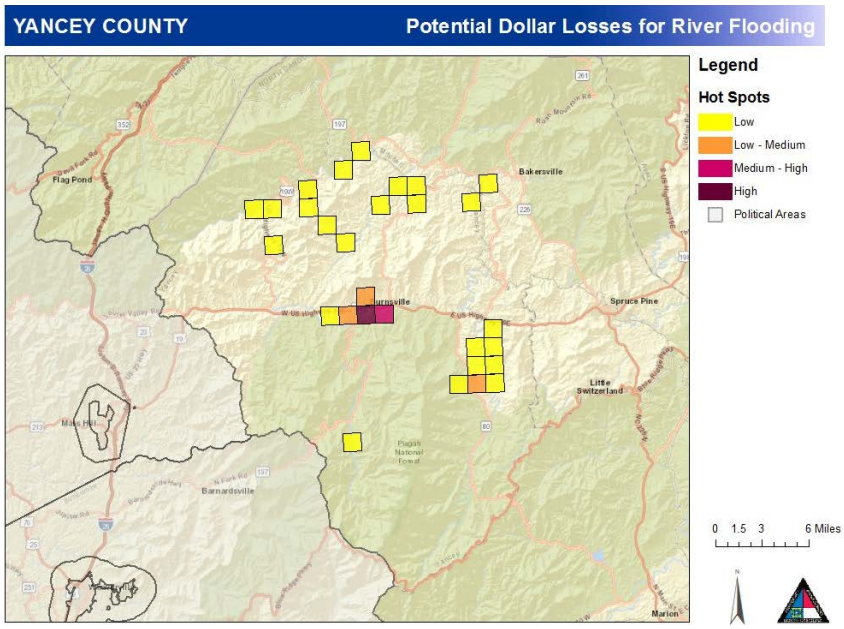

*Source: NCEM Risk Management Tool*

**FIGURE 6.7: POTENTIAL LOSSES FOR FLOODING IN MITCHELL COUNTY**




*Source: NCEM Risk Management Tool*

**FIGURE 6.8: POTENTIAL LOSSES FOR FLOODING IN YANCEY COUNTY**




*Source: NCEM Risk Management Tool*

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

## TABLE 6.17: POPULATION VULNERABILITY FOR 100-YEAR FLOODPLAINS

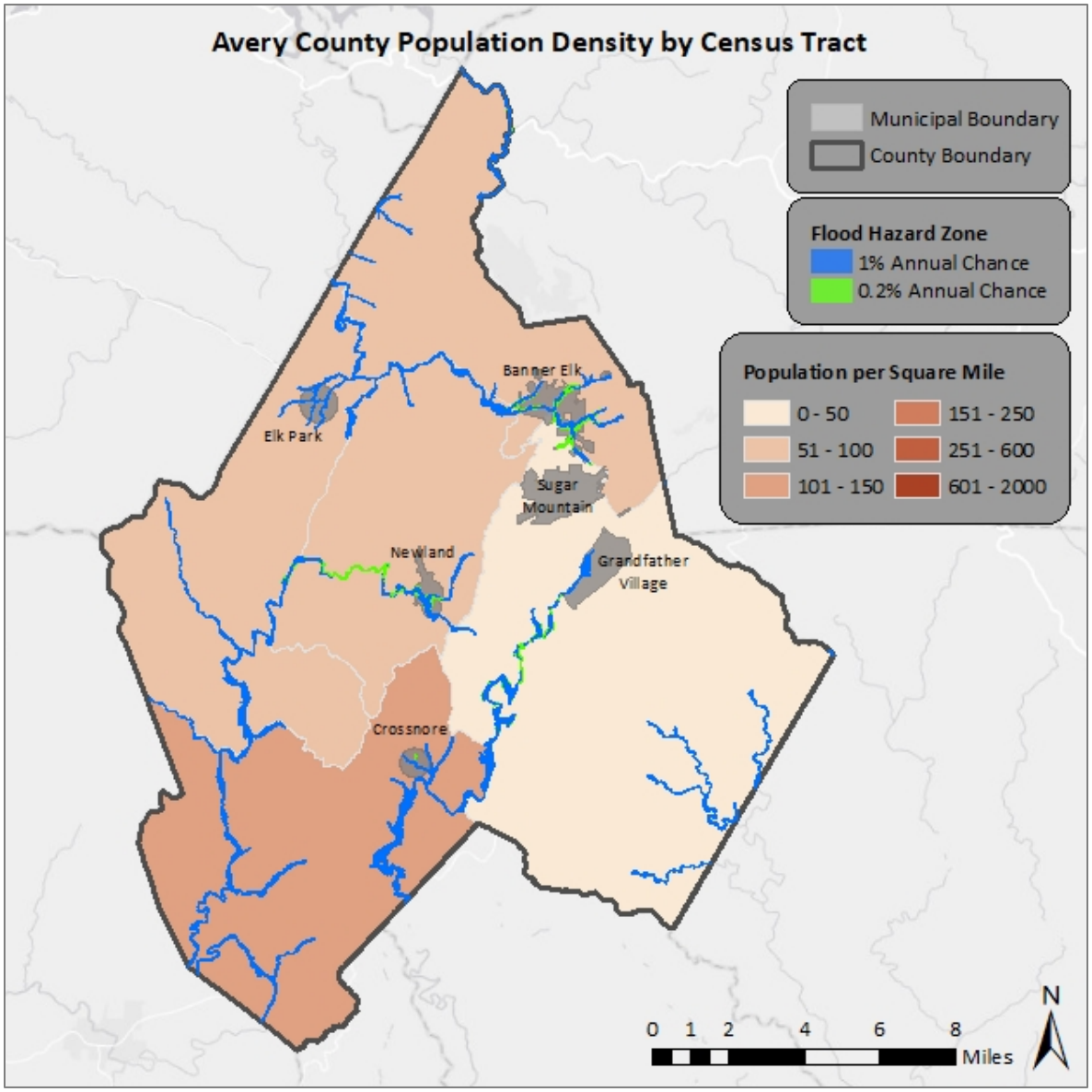
| Incidence Level | Elderly at Risk | Children at Risk | Total at Risk |
|---|---|---|---|
| **Avery County** | **108** | **26** | **621** |
| Banner Elk | 8 | 2 | 47 |
| Crossnore | 3 | 1 | 20 |
| Elk Park | 14 | 3 | 79 |
| Grandfather Village | 0 | 0 | 0 |
| Newland | 6 | 1 | 33 |
| Sugar Mountain | 0 | 0 | 0 |
| Unincorporated Area | 77 | 19 | 442 |
| **McDowell County** | **151** | **54** | **921** |
| Marion | 19 | 7 | 114 |
| Old Fort | 5 | 2 | 31 |
| Unincorporated Area | 127 | 45 | 776 |
| **Mitchell County** | **56** | **13** | **266** |
| Bakersville | 12 | 3 | 59 |
| Spruce Pine | 1 | 0 | 4 |
| Unincorporated Areas | 43 | 10 | 203 |
| **Yancey County** | **43** | **10** | **207** |
| Burnsville | 14 | 3 | 68 |
| Unincorporated Area | 29 | 7 | 139 |
| **Toe River Regional Total** | **358** | **103** | **2,015** |

*Source: NCEM Risk Management Tool*

**SOCIAL VULNERABILITY**

A national Census has not been conducted since 2010; therefore, 2010 Census tract level population counts are outdated for this update. However, population estimates from the US Census Bureau as of July 1, 2017 were available at a jurisdictional level. This data was analyzed to present at-risk populations to the flooding hazard in each county in the Toe River region and can be seen below in **Figures 6.13-16**.

**FIGURE 6.9: POPULATION DENSITY NEAR FLOODPLAINS**




*Source: FEMA DFIRM, US Census Bureau*

**CRITICAL FACILITIES**

The critical facility analysis revealed that there are 12 critical facilities located in the Toe River Region's 1.0-percent and 2.0-percent annual chance floodplain based on FEMA DFIRM boundaries and GIS analysis. (As previously noted, this analysis does not consider building elevation, which may negate risk.) A list of specific critical facilities and their associated risk can be found in **Table 6.26** at the end of this section.

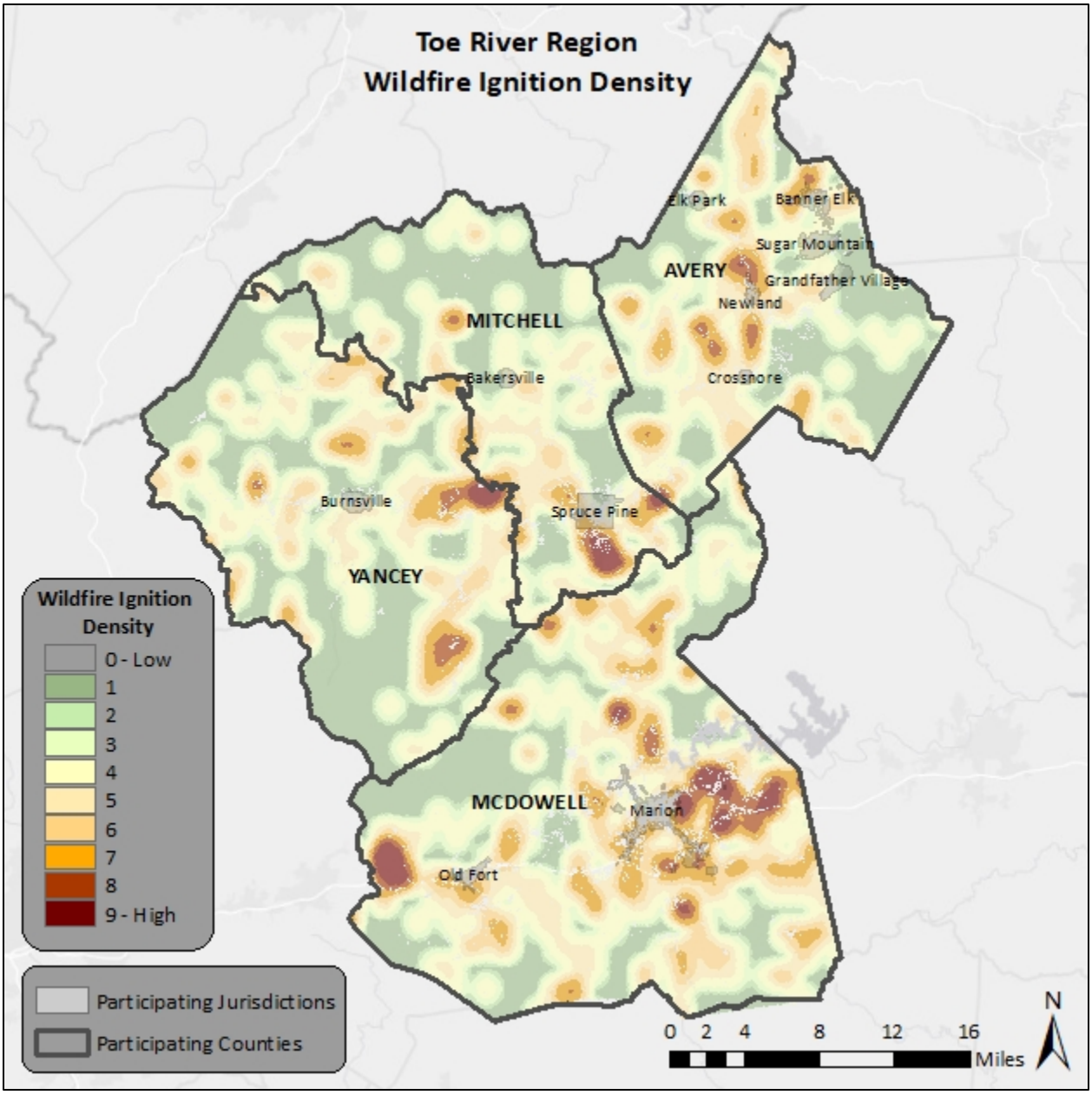
In conclusion, a flood has the potential to impact many existing and future buildings, facilities, and populations in the Toe River Region, though some areas are at a higher risk than others. All types of structures in a floodplain are at-risk, though elevated structures will have a reduced risk. As noted, the floodplains used in this analysis include the 100-year and 500-year FEMA regulated floodplain boundaries. It is certainly possible that more severe events could occur beyond these boundaries or urban (flash) flooding could impact additional structures. Such site-specific vulnerability determinations should be considered during future plan updates. Furthermore, areas subject to repetitive flooding should be analyzed for potential mitigation actions.

### 6.5.6 Wildfires

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

To estimate exposure to wildfire, the Wildfire Ignition Density Index for the region was obtained through the Southern Wildfire Risk Assessment. Wildfire Ignition Density is the likelihood of a wildfire igniting in an area. Occurrence is derived by modeling historic wildfire ignition locations to create an average ignition rate map. The ignition rate is measured in the number of fires per year per 1000 acres. The index ranges from 0 to 9, with 9 being the highest risk. This index was layered with parcel data using GIS analysis. **Figures 6.17-20** show the Wildfire Ignition Density for each county in the region below.

**FIGURE 6.10: AVERY COUNTY WILDFIRE IGNITION DENSITY**




*Source: Southern Wildfire Risk Assessment*

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

**SOCIAL VULNERABILITY**

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

**CRITICAL FACILITIES**

Few of the Toe River Region critical facilities are in the at-risk area (7 or higher) for wildfires. Yancey County had the most with 3 facilities, while Avery, McDowell, and Mitchell Counties had none. **Table 6.19** shows the results of the GIS analysis.

## TABLE 6.18: CRITICAL FACILITIES IN THE AT-RISK AREA

| Location | Number of At-Risk Critical Facilities |
|---|---|
| **Avery County** | **0** |
| **McDowell County** | **0** |
| **Mitchell County** | **0** |
| **Yancey County** | **3** |
| **Toe River Regional Total** | **3** |

*Source: Southern Wildfire Risk Assessment, Local governments*

Additional information was provided through the NCEM Risk Management Tool (RMT). This data can be seen in below in **Table 6.20** and **Table 6.21**.

## TABLE 6.19: BUILDING VULNERABILITY TO WILDFIRE HAZARDS

| Location | Pre-Firm Buildings at Risk | Residential Buildings at Risk | | Commercial Buildings at Risk | | Public Buildings at Risk | | Total Buildings at Risk | |
|---|---|---|---|---|---|---|---|---|---|
| | | Number | Damages | Number | Damages | Number | Damages | Number | Damages |
| **Avery County** | **8,010** | **9,663** | **$1,825,435,778** | **648** | **$598,280,352** | **282** | **$302,702,492** | **10,593** | **$2,726,418,622** |
| Banner Elk | 760 | 1,051 | $287,387,787 | 118 | $131,559,075 | 57 | $64,425,260 | 1,226 | $483,372,122 |
| Crossnore | 72 | 76 | $34,154,586 | 7 | $1,437,440 | 20 | $18,775,452 | 103 | $54,367,479 |
| Elk Park | 84 | 87 | $11,713,819 | 5 | $5,135,644 | 4 | $1,541,028 | 96 | $18,390,491 |
| Grandfather Village | 165 | 184 | $88,487,103 | 8 | $29,216,607 | - | $ - | 192 | $117,703,710 |
| Newland | 288 | 280 | $37,048,576 | 56 | $54,107,902 | 17 | $23,094,720 | 353 | $114,251,198 |
| Sugar Mountain | 291 | 272 | $75,667,034 | 21 | $44,690,491 | 4 | $6,625,737 | 297 | $126,983,261 |
| Unincorporated Area | 6,350 | 7,713 | $1,290,976,873 | 433 | $332,133,193 | 180 | $188,240,295 | 8,326 | $1,811,350,361 |
| **McDowell County** | **17,177** | **16,381** | **$2,253,233,517** | **670** | **$1,393,259,976** | **115** | **$390,511,770** | **17,166** | **$4,037,005,264** |
| Marion | 1,387 | 1,206 | $242,177,972 | 139 | $311,232,552 | 40 | $135,766,836 | 1,385 | $689,177,360 |
| Old Fort | 292 | 264 | $76,213,567 | 28 | $218,979,748 | - | $ - | 292 | $295,193,315 |
| Unincorporated Area | 15,498 | 14,911 | $1,934,841,978 | 503 | $863,047,676 | 75 | $254,744,934 | 15,489 | $3,052,634,589 |
| **Mitchell County** | **7,757** | **7,447** | **$1,261,015,431** | **348** | **$364,429,099** | **82** | **$175,239,343** | **7,877** | **$1,800,683,873** |
| Bakersville | 209 | 171 | $43,604,987 | 30 | $13,701,703 | 8 | $6,118,460 | 209 | $63,425,149 |
| Spruce Pine | 551 | 554 | $98,775,308 | 99 | $73,797,247 | 18 | $26,971,139 | 671 | $199,543,694 |
| Unincorporated Areas | 6,997 | 6,722 | $1,118,635,136 | 219 | $276,930,149 | 56 | $142,149,744 | 6,997 | $1,537,715,030 |
| **Yancey County** | **7,735** | **10,210** | **$1,513,440,725** | **296** | **$412,008,078** | **71** | **$102,348,731** | **10,577** | **$2,027,797,533** |
| Burnsville | 406 | 398 | $95,335,021 | 86 | $97,424,935 | 9 | $10,959,374 | 493 | $203,719,329 |
| Unincorporated Area | 7,329 | 9,812 | $1,418,105,704 | 210 | $314,583,143 | 62 | $91,389,357 | 10,084 | $1,824,078,204 |
| **Toe River Regional Total** | **40,679** | **43,701** | **$6,853,125,451** | **1,962** | **$2,767,977,505** | **550** | **$970,802,336** | **46,213** | **$10,591,905,292** |

*Source: NCEM Risk Management Tool*

## TABLE 6.20: POPULATION VULNERABILITY TO WILDFIRE HAZARD

| Incidence Level | Elderly at Risk | Children at Risk | Total at Risk |
|---|---|---|---|
| **Avery County** | 2,161 | 539 | 12,426 |
| Banner Elk | 257 | 64 | 1,477 |
| Crossnore | 26 | 6 | 150 |
| Elk Park | 24 | 6 | 141 |
| Grandfather Village | 3 | 1 | 16 |
| Newland | 90 | 22 | 517 |
| Sugar Mountain | 20 | 5 | 116 |
| Unincorporated Area | 1,741 | 435 | 10,009 |
| **McDowell County** | 4,635 | 1,632 | 28,273 |
| Marion | 540 | 190 | 3,291 |
| Old Fort | 61 | 22 | 375 |
| Unincorporated Area | 4,034 | 1,420 | 24,607 |
| **Mitchell County** | 2,302 | 543 | 10,992 |
| Bakersville | 78 | 18 | 373 |
| Spruce Pine | 258 | 61 | 1,229 |
| Unincorporated Areas | 1,966 | 464 | 9,390 |
| **Yancey County** | 2,760 | 641 | 13,396 |
| Burnsville | 190 | 44 | 922 |
| Unincorporated Area | 2,570 | 597 | 12,474 |
| **Toe River Regional Total** | **11,858** | **3,355** | **65,087** |

*Source: NCEM Risk Management Tool*

## 6.5.7 Hazardous Substances

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

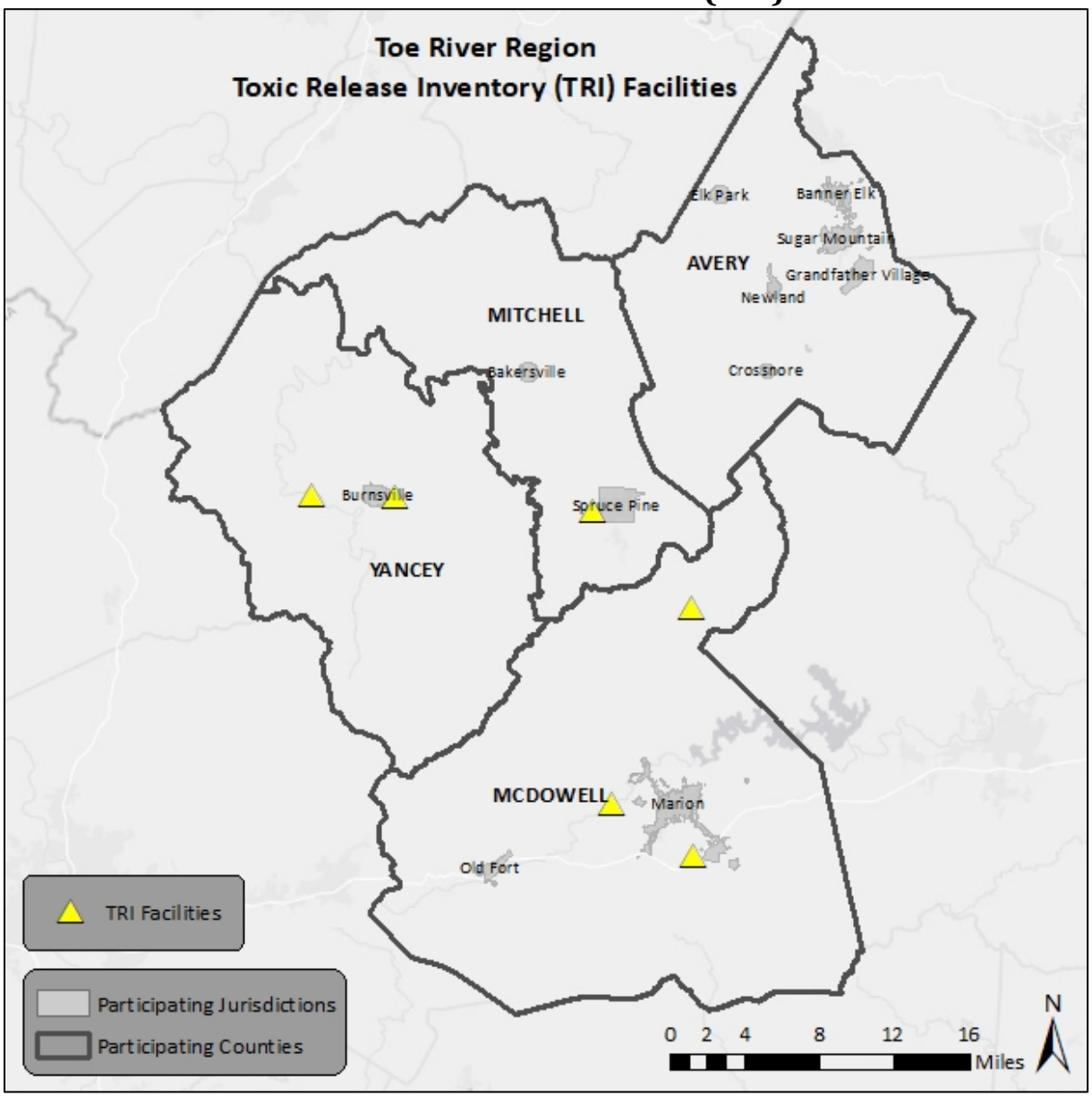
Most hazardous substance incidents that occur are contained and suppressed before destroying any property or threatening lives. However, they can have a significant negative impact. Such events can cause multiple deaths, completely shut down facilities for 30 days or more, and cause more than 50 percent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

In order to conduct the vulnerability assessment for this hazard, GIS intersection analysis was used for fixed and mobile areas and parcels[5]. In both scenarios, two sizes of buffers—0.5 mile and 1 mile—were used. These areas are assumed to respect the different levels of effect: immediate (primary) and 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.

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

For the fixed site analysis, geo-referenced TRI listed toxic sites in the Toe River Region, along with buffers, were used for analysis as shown in **Figure 6.21.** 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 6.22** shows the areas used for mobile toxic release buffer analysis. The results indicate the approximate number of parcels, improved value, as shown in **Table 6.22** (fixed sites), **Table 6.23** (mobile road sites) and **Table 6.24** (mobile railroad sites)[6].

## FIGURE 6.11: TOXIC RELEASE INVENTORY (TRI) FACILITIES




*Source: EPA*

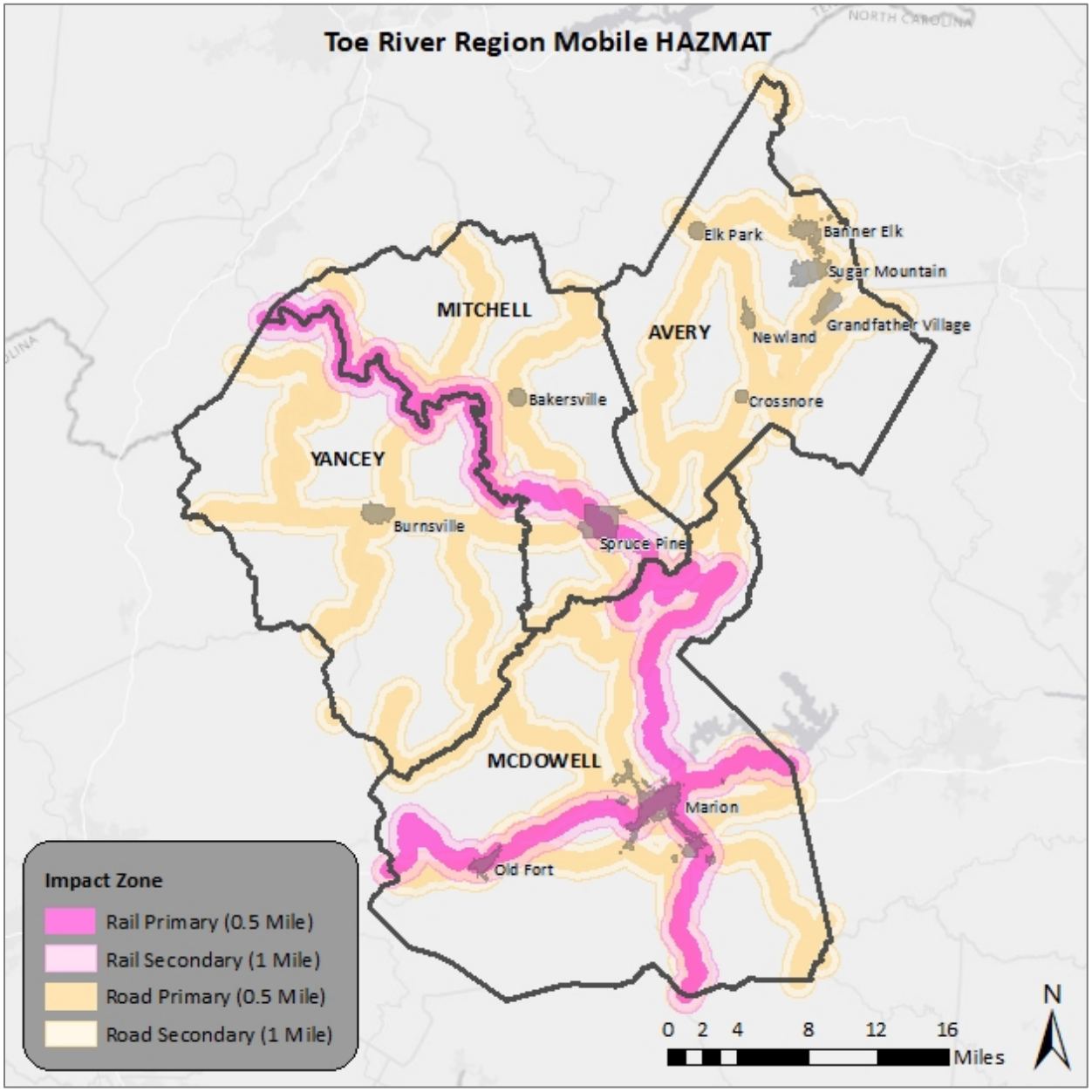
[6] Note that parcels included in the 1-mile analysis are also included in the 0.5-mile analysis.

## TABLE 6.21: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (FIXED SITES)

| Location | 0.5 Mile Buffer | | | 1.0 Mile Buffer | | |
|---|---|---|---|---|---|---|
| | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value |
| **Avery County** | 0 | 0 | $0 | 0 | 0 | $0 |
| Banner Elk | 0 | 0 | $0 | 0 | 0 | $0 |
| Crossnore | 0 | 0 | $0 | 0 | 0 | $0 |
| Elk Park | 0 | 0 | $0 | 0 | 0 | $0 |
| Grandfather Village | 0 | 0 | $0 | 0 | 0 | $0 |
| Newland | 0 | 0 | $0 | 0 | 0 | $0 |
| Sugar Mountain | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Area | 0 | 0 | $0 | 0 | 0 | $0 |
| **McDowell County** | 292 | 153 | $75,169,910 | 1,011 | 596 | $137,220,160 |
| Marion | 21 | 10 | $6,886,730 | 44 | 22 | $9,812,670 |
| Old Fort | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Area | 271 | 143 | $68,283,180 | 967 | 574 | $127,407,490 |
| **Mitchell County** | 252 | 122 | $29,899,700 | 873 | 412 | $71,615,500 |
| Bakersville | 0 | 0 | $0 | 0 | 0 | $0 |
| Spruce Pine | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Areas | 252 | 122 | $29,899,700 | 873 | 412 | $71,615,500 |
| **Yancey County** | 392 | 297 | $51,648,920 | 1,296 | 975 | $150,824,015 |
| Burnsville | 134 | 108 | $24,478,580 | 415 | 330 | $63,130,210 |
| Unincorporated Area | 258 | 189 | $27,170,340 | 881 | 645 | $87,693,805 |
| **Toe River Regional Total** | **936** | **572** | **$156,718,530** | **3,153** | **1,983** | **$359,659,675** |

*Source: EPA, Local governments*

## FIGURE 6.12: MOBILE HAZMAT BUFFERS IN THE TOE RIVER REGION




*Source: NC Department of Transportation*

## TABLE 6.22: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (MOBILE ANALYSIS – ROAD)

| Location | 0.5 Mile Buffer | | | 1.0 Mile Buffer | | |
|---|---|---|---|---|---|---|
| | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value |
| **Avery County** | **13,006** | **7,746** | **$1,559,165,508** | **17,534** | **$10,227** | **$2,117,554,710** |
| Banner Elk | 1,003 | 559 | $143,457,229 | 1,004 | 559 | $143,457,229 |
| Crossnore | 155 | 104 | $38,104,600 | 164 | 109 | $38,323,100 |
| Elk Park | 379 | 273 | $19,888,700 | 379 | 273 | $19,888,700 |

| Location | 0.5 Mile Buffer | | | 1.0 Mile Buffer | | |
|---|---|---|---|---|---|---|
| | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value |
| Grandfather Village | 271 | 206 | $127,591,200 | 386 | 279 | $185,229,300 |
| Newland | 515 | 372 | $70,121,074 | 515 | 372 | $70,121,074 |
| Sugar Mountain | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Area | 10,683 | 6,232 | $1,160,002,705 | 15,086 | 8,635 | $1,660,535,307 |
| **McDowell County** | **16,065** | **9,963** | **$1,326,721,363** | **21,933** | **13,244** | **$1,758,732,913** |
| Marion | 3,669 | 2,754 | $394,949,872 | 3,990 | 2,987 | $469,565,572 |
| Old Fort | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Area | 12,396 | 7,209 | $931,771,491 | 17,943 | 10,257 | $1,289,167,341 |
| **Mitchell County** | **8,879** | **5,368** | **$805,993,600** | **13,029** | **7,402** | **$1,101,705,800** |
| Bakersville | 317 | 255 | $41,086,000 | 318 | 255 | $41,086,000 |
| Spruce Pine | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Areas | 8,562 | 5,113 | $764,907,600 | 13,347 | 7,147 | $1,060,619,800 |
| **Yancey County** | **7,437** | **5,043** | **$577,049,110** | **11,060** | **7,268** | **$795,826,770** |
| Burnsville | 923 | 760 | $126,752,815 | 966 | 783 | $130,175,105 |
| Unincorporated Area | 6,514 | 4,283 | $450,296,295 | 10,094 | 6,485 | $665,651,665 |
| **Toe River Regional Total** | **45,387** | **28,120** | **$4,268,929,581** | **63,556** | **38,141** | **$5,773,820,193** |

*Source: NC Department of Transportation, Local Governments*

## TABLE 6.23: EXPOSURE OF IMPROVED PROPERTY TO HAZARDOUS SUBSTANCES (MOBILE ANALYSIS – RAILROAD)

| Location | 0.5 Mile Buffer | | | 1.0 Mile Buffer | | |
|---|---|---|---|---|---|---|
| | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value |
| **Avery County** | **0** | **0** | **$0** | **0** | **0** | **$0** |
| Banner Elk | 0 | 0 | $0 | 0 | 0 | $0 |
| Crossnore | 0 | 0 | $0 | 0 | 0 | $0 |
| Elk Park | 0 | 0 | $0 | 0 | 0 | $0 |
| Grandfather Village | 0 | 0 | $0 | 0 | 0 | $0 |
| Newland | 0 | 0 | $0 | 0 | 0 | $0 |
| Sugar Mountain | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Area | 0 | 0 | $0 | 0 | 0 | $0 |
| **McDowell County** | **9,554** | **5,836** | **$834,659,972** | **14,323** | **8,672** | **$1,193,450,892** |
| Marion | 3,238 | 2,500 | $378,194,552 | 3,686 | 2,794 | $422,776,562 |
| Old Fort | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Area | 6,316 | 3,336 | $456,465,420 | 10,637 | 5,878 | $770,674,330 |
| **Mitchell County** | **3,690** | **1,914** | **$403,877,500** | **6,630** | **3,305** | **$626,890,100** |
| Bakersville | 0 | 0 | $0 | 0 | 0 | $0 |
| Spruce Pine | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Areas | 3,690 | 1,914 | $403,877,500 | 6,630 | 3,305 | $626,890,100 |
| **Yancey County** | **597** | **338** | **$30,001,320** | **1,174** | **688** | **$58,289,460** |
| Burnsville | 0 | 0 | $0 | 0 | 0 | $0 |
| Unincorporated Area | 597 | 338 | $30,001,320 | 1,174 | 688 | $58,289,460 |

| Location | 0.5 Mile Buffer | | | 1.0 Mile Buffer | | |
|---|---|---|---|---|---|---|
| | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value | Approx. Number of Parcels | Approx. Number Improved | Approx. Improved Value |
| **Toe River Regional Total** | **13,841** | **8,088** | **$1,268,538,792** | **22,127** | **12,665** | **$1,878,630,452** |

*Source: NC Department of Transportation, Local Governments*

**SOCIAL VULNERABILITY**

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

**CRITICAL FACILITIES**

*Fixed Site Analysis:*

The critical facility analysis for fixed TRI sites revealed that there are 15 facilities located in a HAZMAT risk zone. The primary impact zone (0.5-mile buffer) includes 4 facilities throughout the region. Mitchell County has the most facilities in the primary impact zone with 3 facilities. McDowell has 1, and Avery and Yancey counties have none. The remaining facilities are in the secondary, 1-mile zone. A list of specific critical facilities and their associated risk can be found in **Table 6.26** at the end of this section.

*Mobile Analysis:*

The critical facility analysis for road and railroad transportation corridors revealed that there are 160 critical facilities located in the primary (0.5 mile) mobile HAZMAT buffer areas for roads and railroads throughout the region. Although this is a worst-case scenario model, it indicates that most of the critical facilities in the Toe River region are vulnerable to a potential mobile HAZMAT incident. Additionally, there are 172 critical facilities located in the secondary (1 mile) buffer area of both roads and railroads, accounting for approximately 93 percent of the total number of critical facilities in the region. This may be the result of many critical facilities being located near major roadways for ease of access, but it is nonetheless important to recognize what a large percentage of critical facilities in the region are located in the smaller buffer area. A list of specific critical facilities and their associated risk can be found in **Table 6.26** at the end of this section.

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

## 6.6 CONCLUSIONS ON HAZARD VULNERABILITY

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

- Improving our understanding of the risk associated with the natural hazards in the Toe River 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 Toe River 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 Toe River 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 Caswell, Davie, Forsyth, Rockingham, Stokes, Surry, and Yadkin 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).

**Table 6.25** presents a summary of potential annualized loss estimates for each hazard in the Toe River Region. Due to the reporting of hazard damages primarily at the county level, it was difficult to determine an accurate annualized loss estimate for each municipality. Therefore, an annualized loss was determined through the damage reported through historical occurrences at the county level. If no historical occurrences were reported, an accurate annualized loss estimate could not be obtained. These values should be used as an additional planning tool or measure risk for determining hazard mitigation strategies throughout the region.

### TABLE 6.24: POTENTIAL ANNUALIZED LOSSES FOR THE TOE RIVER REGION

| Hazard | Avery County | McDowell County | Mitchell County | Yancey County | Total |
|---|---|---|---|---|---|
| **Drought** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Excessive Heat** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Hurricane and Coastal Hazards** | $1,103,784 | $1,692,227 | $1,125,176 | $1,217,909 | $5,139,096 |
| **Tornadoes/ Thunderstorms** | $345,135 | $365,849 | $367,383 | $441,323 | $1,519,690 |
| **Severe Winter Weather** | $3,803,738 | $3,810,122 | $58,255 | $58,268 | $7,730,383 |
| **Earthquakes** | $146,001 | $241,940 | $164,452 | $179,695 | $732,088 |
| **Geological** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Dam Failure** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Flooding** | $30,226 | $32,418 | $34,616 | $67,058 | $164,318 |
| **Wildfires** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Infectious Disease** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Hazardous Substances** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Radiological Emergency** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Terrorism** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Cyber** | Negligible | Negligible | Negligible | Negligible | Negligible |
| **Electromagnetic Pulse** | Negligible | Negligible | Negligible | Negligible | Negligible |

**In this table, the term "Negligible" is used to indicate that no records of dollar losses for the particular hazard were recorded. This could be the case either because there were no events that caused dollar damage or because documentation of that particular type of event is not well kept.*

As noted previously, all existing and future buildings and populations (including critical facilities) are vulnerable to natural hazards including drought, hurricane and coastal hazards, tornadoes/ thunderstorms, and severe winter weather. Some buildings may be more vulnerable to these hazards based on locations, construction, and building type. **Table 6.25** shows the critical facilities vulnerable to additional hazards analyzed in this section. The table lists those assets that are determined to be exposed to each of the identified hazards (marked with an "**X**")

## TABLE 6.25: AT-RISK CRITICAL FACILITIES

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| **Avery County** | | | | | | | | | | | | | | | | | | |
| Avery County EOC | Other | X | X | X | X | X | X | X | X | | | | | | X | X | | |
| Emergency and Rescue Squad | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Emergency Medical Services - Banner Elk Station | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Emergency Medical Services - Newland | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Banner Elk Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Banner Elk Volunteer Fire Rescue Station 2 | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Crossnore Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Elk Park Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Fall Creek Volunteer Fire Department - Station 1 | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | | | | |
| Fall Creek Volunteer Fire Department - Station 2 | Fire/EMS Stations | X | X | X | X | X | X | X | X | X | | | | | | | | |
| Frank Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Green Valley Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Linville - Central Rescue Squad | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Linville Volunteer Fire and Rescue | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Newland Volunteer Fire Department Incorporated | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Avery County Sheriff's Department / Jail | Law Enforcement | X | X | X | X | X | X | X | X | | | | | | X | X | | |
| Beech Mountain Police Department | Law Enforcement | X | X | X | X | X | X | | | X | | | | | X | X | | |
| City of Banner Elk Police Department | Law Enforcement | X | X | X | X | X | X | X | X | X | | | | | X | X | | |
| Elk Park Police Department | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | | |
| Newland Police Department | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | | |
| NC State Highway Patrol Troop G District I - Substation | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | | |

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| Sugar Mountain Police Department | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | | |
| American Homepatient | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Avery C.A.R.E.S. | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Avery County Group Home | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Medi Home Care | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Sloop Cap/Avery Home Care Services | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Sloop Care Center, Inc., LLC | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Yellow Mountain Enterprises | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Avery County High | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Avery High Stem Academy | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Avery High Viking Academy | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Avery Middle | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Banner Elk Elementary | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Cranberry Middle | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Crossnore Academy | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Crossnore Elementary | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Freedom Trail Elementary | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Grandfather Academy | Public School | X | X | X | X | X | X | | | | | | | | | X | | |
| Mayland Early College | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | |
| Newland Elementary | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Riverside Elementary | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| **McDowell County** | | | | | | | | | | | | | | | | | | |
| McDowell County Emergency Management | Other | X | X | X | X | X | X | | | | | | | | X | X | X | X |

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| Ashford-North Cove Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Dysartsville Volunteer Fire Department Incorporated | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Glenwood Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | X |
| Hankins - North Fork Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | | | X | X |
| Marion Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| McDowell County Emergency Medical Services Station 1 | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| McDowell County Emergency Medical Services Station 2 | Fire/EMS Stations | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| McDowell County Rescue Squad and Ambulance Inc. | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Nebo Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | | X | X | X |
| NC Division of Forest Resources District 1 | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Old Fort Volunteer Fire Department Incorporated | Fire/EMS Stations | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| Pleasant Gardens Volunteer Fire Department Incorporated | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Sugar Hill-Montford Cove Volunteer Fire Department Incorporated | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | | | | |
| The Crooked Creek Township Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | | | | |
| Woodlawn - Sevier Volunteer Fire Department Inc. | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | X |
| City of Marion Police Department | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| McDowell County Sheriff's Department / Jail | Law Enforcement | X | X | X | X | X | X | | | | | | | | | | X | X |
| North Carolina State Highway Patrol Troop G District II | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Old Fort Police Department | Law Enforcement | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| USFS - Pisgah National Forest Grandfather Ranger District | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | | |
| Agape House | Medical Facility | X | X | X | X | X | X | | | | | | | | | | | X |

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| Autumn Care of Marion | Medical Facility | X | X | X | X | X | X | X | X | | | | | | | | | X |
| Blue Ridge Home Care | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | X |
| Carolina Home Care | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Cedarbrook Residential Center | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | | |
| East Court Group Care, Inc. | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Eliada Homes/Taylor-Green Home | Medical Facility | X | X | X | X | X | X | | | | | | | | | | | |
| Fairview Assisted Living, Inc. | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Foothills Mental Health of McDowell County | Medical Facility | X | X | X | X | X | X | | | | | | | | | | X | X |
| Gowan Family Care, Inc. | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | | X |
| Health II of the McDowell Hospital | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| High Country Home Care | Medical Facility | X | X | X | X | X | X | | | | | | | X | X | X | | |
| Hospice of McDowell County, Inc. | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Laurelwood Group Home | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | | X |
| McDowell Care Center | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| McDowell County Department of Social Services | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| McDowell Group Care | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| McDowell Home Health Agency | Medical Facility | X | X | X | X | X | X | | | | | | | | | | X | X |
| McDowell Opportunities | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | | X |
| Medstat Staffing | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | X | X |
| Mountain View Care Center | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Mountain View Family Care Home | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | X |
| Quality Home Care | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | X | X |
| Sci - Individual 2 | Medical Facility | X | X | X | X | X | X | | | | | | | | | | | |

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| Tender Touch In-Home Assistance | Medical Facility | X | X | X | X | X | X | X | X | | | | | | X | X | | |
| The McDowell Hospital | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | X | X |
| Truett's Family Care Home | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Wintergreen Assisted Living | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | X |
| Zion Hill Living Center | Medical Facility | X | X | X | X | X | X | | | | | | | | | | | |
| East McDowell Junior High | Public School | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Eastfield Global Magnet School | Public School | X | X | X | X | X | X | | | | | | | | | X | X | X |
| Glenwood Elementary | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | X |
| Marion Elementary | Public School | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| McDowell Early College | Public School | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| McDowell High | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Nebo Elementary | Public School | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| North Cove Elementary | Public School | X | X | X | X | X | X | | | | | | X | X | X | X | X | X |
| Old Fort Elementary | Public School | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| Pleasant Gardens Elementary | Public School | X | X | X | X | X | X | | | | | | | X | X | X | | |
| West Marion Elementary | Public School | X | X | X | X | X | X | | | | | | | | | | | |
| West McDowell Junior High | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| **Mitchell County** | | | | | | | | | | | | | | | | | | |
| Mitchell County Emergency Operations Center | Other | X | X | X | X | X | X | | X | | | | | | X | X | | |
| Bakersville Volunteer Fire and Rescue Station 2 | Fire/EMS Stations | X | X | X | X | X | X | X | X | | | | | | X | X | | |
| Bradshaw Volunteer Fire and Rescue | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Buladean Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Clearmont Volunteer Fire Department Station 1 | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | X |

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| Fork Mountain Fire Department and Rescue Squad | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Ledger Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Mitchell Emergency Medical Services | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Parkway Fire and Rescue Station 1 | Fire/EMS Stations | X | X | X | X | X | X | | | X | | | | | X | X | | |
| Parkway Fire and Rescue Station 2 | Fire/EMS Stations | X | X | X | X | X | X | | | X | | | | | | X | X | X |
| Parkway Fire and Rescue Station 3 | Fire/EMS Stations | X | X | X | X | X | X | | | X | | | | | X | X | | |
| Spruce Pine Fire and Rescue | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Bakersville Police Department | Law Enforcement | X | X | X | X | X | X | | X | | | | | | X | X | | |
| Mitchell County Sheriff's Department | Law Enforcement | X | X | X | X | X | X | X | X | | | | | | X | X | | |
| NPS - Blue Ridge Parkway Gillespie Gap Ranger Station | Law Enforcement | X | X | X | X | X | X | | | X | | | | | X | X | | X |
| Spruce Pine Police Department | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| B & L Family Care Home | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Bear Creek Manor I | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Bear Creek Manor II | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | X |
| Blue Ridge Center-Mitchell County Program | Medical Facility | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| Blue Ridge Home Care | Medical Facility | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| Brian Center Health & Rehabilitation/Spruce Pine | Medical Facility | X | X | X | X | X | X | | | | | | X | X | X | X | | |
| Heart Path at Spruce Pine Community Hospital | Medical Facility | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| High Country Counseling Center | Medical Facility | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| High Country Home Care | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | X | X |
| Hospice of Mitchell County, Inc. | Medical Facility | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| Mitchell County DSS | Medical Facility | X | X | X | X | X | X | | X | | | | | | X | X | | |
| Mitchell County Group Home | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| Mountain Opportunity Center-Mitchell | Medical Facility | X | X | X | X | X | X | | X | | | | | | X | X | | |
| Roan View Home Care | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Spruce Pine Community Hospital | Medical Facility | X | X | X | X | X | X | | | X | | | | | X | X | X | X |
| White Oak Family Care Home | Medical Facility | X | X | X | X | X | X | | | | | | | | | | | |
| Williams Home | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | X | X |
| Bowman Middle | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Deyton Elementary | Public School | X | X | X | X | X | X | | | | | | X | X | X | X | | X |
| Gouge Elementary | Public School | X | X | X | X | X | X | | X | | | | | | X | X | | |
| Greenlee Primary | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | |
| Harris Middle | Public School | X | X | X | X | X | X | | | | | | X | X | X | X | | X |
| Mitchell High | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| **Yancey County** | | | | | | | | | | | | | | | | | | |
| Yancey County Emergency Management | Other | X | X | X | X | X | X | | | | | | | | X | X | | |
| Burnsville Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Clearmont Volunteer Fire Department Station 2 | Fire/EMS Stations | X | X | X | X | X | X | | | | | X | | | | | | |
| Double Island Volunteer Fire Department Station 1 | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | | | | X |
| Double Island Volunteer Fire Department Station 2 | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | | | | X |
| Egypt-Ramseytown Volunteer Fire Department Station 1 | Fire/EMS Stations | X | X | X | X | X | X | X | X | | | | | | X | X | | |
| Egypt-Ramseytown Volunteer Fire Department Station 2 | Fire/EMS Stations | X | X | X | X | X | X | | X | | | | | | X | X | | |
| Newdale Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Pensacola Volunteer Fire Department | Fire/EMS Stations | X | X | X | X | X | X | | | X | | | | | | | | |
| South Toe Volunteer Fire and Rescue Station 1 | Fire/EMS Stations | X | X | X | X | X | X | X | X | X | | | | | X | X | | |
| South Toe Volunteer Fire and Rescue Station 2 | Fire/EMS Stations | X | X | X | X | X | X | X | X | | | | | | X | X | X | X |

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| United States Forest Service - Toecane Ranger Station | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | X | X | X | | |
| West Yancey Volunteer Fire Department Station 1 | Fire/EMS Stations | X | X | X | X | X | X | X | X | X | | | | | X | X | | |
| West Yancey Volunteer Fire Department Station 2 | Fire/EMS Stations | X | X | X | X | X | X | | | X | | | | | | | | |
| West Yancey Volunteer Fire Department Station 3 | Fire/EMS Stations | X | X | X | X | X | X | | | X | | | | | | | | |
| Yancey Emergency Medical Services | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Yancey Rescue Squad | Fire/EMS Stations | X | X | X | X | X | X | | | | | | | | X | X | | |
| Burnsville Police Department | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | | |
| NC Division of Parks - Mount Mitchell State Park | Law Enforcement | X | X | X | X | X | X | | | X | | X | | | X | X | | |
| North Carolina State Highway Patrol Troop G District I | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | | |
| USFS - Pisgah National Forest Appalachian Ranger District | Law Enforcement | X | X | X | X | X | X | | | | | | | X | X | X | | |
| Yancey County Sheriff's Department / Yancey County Jail | Law Enforcement | X | X | X | X | X | X | | | | | | | | X | X | | |
| Alliance Home Care | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Alpha Omega Health, Inc. | Medical Facility | X | X | X | X | X | X | | | | | | | X | X | X | | |
| Alpha Omega Health, Inc. Recreational Respite | Medical Facility | X | X | X | X | X | X | | | | | | | X | X | X | | |
| Blue Ridge Center-Yancey County Program | Medical Facility | X | X | X | X | X | X | | | X | | | | X | X | X | | |
| Hospice of Yancey County | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Mountain Manor Assisted Living, LLC | Medical Facility | X | X | X | X | X | X | | | | | | | | | X | | |
| Mountain Opportunity Center-Yancey | Medical Facility | X | X | X | X | X | X | | | | | | | X | X | X | | |
| Yancey Community Medical Center | Medical Facility | X | X | X | X | X | X | | | X | | | | X | X | X | | |
| Yancey County Group Home | Medical Facility | X | X | X | X | X | X | | | | | | | X | X | X | | |
| Yancey County Home Health Agency | Medical Facility | X | X | X | X | X | X | | | | | | | | X | X | | |
| Yancey Nursing Center | Medical Facility | X | X | X | X | X | X | | | X | | | | X | X | X | | |
| Bald Creek Elementary | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | |

| Facility Name | Facility Type | Natural | | | | | | | | Geological | | Other | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Drought | Excessive Heat | Hurricane & Coastal Hazards | Tornadoes/Thunderstorms | Severe Winter Weather | Earthquakes | Flood 100-year | Flood 500-year | Landslide - High Incidence | Landslide - Mod. Incidence | Wildfires | Fixed HAZMAT 0.5 Mile | Fixed HAZMAT 1 Mile | Mobile HAZMAT 0.5 Mile (Road) | Mobile HAZMAT 1 Mile (Road) | Mobile HAZMAT 0.5 Mile (Rail) | Mobile HAZMAT 1 Mile (Rail) |
| Bee Log Elementary | Public School | X | X | X | X | X | X | | | | | | | | | X | | |
| Burnsville Elementary | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | |
| Cane River Middle | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | |
| Clearmont Elementary | Public School | X | X | X | X | X | X | | | | | X | | | | X | | |
| East Yancey Middle | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | |
| Micaville Elementary | Public School | X | X | X | X | X | X | | | | | | | | X | X | | |
| Mountain Heritage High | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | |
| South Toe Elementary | Public School | X | X | X | X | X | X | | | X | | | | | X | X | | |

# SECTION 7
# CAPABILITY ASSESSMENT

This section of the Plan discusses the capability of the Toe River Region to implement hazard mitigation activities. It consists of the following five subsections:

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

## 7.1 WHAT IS A CAPABILITY ASSESSMENT?

The purpose of conducting a capability assessment is to determine the ability of a local jurisdiction to implement a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs or projects. Conducting a capability assessment also helps the communities meet the FEMA requirement for reviewing and incorporating existing plans, studies, reports and technical information into the plan. 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 Toe River 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 also ensures that those goals and objectives are realistically achievable under given local conditions.

## 7.2 CONDUCTING THE CAPABILITY ASSESSMENT

In order to facilitate the inventory and analysis of local government capabilities within the Toe River counties, a detailed Capability Assessment Survey[1] was distributed to members of the Toe River Regional Hazard Mitigation Planning Committee at the project kickoff meeting during the development of the 2010 plan. The survey questionnaire requested information on a variety of "capability indicators" such as existing local plans, policies, programs or ordinances that contribute to and/or hinder the Region's ability to implement hazard mitigation actions. Other indicators included information related to the Region's fiscal, administrative and technical capabilities, such as access to local budgetary and personnel resources for mitigation purposes. Survey respondents were also asked to comment on the current political climate with respect to hazard mitigation, an important consideration for any local planning or decision making process.

At a minimum, survey results provide an extensive inventory of existing local plans, ordinances, programs and resources in place or under development, in addition to their overall effect on hazard loss reduction. In completing the survey, local officials were also required to conduct a self-assessment of their jurisdiction's specific capabilities. The survey instrument thereby not only helps accurately assess the degree of local capability, but also serves as a good source of introspection for counties and local jurisdictions that want to improve their capabilities as identified gaps, weaknesses or conflicts can be recast as opportunities for specific actions to be proposed as part of the hazard mitigation strategy.

The information provided in response to the survey questionnaire was incorporated into a database for further analysis. A general scoring methodology[2] was then applied to quantify each jurisdiction's overall capability. According to the scoring system, each capability indicator was assigned a point value based on its relevance to hazard mitigation. Additional points were added based on the jurisdiction's self-assessment of their own planning and regulatory capability, administrative and technical capability, fiscal capability and political capability.

Using this scoring methodology, a total score and an overall capability rating of "High," "Moderate" or "Limited" could be determined according to the total number of points received. These classifications are designed to provide nothing more than a general assessment of local government capability. In combination with the narrative responses provided by local officials, the results of this capability assessment provide critical information for developing an effective and meaningful mitigation strategy.

For the 2015 update each jurisdiction reviewed findings from the initial assessment and made changes as needed to reflect implementation of new capabilities in all capability sectors (Planning and Regulatory Capability, Administrative and Technical Capability, Fiscal Capability and Political Capability).

## 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 Toe River Region to implement hazard mitigation activities. All information is based upon the input provided by local government officials through the Capability Assessment Survey and during meetings of the Toe River Regional Hazard Mitigation Planning Committee.

[1] The Capability Assessment Survey instrument is available in Appendix B.
[2] The scoring methodology used to quantify and rank the Region's capability can be found in Appendix B.

### 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, in addition to 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 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 or programs in place or under development for the Toe River 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 Toe River Region. A checkmark (✓) indicates that the given item is currently in place and being implemented. An asterisk (*) indicates that the given item is currently being developed for future implementation. Each of these local plans, ordinances and programs should be considered available mechanisms for incorporating the requirements of the Toe River Regional Hazard Mitigation Plan.

## TABLE 7.1: RELEVANT PLANS, ORDINANCES AND PROGRAMS

| Planning / Regulatory Tool | AVERY COUNTY | Banner Elk | Crossnore | Elk Park | Grandfather Village | Newland | Sugar Mountain | McDOWELL COUNTY | Marion | Old Fort | MITCHELL COUNTY | Bakersville | Spruce Pine | YANCEY COUNTY | Burnsville |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hazard Mitigation Plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Comprehensive Land Use Plan | ✓ | ✓ | * | | ✓ | * | ✓ | | ✓ | | | | ✓ | | |
| Floodplain Management Plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Open Space Management Plan (or Parks & Rec/Greenway | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | |
| Stormwater Management Plan/Ordinance | ✓ | ✓ | * | * | * | ✓ | ✓ | | | | | ✓ | | | |
| Natural Resource Protection Plan | ✓ | ✓ | ✓ | | ✓ | | ✓ | | | | | | | | |
| Flood Response Plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | |
| Emergency Operations Plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | |
| Continuity of Operations Plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | * | |
| Evacuation Plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| Disaster Recovery Plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | ✓ | |
| Capital Improvements Plan | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | * | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Economic Development Plan | ✓ | ✓ | * | * | * | * | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | |
| Historic Preservation Plan | | ✓ | ✓ | * | | * | ✓ | ✓ | | | | | | ✓ | |
| Flood Damage Prevention Ordinance | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Zoning Ordinance | ✓ | ✓ | * | * | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | ✓ |
| Subdivision Ordinance | ✓ | ✓ | * | * | ✓ | | ✓ | ✓ | ✓ | | | | | | ✓ |
| 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, along with the incorporation of additional information based on the narrative comments provided by local officials in response to the survey questionnaire.

### 7.3.2 Emergency Management

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

**FIGURE 7.1: THE FOUR PHASES OF EMERGENCY MANAGEMENT**


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

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

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

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

- Avery County maintains a Disaster Recovery Plan that is a cooperative effort between the Emergency Management and Planning Departments. The County's plan covers the participating jurisdictions within Avery County.
- McDowell County and Yancey County each maintain Disaster Recovery Plans through their respective Emergency Management Departments.
- Mitchell County does not currently maintain a Disaster Recovery Plan. The County 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.

- Avery County, McDowell County, Mitchell County and Yancey County each maintain Emergency Operations Plans through their respective Emergency Management Departments.
- Avery County's Emergency Operations Plan covers the participating jurisdictions of Grandfather Village, Elk Park, and Crossnore. The participating jurisdictions of Newland, Sugar Mountain, and Banner Elk maintain their own Emergency Operations Plans through their respective Town Managers.
- Mitchell County's Emergency Operations Plan covers the participating jurisdictions of Bakersville and Spruce Pine.
- The City of Marion maintains an Emergency Operations Plan through the Administration, Police, Fire, Public Works, and Planning Departments.

***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.

- Avery County and McDowell County currently maintain Continuity of Operations Plans through their respective Emergency Management Departments. The Avery County plan includes the participating jurisdiction of Elk Park.
- The participating jurisdictions of Grandfather Village, Crossnore, Newland, Sugar Mountain, and Banner Elk maintain their own Continuity of Operations Plans.
- Mitchell County does not currently have a Continuity of Operations Plan.
- Yancey County Emergency Management is currently developing a Continuity of Operations 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 Survey also asked questions regarding general planning capabilities and the degree to which hazard mitigation is integrated into other on-going planning efforts in the Toe River 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.

- Avery County has a comprehensive land use plan that was adopted by the Board of County Commissioners and is maintained by the Planning Department. The participating jurisdictions of Grandfather Village, Sugar Mountain, and Banner Elk maintain their own comprehensive land use plans. The Towns of Crossnore and Newland are currently developing comprehensive land use plans. The Town of Elk Park does not have a comprehensive land use plan.
- McDowell County does not have a comprehensive land use plan. The City of Marion within McDowell County maintains a comprehensive plan through its Planning Department.
- Mitchell County does not have a comprehensive land use plan. The participating jurisdiction of Spruce Pine within Mitchell County maintains a Town Master Plan.
- Yancey County does not have a comprehensive land use plan.

***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.

- Avery County maintains a Capital Improvements Plan through the County Manager. The participating jurisdictions of Grandfather Village, Elk Park, Crossnore, Newland, Sugar Mountain, and Banner Elk maintain their own Capital Improvements Plans.
- McDowell County is currently developing a Capital Improvements Plan through County Administration. The City of Marion maintains a Capital Improvements Plan through its Finance Department.
- Mitchell County maintains a Capital Improvements Plan through County Administration. The participating jurisdictions of Bakersville and Spruce Pine work with the County to maintain this plan.
- Yancey County maintains a Capital Improvements Plan through its Finance Department. The Town of Burnsville maintains its own Capital Improvements Plan.

***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.

- McDowell County and Yancey County have Historic Preservation Plans.
- Mitchell County does not have a Historic Preservation Plan.
- Avery County does not have a Historic Preservation Plan. The Towns of Newland and Elk Park are currently developing Historic Preservation Plans. The Village of Sugar Mountain and the Towns of Banner Elk and Crossnore currently have Historic Preservation Plans.
- Mitigation strategies such as applying for federal grant funds (i.e., PDM, FMA, HMGP) to protect identified at-risk historic structures in the Toe River Region could be considered in any future historic planning efforts.

***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.

- Avery County has a zoning ordinance that is administered by the Planning Department. Grandfather Village, Sugar Mountain, and the Towns of Newland and Banner Elk have adopted zoning ordinances. The Towns of Elk Park and Crossnore are currently developing zoning ordinances.
- McDowell County has a zoning ordinance, but it only covers certain areas of the county. The City of Marion has an adopted zoning ordinance.
- Mitchell County does not have a zoning ordinance. The Town of Spruce Pine within Mitchell County has an adopted zoning ordinance.
- Yancey County does not have a zoning ordinance. The Town of Burnsville within Yancey County has an adopted zoning 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.

- Avery County has a subdivision ordinance that is administered by the Planning Department. Grandfather Village, Sugar Mountain, and Banner Elk have adopted subdivision ordinances. The Towns of Elk Park and Crossnore are currently developing subdivision ordinances.
- McDowell County has a Subdivision Ordinance that was adopted by the Board of County Commissioners in August 2007 and applies to all areas of unincorporated McDowell County. One of the stated purposes of the ordinance is to "reduce the danger to health or peril from

flood, erosion, or water pollution." Further, the ordinance limits the steepness of streets specifically to reduce the risk of landslides and landslide affects (injury, blocked roads, etc). The City of Marion has adopted a subdivision ordinance.

- Mitchell County does not have a subdivision ordinance.
- Yancey County does not have a subdivision ordinance. The Town of Burnsville within Yancey County has an adopted subdivision ordinance.

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

- All of the participating counties and jurisdictions have adopted the North Carolina State Building Code. The building code is enforced by each county's Building Inspector. The City Marion has its own Building Inspector and enforces the North Carolina State Building Code within the City 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).[3] 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 number of inspections performed per day. This type of information combined with local building codes is used to determine a grade for that jurisdiction. The grades range from 1 to 10, with a BCEGS grade of 1 representing exemplary commitment to building code enforcement, and a grade of 10 indicating less than minimum recognized protection.

## 7.3.4 Floodplain Management

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

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

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 Toe River Region. All of the jurisdictions within the Toe River region participate in the NFIP through enforcement of floodplain management ordinances and by regulating development using Flood Insurance Rate Maps. Continued compliance with the NFIP is a priority for the jurisdictions in the Toe River region.

## TABLE 7.2: NFIP POLICY AND CLAIM INFORMATION

| Jurisdiction | Date Joined NFIP | Current Effective Map Date | NFIP Policies in Force | Insurance in Force | Total Losses | Total Payments to Date |
|---|---|---|---|---|---|---|
| **AVERY COUNTY** | 9/28/90 | 12/3/09 | 132 | $31,789,900 | 118 | $2,034,079 |
| Banner Elk | 1/15/88 | 12/3/09 | 34 | $10,322,400 | 9 | $85,396 |
| Crossnore | 8/19/86 | 12/3/09 (M) | 4 | $689,100 | 4 | $34,480 |
| Elk Park | 4/15/86 | 12/3/09 (M) | 5 | $575,400 | 2 | $2,487 |
| Grandfather Village | 7/15/10 | 12/3/09 | 14 | $4,750,000 | 1 | 0 |
| Newland | 12/8/84 | 12/3/09 | 7 | $2,253,700 | 10 | $586,225 |
| Sugar Mountain | 6/1/09 | NSFHA | 7 | $1,950,000 | 0 | 0 |
| **McDOWELL COUNTY** | 7/15/88 | 1/6/10 | 77 | $18,001,300 | 53 | $208,649 |
| Marion | 5/1/87 | 1/6/10 | 15 | $4,070,500 | 3 | $56,414 |
| Old Fort | 7/15/88 | 1/6/10 | 13 | $3,499,700 | 3 | $140,685 |
| **MITCHELL COUNTY** | 9/4/86 | 6/2/09 | 21 | $5,100,300 | 13 | $316,563 |
| Bakersville | 5/1/87 | 6/2/09 | 11 | $3,124,700 | 13 | $307,038 |
| Spruce Pine | 9/2/88 | 6/2/09 | 1 | $192,000 | 6 | $256,600 |
| **YANCEY COUNTY** | 4/17/84 | 6/2/09 | 116 | $27,579,700 | 53 | $665,940 |
| Burnsville | 4/17/84 | 6/2/09 | 6 | $977,700 | 4 | $70,736 |

(M) – No elevation determined, all Zone A, C, and X
(NSFHA) – No Special Flood Hazard Area, all Zone C
Source: NFIP claims and policy information as of 11/14/19; NFIP Community Status information as of 11/14/19.

***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, 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. Class ratings, which range from 10 to 1, are tied to flood insurance premium reductions as shown in **Table 7.3**. As class ratings improve (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 intended to make the CRS more user friendly, and extensive technical assistance available for communities who request it.

- None of the counties or local jurisdictions currently participates in the CRS. Participation in the CRS program should be considered as a mitigation action. The program would be most beneficial to Avery and Yancey Counties, which each have more than 100 NFIP policies.

***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.

- All communities participating in the NFIP are required to adopt a local flood damage prevention ordinance. All counties and municipalities participating in this hazard mitigation plan also participate in the NFIP and they all have adopted flood damage prevention ordinances.

***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.

- McDowell County's Recreation Department maintains a Parks and Recreation Plan. The City of Marion has an Open Space Management Plan administered by the City's Planning Department.
- Yancey County and Mitchell County do not have Open Space Management Plans, nor do any of the participating jurisdictions within these counties.
- Avery County enforces an Open Space Management Plan as part of their subdivision ordinance and commercial site plan requirements. Each of the participating jurisdictions in Avery County also has some form of Open Space Management Plan.

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

- Avery County has an adopted Sedimentation and Erosion Control Ordinance that serves as their Stormwater Ordinance. Sugar Mountain and the Towns of Newland and Banner Elk have adopted Stormwater Management Plans. Grandfather Village and the Towns of Elk Park and Crossnore are currently developing Stormwater Management Plans.
- McDowell County does not have a formal Stormwater Management Plan, but the County follows the North Carolina Department of Environment and Natural Resources (NCDENR) rules for stormwater runoff.
- Mitchell County does not have a Stormwater Management Plan. The Town of Bakersville enforces NCDOT stormwater management regulations.
- Yancey County does not have a formal Stormwater Management Plan.

### 7.3.5 Administrative and Technical Capability

The ability of a local government to develop and implement mitigation projects, policies and programs is directly tied to its ability to direct staff time and resources for that purpose. Administrative capability can be evaluated by determining how mitigation-related activities are assigned to local departments and if there are adequate personnel resources to complete these activities. The degree of intergovernmental coordination among departments will also affect administrative capability for the implementation and success of proposed mitigation activities.
Technical capability can generally be evaluated by assessing the level of knowledge and technical expertise of local government employees, such as personnel skilled in using Geographic Information Systems (GIS) to analyze and assess community hazard vulnerability. The Capability Assessment Survey was used to capture information on administrative and technical capability through the identification of available staff and personnel resources.

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

## TABLE 7.4: RELEVANT STAFF / PERSONNEL RESOURCES

| Staff / Personnel Resource | AVERY COUNTY | Banner Elk | Crossnore | Elk Park | Grandfather Village | Newland | Sugar Mountain | McDOWELL COUNTY | Marion | Old Fort | MITCHELL COUNTY | Bakersville | Spruce Pine | YANCEY COUNTY | Burnsville |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Planners with knowledge of land development / land management practices | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | | | | |
| Engineers or professionals trained in construction practices related to buildings and/or infrastructure | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | | | | | | |
| Planners or engineers with an understanding of natural and/or human-caused hazards | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | | | | |
| Emergency Manager | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Floodplain Manager | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | |
| Land Surveyors | | | | | | | | | | | | | | | |
| Scientists familiar with the hazards of the community | | | | | | | | | | | | | | | |
| Staff with education or expertise to assess the community's vulnerability to hazards | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | ✓ | |
| Personnel skilled in GIS and/or HAZUS | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | | | ✓ | |
| Resource development staff or grant writers | ✓ | ✓ | | ✓ | | ✓ | ✓ | ✓ | | | | | | | |

### 7.3.6 Fiscal Capability

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

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

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

**TABLE 7.5: RELEVANT FISCAL RESOURCES**

| Potential Fiscal Resource/Tool | AVERY COUNTY | Banner Elk | Crossnore | Elk Park | Grandfather Village | Newland | Sugar Mountain | McDOWELL COUNTY | Marion | Old Fort | MITCHELL COUNTY | Bakersville | Spruce Pine | YANCEY COUNTY | Burnsville |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Capital Improvement Programming | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | |
| Community Development Block Grants (CDBG) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | |
| Special Purpose Taxes (or taxing districts) | ✓ | | | | | | ✓ | | ✓ | | ✓ | | | ✓ | |
| Gas / Electric Utility Fees | | | | | | | | | | | | | | | |
| Water / Sewer Fees | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ |
| Stormwater Utility Fees | | ✓ | | | | ✓ | | | | | | | | | |
| Development Impact Fees | | ✓ | | | | | | | | | | | ✓ | | |
| General Obligation, Revenue, and/or Special Tax Bonds | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | ✓ | | |
| Partnering Arrangements or Intergovernmental Agreements | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | ✓ |

## 7.3.7 Political Capability

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

The Capability Assessment Survey was used to capture information on political capability of the Toe River Region. Survey respondents were asked to identify some 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 (e.g. building codes, floodplain management, etc.).

- Some survey responses provided examples of development regulations that go beyond minimum state or federal requirements. The City of Marion indicated that they enforce a two-foot freeboard in the floodplain and have additional regulations for development along steep slopes. Past mitigation activities in the Toe River Region are described in the next section under *Previously Implemented Mitigation Measures*.

- The Town of Bakersville indicated strong support from its Town Board, which has gone through two disaster events.

### 7.3.8 Local Self Assessment

In addition to the inventory and analysis of specific local capabilities, the Capability Assessment Survey asked counties and local jurisdictions within the Toe River Region to conduct a self assessment of their perceived capability to implement hazard mitigation activities. As part of this process, local officials were encouraged to consider the barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. In response to the survey questionnaire, county officials classified each of the aforementioned capabilities as either "limited," "moderate" or "high."

Table 7.6 summarizes the results of the self assessment process for the Toe River Region.

## TABLE 7.6: SELF ASSESSMENT OF CAPABILITY

| Jurisdiction | Planning and Regulatory Capability | Administrative and Technical Capability | Fiscal Capability | Political Capability | OVERALL CAPABILITY |
|---|---|---|---|---|---|
| AVERY COUNTY | High | High | High | High | High |
| Banner Elk | High | High | High | High | High |
| Crossnore | High | High | High | High | High |
| Elk Park | High | High | High | High | High |
| Grandfather Village | High | High | High | High | High |
| Newland | High | High | High | High | High |
| Sugar Mountain | High | High | High | High | High |
| McDOWELL COUNTY | Moderate | Moderate | Limited | Moderate | Moderate |
| Marion | High | High | High | High | High |
| Old Fort* | | | | | |
| MITCHELL COUNTY | Limited | Moderate | Limited | High | Moderate |
| Bakersville | Limited | Moderate | Limited | High | Moderate |
| Spruce Pine | Limited | Moderate | Limited | High | Moderate |
| YANCEY COUNTY | Moderate | Limited | Limited | Moderate | Limited |
| Burnsville | Limited | Limited | Limited | Limited | Limited |

** No response provided*

## 7.4 CONCLUSIONS ON LOCAL CAPABILITY

In order to form meaningful conclusions on the assessment of local capability, a quantitative scoring methodology was designed and applied to results of the Capability Assessment Survey. This methodology, further described in Appendix B, attempts to assess the overall level of capability of the Toe River Region to implement hazard mitigation actions.

The overall capability to implement hazard mitigation actions varied among the participating jurisdictions. For planning and regulatory capability, the jurisdictions were in the moderate or high range. The administrative and technical capabilities varied widely among the jurisdictions, with larger jurisdictions generally having greater staff and technical resources. Most jurisdictions were in the low to moderate range for fiscal capability.

**Table 7.7** shows the results of the capability assessment using the designed scoring methodology. The capability score is based solely on the information provided by local officials in response to the

Capability Assessment Survey. According to the assessment, the average local capability score for all responding jurisdictions is **44.6**, which falls into the moderate capability ranking.

## Table 7.7: Capability Assessment Results

| Jurisdiction | Overall Capability Score | Overall Capability Rating |
|---|---|---|
| AVERY COUNTY | 65 | High |
| Banner Elk | 64 | High |
| Crossnore | 51 | High |
| Elk Park | 48 | Moderate |
| Grandfather Village | 56 | High |
| Newland | 46 | Moderate |
| Sugar Mountain | 61 | High |
| McDOWELL COUNTY | 51 | High |
| Marion | 45 | Moderate |
| Old Fort | | |
| MITCHELL COUNTY | 31 | Moderate |
| Bakersville | 27 | Moderate |
| Spruce Pine | 34 | Moderate |
| YANCEY COUNTY | 29 | Moderate |
| Burnsville | 17 | Limited |

As previously discussed, one of the reasons for conducting a Capability Assessment is to examine 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.

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

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

# SECTION 8
# MITIGATION STRATEGY

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

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

## 8.1 INTRODUCTION

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

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

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

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

The third and last step in designing the Mitigation Strategy is the selection and prioritization of specific mitigation actions for the Toe River Region (provided separately in Section 8: *Mitigation Action Plan*). Each County and participating jurisdiction has its own Mitigation Action Plan (MAP) that reflect 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 Toe River 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 Toe River 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. Prioritization of the proposed mitigation actions was based on the following five (5) factors:

### 8.1.1 Mitigation Action Prioritization

In the previous versions of Toe River county plans, not all actions were prioritized. In addition, there needed to be consistency among the counties and jurisdiction regarding how they prioritized their actions. Therefore, for the 2010 Toe River Regional plan, the Regional Hazard Mitigation Planning Committee members were tasked with establishing a priority for each action at the second Regional Hazard Mitigation Planning Committee meeting (February 18, 2010). Prioritization of the proposed mitigation actions was based on the following six (6) 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

[1] Only a general economic cost/benefit review was considered by the Regional Hazard Mitigation Planning Committee 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. "Medium" and "Low" priority actions were labeled as such because they had a medium and lower qualitative benefit respectively when evaluated against the six factors used to determine action priority. A more detailed cost/benefit analysis will be applied to particular projects prior to the application for or obligation of funding, as appropriate.

- 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.

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 Toe River counties and the participating municipalities have developed six goal statements for local hazard mitigation planning in the region. In developing these goals for the initial version of this plan in 2010, the previous four county hazard mitigation plans were reviewed to determine areas of consistency. The project consultant reviewed the goals from each of the four existing plans that were combined to form this regional plan. Many of the goals were similar and regional goals were formulated based on commonalities found between the goals in each plan.

The proposed regional goals were presented, reviewed, voted on, and accepted by the Planning Committee at the second Regional Hazard Mitigation Planning Committee meeting (2/18/10) during the development of the first version of this regional plan. This process of combining goals from the previous plans served to highlight the planning process that had occurred in each county prior to joining this regional planning effort. Each goal, purposefully broad in nature, serves to establish parameters that were used in developing more mitigation actions. The Toe River Region Mitigation Goals are presented in **Table 8.1**. Consistent implementation of actions over time will ensure that community goals are achieved.

As part of the development of the 2020/2021 update of this plan, the goals found in Table 8.1 were reviewed and discussed at the 2/4/20 meeting of the Regional Hazard Mitigation Planning Committee. It was determined that the goals, with minor revisions to add mention of man-made hazards, are still applicable for the region and no revisions were recommended.

## TABLE 8.1: TOE RIVER MITIGATION GOALS

| | Goal |
|---|---|
| Goal #1 | Establish or participate in local, state, and federal mitigation-oriented and disaster-based programs that lessen the damaging effects of natural hazards thereby protecting life and property. |
| Goal #2 | Investigate, seek funding, and implement unspecified special projects and planning efforts that will reduce the damaging effects of natural hazards. |
| Goal #3 | Enhance or create new policies that will help reduce the damaging effects of natural hazards. |
| Goal #4 | Bolster emergency service capabilities by identifying and seeking funding for necessary equipment, as well as fostering regional cooperation for response and recovery. |
| Goal #5 | Identify and mitigate development and infrastructure in known hazard areas, and avoid building new structures in known hazard areas. |
| Goal #6 | Increase public awareness of hazard mitigation and hazard risk. |

## 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 Toe River 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 Toe River Regional Hazard Mitigation Planning Committee meetings. In general, all activities considered by the Regional Hazard Mitigation Planning Committee can be classified under one of the following six (6) broad categories of mitigation techniques: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, and Public Awareness and Education. These are discussed in detail below.

### 8.3.1 Prevention

Preventative activities are intended to keep hazard problems from getting worse, and are typically administered through government programs or regulatory actions that influence the way land is developed and buildings are built. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Planning and zoning
- Building codes

- Open space preservation
- Floodplain regulations
- Stormwater management regulations
- Drainage system maintenance
- Capital improvements programming
- Riverine / fault zone setbacks

### 8.3.2 Property Protection

Property protection measures involve the modification of existing buildings and structures to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations. Examples include:

- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Retrofitting (e.g., 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 TOE RIVER REGION

In order to determine the most appropriate mitigation techniques for the communities in the Toe River Region, the Regional Hazard Mitigation Planning Committee members thoroughly reviewed and considered the findings of the *Capability Assessment* and *Risk Assessment* to determine the best activities for their respective communities. Other considerations included the effect of each mitigation action on overall risk to life and property, its ease of implementation, its degree of political and community support, its general cost-effectiveness, and funding availability (if necessary).

## 8.5 PLAN UPDATE REQUIREMENT

In keeping with FEMA requirements for plan updates, the Mitigation Actions identified in the previous Toe River Region county plans and in the 2010 and 2015 versions of this regional hazard mitigation plan were evaluated to determine their 2021 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 2021 planning process.

Also as part of the 2021 update, the participating jurisdiction also reviewed the assigned priority for each action to determine if that priority has changed over the past five year. Any actions that were determined to be of higher priority were adjusted accordingly as were any actions that were determined to be a lower priority.

# SECTION 9
# MITIGATION ACTION PLAN

**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.

This section of the Plan includes the listing of the mitigation actions proposed by the participating jurisdictions in the Toe River Region.



## 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 Procedures*.

Each proposed mitigation action has been identified as an effective measure (policy or project) to reduce hazard risk for the Toe River Region. Each action is listed in the MAP in conjunction with background information such as priority, hazard(s) addressed 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 Toe River Regional Hazard Mitigation Plan remains a functional document that can be monitored for progress over time. The proposed actions are not listed in priority order, though each has been assigned a priority level of "high," "moderate" or "low" as described below and in Section 8 (page 8.2).

**Table 9.1** describes the key elements of the Mitigation Action Plan.

# Table 9.1: Key Elements of the Mitigation Action Plan

| **Jurisdiction Name Mitigation Action Number** | **Title of Action (Description of action to be undertaken.)** |
|---|---|
| Hazard(s) Addressed: | Hazard which the action addresses. |
| Category: | Category of Mitigation Strategy that is met: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Emergency Services, Public Education and Awareness |
| Priority (High, Moderate, Low): | In preparing their own individual Mitigation Actions Place, each jurisdiction considered their overall hazard risk and capability to mitigate natural hazards as recorded through the risk and capability assessment process, in addition to meeting the adopted countywide mitigation goals and the unique needs of the unique needs of their community. Prioritizing mitigation actions for each jurisdiction was based on the following five (5) factors: (1) effect on overall risk to life and property; (2) ease of implementation; (3) political and community support; (4) a general economic cost/benefit review; and (5) funding availability. This process is also described on page 8:2, Section 8: *Mitigation Strategy*. |
| Lead Agency/Department Responsible: | Department responsible for undertaking the action. |
| Estimated Cost: | Anticipated cost of the action. |
| Potential Funding Sources: | Local, State, or Federal sources of funds are noted here, where applicable. |
| Implementation Schedule: | Date by which the action the action should be completed. More information is provided when possible. |
| Implementation Status (2021): | An indication of completion, progress, deferment, or no change with each action since the previous (2010) plan. If the action is new, that will be noted here. |

## 9.2 MITIGATION ACTION PLANS

The mitigation actions proposed by each of the participating jurisdictions are listed in fifteen individual MAPs on the following pages. **Table 9.2** shows the location of each jurisdiction's MAP within this section as well as the number of mitigation actions proposed by each jurisdiction.

A number of mitigation actions have been completed by the participating jurisdictions over the years. Completed mitigation actions have been removed from the main mitigation action plan and placed in **Appendix E.** Similarly, some actions have been removed from the plan as they were identified to be irrelevant or unimplementatable for various reasons. The specific reasons for the removal of each of those actions has been documented in the previous version of this plan and those actions are no longer found in the mitigation action plan.

### TABLE 9.2: INDIVIDUAL MAP LOCATIONS

| Location | Page | Number of Mitigation Actions |
|---|---|---|
| **Avery County** | **9:4** | **5** |
| Banner Elk | 9:7 | 5 |
| Crossnore | 9:9 | 4 |
| Elk Park | 9:11 | 4 |
| Grandfather Village | 9:13 | 5 |
| Newland | 9:16 | 4 |
| Sugar Mountain | 9:18 | 4 |
| **McDowell County** | **9:20** | **9** |
| Marion | 9:24 | 5 |
| Old Fort | 9:27 | 6 |
| **Mitchell County** | **9:29** | **42** |
| Bakersville | 9:49 | 4 |
| Spruce Pine | 9:51 | 4 |
| **Yancey County** | **9:53** | **11** |
| Burnsville | 9:54 | 5 |
| | | |

## AVERY COUNTY MITIGATION ACTION PLAN

| **Avery County Mitigation Action 4** | **Avery County Schools – Conduct annual earthquake drills at each school** |
|---|---|
| Hazard(s) Addressed: | Earthquake |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | County Building Inspector/County Schools Facilities Director/Principals/County Fire Marshal |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | There has been limited progress in implementing this action over the past 5 years because state technical assistance in no longer available. The County will evaluate the feasibility of providing local funds for implementing the action or will utilize external funds for implementing should they become available. |

| **Avery County Mitigation Action 5** | **Avery County Schools – At Cranberry Middle School and Freedom Trail Elementary School, perform detailed inspection of school buildings and retaining walls during and after severe rains.** |
|---|---|
| Hazard(s) Addressed: | Geological (Landslide); Flood-induced erosion |
| Category: | Natural Resource Protection, Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | County Building Inspector/County Schools Facilities Director/Principals/County Fire Marshal |
| Estimated Cost: | Minimal for inspections; Costs could rise if problems are found and construction must take place for stabilization |
| Potential Funding Sources: | Local Funds; Grant funds through FEMA |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | The walls were reinforced and no problems have occurred since then. No inspections have been done since the reinforcement. |

| **Avery County Mitigation Action 7** | **Evaluate floodplain ordinance and identify potential improvements (also considering impacts to present and future buildings and infrastructure)** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Avery County Floodplain Manager |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the County has been successfully implementing the Flood Damage Prevention Ordinance which regulates new development in the floodplain. By requiring new development to be built above the BFE, Avery County is reducing future vulnerability to the flood hazard. At this time, we have no changes to make to the floodplain ordinance but will continue to evaluate the ordinance and make changes as potential improvements are identified. |

| **Avery County Mitigation Action 8** | **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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Avery County Emergency Management |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Avery County Mitigation Action 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 the application. Projects may 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, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Avery County Emergency Management |
| Estimated Cost: | Costs to be determined on a project-by project basis as they are identified. |
| Potential Funding Sources: | Federal Grants |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | New action for the 2021 plan update. Ongoing. |

# TOWN OF BANNER ELK MITIGATION ACTION PLAN

| **Banner Elk Mitigation Action 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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Banner Elk Mitigation Action 4** | **The Town will continue to work with Avery County and other Agencies to reduce the impacts of all hazards to the Town and its citizens. New, specific mitigation actions will be identified in future versions of the plan as they are identified.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Property Protection, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Banner Elk Town Council, Planning Department |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new mitigation action. |

| **Banner Elk Mitigation Action 5** | **Work with Banner Elk Police Department and Avery County Sheriff's office to bring awareness of the new threats for terrorism, more specifically, cyber terrorism. Also work with Banner Elk Elementary to highlight the awareness of our changing world and the potential dangers associated with terrorism.** |
|---|---|
| Hazard(s) Addressed: | Terrorism |
| Category: | Property Protection, Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Banner Elk Town Council, Planning Department |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new mitigation action. |

| **Banner Elk Mitigation Action 6** | **Determine if there are any Town or County-owned critical facilities that should have a back-up generator. If so, seek funding to purchase a generator for the facility for improved resilience to all hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Property Protection, Emergency Services |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Banner Elk Town Council |
| Estimated Cost: | To be determined |
| Potential Funding Sources: | Federal Grant funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

| **Banner Elk Mitigation Action 7** | **In addition to maintaining basic required compliance actions of the NFIP, periodically evaluate feasibility of implementing the following higher regulatory standards**<br>**a) Require critical facilities protection to 500-year flood levels**<br>**b) Require parking lots to be elevated (no more than six inches deep in any parking space during Community Flood event)**<br>**c) Require dry land access for new or substantially improved buildings (above Community Base Flood Elevation)**<br>**d) Levee restrictions**<br>**e) Floors of new or substantially improved buildings allowed by variance in the floodplain must be elevated at least one (1) foot above the Community (future) Base Flood Elevation.**<br>**f) Prohibit basements below flood level on filled lots** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention, Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Banner Elk Town Council |
| Estimated Cost: | None needed |
| Potential Funding Sources: | Local Staff Time |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

# TOWN OF CROSSNORE MITIGATION ACTION PLAN

| **Crossnore Mitigation Action 2** | **Evaluate the feasibility of developing a plan for floodplain protection within Town Limits (also considering impacts to present and future buildings and infrastructure)** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Natural Resource Protection; Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Moderate |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021 through 2026 |
| 2021 Implementation Status: | This action remains ongoing: The town is working with the county to put together a team that can complete this action. Funding and staff time are needed to fully implement this action. |

| **Crossnore Mitigation Action 3** | **The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the Town of Crossnore has coordinated with the County to successfully implement the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, Crossnore and Avery County are reducing future vulnerability to the flood hazard. The Town will continue their partnership with Avery County in enforcing this important ordinance. |

| **Crossnore Mitigation Action 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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Crossnore Mitigation Action 5** | **Determine if there are any Town or County-owned critical facilities that should have a back-up generator. If so, seek funding to purchase a generator for the facility for improved resilience to all hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services; Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council |
| Estimated Cost: | To be determined |
| Potential Funding Sources: | Federal Grant funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

# TOWN OF ELK PARK MITIGATION ACTION PLAN

| **Elk Park Mitigation Action 3** | **The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the Town of Elk Park has coordinated with the County to successfully implement the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, Elk Park and Avery County are reducing future vulnerability to the flood hazard. The Town will continue their partnership with Avery County in enforcing this important ordinance. |

| **Elk Park Mitigation Action 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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Elk Park Mitigation Action 5** | **Determine if there are any Town or County-owned critical facilities that should have a back-up generator. If so, seek funding to purchase a generator for the facility for improved resilience to all hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services; Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Elk Park Town Council |
| Estimated Cost: | To be determined |
| Potential Funding Sources: | Federal Grant funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

| | |
|---|---|
| **Elk Park<br>Mitigation Action 6** | **In addition to maintaining basic required compliance actions of the NFIP, periodically evaluate feasibility of implementing the following higher regulatory standards<br>a) Require critical facilities protection to 500-year flood levels<br>b) Require parking lots to be elevated (no more than six inches deep in any parking space during Community Flood event)<br>c) Require dry land access for new or substantially improved buildings (above Community Base Flood Elevation)<br>d) Levee restrictions<br>e) Floors of new or substantially improved buildings allowed by variance in the floodplain must be elevated at least one (1) foot above the Community (future) Base Flood Elevation.<br>f) Prohibit basements below flood level on filled lots** |
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council |
| Estimated Cost: | None needed |
| Potential Funding Sources: | Local Staff Time |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

## GRANDFATHER VILLAGE MITIGATION ACTION PLAN

| **Grandfather Village Mitigation Action 3** | **Educate the Public through a newsletter about the new second exit out of the gated community since few people know about it.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness; Emergency Services |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Village Controller |
| Estimated Cost: | Low, approximate $500 |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is an ongoing action. Notice of the second exit out of the community is posted twice a year in community newsletter and at public gathering spaces in the community. This notification will continue in the future. |

| **Grandfather Village Mitigation Action 4** | **The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Village Planning Board, Zoning |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, Grandfather Village has coordinated with the County to successfully implement the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, Grandfather Village and Avery County are reducing future vulnerability to the flood hazard. The Town will continue their partnership with Avery County in enforcing this important ordinance. |

| Grandfather Village Mitigation Action 5 | 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. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Village Governing Board |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| Grandfather Village Mitigation Action 6 | Determine if there are any Village or County-owned critical facilities that should have a back-up generator. If so, seek funding to purchase a generator for the facility for improved resilience to all hazards. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services; Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Village Governing Board |
| Estimated Cost: | To be determined |
| Potential Funding Sources: | Federal Grant funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

| | |
|---|---|
| **Grandfather Village Mitigation Action 7** | **In addition to maintaining basic required compliance actions of the NFIP, periodically evaluate feasibility of implementing the following higher regulatory standards**<br>**a) Require critical facilities protection to 500-year flood levels**<br>**b) Require parking lots to be elevated (no more than six inches deep in any parking space during Community Flood event)**<br>**c) Require dry land access for new or substantially improved buildings (above Community Base Flood Elevation)**<br>**d) Levee restrictions**<br>**e) Floors of new or substantially improved buildings allowed by variance in the floodplain must be elevated at least one (1) foot above the Community (future) Base Flood Elevation.**<br>**f) Prohibit basements below flood level on filled lots** |
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Banner Elk Town Council |
| Estimated Cost: | None needed |
| Potential Funding Sources: | Local Staff Time |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

# TOWN OF NEWLAND MITIGATION ACTION PLAN

| **Newland Mitigation Action 3** | **The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Town Planning Board, Zoning |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the Town of Newland has coordinated with the County to successfully implement the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, Newland and Avery County are reducing future vulnerability to the flood hazard. The Town will continue their partnership with Avery County in enforcing this important ordinance. |

| **Newland Mitigation Action 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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Newland Mitigation Action 5** | **Determine if there are any Town or County-owned critical facilities that should have a back-up generator. If so, seek funding to purchase a generator for the facility for improved resilience to all hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services; Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Newland Town Council |
| Estimated Cost: | To be determined |
| Potential Funding Sources: | Federal Grant funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

| | |
|---|---|
| **Newland Mitigation Action 6** | **In addition to maintaining basic required compliance actions of the NFIP, periodically evaluate feasibility of implementing the following higher regulatory standards**<br>**a) Require critical facilities protection to 500-year flood levels**<br>**b) Require parking lots to be elevated (no more than six inches deep in any parking space during Community Flood event)**<br>**c) Require dry land access for new or substantially improved buildings (above Community Base Flood Elevation)**<br>**d) Levee restrictions**<br>**e) Floors of new or substantially improved buildings allowed by variance in the floodplain must be elevated at least one (1) foot above the Community (future) Base Flood Elevation.**<br>**f) Prohibit basements below flood level on filled lots** |
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council |
| Estimated Cost: | None needed |
| Potential Funding Sources: | Local Staff Time |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

## VILLAGE OF SUGAR MOUNTAIN MITIGATION ACTION PLAN

| **Sugar Mountain Mitigation Action 4** | **The Village will continue to work with the County to enforce the floodplain ordinance within its jurisdiction.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the Village of Sugar Mountain has coordinated with the County to successfully implement the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, Sugar Mountain and Avery County are reducing future vulnerability to the flood hazard. The Town will continue their partnership with Avery County in enforcing this important ordinance. |

| **Sugar Mountain Mitigation Action 5** | **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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Sugar Mountain Mitigation Action 6** | **Determine if there are any Town or County-owned critical facilities that should have a back-up generator. If so, seek funding to purchase a generator for the facility for improved resilience to all hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services; Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Sugar Mountain Town Council |
| Estimated Cost: | To be determined |
| Potential Funding Sources: | Federal Grant funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

| | |
|---|---|
| **Sugar Mountain Mitigation Action 7** | **In addition to maintaining basic required compliance actions of the NFIP, periodically evaluate feasibility of implementing the following higher regulatory standards**<br>**a) Require critical facilities protection to 500-year flood levels**<br>**b) Require parking lots to be elevated (no more than six inches deep in any parking space during Community Flood event)**<br>**c) Require dry land access for new or substantially improved buildings (above Community Base Flood Elevation)**<br>**d) Levee restrictions**<br>**e) Floors of new or substantially improved buildings allowed by variance in the floodplain must be elevated at least one (1) foot above the Community (future) Base Flood Elevation.**<br>**f) Prohibit basements below flood level on filled lots** |
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council |
| Estimated Cost: | None needed |
| Potential Funding Sources: | Local Staff Time |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

# MCDOWELL COUNTY MITIGATION ACTION PLAN

| McDowell County Mitigation Action 9 | Create a zoning map (digital) that can be easily reproduced/ updated for staff and public use. |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning |
| Estimated Cost: | minimal (using in-place staff) |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This action remains ongoing as of 2020. There is currently no zoning on a county-wide basis, only through voluntary means when requested by a landowner. McDowell County's GIS layer of zoning in the County is currently up to date with all zoning in place in the County. The County's GIS will continue to ensure that this layer is kept up to date. |

| McDowell County Mitigation Action 10 | Create and maintain a list of repetitive flood loss properties. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This action has been completed (list of 4 repetitive loss properties maintained in County Building Inspections office) and remains ongoing as long as there are repetitive loss properties in the County. This action will remain in the plan as a reminder to County staff to actively attempt to mitigation all repetitive loss properties when feasible. |

| McDowell County Mitigation Action 12 | Improve shelter capacities with alternate power/heat sources. |
|---|---|
| Hazard(s) Addressed: | Winter Storm |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | McDowell County Emergency Services |
| Estimated Cost: | Unknown at this time |
| Potential Funding Sources: | Grant Funding |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. Working with Red Cross and County on alternative heating sources. We have obtained one heating unit to date that can be used. More funding needed for further implementation. We have applied for HMGP funding for an additional fixed generator at our Commercial Kitchen site that we would use for a mass feeding operation in a time of need and the location could be used as additional sheltering location. |

| McDowell County Mitigation Action 13 | Establish program to maintain continuity of government operations. |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | McDowell County Emergency Services |
| Estimated Cost: | Minimal (use in-place staff) |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Completed/Ongoing Updated as needed when changes are needed or made. Continuity of government operations in outlined in the McDowell County Emergency Operations Plan. As this action is now considered part of the County's capabilities to implement mitigation, the action will be removed from future plan updates. Our County Administration Office is in the same location as the site which is mentioned in Action 12 that will be served by the same generator that we have applied for under the HMGP grant funding. If this funding is approved this will be another step in maintaining continuity of government operations. |

| McDowell County Mitigation Action 14 | Identify alternate Emergency Operations Center locations. |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | McDowell County Emergency Services |
| Estimated Cost: | Unknown; dependent on various options |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Completed. The EOC is now located at 632 College Drive STE G, Marion NC 28752. This action will be moved to the Completed Actions appendix in the next update. |

| McDowell County Mitigation Action 15 | Identify alternate detour routes from major arteries in the county. |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | McDowell County Emergency Services |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing and constantly identifying alternative routes as needed throughout the County. The county has identified and completed detour routes for Interstate 40, but may also consider routes from other major arteries. These detour routes can be found in the county's Detour Plan. |

| McDowell County Mitigation Action 16 | Place flood protection and other hazard education materials in all branches of the McDowell County public library system. |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning |
| Estimated Cost: | Costs of reproducing a plan and materials (minimal) |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Completed and ongoing. We hand out flyers at PR events and also plans are on the County website (mcdowellgov.com). We also use Facebook to put out messages on different safety issues. |

| McDowell County Mitigation Action 17 | The McDowell Planning and Zoning Director has received training on erosion and sedimentation control methods and on floodplain surveying certification. On an annual basis, this official or his designee makes numerous site visits to assist property owners and developers with problems and potential problems associated with drainage, erosion, and flooding. Site visits are made at the request of the property owner or developer and are usually handled through the Planning and Zoning Department. |
|---|---|
| Hazard(s) Addressed: | Flood, Earthquake |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning/Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Completed and ongoing. This procedure is in place with all land use ordinances in McDowell County. Planning works alongside Building Inspections on this task. As needed with visits as requested from property owners or developers. Continued training done when additional training is made available or when updates/changes made. |

| McDowell County Mitigation Action 18 | 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. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | McDowell County Emergency Services |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |

| | |
|---|---|
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

## CITY OF MARION MITIGATION ACTION PLAN[1]

| City of Marion Mitigation Action 1 | The City will continue to enforce the floodplain ordinance within its jurisdiction. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | City Planning and Development Services Department |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the City of Marion successfully implemented the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, the City is reducing future vulnerability to the flood hazard. The City will continue to enforce this important ordinance. |

| City of Marion Mitigation Action 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. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | City of Marion Planning and Development/City Manager's Office |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

[1] In June of 2020, the City of Marion adopted additional mitigation actions that are included in Appendix I of this plan. These actions will be fully integrated into the plan during the 2026 plan update.

| **City of Marion Mitigation Action 5** | **Continue to attend NFIP and NIMS trainings annually to effectively administer and respond to flood and other natural disasters.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention, Emergency Services |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Planning and Development Services / All Department Supervisors |
| Estimated Cost: | Moderate |
| Potential Funding Sources: | State and local sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | All City Staff are required to have NIMS 100 and 700. The Development Services Director, while not a CFM, has had extensive training in floodplain management and has attended several NC Flood Management Workshops in past years. All Development Services Staff (i.e. building inspectors and planning staff) are being required to complete the following NFIP training courses by the end of January 2016.<br><br>*1. EC Made Easy: Elevation Certificate Overview* (IS-1105), https://www.training.fema.gov/is/courseoverview.aspx?code=IS-1105. (2 hrs)<br>*2. Theory of Elevation Rating* (IS-1102), http://training.fema.gov/is/courseoverview.aspx?code=IS-1102 (2 hrs)<br>3. Increased Cost of Compliance (IS-1100), https://www.training.fema.gov/is/courseoverview.aspx?code=IS-1100. (1 hr)<br>4. *Elevation Certificate for Surveyors* (IS-1103), http://training.fema.gov/is/courseoverview.aspx?code=IS-1103. (2 hrs)<br>5. FEMA Mapping Changes (IS-1106), http://training.fema.gov/is/courseoverview.aspx?code=IS-1106 (1 hr) |

| City of Marion Mitigation Action 6 | Provide public notification of impending/occurring severe weather events to the public. |
|---|---|
| Hazard(s) Addressed: | Flood, Severe Thunderstorm, Winter Storm and Freeze |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | City Manager's Office/Police and Fire Departments |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | State and local funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | The City of Marion entered into an inter-local agreement with McDowell County in 2011 for consolidated 911 communication services. The McDowell County 911/Emergency Management office has a Nixle system that sends out notifications regarding severe weather events, the City Manager's office sends out alerts to local media outlets including McDowell News and WBRM radio, the Marion Police Department maintains a Facebook page to send out alerts, and the City website has a color coded emergency alert status on the homepage that is updated with information during impending and/or occurring severe weather events. |

| City of Marion Mitigation Action 7 | Seek grant funding for mitigation opportunities eligible under the most current version of the UHMA Guidance and Public Assistance 406 mitigation guidance at the time of the application. Projects may 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, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | City of Marion staff |
| Estimated Cost: | Costs to be determined on a project-by project basis as they are identified. |
| Potential Funding Sources: | Federal Grants |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | New action for the 2021 plan update. Ongoing. |

# TOWN OF OLD FORT MITIGATION ACTION PLAN

| Town of Old Fort Mitigation Action 1 | The Town will continue to work with the County to enforce the floodplain ordinance within its jurisdiction. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Building Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the Town of Old Fort has coordinated with the County to successfully implement the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, Old Fort and McDowell County are reducing future vulnerability to the flood hazard. The Town will continue their partnership with McDowell County in enforcing this important ordinance. |

| Town of Old Fort Mitigation Action 2 | Develop a community awareness program to education the citizens of Old Fort on hazard risks. |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Planning |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | State and local sources |
| Implementation Schedule: | Action being deleted. |
| 2021 Implementation Status: | This Mitigation Action is very similar to Mitigation Action 4. It will be deleted in future updates of the plan. |

| Town of Old Fort Mitigation Action 3 | Develop a stormwater management plan to address with stormwater issues throughout the town. |
|---|---|
| Hazard(s) Addressed: | Flood, Severe Thunderstorm, Winter Storm and Freeze |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Planning and Zoning, Building Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | State and Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, there has been no progress in implementing this action. The action will remain ongoing pending funding and staff time for implementation. |

| **Town of Old Fort Mitigation Action 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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Duplicate action – similar to action #2 – action will be deleted in future plan updates. |

| **Town of Old Fort Mitigation Action 5** | **Determine if there are any Town or County-owned critical facilities that should have a back-up generator. If so, seek funding to purchase a generator for the facility for improved resilience to all hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services; Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Old Fort Town Council |
| Estimated Cost: | To be determined |
| Potential Funding Sources: | Federal Grant funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

| **Town of Old Fort Mitigation Action 6** | **In addition to maintaining basic required compliance actions of the NFIP, periodically evaluate feasibility of implementing the following higher regulatory standards**<br>**a) Require critical facilities protection to 500-year flood levels**<br>**b) Require parking lots to be elevated (no more than six inches deep in any parking space during Community Flood event)**<br>**c) Require dry land access for new or substantially improved buildings (above Community Base Flood Elevation)**<br>**d) Levee restrictions**<br>**e) Floors of new or substantially improved buildings allowed by variance in the floodplain must be elevated at least one (1) foot above the Community (future) Base Flood Elevation.**<br>**f) Prohibit basements below flood level on filled lots** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council |
| Estimated Cost: | None needed |
| Potential Funding Sources: | Local Staff Time |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This is a new action. |

# MITCHELL COUNTY MITIGATION ACTION PLAN

| **Mitchell County Mitigation Action 1** | **Promote Sustainable Development in Mitchell County** |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | Federal, state, and local funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Sustainable development is promoted through the day to day activities of the County and represents a community capability. This action will be deleted in future updates of the plan. |

| **Mitchell County Mitigation Action 2** | **Delineate preferred growth areas and develop area plans for target locations. This will help ensure that future development is not conducted in hazardous areas.** |
|---|---|
| Hazard(s) Addressed: | Flood, Landslide, HAZMAT |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Board of Commissioners |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, State, and private funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Mitchell County is currently moving towards GIS which can be used to accomplish this action. |

| **Mitchell County Mitigation Action 3** | **Develop an open space plan; target properties for acquisition/fund acquisition program.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Board of Commissioners |
| Estimated Cost: | $1,000,000+ |
| Potential Funding Sources: | Federal, State, and private funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred due to lack of funding: The County was in the process of buying several sawmills along the streams in Mitchell County using state and federal grants and local funds. The plan was to buy out the properties, beginning with one mill, and create open space on the land. However, funds at the local level are not sufficient at this time to complete the task. This is still a priority for the county and will be revisited in the future.<br><br>In addition, an open space recreation plan was developed for the county. |

| Mitchell County Mitigation Action 4 | Consider amending subdivision ordinance to allow clustering to maximize density while preserving flood hazard areas. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections |
| Estimated Cost: | minimal |
| Potential Funding Sources: | Federal, State, and private funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: At this time, Mitchell County does not have a subdivision ordinance in place. However, officials have considered one in the past and it may be revisited in the future. |

| Mitchell County Mitigation Action 10 | Develop an impervious surface limit requirement. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local, state, and federal sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: This issue is not currently being discussed in the county, but may be in the future if stormwater issues arise. |

| Mitchell County Mitigation Action 11 | Develop a requirement to limit or mitigate the impacts of increased storm water. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Board of Commissioners |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, state, and local sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased developed and/or state regulations may requirement a stormwater management plan. |

| Mitchell County Mitigation Action 13 | Develop a requirement for all lots to have a buildable zone in non-hazard areas |
|---|---|
| Hazard(s) Addressed: | Flood, Wildfire, Severe Winter Weather |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local funds |
| Implementation Schedule: | Deferred |
| 2021 Implementation Status: | Deferred: This action would fall under a subdivision ordinance. At this time, Mitchell County does not have a subdivision ordinance in place. However, officials have considered one in the past and it may be revisited in the future. |

| Mitchell County Mitigation Action 14 | Develop a requirement and/or continue to use the floodplain ordinance to ensure developments are built in a hazard-resilient manner. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Mitchell County will continue to require such measures through the floodplain ordinance and encourage responsible development elsewhere. However, there are no requirements beyond those in the floodplain ordinance at this time. |

| Mitchell County Mitigation Action 15 | Develop a provision for protection or creation of natural areas. |
|---|---|
| Hazard(s) Addressed: | Flood, Thunderstorm, Wildfire |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, state, and local funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | The county completed a master recreation plan that identifies potential green space areas in the county. For example, the county intends to eventually mitigate the mills around the streams in the county. |

| Mitchell County Mitigation Action 18 | Develop a Storm Water Management Plan |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | NCDENR, Board of Commissioners |
| Estimated Cost: | $30,000 |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased development and/or state regulations which may require a stormwater management plan. |

| Mitchell County Mitigation Action 19 | Require retention facilities on developments to hold storm water from smaller storms so as to allow seepage on site. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | NCDENR, Board of Commissioners, Building Inspections |
| Estimated Cost: | Private funds |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased development and/or state regulations which may require a stormwater management plan. |

| Mitchell County Mitigation Action 20 | Consider storm water detention facilities (perhaps as public improvements for multiple developments) to store storm water during peak runoff to be released at off-peak times. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | NCDENR, Board of Commissioners, Building Inspections |
| Estimated Cost: | Private funds |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased development and/or state regulations which may require a stormwater management plan. |

| **Mitchell County Mitigation Action 21** | **Make storm water management a public purpose and implement a program to "take back" major drainage areas or streams within the community through acquisition or easements and maintain them as essential public facilities.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | NCDENR, NRCS, Board of Commissioners, Building Inspections |
| Estimated Cost: | Private funds |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: Stormwater is not an issue in the county at this time. However, it may become in the future with increased development and/or state regulations which may require a stormwater management plan. |

| **Mitchell County Mitigation Action 22** | **Improve and maintain streams throughout the community to the fullest extent possible.** |
|---|---|
| Hazard(s) Addressed: | Flood, Winter Storm and Freeze, Severe Thunderstorm |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | NCDENR, Core of Engineers |
| Estimated Cost: | 1998-$986,000; 2004-$1,000,000 (future events expected to be similar to these costs |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: The previous clean-ups were a result of Ivan and Francis and the associated presidential disaster declaration money. Extensive sediment was removed by dredging and some mitigation measures were put in place (flood walls, etc). No flooding has occurred since the 2004 clean-up. |

| **Mitchell County Mitigation Action 26** | **Continue to expand flood warning capacities in the County. Several flood monitoring facilities can be placed on the streams and be coupled with a disaster warning system to give early warning of flood problems. A flood warning system, including steam monitoring devices to warn emergency personnel, radio/television announcements, door-to-door contact by fire or police, and mobile public-address would provide more early warning of flood problems.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | NC DENR |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |

| | |
|---|---|
| 2021 Implementation Status: | Ongoing: The state has a program to monitor all streams in the state called I-Flow and a Flood Inundation Mapping and Alert Network (FIMAN). There is a FIMAN gauge in Spruce Pine. The County Emergency Manager has access to I-Flow and FIMAN. At this time, the County feels that I-Flow and FIMAN are sufficient for their needs and does not have any plans to upgrade flood warning capabilities. However, this action will remain in the plan and the County will continue to consider potential locations where additional stream gauges could be useful. |

| **Mitchell County Mitigation Action 28** | **Review/Update Flood Damage Prevention Ordinance to ensure maximum protection from flood hazard events.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Inspections |
| Estimated Cost: | Minimal, done by the county |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Completed/ongoing: The floodplain ordinance was reviewed and updated in 2010. Updates include mandating set-backs in floodplains. |
| Additional Notes: | Potential improvements to consider in the future.<br>• Consider adopting temporary moratorium on new construction and new subdivisions within flood hazard areas until Flood Damage Prevention Ordinance has been updated.<br>• Review rebuilding activities in wake of last floods and consider policies/procedures for minimizing repetitive losses.<br>• Continue to require and maintain FEMA elevation certificates for all permits for new buildings or improvements to buildings on lots including any portion of 100-year floodplain.<br>• Advise/assist property owners in retrofitting their homes and businesses. Retrofitting means modifying an existing building or yard to protect the property from flood damage.<br>• Limit development that would increase flood height<br>• Identify specific properties for wetland preservation or other use<br>• Include measures to preserve the floodplain natural function<br>• Address mobile home parks location |

| Mitchell County Mitigation Action 31 | Implement the emergency operations plan |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention; Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Emergency Management |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the EOP has been used to manage emergencies as needed. The plan will continue to be implemented as needed and through training exercises. |

| Mitchell County Mitigation Action 32 | Review/update the emergency operations plan |
|---|---|
| Hazard(s) Addressed: | All-Hazards |
| Category: | Prevention; Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Emergency Management Office |
| Estimated Cost: | Minimal to none |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: The county's emergency operation plan is reviewed annually to be compliant with state requirements under the Emergency Management Program Grant. The plan was reviewed on September 16, 2009. |
| Additional Notes: | • Review the Emergency Management Operational Plan on an annual basis to insure that it is kept current. – Completed, 2010<br>• Include human caused disasters in the plan – Completed<br>• Provide more specific procedures and guidelines for the emergency manager |

| Mitchell County Mitigation Action 33 | Develop an Evacuation Plan |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Prevention; Emergency Services |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Board of Commissioners, Emergency Management |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | State grants |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: At a recent branch level meeting among regional coordinators, it was determined that western North Carolina was not in immediate of an evacuation plan. Most residents shelter in place. Money was available at the time but it was determined to be best spent on a different project. |

| **Mitchell County Mitigation Action 35** | **Identify any Government facilities, especially those that house emergency services, should not be located in high-hazard areas.** |
|---|---|
| Hazard(s) Addressed: | All-Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections |
| Estimated Cost: | $1,000,000 |
| Potential Funding Sources: | Federal, state, local; federal disaster declaration money was used to relocate the building in 1998. |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Completed: There are no government facilities located in flood hazard areas. A sheriff's building was relocated in 1998 after flooding, and that was the last of the buildings (approximate cost $1,000,000). No future buildings will be located in such areas per the floodplain ordinance and hazard mitigation plan.<br><br>This action will be removed from future updates of the plan. |

| **Mitchell County Mitigation Action 36** | **Develop a basic plan to inform employers about the hazards in the region; provide information and funding sources available at different levels for mitigation efforts; and to plan for specific needs of businesses for future development would be of great use.** |
|---|---|
| Hazard(s) Addressed: | All-Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Chamber of Commerce, Board of Commissioners |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local funds, state grants |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Deferred: While there is no plan in place, officials felt that most industries have an understanding of the area's risks. This issue will be revisited in the future. |
| Additional Notes: | There is no existing plan about the business and industries in the region. Several of them are located in harm's way and the local economy needs to do its best to prevent damage to its assets. |

| **Mitchell County Mitigation Action 37** | **Develop an inclement weather plan that would detail specific actions to be taken when inclement weather occurs, such as ice, snow, and severe storm damage.** |
|---|---|
| Hazard(s) Addressed: | All-Hazards |
| Category: | Prevention; Public Awareness and Education |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Emergency Management Office |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | State or local money |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: The county addresses inclement weather through the media and websites. However, an official plan is not in plan and the need to implement one due to tourists in the area is recognized. |
| Additional Notes: | Inclement weather is the most common emergency in the county, highlighting the need for a plan. The plan would be coupled with a section in the emergency operational guideline that designates county personnel responsible for different tasks when inclement weather occurs. |

| **Mitchell County Mitigation Action 38** | **Develop an inclement weather plan that would detail specific actions to be taken when inclement weather occurs, such as ice, snow, and severe storm damage.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Emergency Management |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | State or local money |
| Implementation Schedule: | Action to be deleted. |
| Implementation Status: | Action to be deleted. This is a duplicate mitigation action and will be removed from future updates. |

| Mitchell County Mitigation Action 39 | Protect Critical Facilities |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Engineering with support from EMS, Utility Companies, Hospital, NCDOT |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | Federal, State, local, and private funding sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Over the past five years, three new critical facilities have been built (Spruce Pine Police Station, an EMS station and an office annex to the hospital). All three facilities are located out of the floodplain and thus protected against the flood hazard. The facilities are also built to current codes and therefore protected from wind and seismic hazards. Over the next five years, the County will work to identify any vulnerabilities to existing critical facilities and work to mitigate the facilities from hazard impacts. |
| Additional Notes: | Critical facilities are essential to the health, safety and viability of a community. These are the buildings, services, and utilities without which residents and businesses cannot survive for long, such as hospitals, police stations, fire stations and sewage treatment plants. Therefore, the security of these facilities is imperative to ensure the public's health and safety in the aftermath of a hazard event. Steps that communities can take to better protect their critical facilities include such measures as retrofitting, relocation and acquisition. While considering the protection of these facilities, a multi hazard approach should be taken. |

| Mitchell County Mitigation Action 40 | Use acquisition as a strategy if there are signs of repetitive losses or the reviewed flood maps show intensive construction on flood prone areas. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Building Inspections, Planning Board Commission, FEMA |
| Estimated Cost: | Varies |
| Potential Funding Sources: | Federal, State, local and private funding sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | The county has bought out some properties, such as the Bakersville Fire Department and residential homes. The county will continue to use this strategy as means to reduce repetitive loss properties. |

| **Mitchell County Mitigation Action 41** | **Consider relocation as strategy for mitigation** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Building Inspections, Planning Board Commission, FEMA |
| Estimated Cost: | Varies |
| Potential Funding Sources: | Federal, State, local and private funding sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | The county has relocated some properties, such as the Sheriff's Department in the past. The county will continue to use this strategy as means to reduce flood losses. |
| Additional Notes: | Relocation means moving a building or facility to a less hazard-prone area, either within the same parcel or on a new parcel. This technique is typically used to avoid coastal or riverine flood hazards. "Relocation" can also be used to describe the process of demolishing a building and reconstructing it outside the hazard area. |
| | One way to make relocation work is to adopt what Pilkey et al. call a 10/100-year relocation plan. Under this approach, a community develops a relocation strategy for its hazard-prone structures within 10 years, then implements that plan over the ensuing 100 years. Issues that need to be addressed in the planning stage include: cost-benefit comparisons of relocating structures intact or rebuilding; and whether buildings can be relocated on the same property or if new property must be acquired. Mobile homes and manufactured housing have been shown to be highly vulnerable to floods and should not be located in the floodplain. Where such housing can be relocated, this step should be taken. Communities may wish to require a bond against the damage to public streets and utilities incurred during a move. |

| **Mitchell County Mitigation Action 42** | **Provide advanced training to enhance the knowledge, experience and dedication of staff on the local inspections team.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Building Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | State and local sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. The County hired a new Building Inspector in March of 2015. He has met most of his Level 1 certifications from the Department of Insurance and has met several of his Level 2 certifications. Continued maintenance of these certifications is required, which means staying up to date with trainings and knowledge. These trainings are not provided by the county. In the future, this action will be amended to reflect this information. |
| Additional Notes: | Well-trained inspectors are more likely to recognize building practices that are suspect with regard to hazard resilience, and can pass on their expertise to junior staff, thereby fostering a tradition of sustainable education within the inspections department.<br>Brief training sessions could be provided to county inspectors who are working on local projects, to ensure that these supplemental staff are aware of local codes that are more stringent than county or state codes (such as free-board requirements).<br>This method is one of the best alternatives to structural mitigation measures. By training building inspectors it is possible to tailor solutions for each home separately and come up with more economical and sound solutions than imposing change by regulations to all existing units. |

| Mitchell County Mitigation Action 44 | Mandate tie-downs on propane tanks and mobile homes. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Building Inspections, NCDENR |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, state, local, and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Mobile Homes that are on wheels (not a fixed foundation) are required to have tie-downs through the County's Floodplain Ordinance. Fixed mobile homes and trailers and propane tanks are not required to have tie-downs at this time. |
| Additional Notes: | Propane tanks and mobile homes should be mandated with standard tie-downs to prevent tanks and mobile homes from being lifted by floodwaters or winds and becoming ballistic hazards. Due to inexpensive land values, mobile homes are often located in floodplains; elevated mobile homes are at an increased risk of wind uplift and should be securely attached to foundation. Enforcement of a tank tie-down ordinance may need to be coordinated with the State Agriculture Department. However, even with tie-downs, residents should not remain in mobile homes during severe storms. |

| Mitchell County Mitigation Action 45 | Development regulations that provide guidelines for future settlement should be revised from an emergency management point of view. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Board of Commissioners, building inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Over the past five years, there have been no new development regulations put in place that provide guidelines for future settlement from an EM point of view. The floodplain ordinance continues to consider some of these issues. However, a future subdivision ordinance would best address these issues, taking into account, street interconnectivity, width, and slope steepness when permitting development. At this time, a subdivision is not in place but feasibility of implementing one will be evaluated over the next five years. |

| Mitchell County Mitigation Action 46 | Consider acquiring (or not selling) parcels of land in hazard areas to conserve or restore as parks, in order to reduce the number of structures and infrastructure elements vulnerable to natural hazards. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Natural Resource Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners |
| Estimated Cost: | Varies |
| Potential Funding Sources: | Federal, state, and local sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Mitchell County has been successful in completing this action in the past. The County continues to pursue acquisition projects such as the mills along the streams in Mitchell County. This action is largely disaster driven since a disaster declaration results in money that is necessary to complete this action (such as HMGP). In Mitchell County, property of this nature would be deeded to the county where it would be a green space. |
| Additional Notes: | This approach would also be a solution to the recreational area need for the county. |

| Mitchell County Mitigation Action 50 | Raise Low-Lying Bridges or install culverts |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Structural Project |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Engineering with support from NCDOT, FEMA |
| Estimated Cost: | $25,000 cap for state funds |
| Potential Funding Sources: | State and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Bridges in the County are state or privately maintained (the county has none). Following a disaster that destroys a bridge, the state may provide a maximum of $25,000 to replace the bridge. In this case, private funds are often necessary to remedy the bridge as the cost exceeds the funds received. The County maintains a policy through the floodplain management ordinance that any new bridges or culvert built on private lands be inspected however only 2 such inspections have been needed over the past 12 years. |
| Additional Notes: | Raising low-lying bridges will decrease the likelihood that large objects carried by floodwaters to lodge against a bridge and subsequently dam the river course.<br>Of particular concern are fallen trees, which, when swept into a river and snagged by a bridge, can quickly capture floating debris, potentially, forming a solid dam. As a result, areas upstream and adjacent to the unintended dam can receive flood levels unanticipated by hazard mapping and risk assessments. Finally, under the weight of a newly formed reservoir, the bridge may tear from its foundation, allowing a destructive wall of water to rush downstream. |

| Mitchell County Mitigation Action 52 | Routinely clean and repair storm water drains to avoid unnoticed clogs that may hamper the efficiency of the storm water system. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Structural Project |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Maintenance, Utilities Companies |
| Estimated Cost: | $25,000 |
| Potential Funding Sources: | Local and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This action is not relevant to the county at this time as stormwater is not managed by county. This action will be deleted from future versions of this plan. |
| Additional Notes: | Drains are the major entryways into the storm water system and the filters of large floating debris. When drain covers are broken or clogged, the storm water system does not function well and localized flooding is possible.<br><br>Services announcements via utility bills can recruit citizens as surveillance of the drains in their respective neighborhoods, as well as remind them that poor storm water collection can lead to flooded yards and basements. The task of inspection and maintenance, particularly of remote drains, could be on the monthly schedule of the public work staff, with a special round of drains inspections after major storm events. |

| Mitchell County Mitigation Action 54 | Develop a Community Awareness Program to educate citizens on hazard threats and mitigation. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Emergency Management Office with support from the Board of Commissioners |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | The county typically defers to the Red Cross and local county websites (which link to state websites) to disseminate information regarding hazard threats. The county may look into providing specific county information regarding hazard threats in the future through media, flyers, and on utility bills. |

| Mitchell County Mitigation Action 56 | Use the County's website to notify residents and other about flood hazard areas. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Emergency Management Office with support from the Board of Commissioners |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Completed/Ongoing: The county's website site links to floodplains maps (DFIRMS) for the county. Updated maps will be posted to the website as needed. |
| Additional Notes: | Flood maps can be placed on the County's web site along with key sections of the Hazard Mitigation Plan. Visitors to the web site will be able to pull up maps of properties within the County's jurisdiction showing the boundaries of the floodplains. Excerpts from the Plan will provide additional information about the County's Hazard Mitigation Plan. |

| Mitchell County Mitigation Action 57 | Prepare the community for disaster response. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Emergency Management Office with support from the Board of Commissioners |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, state, and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Currently, this is predominately completely through the volunteer fire department. In the past, the county attempted to initiate a CERT, but the program was not successfully started due to turn over in the county. A CERT may be investigated in the future. Other options, such as having emergency response officials work with church groups may be investigated in the future. |
| Additional Notes: | Another goal to reach with awareness programs is to prepare the community to respond to disasters. Many different programs such as Community Emergency Response Team (CERT) have been initiated countrywide and even if there is no such direct need as to start a training program in Mitchell County. Basic concepts and information can be passed to community members through different means: Flyers, Series of writing in the local newspaper, Ads in most frequented places (downtown stores, schools, churches, etc), and Using water bills to convey short messages. |

| **Mitchell County Mitigation Action 58** | **Develop a disaster warning system (an emergency broadcast system (local radio, television channel, and website), a siren system, a mobile public address systems and/or a door-to-door contact).** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Emergency Management Office with support from the Planning Office |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, state, and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Completed/Ongoing: At the local level, Mitchell County uses the Code Red program which sends a message to each resident's phone or email. There is also a reverse 911 system, door-to-door operations, and the Fire trucks are equipped with PA Speakers. There is also a statewide program in place. These programs will be updated as needed. |
| Additional Notes: | The first step in responding to a potential disaster is to know that one is coming. Disaster warning refers to both the monitoring of local conditions and the broadcasting of pre-event alerts.<br><br>These assets need to be prioritized and one official warning system should be publicized. This does not mean that the county would rely only on that one, but rather would form a focus for the community to access information in times of need. |

| **Mitchell County Mitigation Action 59** | **Identify and strengthen facilities that would be used as emergency shelters.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Planning with support from the Office of Emergency Management |
| Estimated Cost: | Unknown, project dependent |
| Potential Funding Sources: | Federal (homeland security grants, etc), state, and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Churches have also been identified as shelters in the area. These facilities can be strengthened to better meet sheltering needs as funding becomes available. The quick-connect program through homeland security money ensures that at least one shelter in the county has a quick connect generator switch. Mitchell County was in the process of identifying the best shelter locations for this while this plan was being prepared. |
| Additional Notes: | Mitchell County has identified the schools as emergency shelters. The large number of churches and their wide dispersion within the county make them a good candidate for becoming shelters. Several can be chosen as alternative shelters to be used in case of a mass casualty event and those structures can be upgraded to meet necessary standards. |

| **Mitchell County Mitigation Action 62** | **Integrate technology into Mitchell County Emergency Management** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Emergency Management Office with support from the Board of Commissioners |
| Estimated Cost: | Minimal to several thousand dollars |
| Potential Funding Sources: | Federal, state, and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: To date, Mitchell County has implemented the inter-gov system, allowing county maps and flood maps to be viewed remotely; an address database; and is moving towards GIS. Additional improvements will be incorporated as funding and opportunities become available. |
| Additional Notes: | Municipal and other computer systems and networks for use in mitigation and response efforts can be linked together to better share information, be more coordinated in times response and benefit from a more efficient and effective use of resources. The essential point is that those integrated systems would probably not make a great difference in the everyday emergency operations but will have a huge impact should any large scale incident occur. Those County computer systems would collect and process hazard data in order to provide information on hazard mitigation opportunities and to assist in disaster response and recovery efforts. There are numerous computer software products on the market or in development that could be used to integrate multiple data sources and assess the data collected. An example to these data programs is the GIS (Geographical Information System) that divides community into layers (topographic, residential, infrastructure, etc) and can, thus, be used for many different purposes. |

| **Mitchell County Mitigation Action 63** | **Identify response equipment that needs to be replaced or upgraded.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Emergency Management Office |
| Estimated Cost: | Varies by project, averaging several thousand dollars |
| Potential Funding Sources: | Federal, state, and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Mitchell County Emergency Management continues to watch for grants in order to upgrade and replace equipment as the need and funding become available. However, there is no specific process in place which may be enacted in the future. Recently, a bus was replaced with a mobile command truck. Cabinets were also added to a trailer with Department of Homeland Security Money. |
| Additional Notes: | Interviews with local authorities have shown an obvious need for response equipment. Although the technology upgrade described above can also be considered as equipment buyout, what is meant here is response equipment to be used on the field. The needs should be identified and a proposal for a grant can be developed accordingly. |

| **Mitchell County Mitigation Action 64** | **Start public/citizen emergency management and involvement initiatives as the County most likely lacks funds to support new responder posts and risk having its existing capacity overwhelmed should an event of large scale occur.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Emergency Management Office with support from the Board of Commissioners; Local volunteer fire department |
| Estimated Cost: | Low |
| Potential Funding Sources: | Local and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | This action in largely completed through the volunteer fire department, off-duty police officers, amateur radio groups, and church groups. In the future, county officials may work to implement a more formal training program. |

| **Mitchell County Mitigation Action 67** | **Strengthen Mass Causality Training throughout the county.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Emergency Management Office |
| Estimated Cost: | Training exercises and planning ( $30,000) |
| Potential Funding Sources: | Federal, state, and private sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Over the past five years, the County has participated in several mass casualty trainings (Quake, Quake 2.0 and Quake 3.0). The county will continue to seek funding to strengthen mass causality training and overall emergency response. As funds become available, these activities will continue to be completed. |
| Additional Notes: | Due to its relatively recent emergence, at least as a result of deliberate action, its high impact, and the lack of expertise that is involved due to its low frequency of occurrence, local response capacity to mass casualty incidents are behind expectations. While purchasing equipment would help partially, the essential point is to train the local responders about this specific and unique issue. Different training programs like the one offered form the Department of Justice are available at this regard and county officials can obtain further information about standards, program contents and financial issues from federal organizations such as the Department of Homeland Security or the Department of Justice. |

| **Mitchell County Mitigation Action 68** | **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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Emergency Management Office |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Public awareness is addressed by other mitigation actions in this plan. Thus, this action is duplicative and will be removed from future plan updates. |

## TOWN OF BAKERSVILLE MITIGATION ACTION PLAN

| **Bakersville Mitigation Action 1** | **Adopt policies that discourage growth in flood hazard areas, including policy on not extending public services and utilities into flood hazard zones.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Public Works, Zoning Enforcement Officer |
| Estimated Cost: | None |
| Potential Funding Sources: | Local funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. The jurisdictions in Mitchell County are responsible for permitting and extending public services. The jurisdictions are committed to not extending public services into flood zones per their zoning ordinances and the county floodplain ordinance. |

| **Bakersville Mitigation Action 2** | **Develop a community awareness program to educate the citizens of Bakersville on hazard risks.** |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Board, team with County Emergency Management |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | State and local sources |
| Implementation Schedule: | 2021-2016 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve community awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Bakersville Mitigation Action 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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Board, team with County Emergency Management |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | Action to be deleted. |
| 2021 Implementation Status: | This is a duplicate mitigation action and will be removed from future plan updates. |

| **Bakersville Mitigation Action 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 the application. Projects may 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, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Bakersville staff in coordination with Mitchell County EM |
| Estimated Cost: | Costs to be determined on a project-by project basis as they are identified. |
| Potential Funding Sources: | Federal Grants |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | New action for the 2021 plan update. Ongoing. |

## TOWN OF SPRUCE PINE MITIGATION ACTION PLAN

| **Spruce Pine Mitigation Action 1** | **Adopt policies that discourage growth in flood hazard areas, including policy on not extending public services and utilities into flood hazard zones.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Town Board, planning |
| Estimated Cost: | None |
| Potential Funding Sources: | Local funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. The jurisdictions in Mitchell County are responsible for permitting and extending public services. The jurisdictions are committed to not extending public services into flood zones per their zoning ordinances and the county floodplain ordinance. |

| **Spruce Pine Mitigation Action 2** | **Develop a community awareness program to educate the citizens of Spruce Pine on hazard risks.** |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Board, team with County Emergency Management |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | State and local sources |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve community awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Spruce Pine Mitigation Action 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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Board, team with County Emergency Management |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | Action to be deleted. |
| 2021 Implementation Status: | This is a duplicate mitigation action and will be removed from future plan updates. |

| **Spruce Pine Mitigation Action 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 the application. Projects may 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, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Spruce Pine staff in Coordination with Mitchell County EM |
| Estimated Cost: | Costs to be determined on a project-by project basis as they are identified. |
| Potential Funding Sources: | Federal Grants |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | New action for the 2021 plan update. Ongoing. |

# YANCEY COUNTY MITIGATION ACTION PLAN

| Yancey County Mitigation Action 2 | Purchase and install a disconnect for use at the Higgins Methodist Church, which is used as a shelter facility. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services; Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | $2500 |
| Potential Funding Sources: | Local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Underway: The materials have been purchased, but renovations to the church have delayed the installation of the switch. |

| Yancey County Mitigation Action 3 | Establish a flood damage prevention program for crops, in particular for the Cane River Township area along streams. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Programs |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Undetermined |
| Potential Funding Sources: | United States Department of Agriculture funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Incomplete: Due to the reduction of tobacco productions in Yancey County post 2004, the necessity for a crop damage prevention program has become a low priority. |

| Yancey County Mitigation Action 4 | Establish program to address the protection and/or preservation of historic (Civil War-era) properties on the Toe River. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Programs |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Undetermined |
| Potential Funding Sources: | National Trust for Historic Preservation's Preservation Services Fund; Historic Preservation fund through the National Park Service |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Incomplete: Due to the lack of significant historical evidence along the Toe River this action has been deemed a low priority. |

| Yancey County Mitigation Action 6 | Secure computers, shelves, windows, lighting, etc. in schools, local government buildings, etc. within the county with respect to seismic activity. |
|---|---|
| Hazard(s) Addressed: | Earthquakes |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Undetermined |
| Potential Funding Sources: | Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, Department of Homeland Security funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Underway: Three schools have been closed in the past two years and one new one opened. A report will be compiled by the end of the 2021 school year to determine the number of FFE that will be to be secured. |

| Yancey County Mitigation Action 9 | Implement inter-operable communications system. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | > $1 million |
| Potential Funding Sources: | Department of Homeland Security funds/local Funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Underway: Viper radios continue to be upgraded to the new format and replaced at the end of the life cycle. Viper base stations will be added in the EOC and all vehicles. Planning has begun to link four VHF repeaters via internet as well as identify an additional site for a fifth VHF repeater in the NW section of the county. Ensure all radios and repeaters have digital capabilities. |

| Yancey County Mitigation Action 10 | Evaluate and enhance as necessary the Yancey County Flood Damage Prevention Ordinance, in part to ensure that the ordinance continues to address new buildings and infrastructure. |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Internal administrative costs only |
| Potential Funding Sources: | General funds |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: Yancey County has adopted a Flood Damage Prevention Ordinance and continues to monitor the ordinance for opportunities to enhance the ordinance. |

| Yancey County Mitigation Action 11 | Implement enhanced security measures at the Yancey County Courthouse to include security cameras and the appropriate securing of all entrances and exits (Phase 1). |
|---|---|
| Hazard(s) Addressed: | Terrorism |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management and Yancey Sheriff's Office |
| Estimated Cost: | <$50,000 |
| Potential Funding Sources: | Homeland Security Grants/Local funds |
| Implementation Schedule: | 2016-2021 |
| 2021 Implementation Status: | Action completed |

| Yancey County Mitigation Action 12 | Implement enhanced security measures in the Yancey County Courthouse's Courtroom to include metal detectors/wands and the elimination of non-essential entrances/exits (Phase 2). |
|---|---|
| Hazard(s) Addressed: | Terrorism |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management and Yancey Sheriff's Office |
| Estimated Cost: | $10,000 |
| Potential Funding Sources: | Homeland Security Grants/Local funds |
| Implementation Schedule: | 2016-2021 |
| 2021 Implementation Status: | Action completed. |

| Yancey County Mitigation Action 14 | 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. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| Yancey County Mitigation Action 15 | Develop a continuity of operations plan (COOP). |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | $30,000 |
| Potential Funding Sources: | Local Funds, Potential state and federal funds |
| Implementation Schedule: | 2026 |
| 2021 Implementation Status: | This is a new mitigation action. |

| Yancey County Mitigation Action 16 | Install a system of flood gauges and weather stations to assist county officials, first responders, and residents in preparing for and reacting to localized flooding, high winds, extreme temperatures, and landslide potential. |
|---|---|
| Hazard(s) Addressed: | Flood/Severe Weather |
| Category: | Property Protection, Public Awareness |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management, LEPC |
| Estimated Cost: | TBD |
| Potential Funding Sources: | Federal, state, and local sources. |
| Implementation Schedule: | 2020-2025 |
| 2026 Implementation Status: | Underway: By building a network of weather stations and flood gauges at strategic locations and synchronizing them with the current mass messaging system, officials and residents will have improved preparation for and increased reaction time to severe weather conditions. |

# TOWN OF BURNSVILLE MITIGATION ACTION PLAN

| **Town of Burnsville Mitigation Action 1** | **Mitigate the Burnsville sewage treatment plant in the event that the facility is heavily damaged by flooding. Phase 1** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Burnsville Public Works |
| Estimated Cost: | $3,000,000 |
| Potential Funding Sources: | Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Underway: Failure of the 300k clarifier tank in late 2020 has made this action a top priority. Multiple agencies are assisting the Town with identifying the multiple issues and developing a plan to either totally renovate the existing plant or purchase another property to build a new plant. |

| **Town of Burnsville Mitigation Action 1b** | **Mitigate the Burnsville sewage treatment plant in the event that the facility is heavily damaged by flooding. Phase 2** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Burnsville Public Works |
| Estimated Cost: | $4,500,000 |
| Potential Funding Sources: | Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Incomplete due to lack of funding. |

| **Town of Burnsville Mitigation Action 6** | **Continue to enforce the town's Flood Damage Prevention Ordinance to keep structures out of the floodplain.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection, Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management and the LEPC |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, state, and local sources. |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: The Town of Burnsville is coordinating with the County to continue implementation of the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, Burnsville and Yancey County are reducing future vulnerability to the flood hazard. The Town will continue their partnership with Yancey County in enforcing this important ordinance. |

| **Town of Burnsville Mitigation Action 7** | **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.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council and Yancey County Emergency Management |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| **Town of Burnsville Mitigation Action 8** | **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 the application. Projects may 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, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards.** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Burnsville staff in coordination with Yancey County Emergency Management |
| Estimated Cost: | Costs to be determined on a project-by project basis as they are identified. |
| Potential Funding Sources: | Federal Grants |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | New action for the 2021 plan update. Ongoing. |

# SECTION 10
# PLAN MAINTENANCE PROCEDURES

**44 CFR Requirement**

***44 CFR Part201.6(c)(4)(i):***
The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a five-year cycle.

***44 CFR Part 201.6(c)(4)(ii):***
The plan maintenance process shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

This section discusses how the Toe River 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 four subsections:

- 10.1 Implementation and Integration
- 10.2 Monitoring, Evaluation and Enhancement
- 10.3 Continued Public Involvement
- 10.4 Evaluation of Monitoring, Evaluation and Update Process

## 10.1 IMPLEMENTATION AND INTEGRATION

Each agency, department or other partner participating under the Toe River 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 Toe River 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 land use plans or capital improvement plans, when appropriate. The members of the Toe River 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 Toe River Region.

Since the first County plans were adopted in 2005 (Avery, Mitchell, Yancey Counties) and 2006 (McDowell County), and since the development of the initial regional plan in 2010/2011 and subsequent update in 2015/2016, each County and participating jurisdiction has worked to integrate the hazard mitigation plan into other planning mechanisms where applicable/feasible. Examples of how this integration has occurred have been documented in the Implementation Status discussion provided for each of the mitigation actions found in Section 9. Specific examples of how integration has occurred include:

- Integrating the mitigation plan into reviews and updates of floodplain management ordinances,
- Integrating the mitigation plan into reviews and updates of County emergency operations plans,
- Integrating the mitigation plan into review and updates of building codes, and
- Integrating the mitigation plan into the capital improvements plan through identification of mitigation actions that require local funding.

Opportunities to further integrate the requirements of this Plan into other local planning mechanisms shall continue to be identified through future meetings of the Regional Hazard Mitigation Planning Committee, individual county meetings, and the annual review process described herein. Although it is recognized that there are many possible benefits to integrating components of this Plan into other local planning mechanisms, the development and maintenance of this stand-alone Regional Hazard Mitigation Plan is deemed by the Toe River 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 Toe River Regional Hazard Mitigation Planning Committee shall meet in March of every year to evaluate and monitor the progress attained and to revise, where needed, the activities set forth in the Plan. The findings and recommendations of the Regional Hazard Mitigation Planning Committee shall be documented in the form of a report that can be shared with interested City and County Council members. The Regional Hazard Mitigation Planning Committee will also meet following any disaster events warranting a reexamination of the mitigation actions being implemented or proposed for future implementation. This will ensure that the Plan is continuously updated to reflect

changing conditions and needs within the Toe River Region which includes the counties of Avery, McDowell, Mitchell, and Yancey.

For future updates of the plan, North Carolina Emergency Management's Hazard Mitigation Planning Section will help coordinate the reconvening of the Regional Hazard Mitigation Planning Committee for these reviews through coordination with each County's Emergency Management Departments. The Emergency Management Directors from Avery, McDowell, Mitchell and Yancey Counties will maintain ultimate responsibility for their respective County's plan implementation and monitoring, evaluation and update.

**Five (5) Year Plan Review**

The Plan will be thoroughly reviewed by the Regional Hazard Mitigation Planning Committee every five years to determine whether there have been any significant changes in the Toe River Region that may, in turn, necessitate changes in the types of mitigation actions proposed. New development in identified hazard areas, an increased exposure to hazards, an increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan.

The plan review provides participating jurisdiction officials with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures. The plan review also provides the opportunity to address mitigation actions that may not have been successfully implemented as assigned. North Carolina Emergency Management's Hazard Mitigation Planning section will help coordinate the reconvening the Regional Hazard Mitigation Planning Committee and conducting the five-year review through coordination with each County's Emergency Management Departments.

During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did County departments participate in the plan implementation process as assigned?

Following the five-year review, any revisions deemed necessary will be summarized and implemented according to the reporting procedures and plan amendment process outlined herein. Upon completion of the review and update/amendment process, the Toe River Regional Hazard Mitigation Plan will be submitted to the State Hazard Mitigation Officer at the North Carolina Division of Emergency Management (NCEM) for final review and approval in coordination with the Federal Emergency Management Agency (FEMA).

**Disaster Declaration**

Following a disaster declaration, the Toe River Regional Hazard Mitigation Plan will be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility North Carolina Emergency Management's Hazard Mitigation Planning

section to coordinate the reconvening of the Regional Hazard Mitigation Planning Committee, through coordination with each County's Emergency Management Department, and ensure the appropriate stakeholders are invited to participate in the plan revision and update process following declared disaster events.

**Reporting Procedures**

The results of the five-year review will be summarized by the Regional Hazard Mitigation Planning Committee in a report that will include an evaluation of the effectiveness of the Plan and any required or recommended changes or amendments. The report will also include an evaluation of implementation progress for each of the proposed mitigation actions, identifying reasons for delays or obstacles to their completion along with recommended strategies to overcome them.

**Plan Amendment Process**

Upon the initiation of the amendment process, representatives from Avery, McDowell, Mitchell and Yancey Counties will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected County departments, residents, and businesses. Information will also be forwarded to 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 Regional Hazard Mitigation Planning Committee for final consideration. The Planning Committee will review the proposed amendment along with the comments received from other parties, and if acceptable, the committee will submit a recommendation for the approval and adoption of changes to the Plan.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered by the Regional Hazard Mitigation Planning Committee:

- There are errors, inaccuracies or omissions made in the identification of issues or needs in the Plan,
- New issues or needs have been identified which are not adequately addressed in the Plan, and
- There has been a change in information, data, or assumptions from those on which the Plan is based.

Upon receiving the recommendation from the Regional Hazard Mitigation Planning Committee and prior to adoption of the Plan, the participating jurisdictions will hold a public hearing, if deemed necessary. The governing bodies of each participating jurisdiction will review the recommendation from the Regional Hazard Mitigation Planning Committee (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the governing bodies will take one of the following actions:

- Adopt the proposed amendments as presented
- Adopt the proposed amendments with modifications
- Refer the amendments request back to the Regional Hazard Mitigation Planning Committee for further revision, or
- Defer the amendment request back to the Regional Hazard Mitigation Planning Committee for further consideration and/or additional hearings

## 10.3 CONTINUED PUBLIC INVOLVEMENT

**44 CFR Requirement**

***44 CFR Part 201.6(c)(4)(iii):***
The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process

Public participation is an integral component to the mitigation planning process and will continue to be essential as this Plan evolves over time. As described above, significant changes or amendments to the Plan shall require a public hearing prior to any adoption procedures.

Other efforts to involve the public in the maintenance, evaluation and revision process will be made as necessary. These efforts may include:

- Advertising meetings of the Regional Hazard Mitigation Planning Committee in local newspapers, public bulletin boards and/or County office buildings,
- Designating willing and voluntary citizens and private sector representatives as official members of the Regional Hazard Mitigation Planning Committee,
- Utilizing local media to update the public on any maintenance and/or periodic review activities taking place,
- Utilizing the Avery, McDowell, Mitchell and Yancey County websites to advertise any maintenance and/or periodic review activities taking place, and
- Keeping copies of the Plan in public libraries.

## 10.4 EVALUATION OF PREVIOUS MONITORING, EVALUATION AND UPDATE PROCESS

Over the past five years, the participating jurisdictions have been independently implementing, monitoring and evaluating their own mitigation action plans. Progress made in implementing actions has been documented in Section 9: Mitigation Action Plan where each action contains a narrative about the implementation status of the action as of 2021. That said, the jurisdiction did waiver slightly from the monitoring and evaluation process defined in the original version of the plan, but still made significant process in implementing their mitigation action plans. During the 2021 update of this plan, the Regional Hazard Mitigation Planning Committee determined that the procedures for the upcoming five-year monitoring and evaluation process will remain as defined above and will be re-evaluated during the next plan update process.

The five-year comprehensive update process began as early as 2018 when North Carolina Emergency Management made the decision to set aside HMGP funding from Hurricane Matthew to fund the Teo River Regional Hazard Mitigation Plan. To facilitate this effort, NCEM assigned the plan update to their pre-qualified hazard mitigation planning consultants ESP Associates. Representatives from ESP Associates first reached out to Avery, McDowell, Mitchell and Yancey County representatives in July 2019 to initiate the plan update process. More details about the plan update process are provided in Section 2, Planning Process.

For the next update of this plan, NCEM's Hazard Mitigation Planning section will continue take the lead on organizing and initiating the 5-year update of the plan.

# Appendix A: Plan Adoption

| 44 CFR Requirement |
| --- |
| ***44 CFR Part 201.6(c)(5):*** The plan shall include documentation that the plan has been formally adopted by the local governing body of the jurisdiction requesting approval of the plan. |

This section of the Plan includes a copy of the local adoption resolution passed by the participating jurisdictions in the Toe River Region:

| Jurisdiction |
| --- |
| Avery County |
| Banner Elk |
| Crossnore |
| Elk Park |
| Grandfather Village |
| Newland |
| Sugar Mountain |
| McDowell County |
| Marion |
| Old Fort |
| Mitchell County |
| Bakersville |
| Spruce Pine |
| Yancey County |
| Burnsville |

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, Avery County is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, Avery County desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Avery County Board of Commissioners to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Avery County Board of Commissioners to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting Avery County; and

WHEREAS, Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Avery County Board of Commissioners hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan Update; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 5, 2021.

Martha Jaynes Hicks Chair
, Chair
Avery County Board of Commissioners

ATTEST:

, Clerk

# Town of Banner Elk

PO Box 2049
Banner Elk, North Carolina 28604
Telephone (828) 898-5398
Fax (828) 898-4568
www.townofbannerelk.org

Rick Owen, Town Manager
Stacy C. Eggers, IV, Attorney

Council Members
Brenda Lyerly, Mayor
David Lecka, Mayor Pro Tem
Charlie B. VonCanon
Robert Tufts
Mike Dunn


**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Banner Elk is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Banner Elk desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Town of Banner Elk to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Town of Banner Elk to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Banner Elk; and

WHEREAS, the Town of Banner Elk, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Town Council of the Town of Banner Elk hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 12, 2021.

Brenda Lyerly

Brenda Lyerly, Mayor
Town of Banner Elk

ATTEST: Cheryl Buchanan Clerk

*The Town of Banner Elk is an equal opportunity service provider.*

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, **Town of Crossnore** is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the **Town of Crossnore** desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the **Town of Crossnore** to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the **Town of Crossnore** to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the **Town Of Crossnore**; and

WHEREAS, **Town Of Crossnore** in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that **the Board of Crossnore** hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on __April 13, 2021.

_____, Chair
LOCAL GOVERNING BODY

ATTEST:

___Susie Potter
Town of Crossnore, Clerk

# RESOLUTION TO ADOPT THE 2021 UPDATE OF THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN

WHEREAS, the Town of Elk Park is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Elk Park desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Town of Elk Park to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Town of Elk Park to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Elk Park; and

WHEREAS, Town of Elk Park, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Elk Park Town Council of the Town of Elk Park hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on August 02, 2021.

, Chair
The Town of Elk Park

ATTEST:

Connie S. Gunn
, Clerk

TOWN OF ELK PARK
FOUNDED
MARCH 5,
1885
NORTH CAROLINA

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, Grandfather Village is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, Grandfather Village desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Grandfather Village Town Council to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Grandfather Village Town Council to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting Grandfather Village; and

WHEREAS, Grandfather Village, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Grandfather Village Town Council hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 15, 2021.

Richard McCrea
, Mayor Pro tem
Grandfather Village Town Council

ATTEST:

Michele Lafferty
Clerk

GRANDFATHER VILLAGE CORPORATE SEAL 1987 NORTH CAROLINA

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Newland is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Newland desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Town of Newland to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Town of Newland to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Newland; and

WHEREAS, Town of Newland, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Newland Town Council of the Town of Newland hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 9, , 2021.

Valerie C. Jaynes

Valerie C. Jaynes , Mayor
The Town of Newland

ATTEST:

Tammy Gardner

, Clerk

Susan S. Phillips
**Village Manager**

Stacy C. Eggers IV
**Village Attorney**

(828) 898-9292
www.seesugar.com



**THE VILLAGE OF SUGAR MOUNTAIN**
**251 Dick Trundy Lane**
**Sugar Mountain, NC 28604**

# RESOLUTION TO ADOPT THE 2021 UPDATE OF THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN

**R-2021.6**

WHEREAS, the Village of Sugar Mountain is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Village of Sugar Mountain desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Village of Sugar Mountain to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Village of Sugar Mountain to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Village of Sugar Mountain; and

WHEREAS, the Village of Sugar Mountain, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Village Council of the Village of Sugar Mountain hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 20, 2021.

Gunther Jochl, Mayor
The Village of Sugar Mountain

ATTEST:

Tammy Floyd, Village Clerk

60 East Court Street
Marion, NC 28752



**RESOLUTION TO ADOPT THE 2021 UPDATE OF THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

**WHEREAS**, McDowell County is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

**WHEREAS**, McDowell County desires to seek ways to mitigate situations that may aggravate such circumstances; and

**WHEREAS**, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

**WHEREAS**, it is the intent of the McDowell County Board of Commissioners to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

**WHEREAS**, it is also the intent of the McDowell County Board of Commissioners to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting McDowell County; and

**WHEREAS**, McDowell County, in coordination with Avery, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

**WHEREAS**, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

**NOW, THEREFORE, BE IT RESOLVED** that the Board of Commissioners of McDowell County hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and
2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

**Adopted** on February 15, 2021.

Tony G. Brown, Chair

ATTEST:

Cheryl L. Mitchell, Clerk

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the City of Marion is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the City of Marion desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the City Council of the City of Marion to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the City Council of the City of Marion to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the City of Marion; and

WHEREAS, the City of Marion, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties, has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials; and

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the updated Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Marion hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted this the 2nd day of March, 2021.

Stephen R. Little, Mayor

ATTEST:

Landdis A. Hollifield, City Clerk/Public Information Officer

**Resolution Number: R-21-03-02-1**

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, Town of Old Fort is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Old Fort desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Old Fort Board of Alderman to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Old Fort Board of Alderman to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Old Fort; and

WHEREAS, Town of Old Fort, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Old Fort Board of Alderman of the Town of Old Fort hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on March 8, 2021.

NORTH CAROLINA TOWN OF OLD FORT INCORPORATED 1870

Rickey A. Hensley, Mayor
Town of Old Fort

ATTEST:

Renee' Taylor

Renee' Taylor, Clerk

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, Mitchell County is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Mitchell County desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Mitchell County Board of Commissioners to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Mitchell County Board of Commissioners to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Mitchell County; and

WHEREAS, Mitchell County, in coordination with Avery, McDowell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Mitchell County Board of Commissioners of Mitchell County hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 05, 2021.

Matthew Vern Grindstaff, Chairman

ATTEST:

Christy Young, Clerk

Town of

# Bakersville

Incorporated 1870

"Gateway to Roan Mountain"

Mayor:
Charles E. Vines

Town Council:
Charles Nash
Jordon Baker
Andy Palmer

## RESOLUTION TO ADOPT THE 2021 UPDATE OF THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN

WHEREAS, the Town of Bakersville is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the (Town of Bakersville desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Bakersville Town Council to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Bakersville Town Council to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Bakersville; and

WHEREAS, the Town of Bakersville, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Bakersville Town Council hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 26, 2021

Charles E. Vines

Charles E. Vines, Mayor

ATTEST:

Kelli Bean

Town Clerk

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, the Town of Spruce Pine is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the Town of Spruce Pine desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the Town Council to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the Town Council to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the Town of Spruce Pine; and

WHEREAS, the Town of Spruce Pine, in coordination with Avery, McDowell, Mitchell and Yancey Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the Town Council of the Town of Spruce Pine hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on April 12th, 2021.

, Mayor
Town of Spruce Pine

ATTEST:

Shelley Buchanan
, Clerk

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, YANCEY COUNTY is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, YANCEY COUNTY desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the YANCEY COUNTY BOARD OF COMMISSIONERS to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the YANCEY COUNTY BOARD OF COMMISSIONERS to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting YANCEY COUNTY; and

WHEREAS, YANCEY COUNTY, in coordination with Avery, McDowell, and Mitchell Counties and the participating municipalities within those Counties has prepared a multi-jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the BOARD OF COMMISSIONERS of YANCEY COUNTY hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on MARCH 8, 2021.

JEFF WHITSON, Chair
YANCEY COUNTY
BOARD OF COMMISSIONERS

ATTEST:

Sonya Morgan, Clerk to the Board

(seal)

**RESOLUTION TO ADOPT THE**
**2021 UPDATE OF THE TOE RIVER**
**REGIONAL HAZARD MITIGATION PLAN**

WHEREAS, YANCEY COUNTY and the TOWN OF BURNSVILLE is vulnerable to an array of hazards that can cause loss of life and damages to public and private property; and

WHEREAS, the TOWN OF BURNSVILLE desires to seek ways to mitigate situations that may aggravate such circumstances; and

WHEREAS, the development and implementation of a hazard mitigation plan can result in actions that reduce the long-term risk to life and property from natural hazards; and

WHEREAS, it is the intent of the BURNSVILLE TOWN COUNCIL to protect its citizens and property from the effects of hazards by preparing and maintaining a local hazard mitigation plan; and

WHEREAS, it is also the intent of the BURNSVILLE TOWN COUNCIL to fulfill its obligation under North Carolina General Statutes, Chapter 166A: North Carolina Emergency Management Act and Section 322: Mitigation Planning, of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to remain eligible to receive state and federal assistance in the event of a declared disaster affecting the TOWN OF BURNSVILLE; and

WHEREAS, the TOWN OF BURNSVILLE, in coordination with Yancey, Avery, McDowell, and Mitchell Counties and the participating municipalities within those Counties has prepared a multi- jurisdictional hazard mitigation plan with input from the appropriate local and state officials;

WHEREAS, the North Carolina Division of Emergency Management and the Federal Emergency Management Agency have reviewed the Toe River Regional Hazard Mitigation Plan for legislative compliance and have approved the plan pending the completion of local adoption procedures;

NOW, THEREFORE, BE IT RESOLVED that the BURNSVILLE TOWN COUNCIL hereby:

1. Adopts the Toe River Regional Hazard Mitigation Plan; and

2. Agrees to take such other official action as may be reasonably necessary to carry out the proposed actions of the Plan.

Adopted on APRIL 1, 2021.

Theresa Coletta

THERESA COLETTA, MAYOR

ATTEST:

J. Chad Fox

J. CHAD FOX, TOWN CLERK

# TOWN OF BURNSVILLE MITIGATION ACTION PLAN

| **Town of Burnsville Mitigation Action 1** | **Mitigate the Burnsville sewage treatment plant in the event that the facility is heavily damaged by flooding. Phase 1** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Burnsville Public Works |
| Estimated Cost: | $3,000,000 |
| Potential Funding Sources: | Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Underway: Failure of the 300k clarifier tank in late 2020 has made this action a top priority. Multiple agencies are assisting the Town with identifying the multiple issues and developing a plan to either totally renovate the existing plant or purchase another property to build a new plant. |

| **Town of Burnsville Mitigation Action 1b** | **Mitigate the Burnsville sewage treatment plant in the event that the facility is heavily damaged by flooding. Phase 2** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Burnsville Public Works |
| Estimated Cost: | $4,500,000 |
| Potential Funding Sources: | Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Incomplete due to lack of funding. |

| **Town of Burnsville Mitigation Action 6** | **Continue to enforce the town's Flood Damage Prevention Ordinance to keep structures out of the floodplain.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Property Protection, Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management and the LEPC |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, state, and local sources. |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing: The Town of Burnsville is coordinating with the County to continue implementation of the Flood Damage Prevention Ordinance by regulating new development in the floodplain. By requiring new development to be built above the BFE, Burnsville and Yancey County are reducing future vulnerability to the flood hazard. The Town will continue their partnership with Yancey County in enforcing this important ordinance. |

| Town of Burnsville Mitigation Action 7 | 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. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Education and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council and Yancey County Emergency Management |
| Estimated Cost: | Public education and awareness materials are often available free of charge from FEMA, NCEM, Red Cross and other organizations |
| Potential Funding Sources: | None needed |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | Ongoing. We are continuing to improve public awareness about hazards and ways to prevent or reduce the impacts of the hazards. This is done by handing out materials at different events throughout the year, social media posts with materials/information before expected seasons or events such as hurricane season, or winter weather. We are constantly looking for ways to increase awareness and teach prevention. |

| Town of Burnsville Mitigation Action 8 | 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 the application. Projects may 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, storm shelters and other activities that reduce the loss of life and property as a result of impacts from natural hazards. |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Burnsville staff in coordination with Yancey County Emergency Management |
| Estimated Cost: | Costs to be determined on a project-by project basis as they are identified. |
| Potential Funding Sources: | Federal Grants |
| Implementation Schedule: | 2021-2026 |
| 2021 Implementation Status: | New action for the 2021 plan update. Ongoing. |

# Appendix B: Planning Tools

This section of the Plan includes three (3) Items:

1. *A Blank Public Participation Survey*
2. *A Blank Capability Assessment Survey*
3. *Scoring Criteria for the Capability Assessment*

# PUBLIC SURVEY
# FOR HAZARD MITIGATION PLANNING

**We need your help!**

Avery County, McDowell County, Mitchell County, and Yancey County, along with participating local jurisdictions and other participating partners, are now working to update the region's multi-jurisdictional *Hazard Mitigation Plan*. The purpose of this Plan is to identify and assess our community's natural hazard risks and determine how to best minimize or manage those risks. Upon completion, the Plan will represent a comprehensive multi-jurisdictional *Hazard Mitigation Plan* for the four-county region.

This survey questionnaire provides an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and can lead to mitigation activities that should help lessen the impact of future hazard events.

**Please help us by completing this survey and returning it to:**

Nathan Slaughter, ESP Associates
2200 Gateway Centre Blvd,. Suite 216
Morrisville, NC 27560

Surveys can also be emailed to nslaughter@espassociates.com

If you have any questions regarding this survey or would like to learn about more ways you can participate in the development of the *Toe River Regional Multi-Jurisdictional Hazard Mitigation Plan*, please contact Nathan Slaughter at 919-415-2726 or at the email address above.

This survey is also available online at:
**https://s.surveyplanet.com/mKba5o1XH**

**1. Where do you live?**

- ❑ Unincorporated Avery County
- ❑ Unincorporated McDowell County
- ❑ Unincorporated Mitchell County
- ❑ Unincorporated Yancey County
- ❑ Town of Banner Elk
- ❑ Town of Crossnore
- ❑ Town of Elk Park
- ❑ Town of Newland
- ❑ Town of Sugar Mountain
- ❑ Grandfather Village
- ❑ City of Marion
- ❑ Town of Old Fort
- ❑ Town of Bakersville
- ❑ Town of Spruce Pine
- ❑ Town of Burnsville
- ❑ Other

2. **Have you ever experienced or been impacted by a disaster?**

   - ❑ Yes
   - ❑ No

   a. **If "Yes," please explain:**

| |
|---|
| |

3. **How concerned are you about the possibility of our community being impacted by a disaster?**

   - ❑ Extremely concerned
   - ❑ Somewhat concerned
   - ❑ Not concerned

4. **Please select the <u>one</u> hazard you think is the *highest threat* to your neighborhood:**

   - ❑ Acts of Terror
   - ❑ Dam / Levee Failure
   - ❑ Drought
   - ❑ Earthquake
   - ❑ Expansive Soils
   - ❑ Extreme Heat
   - ❑ Flood
   - ❑ Hailstorm
   - ❑ Hurricane Remnants
   - ❑ Land Subsidence
   - ❑ Landslide
   - ❑ Lightning
   - ❑ Severe Winter/Ice Storm
   - ❑ Severe Thunderstorm / High Wind
   - ❑ Tornado
   - ❑ Wildland Fire

5. **Please select the <u>one</u> hazard you think is the *second highest threat* to your neighborhood:**

   - ❑ Acts of Terror
   - ❑ Dam / Levee Failure
   - ❑ Drought
   - ❑ Earthquake
   - ❑ Expansive Soils
   - ❑ Extreme Heat
   - ❑ Flood
   - ❑ Hailstorm
   - ❑ Hurricane Remnants
   - ❑ Land Subsidence
   - ❑ Landslide
   - ❑ Lightning
   - ❑ Severe Winter/Ice Storm
   - ❑ Severe Thunderstorm / High Wind
   - ❑ Tornado
   - ❑ Wildland Fire

6. **Is there another hazard not listed above that you think is a wide-scale threat to your neighborhood?**

   - ❑ Yes (please explain): _____
   - ❑ No

**7. Is your home located in a floodplain?**

- ❑ Yes
- ❑ No
- ❑ I don't know

**8. Do you have flood insurance?**

- ❑ Yes
- ❑ No
- ❑ I don't know

**a. If "No," why not?**

- ❑ Not located in floodplain
- ❑ Too expensive
- ❑ Not necessary because it never floods
- ❑ Not necessary because I'm elevated or otherwise protected
- ❑ Never really considered it
- ❑ Other (please explain): _____

**9. Have you taken any actions to make your home or neighborhood more resistant to hazards?**

- ❑ Yes
- ❑ No

**b. If "Yes," please explain:**

| |
|---|
| |

**10. Are you interested in making your home or neighborhood more resistant to hazards?**

- ❑ Yes
- ❑ No

**11. Do you know what office to contact regarding reducing your risks to hazards in your area?**

- ❑ Yes
- ❑ No

**12. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?**

- ❑ Newspaper
- ❑ Television
- ❑ Radio
- ❑ Internet
- ❑ Mail
- ❑ Public workshops/meetings
- ❑ School meetings
- ❑ Other (please explain): _____

**13. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?**

**14. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?**

**15. A number of community-wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. Please tell us how important you think each one is for your community to consider pursuing.**

| Category | Very Important | Somewhat Important | Not Important |
|---|---|---|---|
| **1. Prevention**<br>Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations. | ❑ | ❑ | ❑ |
| **2. Property Protection**<br>Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area. Examples include acquisition, relocation, elevation, structural retrofits, and storm shutters. | ❑ | ❑ | ❑ |
| **3. Natural Resource Protection**<br>Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management. | ❑ | ❑ | ❑ |
| **4. Structural Projects**<br>Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. Examples include dams, levees, detention/retention basins, channel modification, retaining walls and storm sewers. | ❑ | ❑ | ❑ |
| **5. Emergency Services**<br>Actions that protect people and property during and immediately after a hazard event. Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems. | ❑ | ❑ | ❑ |
| **6. Public Education and Awareness**<br>Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property. Examples include outreach projects, school education programs, library materials and demonstration events. | ❑ | ❑ | ❑ |

## THANK YOU FOR YOUR PARTICIPATION!

*This survey may be submitted anonymously; however, if you provide us with your name and contact information below we will have the ability to follow up with you to learn more about your ideas or concerns (optional):*

**Name:** _____

**Address:** _____

_____

**Phone:** _____ **E-Mail:** _____

## Local Capability Assessment Survey

**Jurisdiction/Agency:** _____ **Phone:** _____

**Point of Contact:** _____ **E-mail:** _____

**1. PLANNING AND REGULATORY CAPABILITY -** Please indicate whether the following planning or regulatory tools (plans, ordinances, codes or programs) are currently in place or under development for your jurisdiction by placing an "**X**" in the appropriate box. Then, for each particular item in place, identify the department or agency responsible for its implementation and indicate its estimated or anticipated effect on hazard loss reduction (Strongly Supports, Helps Facilitate or Hinders) with another "**X**". Finally, please provide additional comments or explanations in the space provided or with attachments.

| Planning / Regulatory Tool | In Place | Under Development | Department / Agency Responsible | Effect on Loss Reduction | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | | Strongly Supports | Helps Facilitate | Hinders | |
| Hazard Mitigation Plan | | | | | | | |
| Comprehensive Land Use Plan (or General, Master or Growth Mgt. Plan) | | | | | | | |
| Floodplain Management Plan | | | | | | | |
| Open Space Management Plan (or Parks & Rec./ Greenways Plan) | | | | | | | |
| Stormwater Management Plan / Ordinance | | | | | | | |
| Natural Resource Protection Plan | | | | | | | |
| Flood Response Plan | | | | | | | |
| Emergency Operations Plan | | | | | | | |
| Continuity of Operations Plan | | | | | | | |
| Evacuation Plan | | | | | | | |
| Other Plans (please explain under Comments) | | | | | | | |

## Local Capability Assessment Survey

| Planning / Regulatory Tool | In Place | Under Development | Department / Agency Responsible | Effect on Loss Reduction | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | | Strongly Supports | Facilitates | Hinders | |
| Disaster Recovery Plan | | | | | | | |
| Capital Improvements Plan | | | | | | | |
| Economic Development Plan | | | | | | | |
| Historic Preservation Plan | | | | | | | |
| Floodplain Ordinance (or Flood Damage Prevention Ordinance) | | | | | | | |
| Zoning Ordinance | | | | | | | |
| Subdivision Ordinance | | | | | | | |
| Unified Development Ordinance | | | | | | | |
| Post-disaster Redevelopment / Reconstruction Ordinance | | | | | | | |
| Building Code | | | | | | | |
| Fire Code | | | | | | | |
| National Flood Insurance Program (NFIP) | | | | | | | |
| NFIP Community Rating System (CRS Program) | | | | | | | |

## Local Capability Assessment Survey

**2. ADMINISTRATIVE AND TECHNICAL CAPABILITY -** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "**X**" in the appropriate box . Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

| Staff / Personnel Resources | Yes | No | Department / Agency | Comments |
|---|---|---|---|---|
| Planners with knowledge of land development and land management practices | | | | |
| Engineers or professionals trained in construction practices related to buildings and/or infrastructure | | | | |
| Planners or engineers with an understanding of natural and/or human-caused hazards | | | | |
| Emergency manager | | | | |
| Floodplain manager | | | | |
| Land surveyors | | | | |
| Scientist familiar with the hazards of the community | | | | |
| Staff with education or expertise to assess the community's vulnerability to hazards | | | | |
| Personnel skilled in Geographic Information Systems (GIS) and/or FEMA's HAZUS program | | | | |
| Resource development staff or grant writers | | | | |

## Local Capability Assessment Survey

**3. FISCAL CAPABILITY -** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources ***for hazard mitigation purposes*** (including as match funds for State of Federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any other comments you may have in the space provided or with attachments.

| Financial Resources | Yes | No | Department / Agency | Comments |
|---|---|---|---|---|
| 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 | | | | |
| Other: _____ | | | | |

## Local Capability Assessment Survey

**4. POLITICAL CAPABILITY -** Political capability can be generally measured by the degree to which local political leadership is willing to enact policies and programs that reduce hazard vulnerabilities in your community, even if met with some opposition. Examples may include 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 (e.g., building codes, floodplain management, etc.). Please identify some general examples of these efforts if available and/or reference where more documentation can be found.

## Local Capability Assessment Survey

**5. SELF-ASSESSMENT OF CAPABILITY -** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "**X**" in the box marking the most appropriate degree of capability (Limited, Moderate or High) based upon best available information and the responses provided in Sections 1-4 of this survey.

| | DEGREE OF CAPABILITY | | |
|---|---|---|---|
| | **LIMITED** | **MODERATE** | **HIGH** |
| Planning and Regulatory Capability | | | |
| Administrative and Technical Capability | | | |
| Fiscal Capability | | | |
| Political Capability | | | |
| OVERALL CAPABILITY | | | |

**Points System for Capability Ranking**

| |
|---|
| **0-19 points = Limited overall capability** |
| **20-39 points = Moderate overall capability** |
| **40-68 points = High overall capability** |

**I. Planning and Regulatory Capability**
**(Up to 43 points)**

*Yes = 3 points*
*Under Development = 1 point*
*Included under County plan/code/ordinance/program = 1 point*
*No = 0 points*

- Hazard Mitigation Plan
- Comprehensive Land Use Plan
- Floodplain Management Plan
- National Flood Insurance Program
- NFIP Community Rating System

*Yes = 2 points*
*Under Development = 1 point*
*Included under County plan/code/ordinance/program = 1 point*
*No = 0 points*

- Open Space Management Plan / Parks & Recreation Plan
- Stormwater Management Plan
- Natural Resource Protection Plan
- Flood Response Plan
- Emergency Operations Plan
- Continuity of Operations Plan
- Evacuation Plan
- Disaster Recovery Plan
- Flood Damage Prevention Ordinance
- Post-disaster Redevelopment / Reconstruction Ordinance

*Yes = 1 point*
*No = 0 points*

- Capital Improvements Plan
- Economic Development Plan
- Historic Preservation Plan
- Zoning Ordinance
- Subdivision Ordinance
- Unified Development Ordinance
- Building Code
- Fire Code

**II. Administrative and Technical Capability**
**(Up to 15 points)**

*Yes = 2 points*
*Service provided by County = 1 point*
*No = 0 points*

- Planners with knowledge of land development and land management practices
- Engineers or professionals trained in construction practices related to buildings and/or infrastructure
- Planners or engineers with an understanding of natural and/or human-caused hazards
- Emergency manager
- Floodplain manager

*Yes = 1 point*
*No = 0 points*

- Land surveyors
- Scientist familiar with the hazards of the community
- Staff with education or expertise to assess the community's vulnerability to hazards
- Personnel skilled in Geographical Information Systems (GIS) and/or Hazus
- Resource development staff or grant writers

**III. Fiscal Capability**
**(Up to 10 points)**

*Yes = 1 point*
*No = 0 points*

- Capital Improvement Programming
- Community Development Block Grants (CDBG)
- Special Purpose Taxes (or tax districts)
- Gas / Electric Utility Fees
- Water / Sewer Fees
- Stormwater Utility Fees
- Development Impact Fees
- General Obligation / Revenue / Special Tax Bonds
- Partnering arrangements or intergovernmental agreements
- Other

# Appendix C: Local Mitigation Plan Review Tool

This section of the Plan includes a completed Local Mitigation Plan Review Tool.

# LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

| **Jurisdiction:**<br>Avery County, Banner Elk, Crossnore, Elk Park, Grandfather Village, Sugar Mountain, Newland, McDowell County, Mario, Old Fort, Mitchell County, Bakersville, Spruce Pine, Yancey County, Burnsville | **Title of Plan:**<br>Toe River Regional Hazard Mitigation Plan – 2021 Update | **Date of Plan:**<br>DRAFT – April 2020<br>RESUBMITTED – September 2020 |
|---|---|---|
| **Local Point of Contact:**<br>Nathan Slaughter | | **Address:**<br>2200 Gateway Centre Blvd., Suite 216<br>Morrisville, NC 27560 |
| **Title:**<br>Hazard Mitigation Department Manager | | |
| **Agency:**<br>ESP Associates | | |
| **Phone Number:**<br>919-264-9582 | | **E-Mail:**<br>nslaughter@espassociates.com |

| **State Reviewer:** | **Title:** | **Date:** |
|---|---|---|
| **Carl Baker** | **Hazard Mitigation Planner** | **May 13, 2020**<br>**September 16, 2020**<br>**September 28, 2020** |

| **FEMA Reviewer:** | **Title:** | **Date:** |
|---|---|---|
| Edwardine S. Marrone<br>Carl Mickalonis | NC-FIT-Mitigation Planner<br>HM Planning Lead | 01/05/21<br>2/1/2021 |
| **Date Received in FEMA Region IV** | 09/20/20 | |
| **Plan Not Approved** | | |
| **Plan Approvable Pending Adoption** | 2-01-2021 | |
| **Plan Approved** | 3-12-2021 | |

✓ Denotes FEMA Reviewer concurs with State Reviewers notations.

## SECTION 1: REGULATION CHECKLIST

**INSTRUCTIONS:** The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

| **1. REGULATION CHECKLIST**<br>**Regulation** (44 CFR 201.6 Local Mitigation Plans) | **Location in Plan** (section and/or page number) | **Met** | **Not Met** |
|---|---|---|---|
| **ELEMENT A. PLANNING PROCESS** | | | |
| A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1)) | Section 1.3, Section 2.3, 2.4, 2.4.1, 2.5, 2.5.1, 2.6, 2.6.1, 2.7; App. D✓<br>a. P1:3; Section 2<br>b. P1:4 Table 1.1, P2:2<br>c. & d. P2:6-7 Appendix B, D<br>e. Section 2 | X | |
| A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))<br><br>**QC concurs** | Section 2.4, 2.4.1, Section 2.7; App. D<br>a. – c. P2:15-16 | X | |
| A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1)) | Section 2.6, 2.6.1; App. D<br>a. & b. P2:7, 2:14-15 | X | |
| A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3)) | Section 7. 7-3, 7-4 and related subsections<br>a. & b. P2:3-4. Section 7 | X | |
| A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6©(4)(iii)) | Section 10.3 10-4✓ | X | |

| 1. REGULATION CHECKLIST<br>**Regulation** (44 CFR 201.6 Local Mitigation Plans) | Location in Plan (section and/or page number) | Met | Not Met |
|---|---|---|---|
| A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6©(4)(i)) | Section 10.2<br>Section 10 | X | |
| **ELEMENT A: REQUIRED REVISIONS**<br>NCEM 1st Review:<br>A1: No position/title is listed for Ben Hassel from the Town of Crossnore.<br>ESP Response: Added<br>A2: None.<br>A3: None.<br>A4: None.<br>A5: None.<br>A6: None.<br>**NCEM 2nd Review:**<br>**A3: No documentation of public meetings discussed in Section 2.6.**<br>**NCEM 3rd Review: The public meetings are to be scheduled virtually in the future. A placeholder statement to the effect is provided by the contractor.** | | | |
| **ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT** | | | |
| B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6©(2)(i)) | Section 4; Section 5 and all subsections<br>a. & b. P4:1-2; Table 4.4 P4:5-15; 5:7, 5:11, 5:13-14, 5:22-26, 5:28, 5:32-34, 5:36, 5:38, 5:40-41, 5:44-45, 5:47-49, 5:53-56, 5:71-73, Appendix F, G, H:19, H:28, Table 5:36 | X | |
| B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6©(2)(i)) | Section 5 and all relevant subsections; Appendix H<br>a. P5:78, 5:11, 5:13-16, 5:23-26, 5:28, 5:33-34, 5:39-42, 5:46, 5:49-50, 5:55-56, Appendix G, H<br>b. P5:9. 5:11. 5:17, 5:26-28, 5:34-35, 5:42, 5:46, 5:51, 5:53, 5:56. | X | |

| 1. REGULATION CHECKLIST<br>**Regulation** (44 CFR 201.6 Local Mitigation Plans) | Location in Plan (section and/or page number) | Met | Not Met |
|---|---|---|---|
| B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6©(2)(ii)) | Section 5; Section 6 and relevant subsections<br>a. 5:7, 5:9-10, 5:12, 5:16, 5:23-28, 5:40, 5:42, 5:43, 5:46, 5:49-50, P5:52, 5:56, 5:75-76. Appendix H<br>b. P3:3-4, 5:7, 5:9-10, 5:12, 5:16, 5:23-26, 5:27-28, 6:6-11, 6:12-14, 6:14-30, 6:37-46. | X | |
| B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6©(2)(ii))<br><br>**QC concurs** | Section 5.11.5<br>Page 5:50✓<br>Page 5:50-51 | X | |
| **ELEMENT B: REQUIRED REVISIONS**<br>NCEM 1st Review:<br>B1: Individual jurisdiction extent maps for flooding and wildfire are located in Appendices G and H.<br>B2: None.<br>B3: Impact is located in Section 5.19.2 and Table 5.37. Vulnerability is located in Section 6.<br>B4: None.<br>**NCEM 2nd Review: no required revisions noted.**<br>**NCEM 3rd Review: no required revisions noted.** | | | |
| **ELEMENT C. MITIGATION STRATEGY** | | | |
| C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6©(3))<br><br>**QC Concurs** | Section 7 and all relevant subsections✓<br>P 7:16-18, 8:4, 8:6, Section 10, Appendix B | **X** | |
| C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6©(3)(ii)) | Section 5.11.4<br>Section 7.3.4<br>P 7:4, 7:10 (Participation)<br>Section 9 P 9:5, 9:8-9, 9:13, 9:15-19, 9:22, 9:24, 9:27-28, 9:31, 9:49, 9:51, 9:53-54, 9:57 (Continued Compliance) | **X** | |

| 1. REGULATION CHECKLIST<br>**Regulation** (44 CFR 201.6 Local Mitigation Plans) | Location in Plan (section and/or page number) | Met | Not Met |
|---|---|---|---|
| C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6©(3)(i)) | Section 8.2✓<br>a. & b. P 8:3-4 | X | |
| C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6©(3)(ii)) | Section 8.3-8.4;<br>Section 9.2 | X | |
| C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6©(3)(iv)); (Requirement §201.6©(3)(iii)) | Section8.1.1;✓<br>Section 9.2<br>a. b. P 8:2-3<br>c. Section 9 | X | |
| C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6©(4)(ii)) | Section 10.1<br>a.-e. P 7:16-18, 8:4, 8:6, Section 10 | X | |

| 1. REGULATION CHECKLIST<br>**Regulation** (44 CFR 201.6 Local Mitigation Plans) | Location in Plan (section and/or page number) | Met | Not Met |
|---|---|---|---|
| **ELEMENT C: REQUIRED REVISIONS**<br>NCEM 1st Review:<br>C1: None.<br>C2: None.<br>C3: None.<br>C4: The following jurisdictions require one additional all hazard action to meet the minimum requirement: Avery County, Marion, Bakersville, Spruce Pine, and Burnsville.<br>Additional mitigation action plan revision requirements included in addendum.<br>ESP Responses: Added<br>C5: None.<br>C6: None.<br>**NCEM 2nd Review: Responses provided to prior review of mitigation actions in Addendum.**<br>**Additional required revisions this review:**<br>**C4:**<br>**Avery County, Action 4, Category should read Public Education and Awareness**<br>ESP Response: Corrected<br>**Avery County, Action 5, Hazard addressed should read Geological**<br>ESP Response: Corrected<br>**Avery County, Action 9, The action is non-specific and does not discuss an actual targeted project.**<br>ESP Response: Request to leave action in plan as-is. This action is very similar to an action in the State Hazard Mitigation Plan (Action NC-2) that is included to cover any potential future actions that might come up between plan updates. Per FEMA, this action will help alleviate the need to update the plan between cycles.<br>**Banner Elk, Action 4, As revised still fails to identify an actual mitigation project.**<br>ESP Response: Request to leave action in plan, as-is for reasons similar to those provided above.<br>**Grandfather Village, Action 3, Will not count as a mitigation action. Category should read Public Education and Awareness.**<br>ESP Response: Corrected<br>**McDowell County, Action 9, Action 16, and Action 17, Category should read Public Education and Awareness. As noted on the addendum, this will not count as a mitigation action.**<br>ESP Response: Corrected<br>**Mitchell County, Action 59 and Action 60, Category should read Public Education and Awareness**<br>ESP Response: Corrected<br>**Yancey County, Action 11 and Action 12, both actions should be categorized as Emergency Services.**<br>ESP Response: Corrected<br>**Yancey County, Action 15, Revise implementation schedule.**<br>ESP Response: Corrected<br>**NCEM 3rd Review: no required revisions noted.** | | | |

| **ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION** (applicable to plan updates only) | | | |
|---|---|---|---|
| D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3)) | Section 3.3.3<br>P 3:5, 6:10-12 | X | |
| D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3)) | Section 9 ✓<br>Appendix E | X | |
| D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3)) | Section 8.5 ✓<br>P 8:6, Section 9 | X | |

| 1. REGULATION CHECKLIST<br>**Regulation** (44 CFR 201.6 Local Mitigation Plans) | **Location in Plan (section and/or page number)** | **Met** | **Not Met** |
|---|---|---|---|
| **ELEMENT D: REQUIRED REVISIONS**<br>NCEM 1st Review:<br>D1: None.<br>D2: None.<br>D3: None.<br>**NCEM 2nd Review: no required revisions noted.**<br>**NCEM 3rd Review: no required revisions noted.** | | | |
| **ELEMENT E. PLAN ADOPTION** | | | |
| E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6©(5))<br><br>**QC concurs** | Pending NCEM and FEMA review and APA status. | X | |
| E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6©(5))<br><br>**QC concurs** | Pending NCEM and FEMA review and APA status. | X | |

| 1. REGULATION CHECKLIST<br>**Regulation** (44 CFR 201.6 Local Mitigation Plans) | Location in Plan (section and/or page number) | Met | Not Met |
|---|---|---|---|

**ELEMENT E: REQUIRED REVISIONS**

**FEMA REQUIRED REVISIONS:**

Adoption documentation has not been provided by any of the participating jurisdictions.

**E1:** The plan must include documentation of plan adoption, usually a resolution by the governing body or other authority.

**E2:** Each jurisdiction that is included in the plan must have its governing body adopt the plan prior to FEMA approval, even when a regional agency has the authority to prepare such plans. At least one participating jurisdiction must formally adopt the plan within one calendar year of FEMA's designation of the plan as "Approvable Pending Adoption."

FEMA recommends that all participating jurisdictions coordinate the adoption process as soon as the plan has received APA status to ensure that all participants are covered by a plan for the full five years.

*For additional information, please see Element E, Plan Adoption, in the "Local Mitigation Plan Review Guide", October 1, 2011, Pages 28-29 and Task 8 of the Local Mitigation Planning Handbook, March 2013.*

3-12-2021 Yancey Co AR received, plan approved.
3-18-2021 Adoption documentation received for:

- McDowell Co
- City of Marion
- Town of Old Fort

4/7/21 Mitchel Co provided adoption documentation.
4/8/21 Town of Burnsville provided adoption documentation.

7/7/21 Adoption documentation provided by:

- Avery County, Unincorporated
- Village of Sugar Mountain

7/23/21 Adoption documentation provided by:

- Town of Banner Elk
- Town of Crossnore

7/30/21 Adoption documentation provided by the Towns of Bakersville & Spruce Pine.

8/5/21 Adoption documentation provided by Grandfather Village and the Town of Elk Park

8/27/21 Town of Newland provided adoption documentation. With the adoption the plan is fully adopted.

| | | | |
|---|---|---|---|
| F1. | | | |
| F2. | | | |

| 1. REGULATION CHECKLIST<br>**Regulation** (44 CFR 201.6 Local Mitigation Plans) | Location in Plan (section and/or page number) | Met | Not Met |
|---|---|---|---|
| **ELEMENT F: REQUIRED REVISIONS** | | | |
| None. | | | |

## SECTION 2:
## PLAN ASSESSMENT

**INSTRUCTIONS**: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

***Plan Strengths and Opportunities for Improvement*** is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

***Resources for Implementing Your Approved Plan*** provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

## A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

### Element A: Planning Process

**Plan Strengths**

- The planning committee has specific assigned task to represent their communities in the development of the plan update.
- The documented planning process was followed and enhanced where possible.
- Each jurisdiction was represented as a development participant and provided pertinent information, such as mitigation action progress or identified new mitigation actions for this life cycle.

**Opportunities for Improvement**

The

**The HMP Committee needs to review the document for correctness and completeness prior to submission for formal review by NCEMA and FEMA.**

In Section 4 the page numbering does not follow the page numbering scheme. The page numbers should be 4:1, 4:2 and so on, however, the page numbers were 1:1.

### Element B: Hazard Identification and Risk Assessment

**Plan Strengths**

- The way the plan is written allows the reader to have a full picture of which hazards present a higher risk to the participating jurisdictions, therefore, these are the hazards that have higher priority mitigations strategies.
- The risk assessment is the groundwork for the development of mitigation measures. The plan draws from each of the community's capabilities to document the community's sustained efforts to incorporate hazard mitigation principles and practices into routine government activities and functions thus establishing a successful and sustainable local hazard mitigation program.

PDF 5/P 1:3

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

PDF 21/P 2:13 The highest PRI was assigned to Winter Storms and Freeze, followed by Severe Thunderstorm, Flood and Landslides.

**Opportunities for Improvement**

- The plan provides hazard information beyond the planning area. There are many instances when the hazard description includes national or statewide data and information. The focus should be the planning area. When the plan consistently provides information for areas outside of the planning area the plan needs to document clearly when information being provided excludes the planning area and when it pertains to the planning area.
- Page 5:49 states: *Specific information on flood events for each county including date, type of flooding, and deaths and injuries, can be found in* ***Appendix F****. Actually,* Appendix H has the NCEI Storm Event Data. Suggestion: **The HMP Committee needs to review the document for correctness and completeness prior to submission for formal review by NCEMA and**

**FEMA.** As information is added to the document which may cause the shifting of Appendices remember to correct the Appendix reference.

## Element C: Mitigation Strategy

**Plan Strengths**

- Each participating jurisdiction has a Mitigation Action Plan.
- The proposed mitigation projects are very specific, actionable, and clear. Included are those carried over from the previous plan which were evaluated and re-prioritized.

## Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

**Plan Strengths**

- Each participating jurisdiction is responsible for providing updates to the Mitigation Action Plan, showing progress, challenges, and opportunities to improve the actions.
- The maintenance, evaluation and implementation process is well documented.

## B. Resources for Implementing Your Approved Plan

- **Local Mitigation Planning Handbook**
  This Handbook provides guidance to local governments on developing or updating hazard mitigation plans to meet the requirements under the Code of Federal Regulations (CFR) Title 44 – Emergency Management and Assistance §201.6.
  Use the Local Plan Guide and Handbook in tandem to understand technical requirements
  **http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=7209**
- **Integrating Mitigation Strategies with Local Planning**
  This resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns.
  **http://www.fema.gov/library/viewRecord.do?id=7130**
- **Mitigation Ideas**
  Communities can use this resource to identify and evaluate a range of potential mitigation actions for reducing risk to natural hazards and disasters.
  **http://www.fema.gov/media-library/assets/documents/30627?id=6938**

- **Risk MAP Program:**
  This resource provides an introduction to Risk MAP and information about the products Risk MAP offers to better understand flood risk. This information can help planning to reduce flood risk and communicate with residents.
  **https://www.fema.gov/risk-map-program-information-community-officials**

## SECTION 3:
## MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

**INSTRUCTIONS**: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

| MULTI-JURISDICTION SUMMARY SHEET | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Jurisdiction Name | Jurisdiction Type (city/borough/ township/ village, etc.) | Plan POC | Mailing Address | Email | Phone | Requirements Met (Y/N) | | | | | |
| | | | | | | | A. Planning Process | B. Hazard Identification & Risk Assessment | C. Mitigation Strategy | D. Plan Review, Evaluation & Implementation | E. Plan Adoption | F. State Require-ments |
| **1** | **Avery County** | **County** | | | | | Y | Y | Y | Y | Y | |
| **2** | Banner Elk | Town | | | | | Y | Y | Y | Y | Y | |
| **3** | Crossnore | Town | | | | | Y | Y | Y | Y | Y | |
| **4** | Elk Park | Town | | | | | Y | Y | Y | Y | Y | |
| **5** | Grandfather Village | Village | | | | | Y | Y | Y | Y | Y | |
| **6** | Sugar Mountain | Village | | | | | Y | Y | Y | Y | Y | |
| **7** | Newland | Town | | | | | Y | Y | Y | Y | Y | |
| **8** | **McDowell County** | **County** | | | | | Y | Y | Y | Y | Y | |
| **9** | Marion | City | | | | | Y | Y | Y | Y | Y | |

| MULTI-JURISDICTION SUMMARY SHEET | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Jurisdiction Name | Jurisdiction Type (city/borough/ township/ village, etc.) | Plan POC | Mailing Address | Email | Phone | Requirements Met (Y/N) | | | | | |
| | | | | | | | A. Planning Process | B. Hazard Identification & Risk Assessment | C. Mitigation Strategy | D. Plan Review, Evaluation & Implementation | E. Plan Adoption | F. State Require-ments |
| **10** | Old Fort | Town | | | | | Y | Y | Y | Y | Y | |
| **11** | **Mitchell County** | **County** | | | | | Y | Y | Y | Y | Y | |
| **12** | Bakersville | Town | | | | | Y | Y | Y | Y | Y | |
| **13** | Spruce Pine | Town | | | | | Y | Y | Y | Y | Y | |
| **14** | **Yancey County** | **County** | | | | | Y | Y | Y | Y | Y | |
| **15** | Burnsville | Town | | | | | Y | Y | Y | Y | Y | |
| **16** | | | | | | | | | | | | |
| **17** | | | | | | | | | | | | |
| **18** | | | | | | | | | | | | |
| **19** | | | | | | | | | | | | |
| **20** | | | | | | | | | | | | |

# Appendix D: Planning Process Documentation

This section of the Plan includes five (5) categories of items:

1. *Toe River Regional Hazard Mitigation Planning Committee Meeting Agendas*
2. *Toe River Regional Hazard Mitigation Planning Committee Meeting Sign-in Sheets*
3. *Toe River Regional Hazard Mitigation Planning Committee Meeting Minutes*
4. *Neighboring Jurisdiction Outreach Documentation*
5. *Public Survey Summary Results*

# AGENDA

Toe River Regional Hazard Mitigation Plan Update
Project Kickoff Meeting
August 27, 2019
10:00 AM – Noon

1) **Introductions**

2) **Mitigation Refresher**

3) **Icebreaker Exercise**

4) **Project Overview**
   a) Key Objectives
   b) Project Tasks
   c) Project Schedule

5) **Roles & Responsibilities**
   a) ESP Associates
   b) County Leads
   c) Participating Jurisdictions

6) **Next Steps**
   a) Determine members to participate on the Hazard Mitigation Planning Team
   b) Initiate data collection efforts
   c) Begin public outreach
   d) Discuss next Hazard Mitigation Planning Team meeting

7) **Questions, Issues or Concerns**

# AGENDA

Toe River Regional Hazard Mitigation Plan
Mitigation Strategy Workshop
February 4, 2020
10:00AM - Noon

1) **Introductions**

2) **Mitigation Recap**

3) **Review Project Schedule**

4) **Risk Assessment Findings**

   a) **Hazard Identification**
   b) **Hazard Profiles**
   c) **Hazard Vulnerability Assessment**

5) **Capability Assessment Findings**

6) **Mitigation Strategy Session**

7) **Summary of Public Involvement**

8) **Plan Maintenance**

9) **Next Steps**

**Toe River Regional Hazard Mitigation Plan Update**
**Project Kickoff Meeting**

**August 27, 2019**

**10:00 AM - Noon**

| Name | Agency | City | Phone Number | E-mail Address |
|---|---|---|---|---|
| Scott Stansberry | Avery County Firefighters Association | NEWLAND, NC | 828-964-1534 | presidentacfa@gmail.com |
| Darla Hall | NCEM | Conover, NC | 704-641-9153 | darla.hall@ncdps.gov |
| Angela Wright | McDowell County EM | Marion | 828-442-6712 | angie.wright@mcdowellgov.com |
| Craig Walker | mcDowell Em | Marion | 828-652-3241 | craig.walker@mcdowellgov.com |
| Jeff Howell | Yancey EM | Burnsville | 828-284-0725 | jeff.howell@yanceycountync.gov |
| David Vance | Avery EM | Newland N.C. | 828-733-8213 | emergencymanagement@averycountync.gov |
| James Seaberg | Avery GIS | Newland, NC | 828-733-1001 | james.seaberg@averycountync.gov |
| Cindy Turbyfill | Assistant City Mgr Avery County | Newland, NC | 828-733-8212 | avery.clerk@averycountync.gov |

**Toe River Regional Hazard Mitigation Plan Update**
**Project Kickoff Meeting**

**August 27, 2019**

**10:00 AM - Noon**

| Name | Agency | City | Phone Number | E-mail Address |
|---|---|---|---|---|
| Susan Clark | Toe River Health District | Avery Mitchell Yancy Co | 828-737-6063 | susan.clark@toeriverhealth.org |
| Debbie Smith | Avery Transportation | Avery | 828-733-0005 | Debbie.Smith@averycountync.gov |
| Ben Hansel | Town of Crossnore | Crossnore | 828 467-4195 | ranger5233@Gmail.com |
| Kolby Silver | Mitchell Co EM | Mitchell Co | 828-385-0911 | mitchellem@mitchellcounty.org |
| Susan Phillips | Village of Sugar Mountain | Sugar Mountain | 828-898-9292 | manager.finance@seesugar.com |
| Bill Daniels | Village of Sugar Mountain | Sugar Mountain | 828-898-9292 | publicworks@seesugar.com |
| Tommy Burleson | Avery Inspections + Planning | Newland | 828-733-8204 | avery.planning@averycountync.gov |
| | | | | |

**Toe River Regional Hazard Mitigation Plan Update**
**Mitigation Strategy Meeting**

**February 4, 2020**

**10:00 AM - Noon**

| Name | Agency | City | Phone Number | E-mail Address |
|---|---|---|---|---|
| Darla Hall | NCEM | | 704-641-9153 | darla.hall@ncdps.gov |
| Russell Greene | NCEM | | 828 506 0684 | russell.greene@ncdps.gov |
| Jamie McMahan | Yancey Co. Planning | Burnsville | 828-682-7722 | Jamie.McMahan@yanceycountync.gov |
| Jeff Howell | YANCEY EM | Burnsville | 828-682-1887 | jeff.howell@yanceycountync.gov |
| Tommy Burleson | Avery Planning | Newland | 828-733-8204 | avery.planning@averycountync.gov |
| JAMES SEABERG | GIS DIRECTOR | NEWLAND | 828-733-7001 | james.seaberg@averycountync.gov |
| David Vance | Avery Co. Emerg. mgmt. | Newland | 828-733-8213 | emergencymanagement@averycountync.gov |
| Paul Buchanan | Avery County Emergency management | Newland | 828-260-3375 | Paul.Buchanan@averycountync.gov |

**Toe River Regional Hazard Mitigation Plan Update**
**Mitigation Strategy Meeting**

**February 4, 2020**
**10:00 AM - Noon**

| Name | Agency | City | Phone Number | E-mail Address |
|---|---|---|---|---|
| Angie Wright | McDowell Em | Marion | 828-442-6712 | Angie.Wright@mcdowellgov.com |
| Craig Walker | McDowell Em | Marion | 828-652-3982 | Craig.Walker@mcdowellgov.com |
| Richard Canipe | Town of Spruce Pine | Spruce Pine | 828-765-2000 | MANAGER@SPRUCEPINE-NC.GOV |
| Susan Clark | Toe River Health District | Avery, Mitchell & Yancey Co | 828-737-6063 | Susan.clerk@toeriverhealth.org |
| Debbie Smith | Avery County Transportation | All Avery New land | 828-733-0005 | Debbie.Smith@AveryCountyNC.gov |
| Cindy Turbyfill | Avery City- Asst City Mgr | Avery | 828-733-8212 | avery.clerk@averycountync.gov |
| | | | | |
| | | | | |

**MEETING MINUTES**
**Toe River RHMP Update Kickoff Meeting**
**August 27, 2019**
**Spruce Pine Fire Station**

Nathan Slaughter, Department Manager from ESP Associates, Inc. and Project Manager for the update of the Toe River Regional Hazard Mitigation Plan, began the meeting by welcoming the attendees and giving a brief overview of the project and the purpose of the meeting.

Mr. Slaughter led the meeting of the Regional Hazard Mitigation Planning Team and began by having attendees introduce themselves. The attendees included representatives from various departments and local jurisdictions within each of the four counties participating in the plan update. All four counties were represented. Mr. Slaughter then provided an overview of the items to be discussed at the meeting and briefly reviewed the agenda and presentation slide handouts. He then defined mitigation and gave a review of the Disaster Mitigation Act of 2000 and NC Senate Bill 300.

To continue, Mr. Slaughter provided detailed information about the project. He mentioned that the project is funded by a FEMA PDM grant, and that representatives from each County met together to hire ESP Associates, Inc. to manage the update, thus ensuring that Mr. Slaughter would remain the Project Manager. For this update, there was no local match requirement.

Mr. Slaughter then explained some of the basic concepts of mitigation. He explained how we should think about mitigation: we want to mitigate hazard impacts of existing development in the community (houses, businesses, critical facilities, etc.), and ensure that future development is conducted in a way that doesn't increase vulnerability. This can be achieved 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, the money was tabulated and results were shared with the group. The most mock money was spent on prevention, followed by emergency services. These results were compared against those from the previous plan development's ice breaker exercise. This helped demonstrate how priorities in mitigation actions have changed since the previous update.

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

- Coordinate between the four participating counties to update the regional plan
- Update the plan to demonstrate progress and reflect current conditions
- Complete the update before the existing plan expires on April 10, 2021
- Increase public awareness and education
- Maintain grant eligibility for participating jurisdictions
- Update the plan in accordance with Community Rating System (CRS) requirements, and
- Maintain compliance with State and Federal requirements

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

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

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

Mr. Slaughter then reviewed the roles and responsibilities of ESP Associates, Inc, the County leads, and the participating jurisdictions. The presentation concluded with a discussion of the next steps to be taken in the project development. He encouraged meeting participants to distribute the Public Participation Survey and shared the public web link. The next HMPT meeting was scheduled for some time in early 2020 to discuss the findings of the risk and capability assessments and to begin updating existing mitigation actions and identify new goals.

**Meeting Minutes from Mitigation Strategy Meeting**
**February 4, 2020**
**Spruce Pine Fire Station**
**10:00 AM – Noon**

Nathan Slaughter, Project Manager from ESP Associates, began the meeting by welcoming the attendees and reviewing the meeting handouts, which included an agenda, existing plan goals for the regional plan, and a hard copy of the meeting presentation. Mr. Slaughter asked meeting attendees to introduce themselves and gave a refresher on mitigation, why we plan, and the key objectives of the project. He reviewed the participating jurisdictions, project tasks and project schedule. He stated that a draft of the updated Regional Hazard Mitigation Plan would be presented in April.

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

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

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

- DROUGHT: There were 18 regional drought events between 2000 and 2018, and future occurrences are likely.
- EXTREME HEAT: The average maximum temperatures from the past 48 months were shared. Future occurrences are likely.
- HAILSTORM: There have been 238 recorded events since 1962. Future occurrences are likely.
- HURRICANE AND COASTAL STORM: 42 storm tracks have come within 75 miles of the region since 1854. 31 of those were classified as a hurricane or tropical storm. Future occurrences are likely.
- LIGHTNING: Since 1996, there have been 6 reported occurrences, which resulted in 2 deaths and 9 injuries and nearly $26 thousand dollars in property damage. Future occurrences are highly likely.
- SEVERE THUNDERSTORMS: 280 severe thunderstorm events have been recorded since 1950. These events resulted in $890,000 in property damages. Future occurrences are highly likely.
- TORNADOES: There have been 8 recorded events since 1950, causing 1 injury, 1 death and $ 973,935 in property damage. Future occurrences are likely.
- WINTER STORM AND FREEZE: 655 winter weather events that resulted in over $55 million in property damage have been recorded since 1993. Future occurrences are highly likely.
- DAM AND LEVEE FAILURE: Of the 109 dams in the region, 47 are considered high hazard dams. No serious breaches have been reported, and future occurrences are unlikely.

- EROSION: Although little information could be obtained on erosion occurrences in the region, erosion was addressed in the previous plan. Future occurrences are possible.
- FLOOD: 99 flood events have occurred since 1993, resulting in over $29 million in property damage. There have also been 274 reported NFIP losses since 1978 and approximately $5.5 million in claims. There are 25 repetitive loss properties, and future occurrences are highly likely.
- EARTHQUAKE: No significant earthquake events have taken place in the region, but future occurrences are possible.
- LANDSLIDE: There have been 80 landslides reported in the region according to the North Carolina Geological Survey. Future occurrences are likely.
- HAZARDOUS MATERIALS INCIDENTS: 24 serious HAZMAT events have been reported through the PHMSA. There are 7 TRI Facilities in the region. Future occurrences are possible.
- WILDFIRE: Much of the region is located in a high-risk wildland urban interface area. Future occurrences are likely.
- NUCLEAR EMERGENCY: There are no nuclear facilities within 50 miles of the region. No major historical occurrences were found, and future occurrences are unlikely.

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

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

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

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

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

Mr. Slaughter then transitioned to the Mitigation Strategy portion of the presentation. He began by reviewing some of the major concepts of mitigation and then gave the results of the icebreaker exercise

from the first Regional Hazard Mitigation Planning Committee meeting, where attendees were given "money" to spend on various hazard mitigation techniques. The results were as follows:

- Prevention $107
- Emergency Services $79
- Structural Projects $46
- Public Education and Awareness $44
- Property Protection $33
- Natural Resource Protection $31

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

Mr. Slaughter then discussed the results of the public participation survey that was posted on several of the participating counties' and jurisdictions' websites. As of the meeting date, 134 responses had been received. Based on the preliminary results, respondents felt that flooding and severe winter storms posed the greatest threats to their neighborhood. Most did not live in a floodplain or have flood insurance, but 64.2% of all respondents did not know who to contact regarding reducing their risks to hazards.

Mr. Slaughter then indicated that each participating jurisdiction would need to provide a status update for their existing mitigation actions (completed, deleted, or deferred) by March 4, 2020. Mr. Slaughter also discussed the Mitigation Action Worksheets to be completed for any new mitigation actions and requested that all worksheets be returned by March 4, 2020. Mr. Slaughter then presented sample mitigation actions for the committee members to consider to include in their plan update.

Finally, Mr. Slaughter discussed the next steps in the planning process. These included returning mitigation action updates and delivery of a draft plan in April 2020. He thanked the group for taking the time to attend and the meeting was adjourned.

## Nathan Slaughter

**From:** Nathan Slaughter
**Sent:** Tuesday, April 28, 2020 1:08 PM
**To:** mayorgreglynch@yahoo.com; johnsoncountymayor@embarqmail.com; mayor@cartercountytn.gov; ema@cartercountytn.gov; planning@cartercountytn.gov; cdispenza@madisoncountync.gov; angela.ledford@buncombecounty.org; nathan.pennington@buncombecounty.org; frankie.hamrick@rutherfordcountync.gov; danny.searcy@rutherfordcountync.gov; michael.willis@burkenc.org; sstevens@caldwellcountync.org; kteague@caldwellcountync.org; taylor.marsh@watgov.com
**Subject:** NOTIFICATION: Toe River Regional Hazard Mitigation Plan

**Importance:** Low

Good afternoon

You are receiving this email because a neighboring County (Avery, McDowell, Mitchell, and/or Yancey County NC), along with the municipalities within those counties and other participating partners, are now working to update the region's multi-jurisdictional *Toe River Regional Hazard Mitigation Plan* as required by the Federal Emergency Management Agency (FEMA). The purpose of this plan is to identify and assess the region's natural hazard risks and determine strategies for how to best minimize or manage those risks. Upon completion, the plan will represent a comprehensive multi-jurisdictional *Hazard Mitigation Plan* for the four-county region.

You are being notified of this planning process for two purposes:

1. FEMA requires that neighboring jurisdictions be provided an opportunity to be involved in the planning process.

2. You may want to contribute information to these jurisdictions to consider as they update their hazard mitigation plan.

I serve as the Project Manager for the update of the plan. Please let me know if you would like to contribute information, be invited to any upcoming meetings in the development of the plan or if you would like to receive a copy of the draft plan.

Should you have any questions about the *Toe River Regional Hazard Mitigation Plan*, please do not hesitate to contact me. Thank you for your time!

**Nathan Slaughter, AICP, CFM**
Department Manager – Hazard Mitigation
**ESP Associates, Inc.**
2200 Gateway Centre Boulevard – Suite 216
Morrisville, NC 27560
www.espassociates.com

nslaughter@espassociates.com
919.415.2726 | Direct
919.678.1070 | Office
919.244.9536 | Cell

Neighboring Jurisdictions for Toe River Region

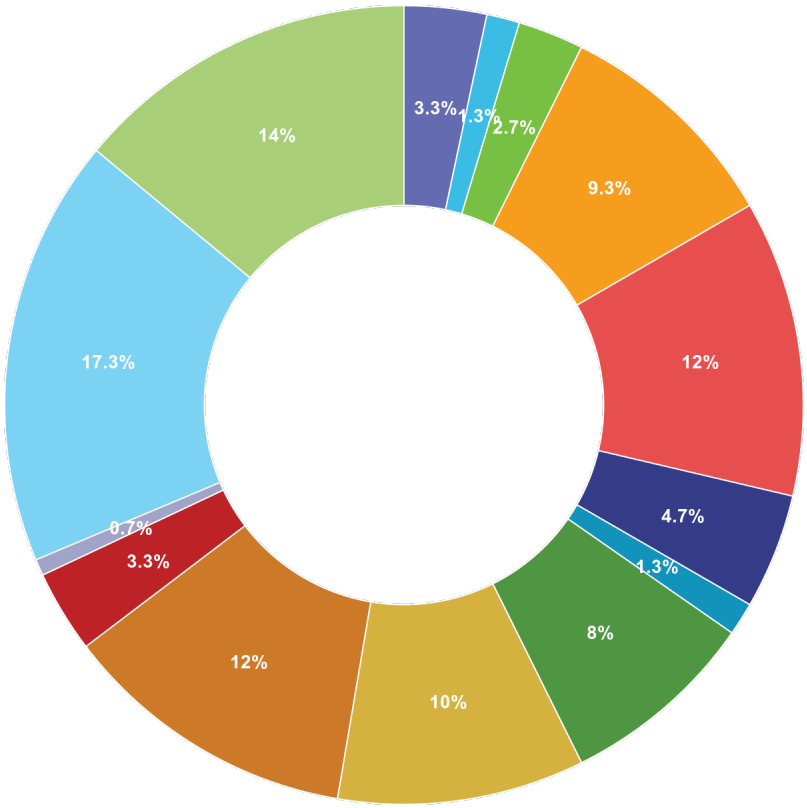
| Jurisdiction | Name | Title | Email |
|---|---|---|---|
| Unicoi County | Greg Lynch | Mayor | mayorgreglynch@yahoo.com |
| Johnson County | Larry D. Potter | Mayor | johnsoncountymayor@embarqmail.com |
| Carter County | Leon Humphrey | Mayor | mayor@cartercountytn.gov |
| | Gary Smith | EM Director | ema@cartercountytn.gov |
| | Chris Schuettler | Planner | planning@cartercountytn.gov |
| Madison County | Caleb Dispenza | EM Director | cdispenza@madisoncountync.gov |
| Buncombe County | Angela Ledford | Emergency Management | angela.ledford@buncombecounty.org |
| | Nathan Pennington | Planning | nathan.pennington@buncombecounty.org |
| Rutherford County | Frankie Hamrick | Emergency Management | frankie.hamrick@rutherfordcountync.gov |
| Rutherford County | Danny Searcy | Planning | danny.searcy@rutherfordcountync.gov |
| Burke County | Michael Willis | EM Director | michael.willis@burkenc.org |
| Caldwell County | Shelley Stevens | Planner | sstevens@caldwellcountync.org |
| | Kenneth Teague | EM Director | kteague@caldwellcountync.org |
| Watauga County | Taylor Marsh | EM Director | taylor.marsh@watgov.com |

surveyplanet

# Toe River Regional Hazard Mitigation Plan - Public Survey

We need your help!

**Q1** 1\. Where do you live?*

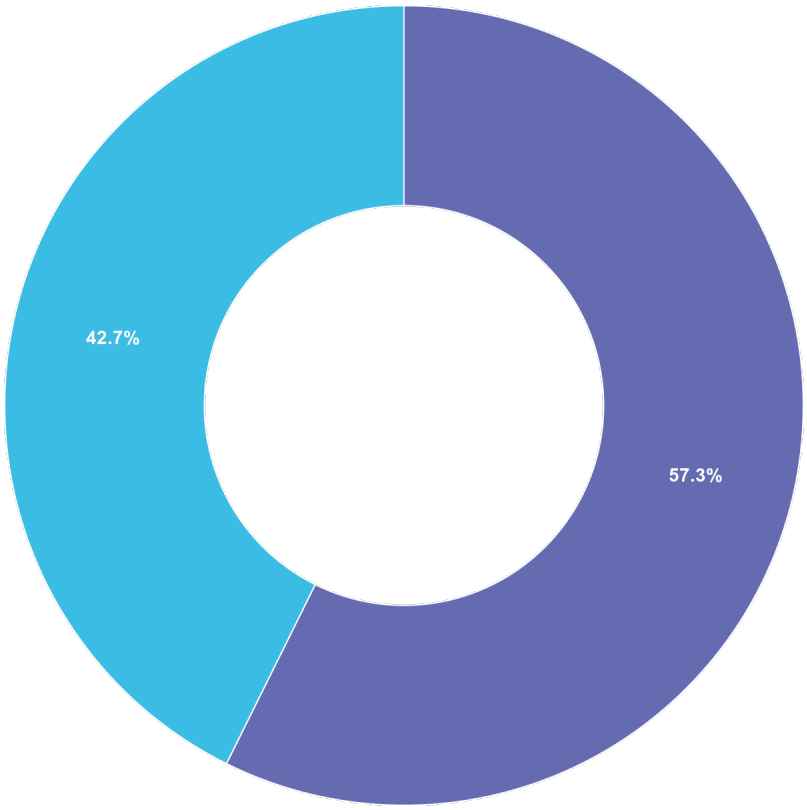



**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| | Banner Elk | 5 |
| | Crossnore | 2 |
| | Elk Park | 4 |
| | Grandfather Village | 0 |
| | Sugar Mountain | 14 |
| | Newland | 18 |
| | Marion | 7 |
| | Old Fort | 2 |
| | Bakersville | 12 |
| | Spruce Pine | 15 |

| Choice | Total |
| --- | --- |
| Burnsville | 18 |
| Unincorporated Mitchell County | 5 |
| Unincorporated McDowell County | 1 |
| Unincorporated Yancey County | 26 |
| Unincorporated Avery County | 21 |

**Q2** 2\. Have you ever experienced or been impacted by a disaster in Avery, McDowell, Mitchell, or Yancey County?*



**Answered:** 150 **Unanswered:** 0

| Choice | Total |
| --- | --- |
| Yes | 86 |
| No | 64 |

**Q3** 3\. If you answered “Yes” to the previous question, please explain.

Saturday, April 11, 2020, 3:14 PM UTC

We live in Land Harbor in the Meadows and were flooded when the back to back Hurricanes occurred. Frances and Ivan

Saturday, April 11, 2020, 11:11 AM UTC

LLH Flood.

Thursday, March 26, 2020, 4:56 PM UTC

May 2013 (I think) severe flooding

Friday, March 20, 2020, 1:46 PM UTC

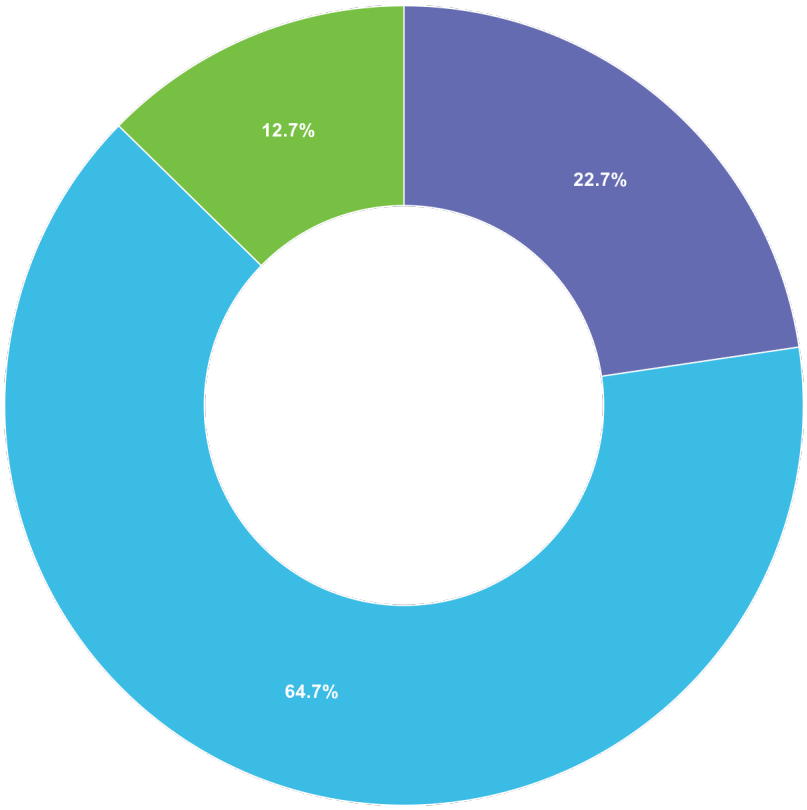
Closing of 19e because of slide

Monday, February 3, 2020, 9:02 PM UTC

As a NC Forest Service employee, I have assisted with many all risk and wildfire incidents throughout the US.

**Answered:** 84 **Unanswered:** 66

**Q4** 4\. How concerned are you about the possibility of your community being impacted by a disaster?*

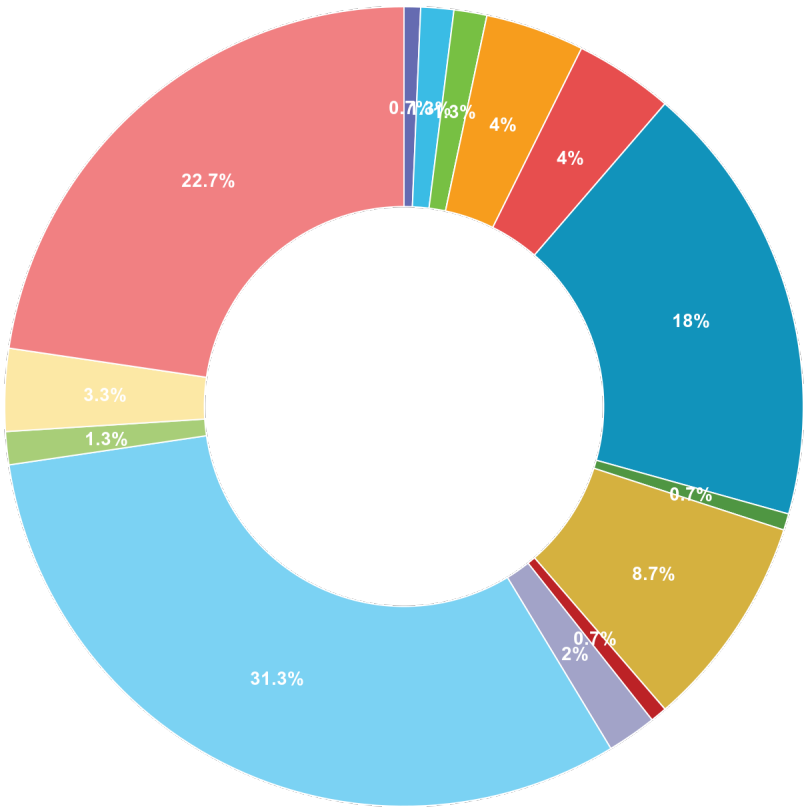



**Answered:** 150 **Unanswered:** 0

| Choice | Total |
| --- | --- |

| Choice | Total |
| --- | --- |
| Extremely concerned | 34 |
| Somewhat concerned | 97 |
| Not concerned | 19 |

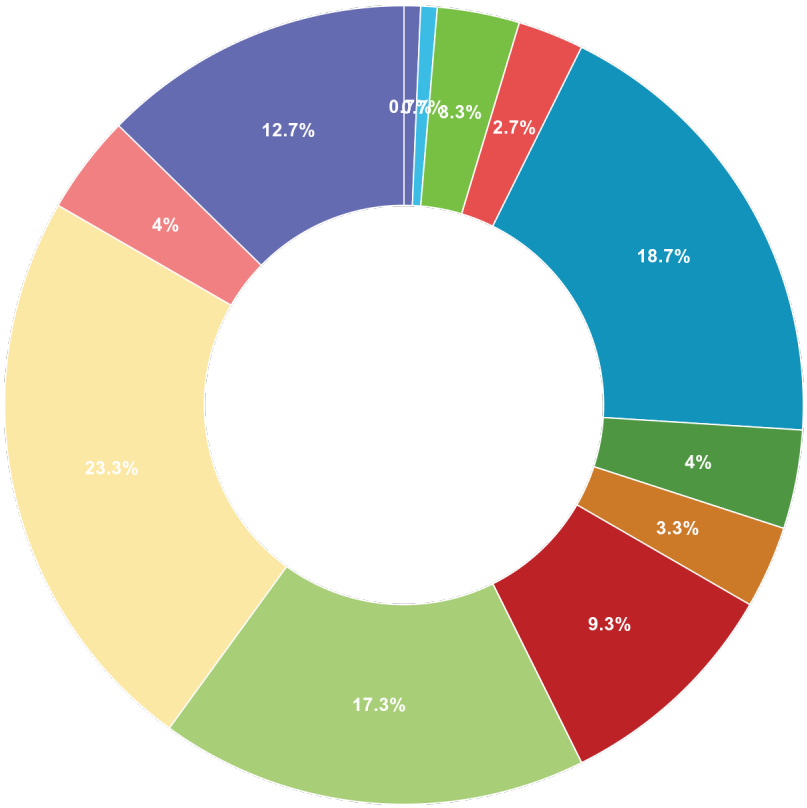
**Q5** 5\. Please select **one** hazard you think is the highest threat to your neighborhood:*




**Answered:** 150 **Unanswered:** 0

| Choice | Total |
|---|---|
| Cyber attack | 1 |
| Drought | 2 |
| Electromagnetic Pulse (EMP) | 2 |
| Excessive heat | 0 |
| Hazardous Substances | 6 |
| Infectious Disease | 6 |
| Lightning | 0 |
| Severe Thunderstorms/High Winds | 27 |
| Terrorism | 1 |
| Wildfire | 13 |
| Dam Failure | 0 |
| Earthquakes | 1 |
| Erosion | 3 |
| Flooding | 47 |
| Huricane and Coastal Hazards | 2 |
| Landslides | 5 |
| Radiological Emergency | 0 |
| Severe Winter Weather | 34 |
| Tornadoes | 0 |

**Q6** 6\. Please select **one** hazard you think is the second highest threat to your neighborhood:*

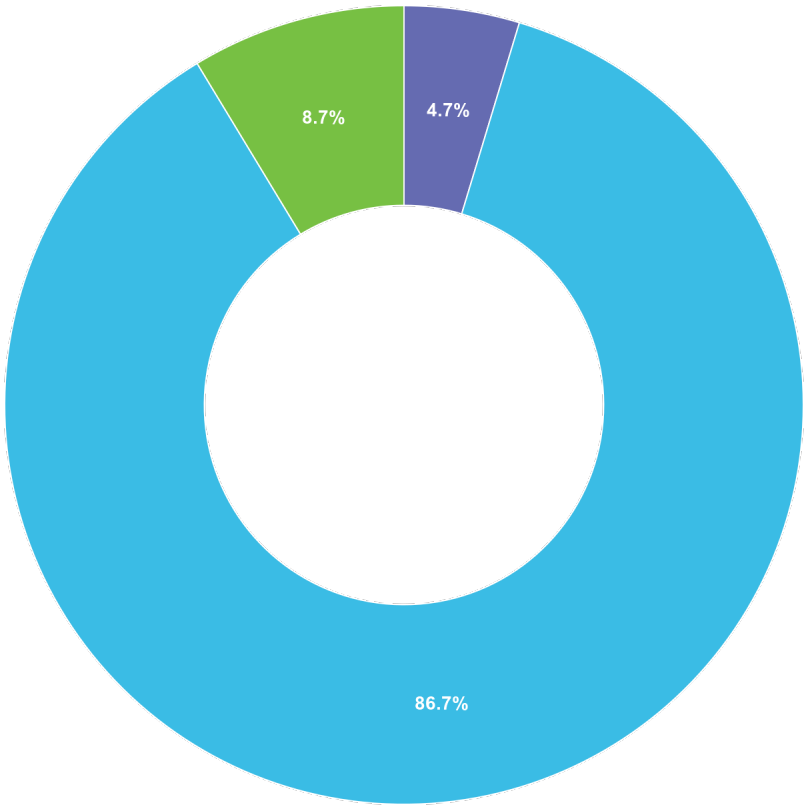



**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| | Cyber Attack | 1 |
| | Dam Failure | 1 |
| | Drought | 5 |
| | Earthquake | 0 |
| | Electromagnetic Pulse (EMP) | 0 |
| | Erosion | 4 |
| | Excessive Heat | 0 |
| | Flooding | 28 |
| | Hazardous Substances | 6 |
| | Hurricane and Coastal Hazards | 0 |

| Choice | Total |
| --- | --- |
| Infectious Disease | 5 |
| Landslides | 14 |
| Lightning | 0 |
| Radiological Emergency | 0 |
| Severe Thunderstorms/High Wind | 26 |
| Severe Winter Weather | 35 |
| Terrorism | 0 |
| Tornado | 6 |
| Wildfire | 19 |

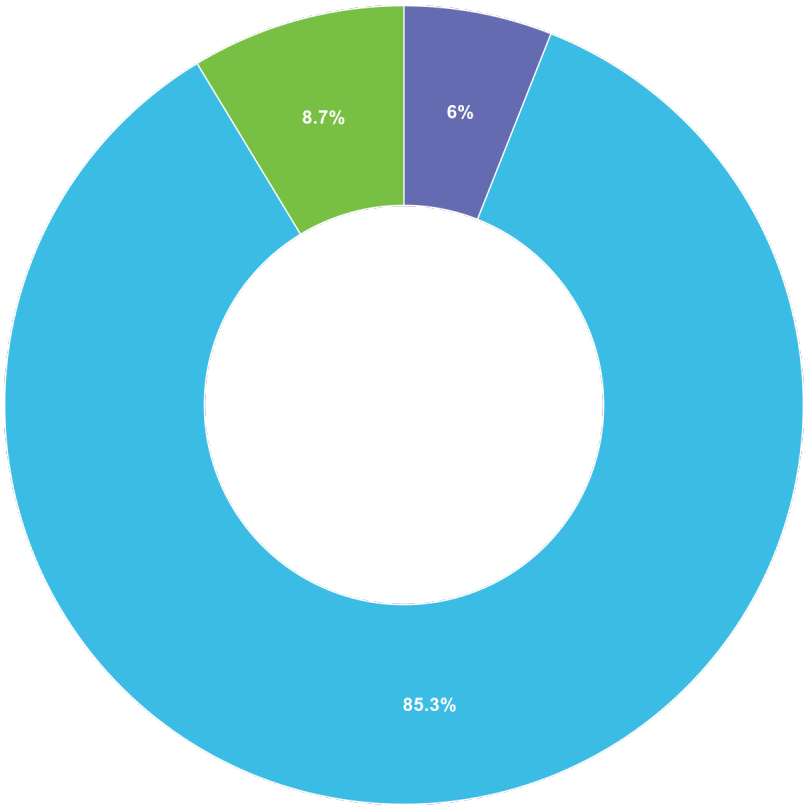
**Q7** 8\. Is your home located in a floodplain?*




**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| ● | Yes | 7 |
| ● | No | 130 |
| ● | I'm not sure | 13 |

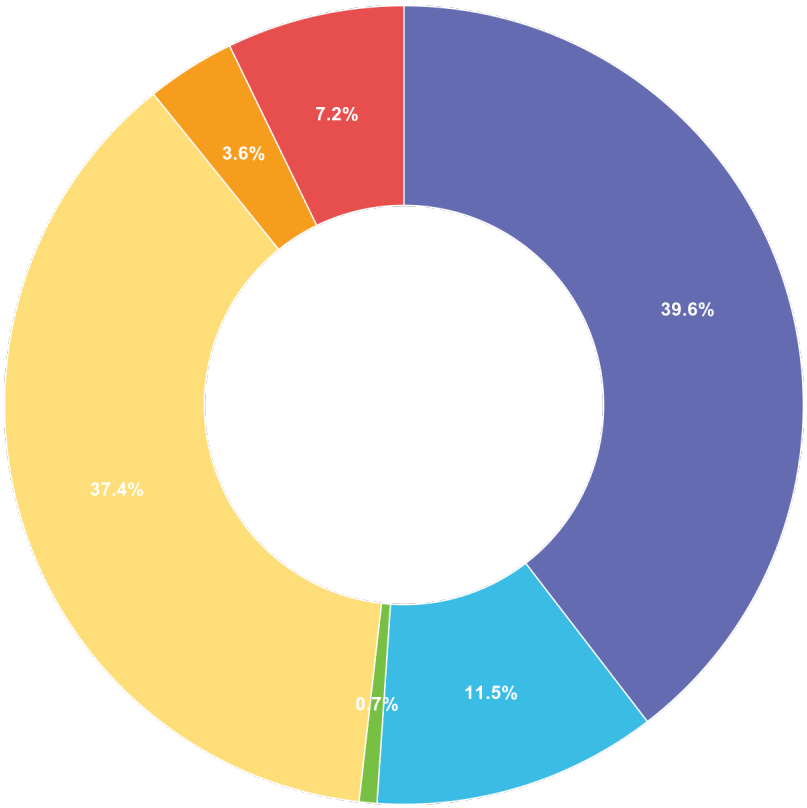
**Q8** 9\. Do you have flood insurance?*




**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| ● | Yes | 9 |
| ● | No | 128 |
| ● | I'm not sure | 13 |

**Q9** 10\. If you do not have flood insurance, why not?




**Answered:** 139 **Unanswered:** 11

| | Choice | Total |
|---|---|---|
| ● | Not located in floodplain | 55 |
| ● | Too expensive | 16 |
| ● | Not necessary because it never floods | 1 |
| ● | Not necessary because I am elevated or otherwise protected | 52 |
| ● | Never really considered it | 5 |
| ● | Other | 10 |

**Q10** 11\. If “Other” please explain:

Sunday, November 10, 2019, 1:43 AM UTC

Due to the fact that I have owned homes where I have carried flood insurance, and had others without, and due to the fact that the mapping outlining the facts surrounding the need for flood insurance are not always accurate (I have had to deal with that) and the fact that "no base flood elevations or depths are shown within" our homes zone, and  the insurance is outrageous, I find that saving my own money and taking the risk myself this late in my life will most likely make more sense.

---

Sunday, November 10, 2019, 1:07 AM UTC

Insurance only protects the profiteers and there Wall Street investors. They are gambling with my livelihood. This is unacceptable.

---

Tuesday, November 5, 2019, 2:30 PM UTC

Have to check my insurance

---

Saturday, November 2, 2019, 2:44 AM UTC

I can't find anyone that sells it.

---

Tuesday, September 3, 2019, 2:11 PM UTC

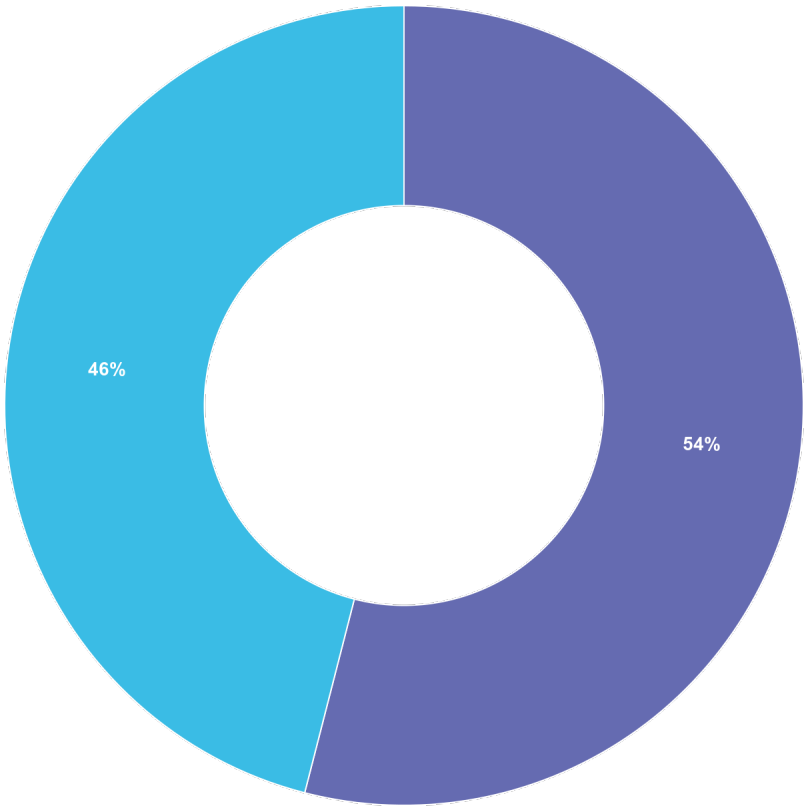
I don't own the home I live in.

---

**Answered:** 9 **Unanswered:** 141

**Q11** 12\. Have you taken any steps to make your home or neighborhood more resistant

to hazards?*




**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| | Yes | 81 |
| | No | 69 |

**Q12** 13\. If "Yes," please explain:

Saturday, April 11, 2020, 3:14 PM UTC

After being flooded twice we were able to get flood insurance and raise the house. When we built we asked to build higher but since we live in Land Harbor they had height restrictions. We were stupid and should have fought to build up but did not want to get in trouble.

---

Saturday, April 11, 2020, 11:11 AM UTC

House raised above the Flood Plain.

---

Friday, April 10, 2020, 8:48 PM UTC

Pumps and drainage systems

---

Thursday, March 26, 2020, 4:56 PM UTC

Retaining walls

---

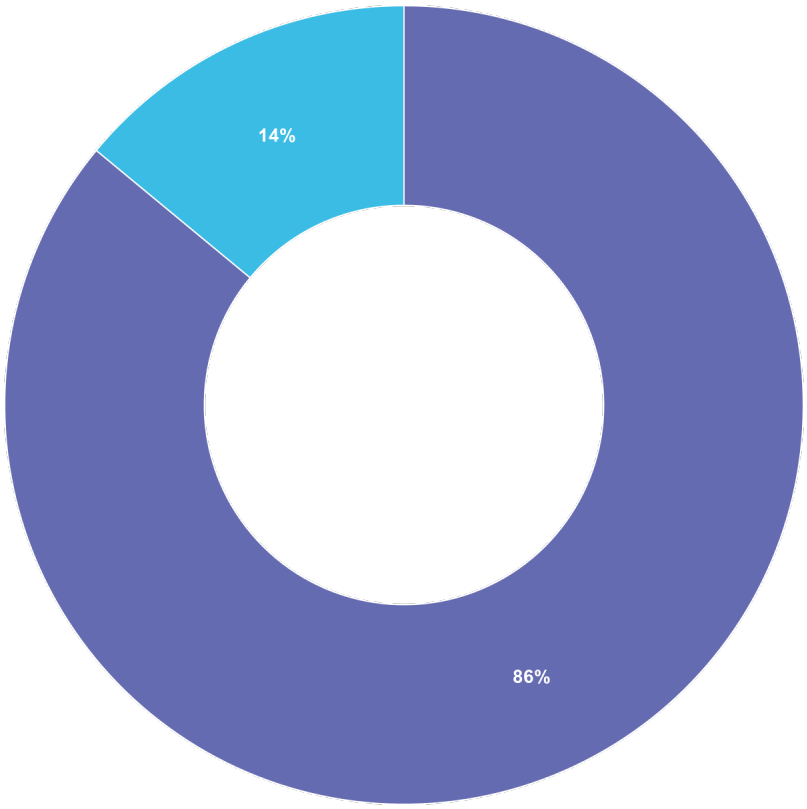
Friday, March 20, 2020, 1:46 PM UTC

Keep property clean of undergrowth and dead wood.

---

**Answered:** 73 **Unanswered:** 77

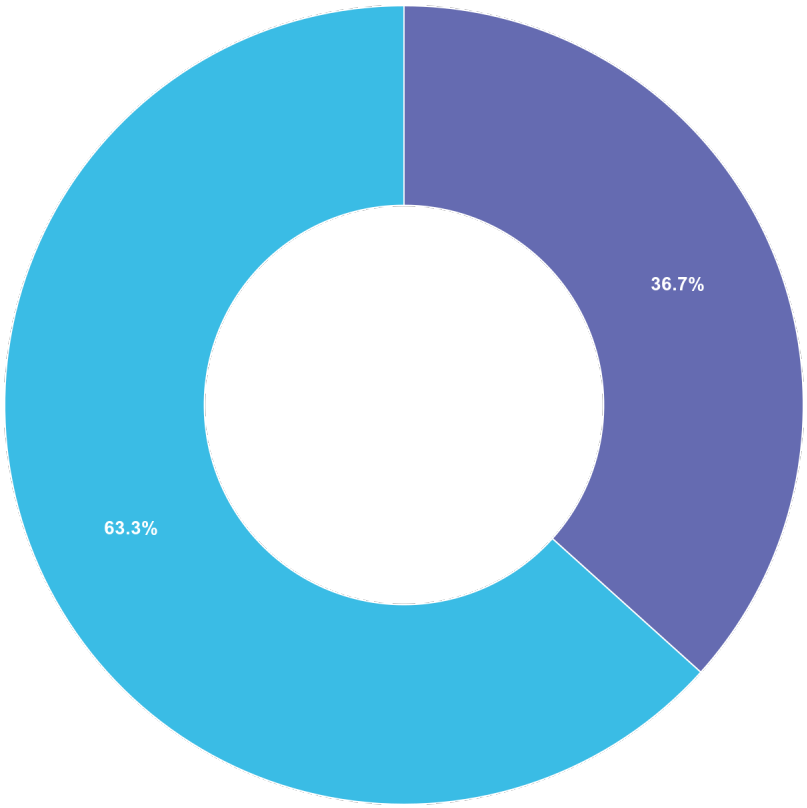
**Q13** 14\. Are you interested in making your home or neighborhood more resistant to hazards?*




**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| ● | Yes | 129 |
| ● | No | 21 |

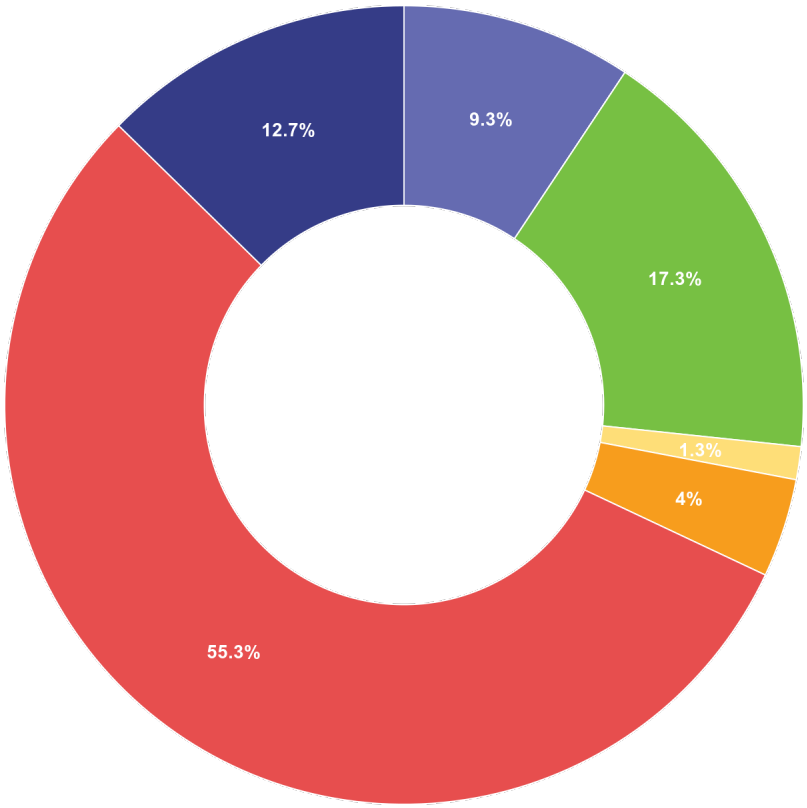
**Q14** 15\. Do you know what office to contact to find out more information about how to reduce you risk to hazards in your area?*




**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| ● | Yes | 55 |
| ● | No | 95 |

**Q15** 16\. What is the most effective way for you to receive information about how to make your home and neighborhood more resistant to hazards?*




**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| | Newspaper | 14 |
| | Radio | 0 |
| | Mail | 26 |
| | School Meetings | 2 |
| | Television | 6 |
| | Internet (including social media) | 83 |
| | Public Workshops/Meetings | 19 |

**Q16** 17\. Are there any other ways you prefer to receive information? If so, please explain:

Wednesday, April 15, 2020, 11:45 PM UTC

email

---

Saturday, April 11, 2020, 3:14 PM UTC

Yes, mail but since we could only check one answer on the prior question could not check that.

---

Friday, March 20, 2020, 1:46 PM UTC

Phone call

---

Sunday, March 1, 2020, 1:48 PM UTC

text messages, email, social media

---

Thursday, February 20, 2020, 1:00 PM UTC

text

---

**Answered:** 50 **Unanswered:** 100

**Q17** 18\. In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages in your neighborhood?

Wednesday, April 15, 2020, 11:45 PM UTC

Be better prepared for what ever comes our way; be it a virus; flood; hurricane (high winds); snow/ice storms etc

---

Saturday, April 11, 2020, 3:14 PM UTC

No

---

Saturday, April 11, 2020, 2:14 PM UTC

Enforce rules & regulations

---

Saturday, April 11, 2020, 12:32 PM UTC

Social distancing very poor no one is wearing masks  People are still playing basketball and gathering at walking paths

---

Saturday, April 11, 2020, 11:11 AM UTC

engineers come in and explain and help to do what is needed to control the erosion of the river.

---

**Answered:** 81  **Unanswered:** 69

**Q18** 19\. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important? If so, please explain:

Wednesday, April 15, 2020, 11:45 PM UTC

I don't understand this question; be more specific

---

Saturday, April 11, 2020, 3:14 PM UTC

We have an alert system here but do not know what is available to others in the county

---

Saturday, April 11, 2020, 12:32 PM UTC

Grocery store workers are not protected with masks or gloves

---

Saturday, April 11, 2020, 11:11 AM UTC

Have someone come in and evaluate the Meadows area of LLH where the risk of flood exists.

---

Sunday, March 1, 2020, 1:48 PM UTC

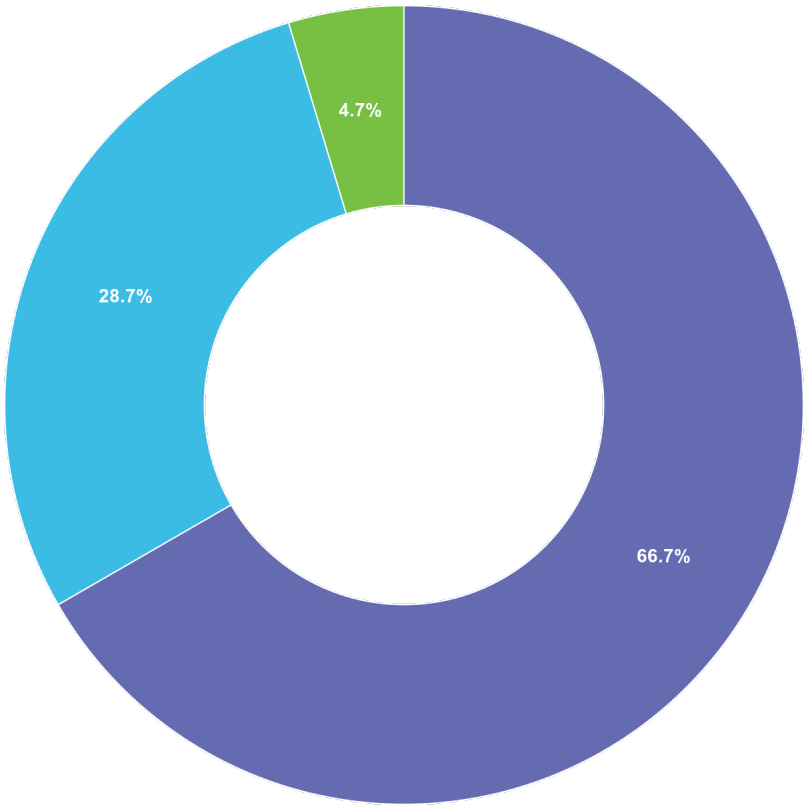
regular, consistent, and accurate communication

---

**Answered:** 38 **Unanswered:** 112

**Q19** A number of community wide activities can reduce our risk from hazards. In general, these activities fall into one of the following six broad categories. In the next six questions, please tell us how important you think each one is for your community to consider pursuing.

20\. **Prevention** - Administrative or regulatory actions that influence the way land is developed and buildings are built. Examples include planning and zoning, building codes, open space preservation, and floodplain regulations.*



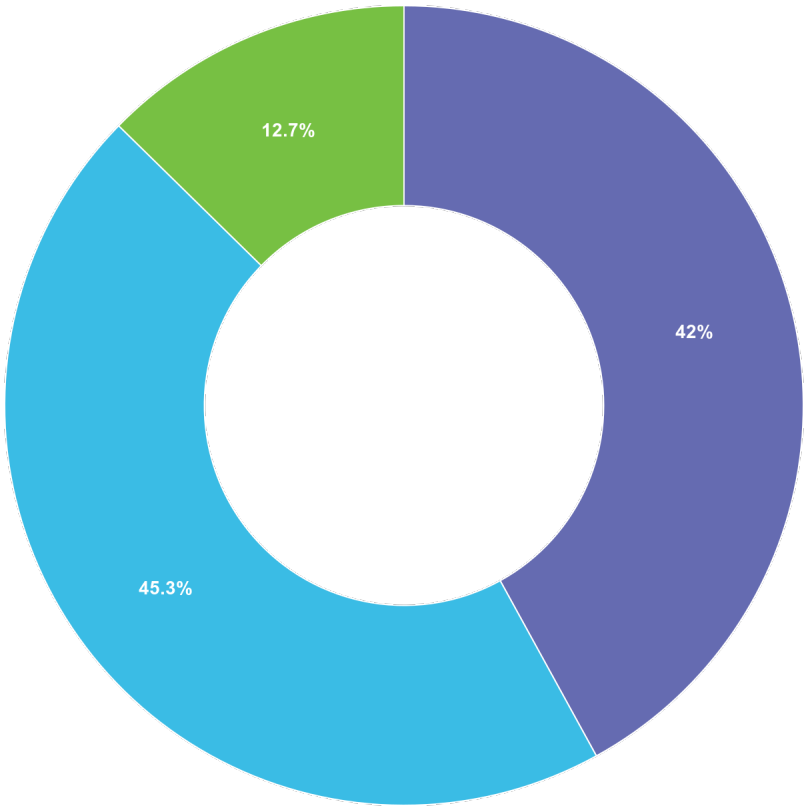

**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| | Very important | 100 |
| | Somewhat important | 43 |
| | Not important | 7 |

**Q20** 21\. **Property Protection** - Actions that involve the modification of existing buildings to protect them from a hazard or removal from the hazard area.

(Examples include acquisition, relocation, elevation, structural retrofits, and storm

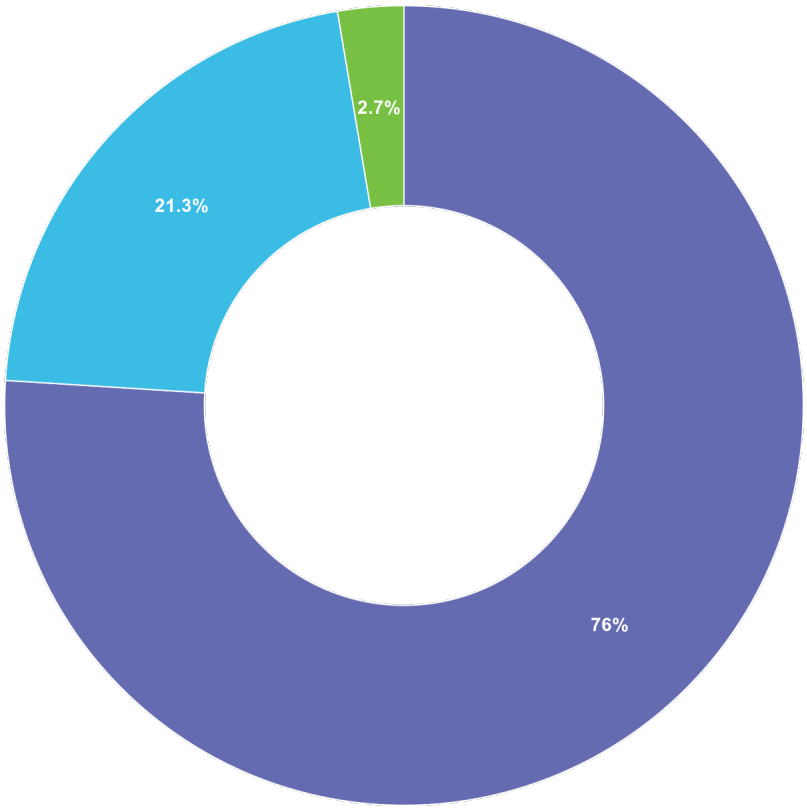
shutters.)*




**Answered:** 150 **Unanswered:** 0

| | Choice | Total |
|---|---|---|
| ● | Very important | 63 |
| ● | Somewhat important | 68 |
| ● | Not important | 19 |

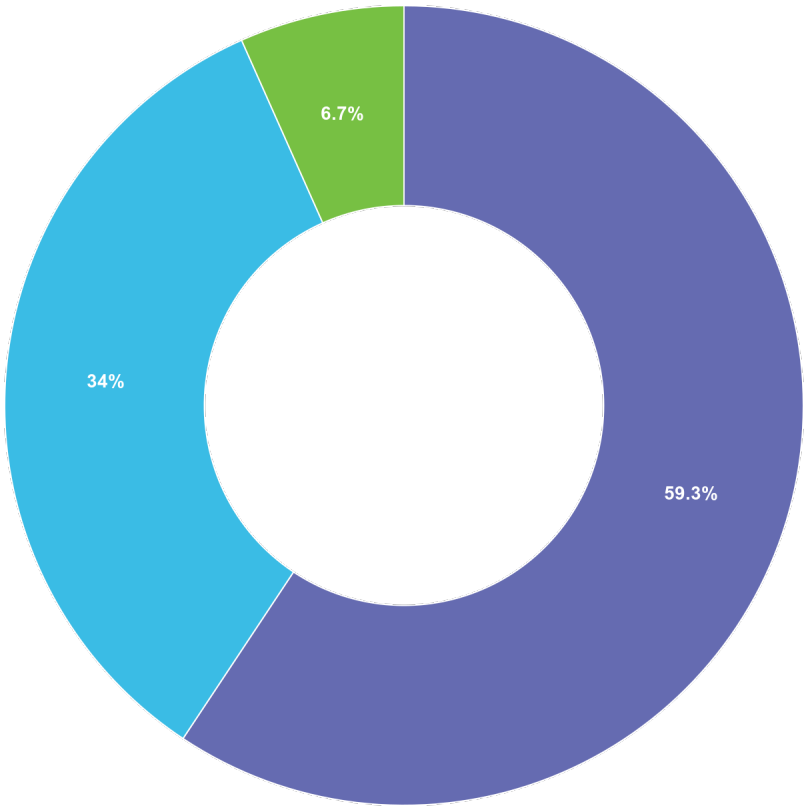
**Q21** 22\. **Natural Resource Protection** - Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. (Examples include: floodplain protection, habitat preservation, slope stabilization, riparian buffers, and forest management.)*




**Answered:** 150 **Unanswered:** 0

| Choice | Total |
|---|---|
| Very important | 114 |
| Somewhat important | 32 |
| Not important | 4 |

**Q22** 23\. **Structural Projects** - Actions intended to lessen the impact of a hazard by modifying the natural progression of the hazard. (Examples include dams, levees, detention/retention basins, channel modification, retaining walls and storm sewers.)*

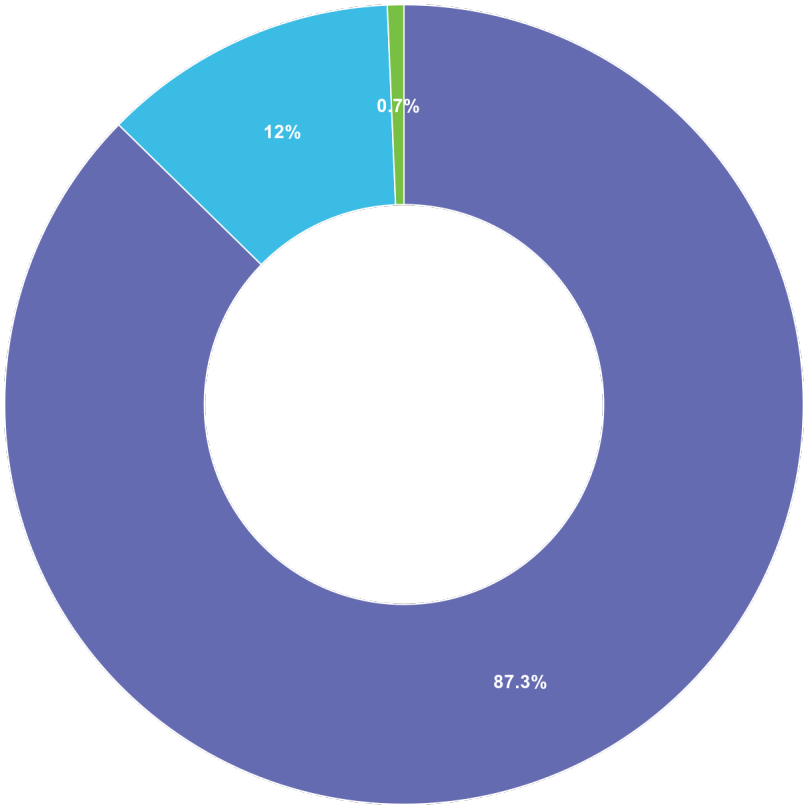



**Answered:** 150 **Unanswered:** 0

| Choice | Total |
|---|---|
| Very important | 89 |
| Somewhat important | 51 |
| Not important | 10 |

**Q23** 24\. **Emergency Services** - Actions that protect people and property during and immediately after a hazard event.

(Examples include warning systems, evacuation planning, emergency response training, and protection of critical emergency facilities or systems.)*



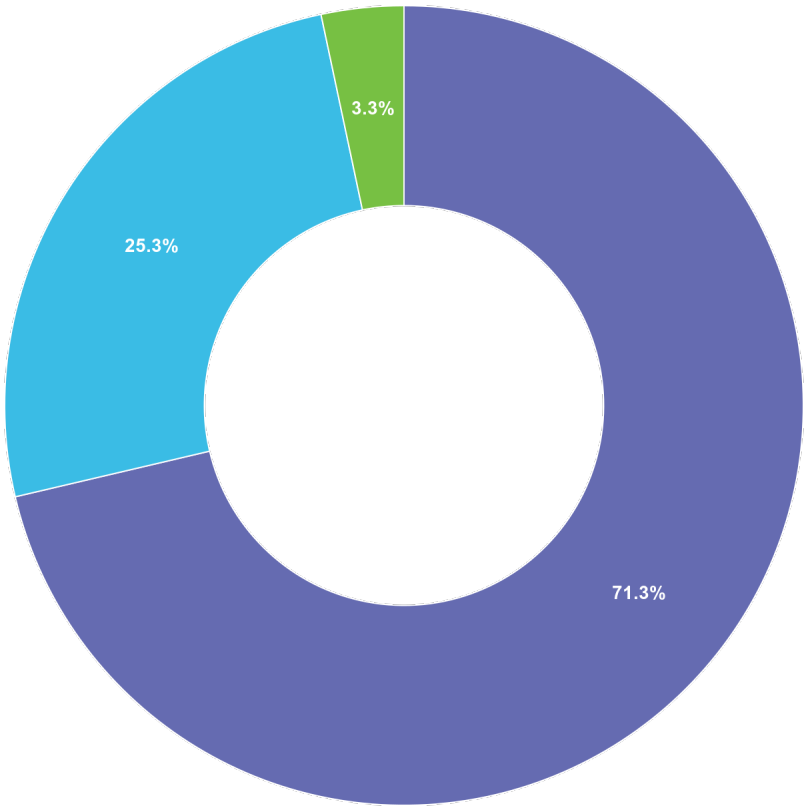

**Answered:** 150 **Unanswered:** 0

| Choice | Total |
|---|---|
| Very important | 131 |
| Somewhat important | 18 |

| Choice | Total |
| --- | --- |
| Not important | 1 |

**Q24** 25\. **Public Education Awareness** - Actions to inform citizens about hazards and the techniques they can use to protect themselves and their property.

(Examples include outreach projects, school education programs, library materials and demonstration events.)*




**Answered:** 150 **Unanswered:** 0

| Choice | Total |
| --- | --- |
| Very important | 107 |
| Somewhat important | 38 |
| Not important | 5 |

**Q25** This survey may be submitted anonymously; however, if you provide us with your name and contact information below, we will have the ability to follow up with you to learn more about your ideas or concerns. (Optional)

Sunday, March 1, 2020, 1:48 PM UTC

Jon Driggers  vo2max@hotmail.com

---

Monday, February 3, 2020, 9:02 PM UTC

Joe Shoupe

Avery County Ranger

---

Tuesday, December 24, 2019, 2:20 PM UTC

Greg Estes 828 206 8469

---

Thursday, December 5, 2019, 9:51 PM UTC

pat tompkins

patiapplefarm@yahoo.com

828-766-0904

---

Friday, November 29, 2019, 5:14 PM UTC

Miguel Cruz, 359 Grace way, Green Mtn, NC 28740

---

**Answered:** 28 **Unanswered:** 122

# Appendix E: Completed Mitigation Actions

This section of the Plan includes the mitigation actions that have been completed by the participating jurisdictions.

# Avery County Completed Mitigation Actions

| **Avery County Mitigation Action 1** | **Attempt to acquire/create digital data in order to produce a land use map (including areas of present and future development) in digital format and overlay hazard vulnerability** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | County Manager/County GIS Department/County Planning and Inspections Department |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | Completed – The County now has digital data in place to produce land use map in digital format and can overlay hazard vulnerability data such as DFIRM, iRISK and data that was used in developing this hazard mitigation plan. |

| **Avery County Mitigation Action 2** | **Avery County Schools – Update the Shelter-In-Place (SIP) Plan** |
|---|---|
| Hazard(s) Addressed: | All hazards |
| Category: | Prevention, Emergency Services |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | County Schools Facilities Director/Principals/County Schools Bus Transportation/County Schools Food Service |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local funds |
| Implementation Notes: | Completed by the end of the 2004-2005 school year. |

| **Avery County Mitigation Action 3** | **Avery County Schools – Inspect school buildings for cracks and structural flaws annually, as well as immediately after seismic events** |
|---|---|
| Hazard(s) Addressed: | Earthquake |
| Category: | Prevention, Property Protection |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | County Building Inspector/County Schools Facilities Director/Principals/County Fire Marshal |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | **COMPLETED by the beginning of the 2004-2005.** Bi-annual Inspections in place |

## Town of Banner Elk Completed Mitigation Actions

| **Banner Elk Mitigation Action 1** | **Evaluate flooding potential along streams in Town Limits (including developed areas as well areas of future development)** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council, Town Maintenance Department |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | **COMPLETED.** New flood maps were developed in 2009. As a result, some areas were rezoned. The Town also maintains an inventory of areas of localized flooding and has been actively taking steps to alleviate flooding in these areas. |

| **Banner Elk Mitigation Action 2** | **Update evaluation of floodplain ordinance to protect present and future buildings and infrastructure.** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council, Town Planning Board |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | Banner Elk has its own Flood Damage Prevention Ordinance as well as a Steep Slope Ordinance. Additionally, Banner Elk has in place a 2010-2030 Comprehensive Land Use Plan that prompts reduced density requirements in the Zoning Ordinance and protects Open Space in those identified hazard areas; such as flooding and steep slopes, encouraging these areas to become conservation easements in place of development.<br><br>This amends the previous Action #2 by updating the information on ordinance protection that is in place. Banner Elk's Flood Damage Prevention Ordinance has some stricter guidelines in place than Avery County's ordinance. |

| **Banner Elk Completed Mitigation Action** | **Implemented extensive Stream Bank Restoration measures in order to protect property and infrastructure from flooding along Shawneehaw Creek** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council, Planning Department |
| Estimated Cost: | Total cost of project: $582,800 |
| Potential Funding Sources: | CWMTF and Matching Local Funds |
| Implementation Notes: | Complete. Began in 2012, ended in 2014. This mitigation action was implemented to protect the residents of Crooked Creek Subdivision in an area that is prone to flooding each year. Funds were granted by the Clean Water Management Trust Fund along with matching local funds.<br><br>This action was never included in the Mitigation Action Plan but the Town added it to the 2015 update of the plan to demonstrate progress made in mitigation. |

| **Banner Elk Completed Mitigation Action** | **Replaced culverts under Highway 194 East. Culverts were too small to accommodate flow.** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | NCDOT |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | NCDOT funds |
| Implementation Notes: | Completed in 2014. This action was necessary to prevent flooding of an area that could not adequately mange the flow of runoff under a major thoroughfare, causing flooding.<br><br>This action was never included in the Mitigation Action Plan but the Town added it to the 2015 update of the plan to demonstrate progress made in mitigation. |

| **Banner Elk Completed Mitigation Action** | **Replaced culverts under Highway 194 East. Culverts were too small to accommodate flow.** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | NCDOT |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | NCDOT funds |
| Implementation Notes: | Completed in 2014. This action was necessary to prevent flooding of an area that could not adequately mange the flow of runoff under a major thoroughfare, causing flooding.<br><br>This action was never included in the Mitigation Action Plan but the Town added it to the 2015 update of the plan to demonstrate progress made in mitigation. |

| **Banner Elk Completed Mitigation Action** | **Replaced a catch basin at intersection of Highway 184 and Orchard Lane.** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Structural Projects |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | NCDOT |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | NCDOT funds |
| Implementation Notes: | Completed in 2014. This action was initiated by the Town in order to prevent flooding of a major thoroughfare resulting in unsafe conditions for traffic and the damage to property in the area.<br><br>This action was never included in the Mitigation Action Plan but the Town added it to the 2015 update of the plan to demonstrate progress made in mitigation. |

| **Banner Elk Completed Mitigation Action** | **Mitigate stormwater runoff** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council, Blue Ridge Environmentals |
| Estimated Cost: | $150,000 |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | Curb and guttering was installed on Dogwood Road along with a catch basin for regular stormwater runoff to alleviate flooding of properties along this town street. Retention ponds were installed to capture the stormwater and allow it to cool before returning to Shawneehaw Creek in a slower manner.<br><br>This action was never included in the Mitigation Action Plan but the Town added it to the 2015 update of the plan to demonstrate progress made in mitigation. |

## Town of Crossnore Completed Mitigation Actions

| **Crossnore Mitigation Action 1** | **Evaluate having Town water system mapped for applying for lower fire ratings for structural fire protection within Town Limits** |
|---|---|
| Hazard(s) Addressed: | Wildfire, Earthquake, Lightning, any other hazard which could induce structural fire |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council, Town Water Department, Crossnore Volunteer Fire Department |
| Estimated Cost: | Moderate |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | The Town's water system was mapped in 2006. As a result, the town earned a lower fire rating (went from a 9 to a 7). |

## Town of Elk Park Completed Mitigation Action

| **Elk Park Mitigation Action 1** | **Study the feasibility of creating and implementing a new Floodplain Ordinance within Town Limits (which would also consider impacts to present and future buildings and infrastructure)** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | Elk Park uses the County's ordinance which has been updated since 2004. There are no plans to develop a separate ordinance for the Town. |

## Grandfather Village Completed Mitigation Actions

| **Grandfather Village Mitigation Action 1** | **Investigate the feasibility of performing a study on dam stabilization** |
|---|---|
| Hazard(s) Addressed: | Dam Failure |
| Category: | Structural projects |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Governing Board |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | The lake level was dropped in 2006 and the dam was stabilized. The dam is now back at full level. This eliminated the need for the study. |

| **Grandfather Village Mitigation Action 2** | **Conduct an evacuation drill for all residents within Village and evaluate current evacuation plan** |
|---|---|
| Hazard(s) Addressed: | All Hazards |
| Category: | Public Information and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Governing Board and Local Security |
| Estimated Cost: | Low |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | **COMPLETED in 2006.** The town developed a new evacuation plan and conducted a drill. |

## Town of Newland Completed Mitigation Actions

| **Newland Mitigation Action 1** | **Channel Modification (through the US Army Corps of Engineers)** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Structural Projects |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council |
| Estimated Cost: | $150,000 |
| Potential Funding Sources: | Army Corps of Engineers |
| Implementation Notes: | Channel modification was completed in 2009 by the Corps. This helped alleviate flood problems in certain parts of the Town. |

| **Newland Mitigation Action 2** | **Review and update current floodplain regulations (also considering impacts to present and future buildings and infrastructure)** |
|---|---|
| Hazard(s) Addressed: | Flooding |
| Category: | Prevention, Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Planning Board |
| Estimated Cost: | Undetermined |
| Potential Funding Sources: | Local funds |
| Implementation Notes: | The Town uses the County's ordinance which has been updated since 2004. There are no plans to develop a separate ordinance for the Town. |

## Village of Sugar Mountain Completed Mitigation Actions

| **Sugar Mountain Mitigation Action 1** | **Evaluate sheltering-in-place capabilities for all persons within Village Limits** |
|---|---|
| Hazard(s) Addressed: | All hazards, particularly Winter Storms |
| Category: | Public Information and Awareness |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Town Manager, Town Council, Town Police Department |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | **COMPLETED in 2005.** The Town uses the County's ordinance which has been updated since 2004. |

| **Sugar Mountain Mitigation Action 2** | **Evaluate action plan for snow removal of roadways and parking areas** |
|---|---|
| Hazard(s) Addressed: | Winter Storm |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Mayor and Town Council, Town Maintenance Department |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | **COMPLETED in 2006.** In addition to a snow removal plan, the Town also has new equipment now. |

| **Sugar Mountain Mitigation Action 3** | **Evaluate wildfire preparedness (including the consideration of impacts to present and future buildings and infrastructure)** |
|---|---|
| Hazard(s) Addressed: | Wildfire |
| Category: | Natural Resource Protection, Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council, Town Manager |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | Action completed in 2005. The Town continues to work with the North Carolina Forest Service through close coordination with the County Forester. |

## McDowell County Completed Mitigation Actions

| **McDowell County Mitigation Action 2** | **Develop a policy to minimize public services to proposed new structures that will be located in 100-year floodplain areas.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | **COMPLETED.** The 2008 update to the floodplain ordinance places restrictions on buildings in flood prone areas. There is no plan to implement any additional policies to minimize public services to structures in the floodplain. |

| **McDowell County Mitigation Action 3** | **Update the Floodplain Ordinance to raise the minimum flood protection level.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: | **COMPLETED in October 2008.** McDowell County requires development in the floodplain be built 1 foot above the base flood elevation. |

| **McDowell County Mitigation Action 4** | **Update the Subdivision Ordinance by reviewing and incorporating hazard mitigation objectives.** |
|---|---|
| Hazard(s) Addressed: | All |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning |
| Implementation Notes: | COMPLETED. McDowell County adopted subdivision rules (through a Subdivision Ordinance) in 2007. Hazard mitigation objectiveswere taken into consideration during this process. One of the stated purposes of the ordinance is to “reduce the danger to health or peril from flood, erosion, or water pollution.” Further, the ordinance limits the steepness of streets specifically to reducethe risk of landslides and landslide affects (injury, blocked roads, etc). |

| **McDowell County Mitigation Action 5** | **Review and revise the Planning Ordinance to allow for clustering of residential lots.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local Funds |
| Implementation Notes: COMPLETED | **COMPLETED in 2007.** McDowell County Subdivision Ordinance (updated in 2007) allows for clustering of lots if certain criteria are met. |

| **McDowell County Mitigation Action 6** | **Revise and update the regulatory floodplain maps.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Public Information |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | McDowell County Planning and Zoning |
| Estimated Cost: | unknown |
| Potential Funding Sources: | Federal/State Funds |
| Implementation Notes: COMPLETED | **COMPLETED.** McDowell County in adopted a new FIRM in October 2008. |

## Mitchell County Completed Mitigation Actions

| **Mitchell County Mitigation Action 7** | **Extend zoning to the unincorporated areas of the county.** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Board of Commissions |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local |
| Implementation Notes: | Completed: A Floodplain Ordinance and Watershed zoning ordinance are in place. They are the only zoning-related ordinances in the county. No other zoning ordinances are being considered by the Board at this time. |

| **Mitchell County Mitigation Action 8** | **Revise zoning ordinance to take into account structures damaged by hazards in non-conforming use provisions.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Building Inspections (floodplain manager) |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local funds |
| Implementation Notes: | Completed: Although there is no zoning ordinance in the county, the county floodplain ordinance covers this action. Further, it is a state requirement to not rebuild once a hazard has been substantially damaged while in a floodplain. |

| **Mitchell County Mitigation Action 9** | **Write more specific criteria in the subdivision regulations for flood damage minimization.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections (floodplain manager) |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local funds |
| Implementation Notes: | Completed: Although no subdivision ordinance exists, the recently updated floodplain ordinance sought to minimize flood damage by requiring set-backs and adhering to state and federal flood regulations. |

| **Mitchell County Mitigation Action 12** | **Develop setback requirements in hazard zones.** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local funds |
| Implementation Notes: | **COMPLETED**: Set-backs are required in the county by the recently updated floodplain ordinance. |

| **Mitchell County Mitigation Action 16** | **Develop an open space preservation plan that plans for further recreational areas in different locations** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners |
| Estimated Cost: | $25,000 |
| Potential Funding Sources: | State Grant |
| Implementation Notes: | **COMPLETED**: The county completed a master recreation plan that identifies potential green space and preserves existing green space areas in the county. |

| **Mitchell County Mitigation Action 17** | **Integrate open space preservation plan into the comprehensive plan to combine need for recreational area with unused land due to potential hazards (i.e. floodplain).** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Low |
| Lead Agency/Department Responsible: | Board of Commissions |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Local funds |
| Implementation Notes: | **COMPLETED**: The county does not have a comprehensive plan in place at this time. The intention of this action, to preserve unused floodplain land as recreation space, is completed through the county's master recreation plan. |

| **Mitchell County Mitigation Action 24** | **Evaluate the relocation/elevation/flood proofing needs of all critical public structures or facilities within the floodplain and implement necessary improvements.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Notes: | **COMPELTED**: All of the critical buildings in the county have been relocated out of the floodplain or elevated and the floodplain ordinance prohibits building future buildings in the floodplain. |

| **Mitchell County Mitigation Action 25** | **Minimize placing new critical public facilities within the floodplain, unless they promote an overriding public benefit, will not worsen hazard risk, will not directly promote development in floodplains, and are designed to withstand flood damage.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Board of Commissioners, Building Inspections |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Notes: | **COMPELTED**: All of the critical buildings in the county have been removed from known hazard areas. |

| **Mitchell County Mitigation Action 27** | **Remap the entire floodplain to properly align existing small scale FIRM maps that approximate floodplain boundaries with larger scale, detailed maps in order to provide detailed flood hazard information.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Building Inspections, state |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Notes: | **COMPLETED**: Following Floyd and under Risk Map, all floodplain maps in the county were converted to Digital FIRM (DFIRM) maps. |

| **Mitchell County Mitigation Action 29** | **Adopt countywide zoning or adopt zoning in floodplain areas to better control future development in these hazard susceptible areas.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Inspections |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, State, and Local Funding Sources |
| Implementation Notes: | **COMPLETED**: This action is completed through the county floodplain ordinance by not permitting development in such areas. There is no countywide zoning. |

| **Mitchell County Mitigation Action 30** | **Set up centralized, coordinated permitting process, including effective filing/permitting system to ensure compliance with floodplain regulations. Count building improvements cumulatively (maintain permit history so when cumulative improvements equal 50% of building value, (substantial improvement) building must be brought up to flood protection standards for new construction). Goal to eventually have all flood hazard endangered buildings brought up to flood protection standards.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Building Inspections |
| Estimated Cost: | unknown |
| Potential Funding Sources: | Local Funding Sources |
| Implementation Notes: | **Completed to date:** A system is in place (inner-gov) that allows maps and permits of the entire county to be viewed online. A floodplain layer is included to ensure compliance. |

| **Mitchell County Mitigation Action 49** | **Complete a Natural Resource Protection Plan** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Natural Resource Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | US Forestry Service, NC Forestry Commission |
| Estimated Cost: | 25,000 |
| Potential Funding Sources: | State and local sources |
| Implementation Notes: | **COMPLETED**: The County completed a Recreation Plan that covers natural areas in the county. The NC Forestry Commission and US Forestry Service manage forests in the area. |
| Additional Notes: | The county does not have a natural resource protection plan as the forests are mostly under federal protection. Still, it is important to integrate their procedures into the local response procedures to be more efficient in case of an emergency. |

| **Mitchell County Mitigation Action 53** | **Create a Repetitive Loss Plan that identifies repetitive loss structures and mitigation measures** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Structural Project |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | NFIP, NCEM, Board of Commissioners, Building Inspections |
| Estimated Cost: | Unknown |
| Potential Funding Sources: | Federal, state, and private sources |
| Implementation Notes: | Completed: The county's floodplain management plan identifies the six properties totaling 15 losses in the county (completed with federal information from the NFIP). The county has commitment to reducing flood losses and will acquire repetitive loss properties as the opportunity arises. |
| Additional Notes: | It is very frequent that a part of the losses suffered through different disasters happens in specific places; places that are vulnerable for different reasons (i.e. location, construction or other specific reason) and will continue to endure loss unless taken care of. A plan identifying these structures should be made and their specific reasons should be investigated. From that analysis, the county can decide on a method to mitigate loss for them. A repetitive loss plan is probably one of the best, quickest and most guaranteed methods of mitigation as it deals directly with a recurring problem. |

| **Mitchell County Mitigation Action 61** | **Identify Assembly Points** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Public Information |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Planning with support from the Office of Emergency Management |
| Estimated Cost: | Minimal |
| Potential Funding Sources: | Federal, state, and private sources |
| Implementation Notes: | Completed: County officials (and appropriate officials from each locations) have completed identified assembly points for each high school (through the safe schools program), Hospital, and Unimen (a local business with hazardous materials on site). No additional assembly points have been identified. This may be revisited in the future if needed. |
| Additional Notes: | The concept of assembly point differs from emergency shelter in the way that they are for a short period of time. The aim here is to take people away from danger as quick as possible and to account for them. An assembly point is generally in open air, at a location that can be reached easily, away from different potential source of dangers and big enough to contain large number of people for a short time period. These can be indicated by a simple painted sign on the ground but should be publicized. They can be used in residential areas prone to earthquake or wild fire and people would meet there first to account for the community and possible missing persons needing to be rescued. They would then either proceed back to their job/home/etc or go to a shelter/hospital for further care.<br><br>The essential issue in assembly points is to extract as many people as quick as possible from the danger zone by gathering them in predefined locations, account for them and make preliminary assessment of the situation's gravity. Each assembly point should be assigned a supervisor that is living or working in that region and knows the community at a certain extent.<br><br>Assembly points can be a safe spot away from buildings, a recreational area or a park. Places that have other purposes in everyday use. And they need not to be everywhere but, rather where high concentration of people occur (downtown area, mobile home park, schools, etc). |

| **Mitchell County Mitigation Action 65** | **Designate volunteer local coordinators in small communities that do not have a Fire or Police station.** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Emergency Management Office with support from the Board of Commissioners |
| Estimated Cost: | unknown |
| Potential Funding Sources: | Federal, state, local and private sources |
| Additional Notes: | These individuals would be contact points and possibly information dissemination agents who would be used in case of an emergency that is overwhelming local response capacity. |

| **Mitchell County Mitigation Action 66** | **The local Emergency Management Office should also develop Mutual Agreements of Understanding (MOU) with neighboring counties and regional organizations so that they can plan ahead to strengthen the regional capability at once.** |
|---|---|
| Hazard(s) Addressed: | Multiple |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Emergency Management Office with support from the Board of Commissioners |
| Estimated Cost: | None |
| Potential Funding Sources: | Federal, state, and private sources |
| Implementation Notes: | **COMPLETED**: there are statewide MOUs as well as in Mitchell County and the municipalities. |
| Additional Notes: | Such a dialogue would permit them to plan for an efficient and effective use of funding available (i.e. avoid equipment duplication) and increase the overall response capacity of the region. |

## Yancey County Completed Mitigation Actions

| **Yancey County Mitigation Action 1** | **Purchase and install a generator for use at the Yancey County Emergency Operations Center.** |
|---|---|
| Hazard(s) Addressed: | Winter Storms, Flood, Severe Thunderstorms and Tornadoes, Hurricanes and Tropical Storms, and Other Hazards |
| Category: | Emergency Services |
| Priority (High, Moderate, Low): | High |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | $17,000 |
| Potential Funding Sources: | A grant has been applied for through North Carolina Emergency Management (Mitigation Section) — status of funding is pending |
| Implementation Notes: | Completed in 2011. The generator has been purchased and installed. |

| **Yancey County Mitigation Action 5** | **Preservation of vital governmental records (such as those located in the Yancey County Register of Deeds Office) by ensuring that records are kept in areas of buildings not subject flooding, in areas of buildings away from glass windows, in locked cabinets to prevent tipping and damage, or by storing duplicate records at locations in low risk areas.** |
|---|---|
| Hazard(s) Addressed: | Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Undetermined |
| Potential Funding Sources: | Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, Department of Homeland Security funds |
| Implementation Notes: | COMPLETED in 2011: Vital government record has been secured in the register of deeds office by eliminating windows in the room and proper maintenance of the records vault. |

| **Yancey County Mitigation Action 7** | **Install a brochure rack in the Yancey County Courthouse to hold FEMA, American Red Cross, and other free disaster-related publications for use by the public.** |
|---|---|
| Hazard(s) Addressed: | Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards |
| Category: | Public Information and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Less than $500 for the installation of the brochure rack. All publications distributed will be those available at no cost. |
| Potential Funding Sources: | Internal funds |
| Implementation Notes: | The brochure rack was installed in 2005 and is kept stocked with disaster-related publications that are free of charge for the public. |

| **Yancey County Mitigation Action 8** | **Reinforce repeater sites and other communications towers and antennas to withstand greater winds, lightning strikes, and ice storms.** |
|---|---|
| Hazard(s) Addressed: | Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards |
| Category: | Property Protection/Emergency Services |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Undetermined |
| Potential Funding Sources: | Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, Department of Homeland Security funds |
| Implementation Notes: | Completed in 2004. All equipment was placed in racks strapped to roof and walls and ice bridges were installed on the towers. |

| **Yancey County Mitigation Action 13** | **Implement enhance security measures at the new EMS facility** |
|---|---|
| Hazard(s) Addressed: | Civil Disruption/ Disobedience |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management and the LEPC |
| Estimated Cost: | $10,000 |
| Potential Funding Sources: | Department of Homeland Security funds |
| Implementation Notes: | Completed in 2004. Electronic door locks, intercom system, and key card entry were installed. |

## Town of Burnsville Completed Mitigation Actions

| **Town of Burnsville Mitigation Action 2** | **Install a brochure rack in the Town of Burnsville Town Hall to hold FEMA, American Red Cross, and other free disaster-related publications for use by the public.** |
|---|---|
| Hazard(s) Addressed: | Flood, Hurricanes and Tropical Storms, Severe Thunderstorms and Tornadoes, Earthquakes, Winter Storms, Other Hazards |
| Category: | Public Information and Awareness |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management |
| Estimated Cost: | Less than $500 for the installation of the brochure rack. All publications distributed will be those available at no cost. |
| Potential Funding Sources: | Internal funds |
| Implementation Notes: | The brochure rack was installed in 2005 and is kept stocked with disaster-related publications that are free of charge for the public. |

| **Town of Burnsville Mitigation Action 3** | **Evaluate and enhance as necessary the Town of Burnsville Flood Damage Prevention Ordinance, in part to ensure that the ordinance continues to address new buildings and infrastructure.** |
|---|---|
| Hazard(s) Addressed: | Flood |
| Category: | Prevention |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Town Council |
| Estimated Cost: | Internal administrative costs only |
| Potential Funding Sources: | General funds |
| Implementation Notes: | Action completed. Burnsville joined the National Flood Insurance Program in 1984 and adopted a Flood Prevention Ordinance then. This Ordinance was updated in 1992 and then again in 2009 which is still current. The Town has always elected to adopt North Carolinas model ordinance without modifications. At this time, Burnsville does not anticipate making any changes to the floodplain ordinance in the future. |

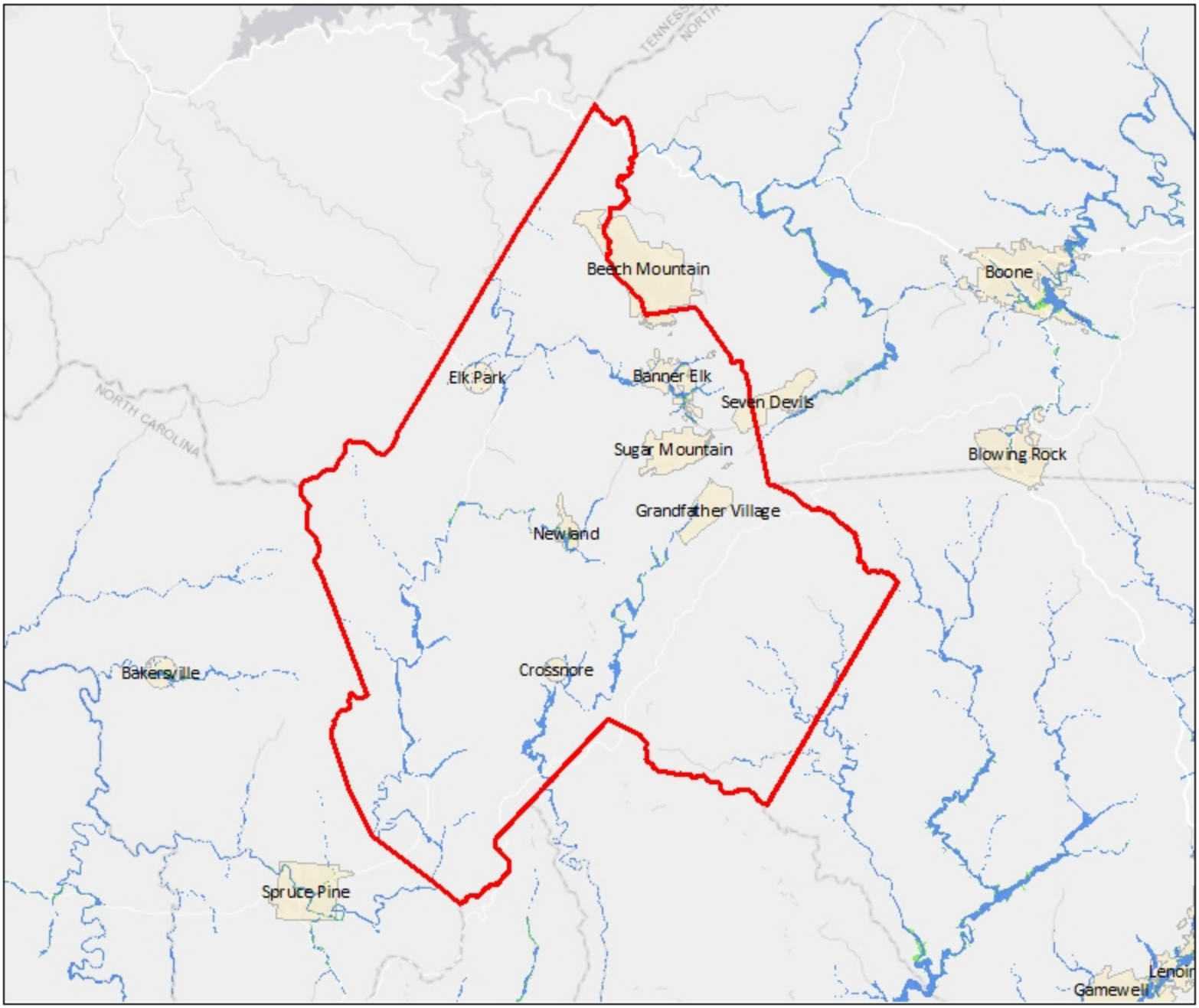
| **Town of Burnsville Mitigation Action 4** | **Implement enhanced security measures at the Burnsville Town Hall to include security cameras and recorders.** |
|---|---|
| Hazard(s) Addressed: | Civil Disruption/ Disobedience |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management and the LEPC |
| Estimated Cost: | $5,000 |
| Potential Funding Sources: | Department of Homeland Security funds |
| Implementation Notes: | Completed in 2005 with installation of enhanced exterior lighting, controlled access to all interior offices, video surveillance. In addition, the Town has adopted and posted an emergency action plan for the building. |

| **Town of Burnsville Mitigation Action 5** | **Implement enhanced security measures at the Burnsville water treatment plant to include security cameras and recorders.** |
|---|---|
| Hazard(s) Addressed: | Civil Disruption/ Disobedience |
| Category: | Property Protection |
| Priority (High, Moderate, Low): | Moderate |
| Lead Agency/Department Responsible: | Yancey County Emergency Management and the LEPC |
| Estimated Cost: | $5,000 |
| Potential Funding Sources: | Department of Homeland Security funds |
| Implementation Notes: | Completed in 2005 with installation of a secure fence around the entire perimeter and video surveillance with controlled access. |

# Appendix F:
# Flood Hazard Maps

This section of the Plan includes the Flood Insurance Rate Maps for each participating County and municipality in the Toe River Region.

# Avery County - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

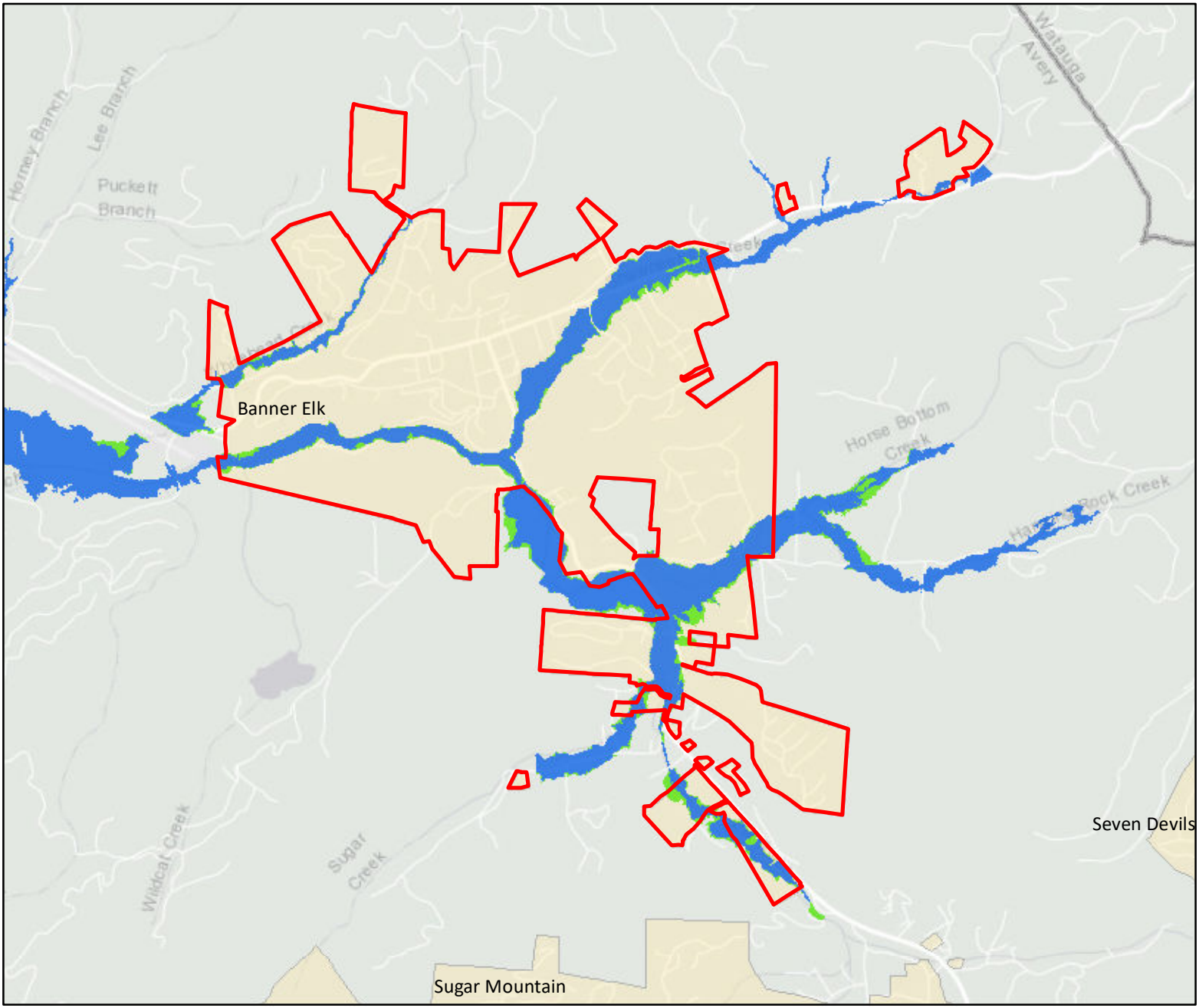
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 2.75 5.5 11 Miles

N

# Banner Elk - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.275 0.55 1.1 Miles

N

# Crossnore - Flood Hazard Areas


**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.075 0.15 0.3 Miles

N

# Elk Park - Flood Hazard Areas


**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

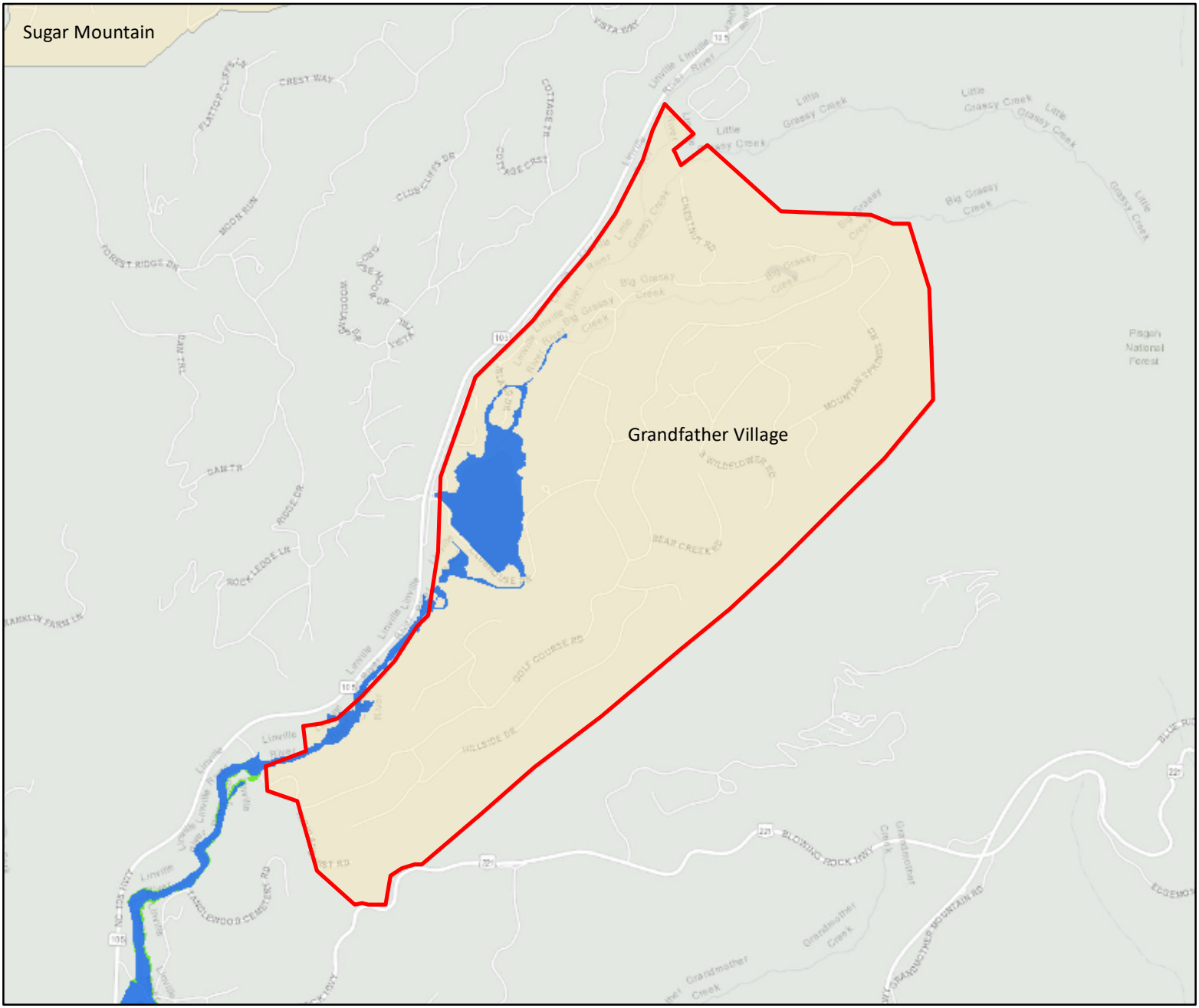
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.1 0.2 0.4 Miles

N

# Grandfather Village - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

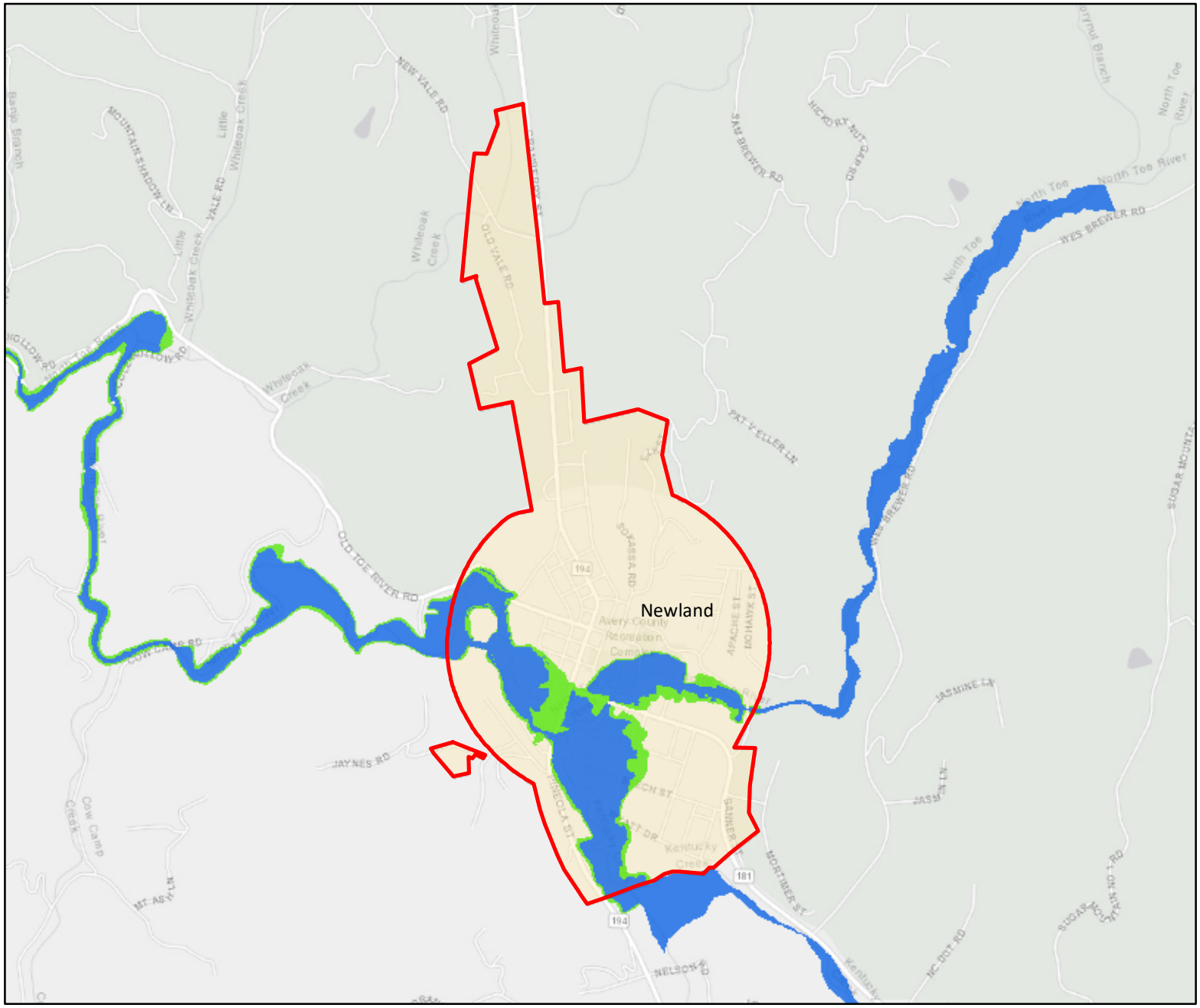
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.225 0.45 0.9 Miles

N

# Newland - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

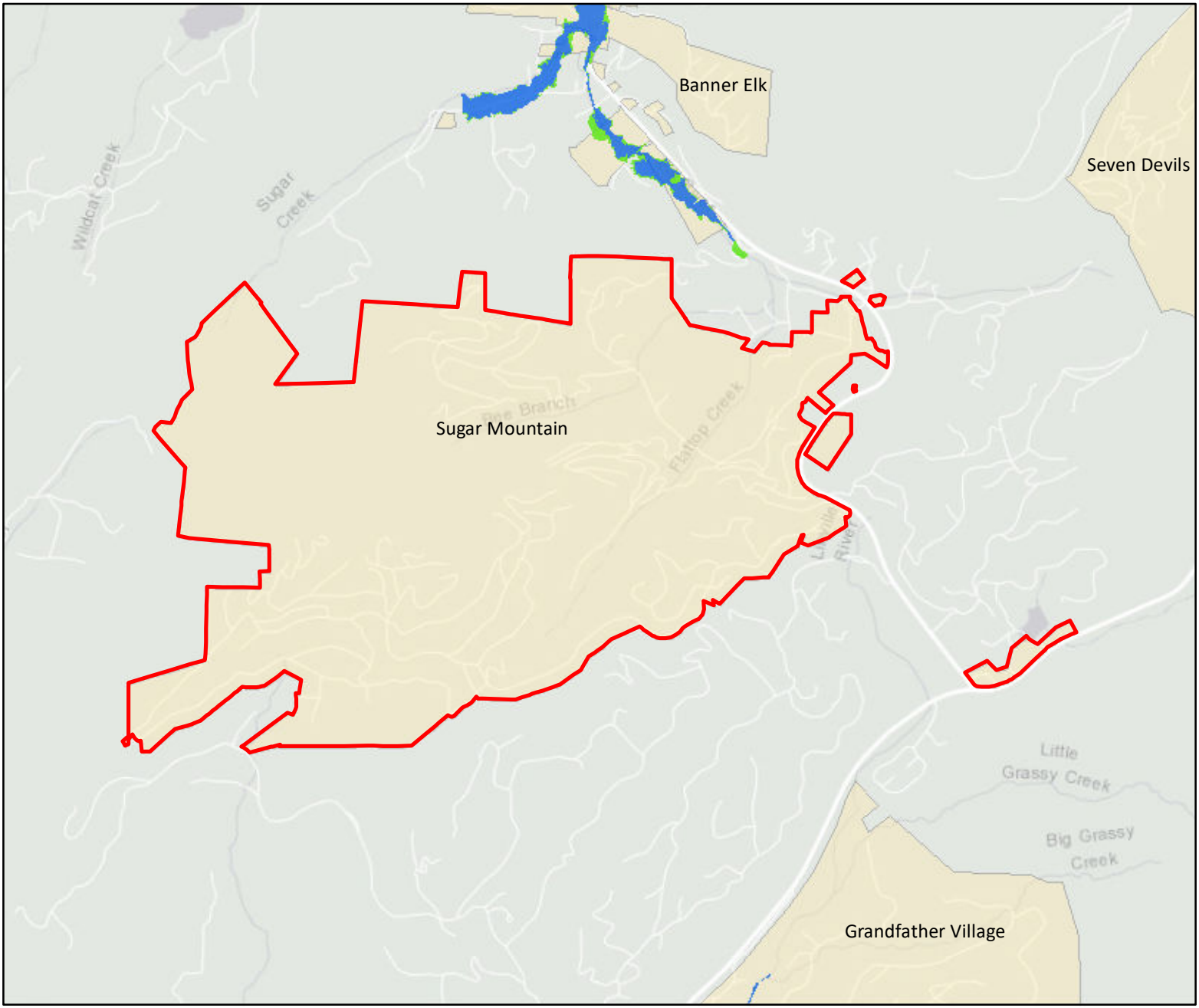
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.2 0.4 0.8 Miles

N

# Sugar Mountain - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

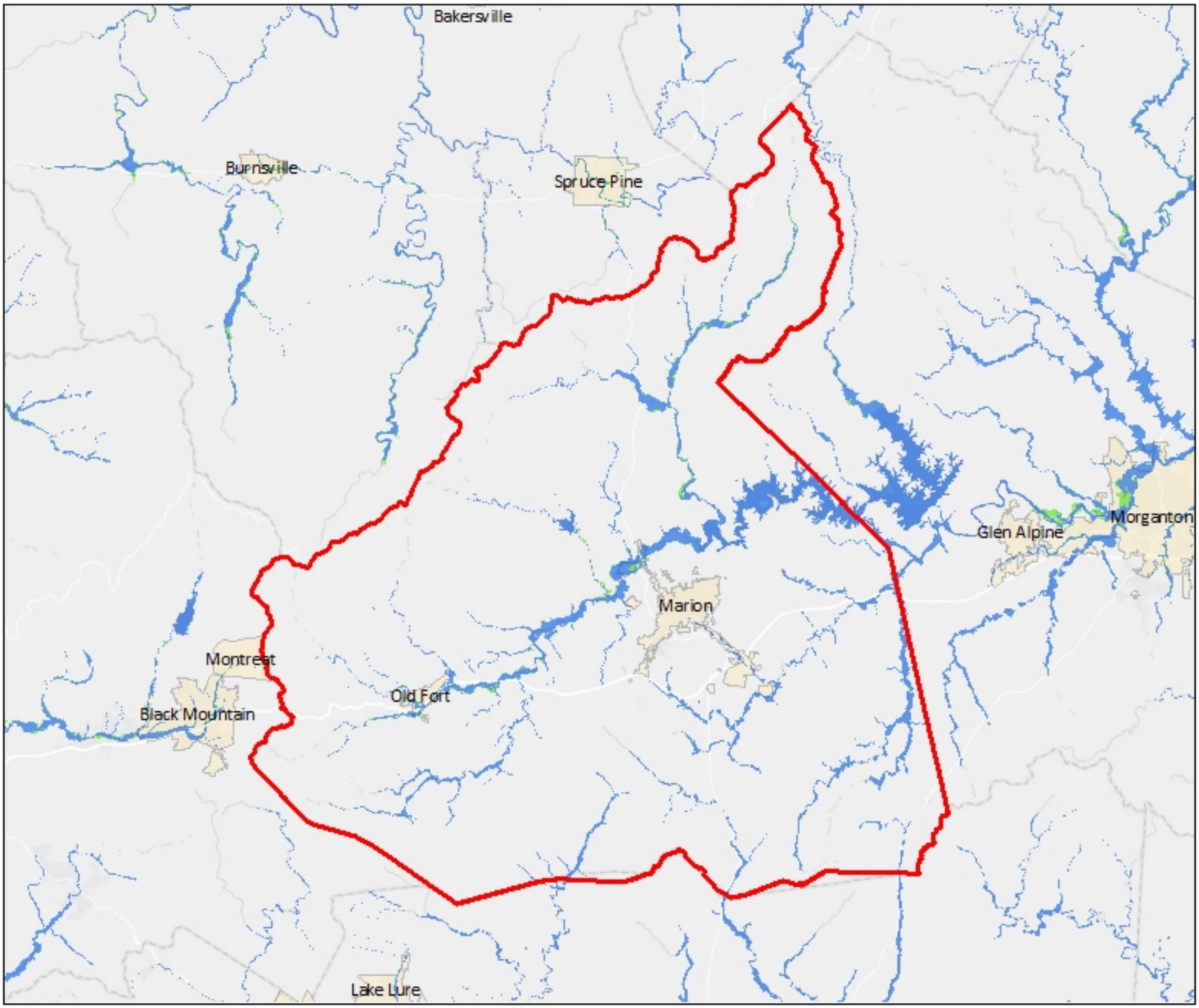
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.275 0.55 1.1 Miles

N

# McDowell County - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

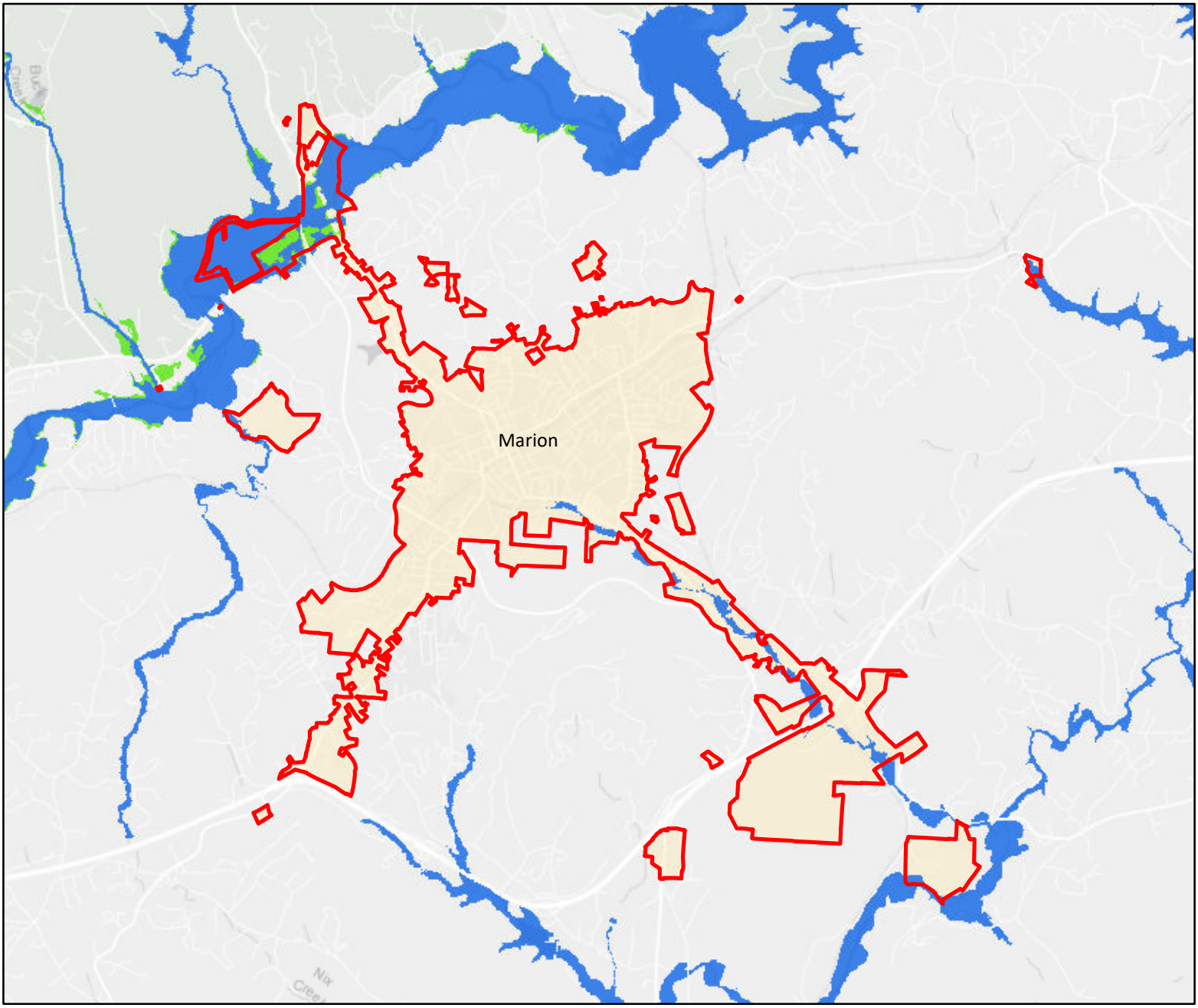
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 3.25 6.5 13 Miles

N

# Marion - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

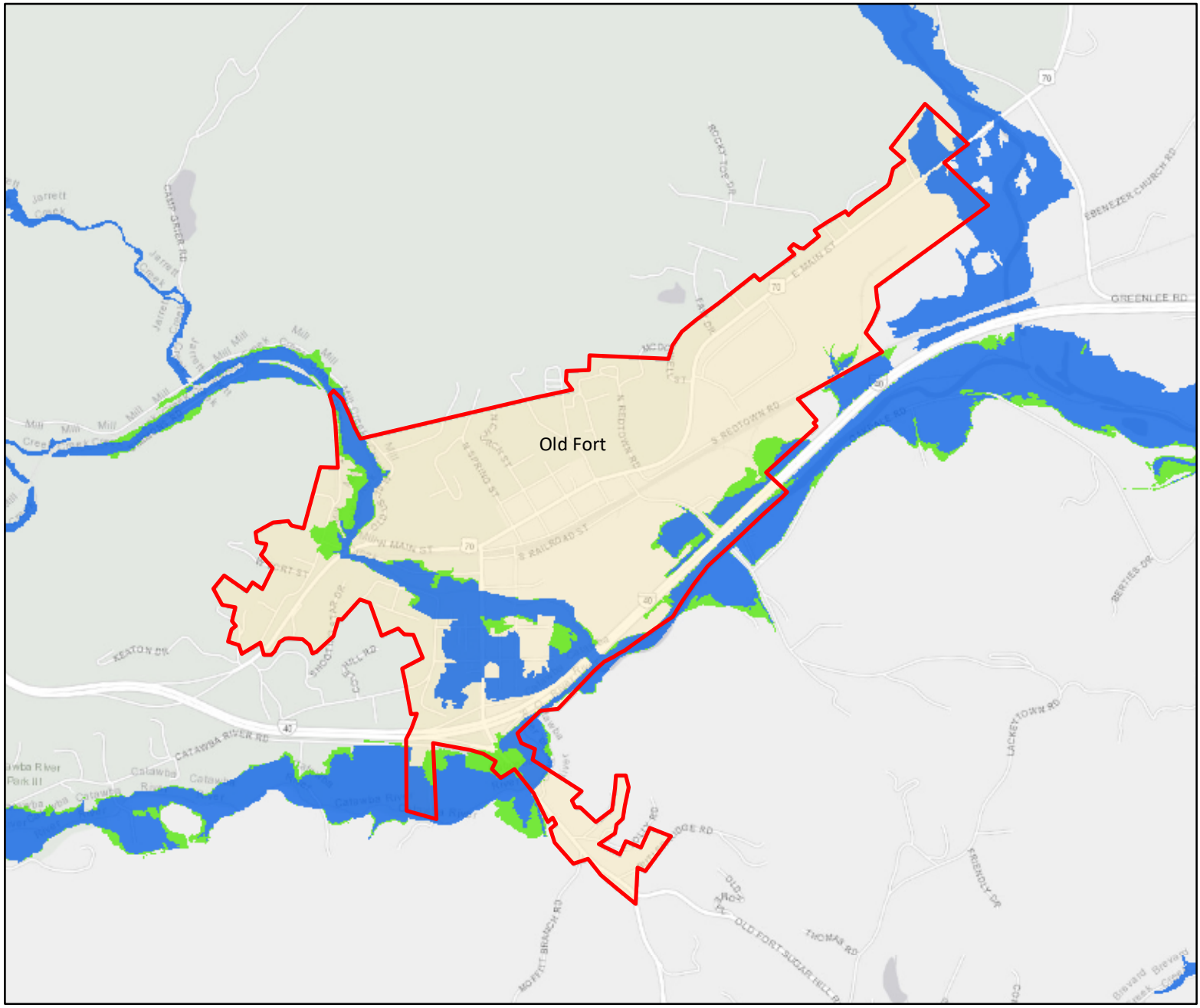
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.5 1 2 Miles

N

# Old Fort - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

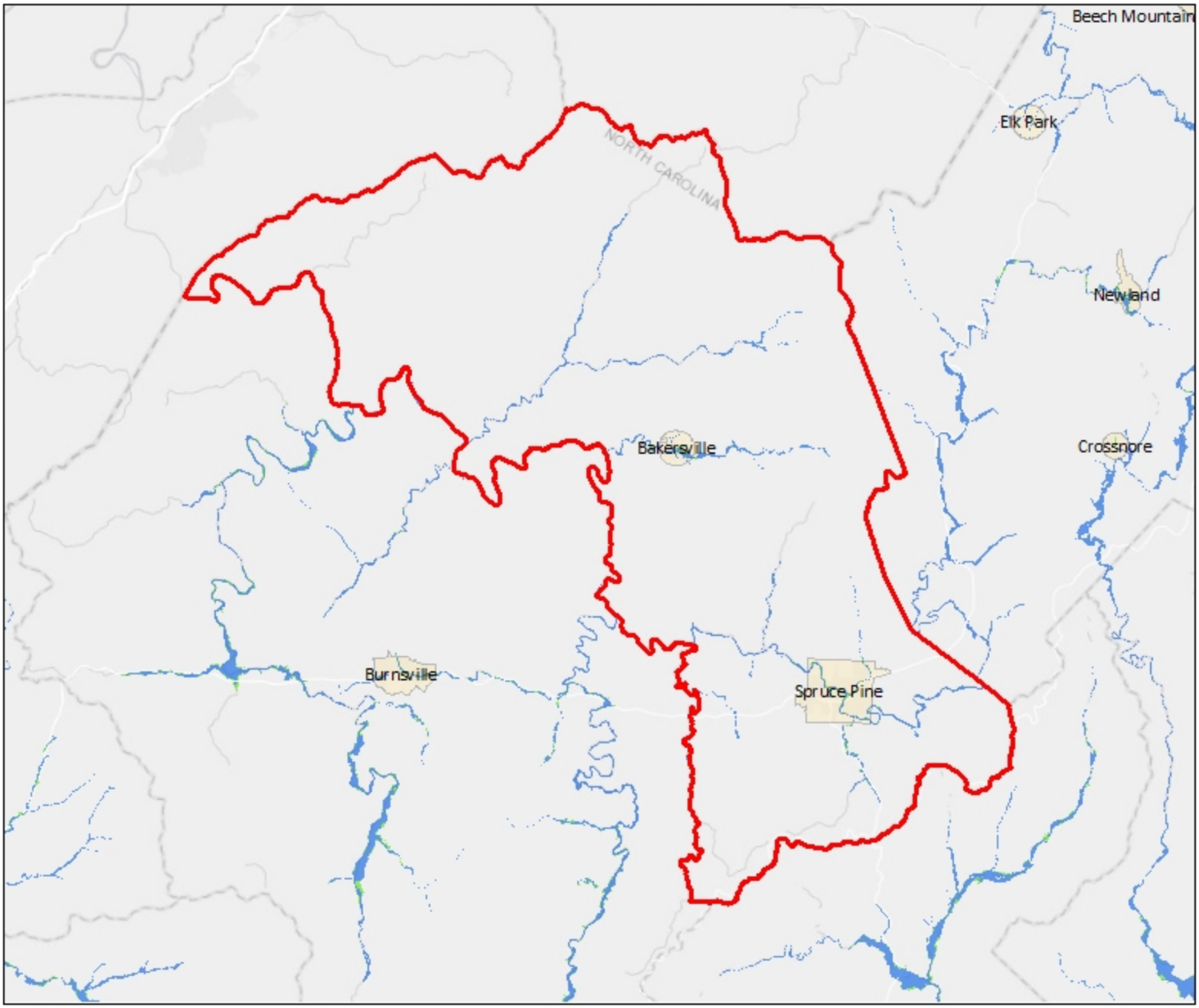
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.2 0.4 0.8 Miles

N

# Mitchell County - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

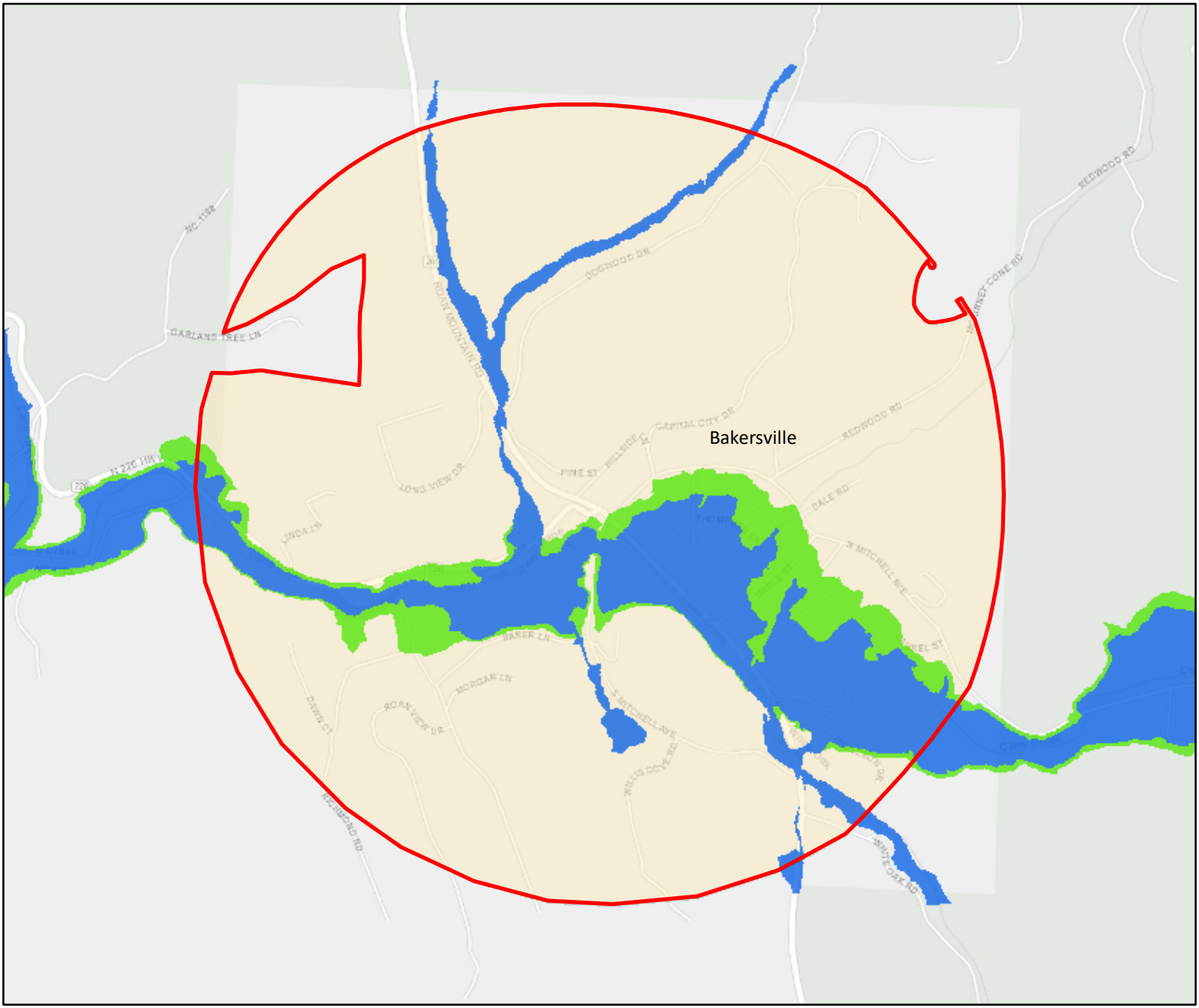
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 2.5 5 10 Miles

N

# Bakersville - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

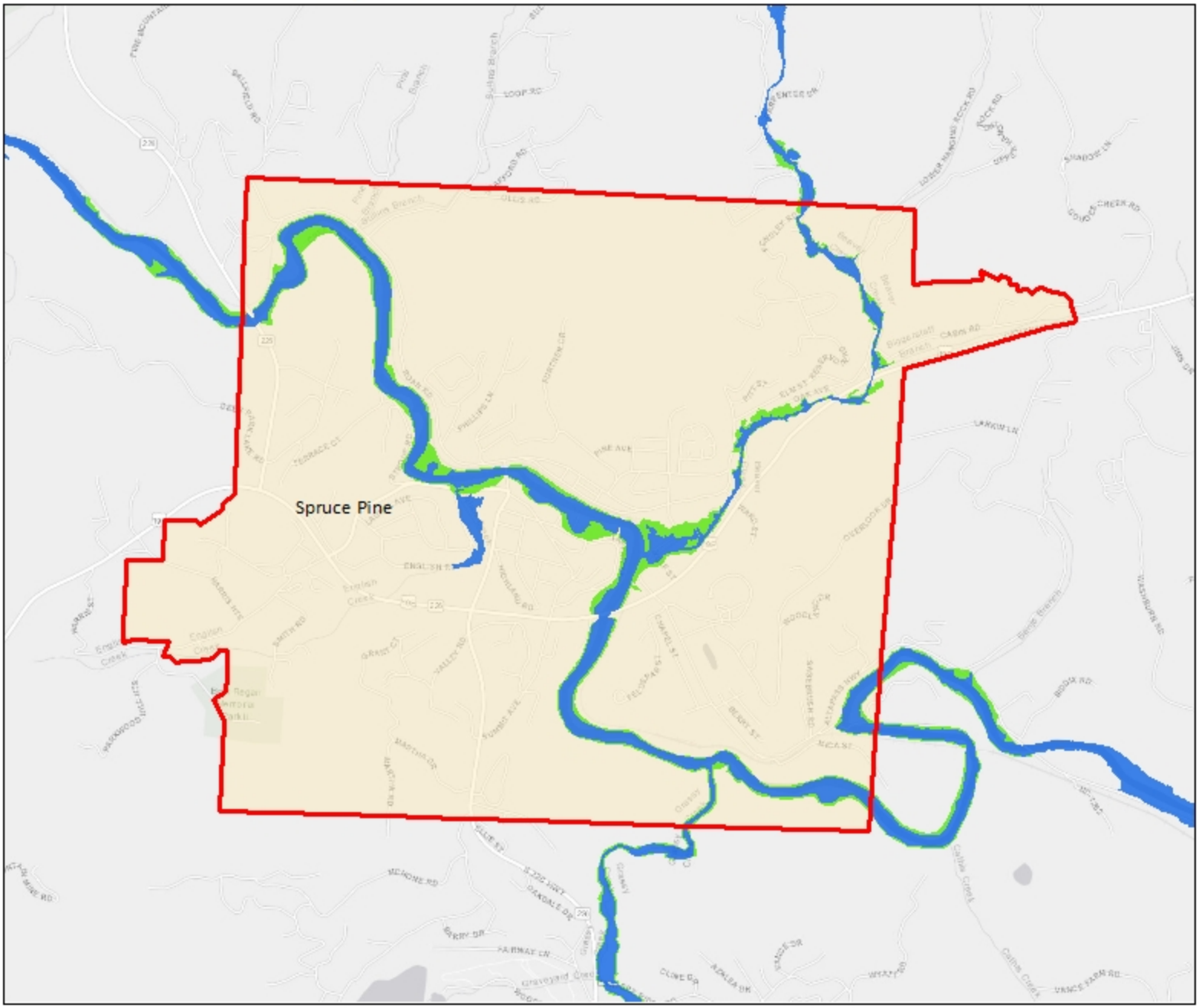
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.1 0.2 0.4 Miles

N

# Spruce Pine - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

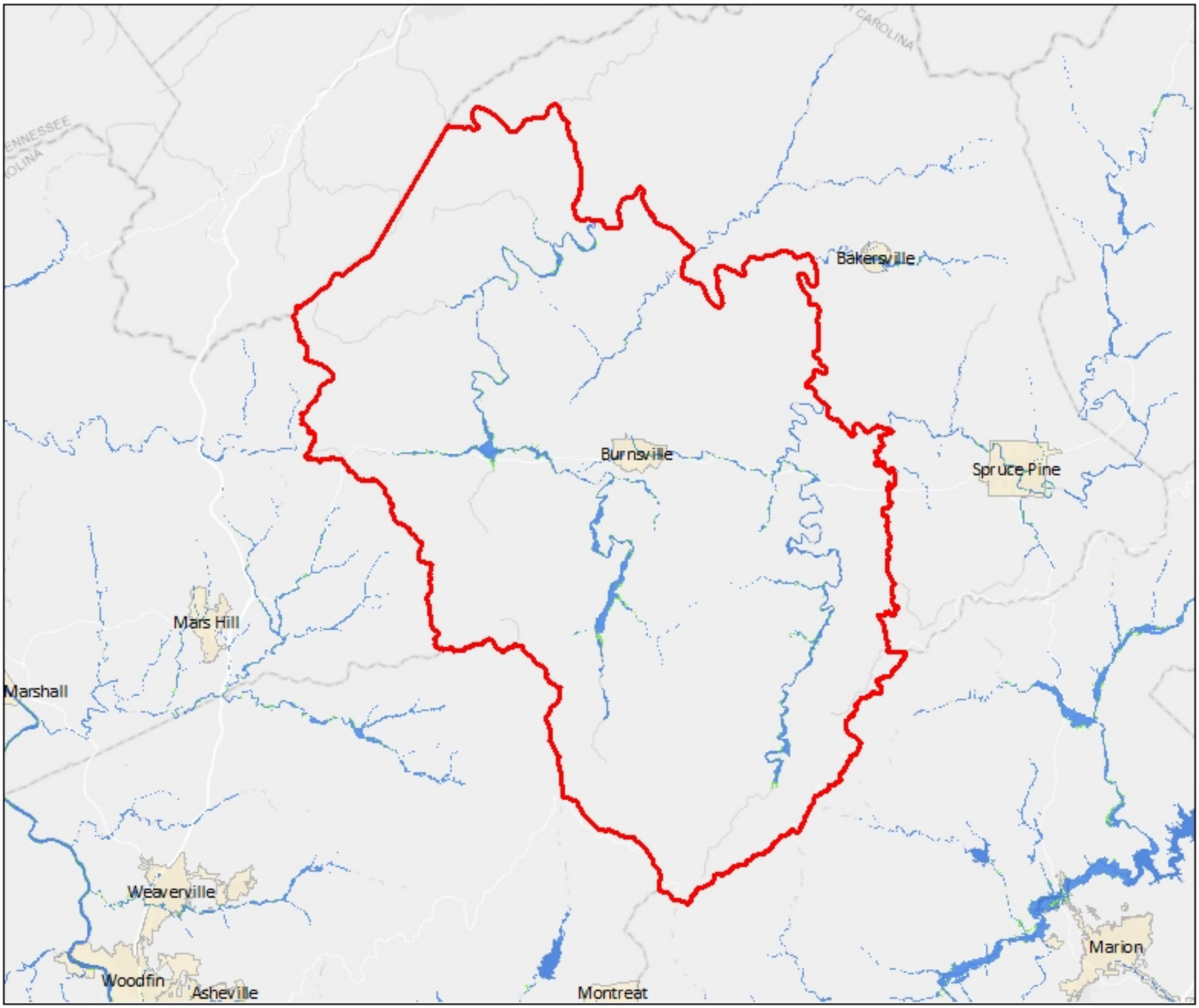
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 0.25 0.5 1 Miles

N

# Yancey County - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

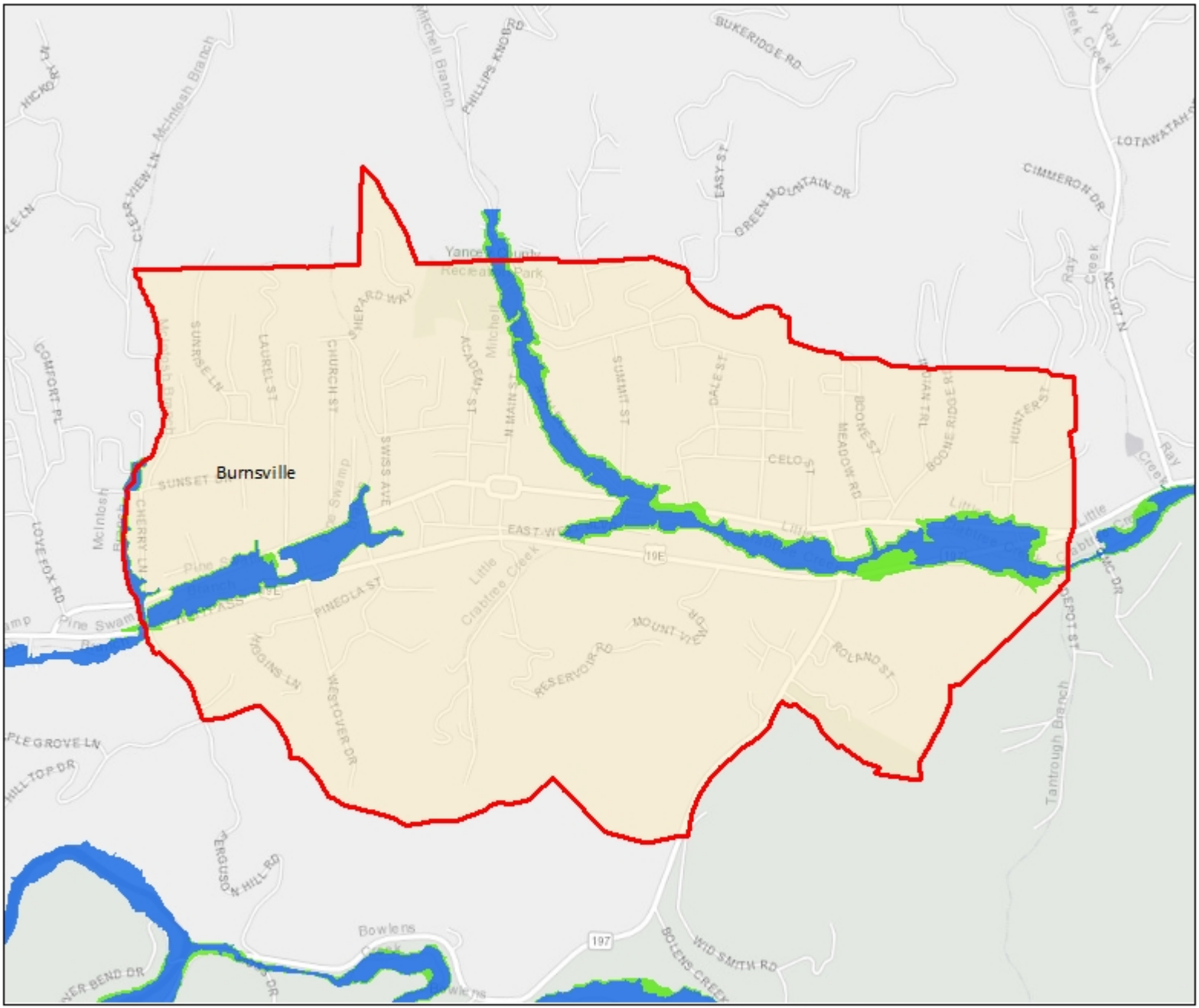
- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

0 3 6 12 Miles

N

# Burnsville - Flood Hazard Areas




**Legend**

- County Boundary
- Municipal Boundary
- Major Roads

**Flood Zone**

- 100 Year Flood Zone
- 500 Year Flood Zone

Data Source: North Carolina Floodplain Mapping Program

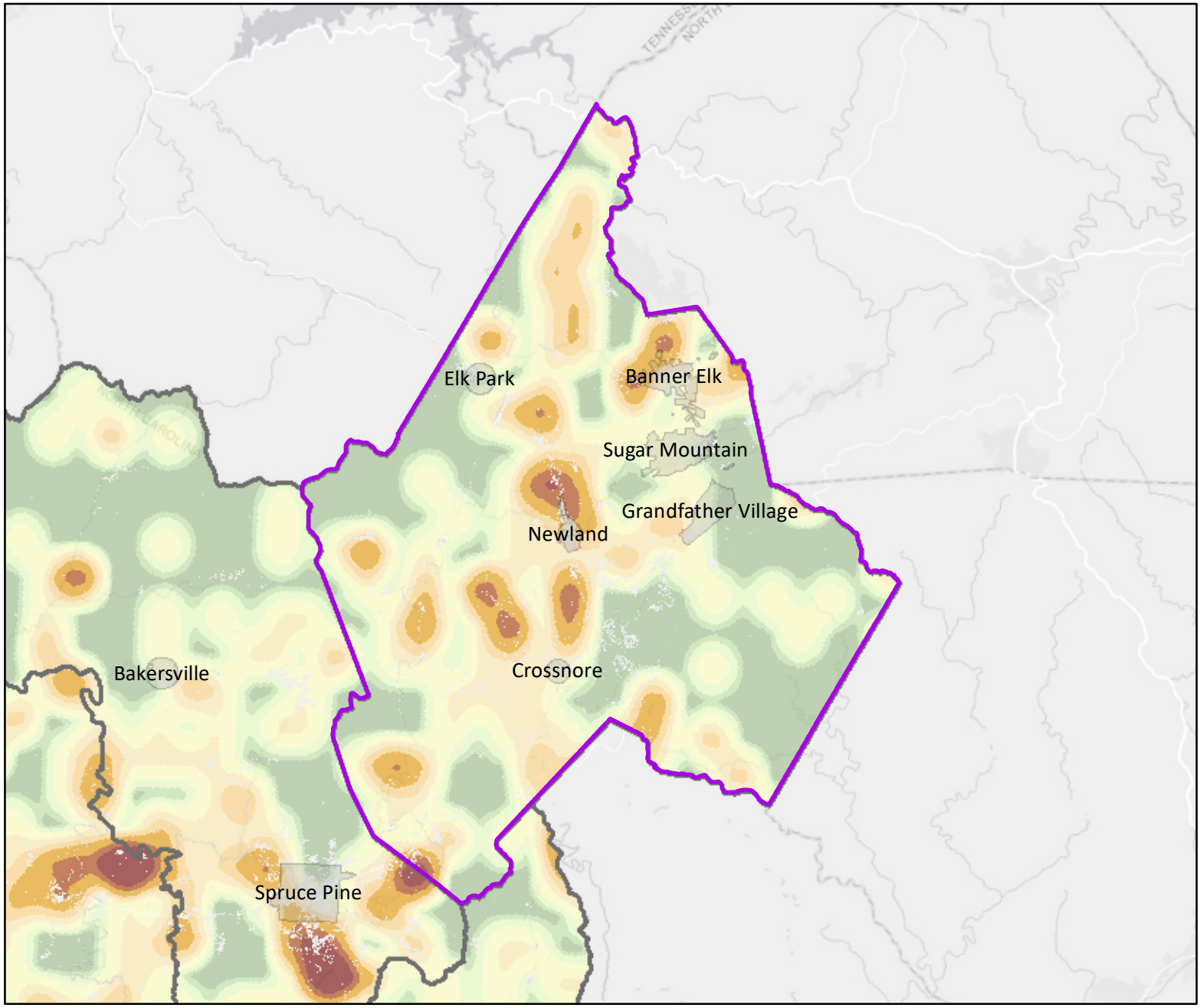
0 0.15 0.3 0.6 Miles

N

# Appendix G: Wildfire Hazard Maps

This section of the Plan includes Wildfire Ignition Density, Wildfire Events and Wildland Urban Interface maps for each participating County and municipality in the Toe River Region.

# Avery County - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

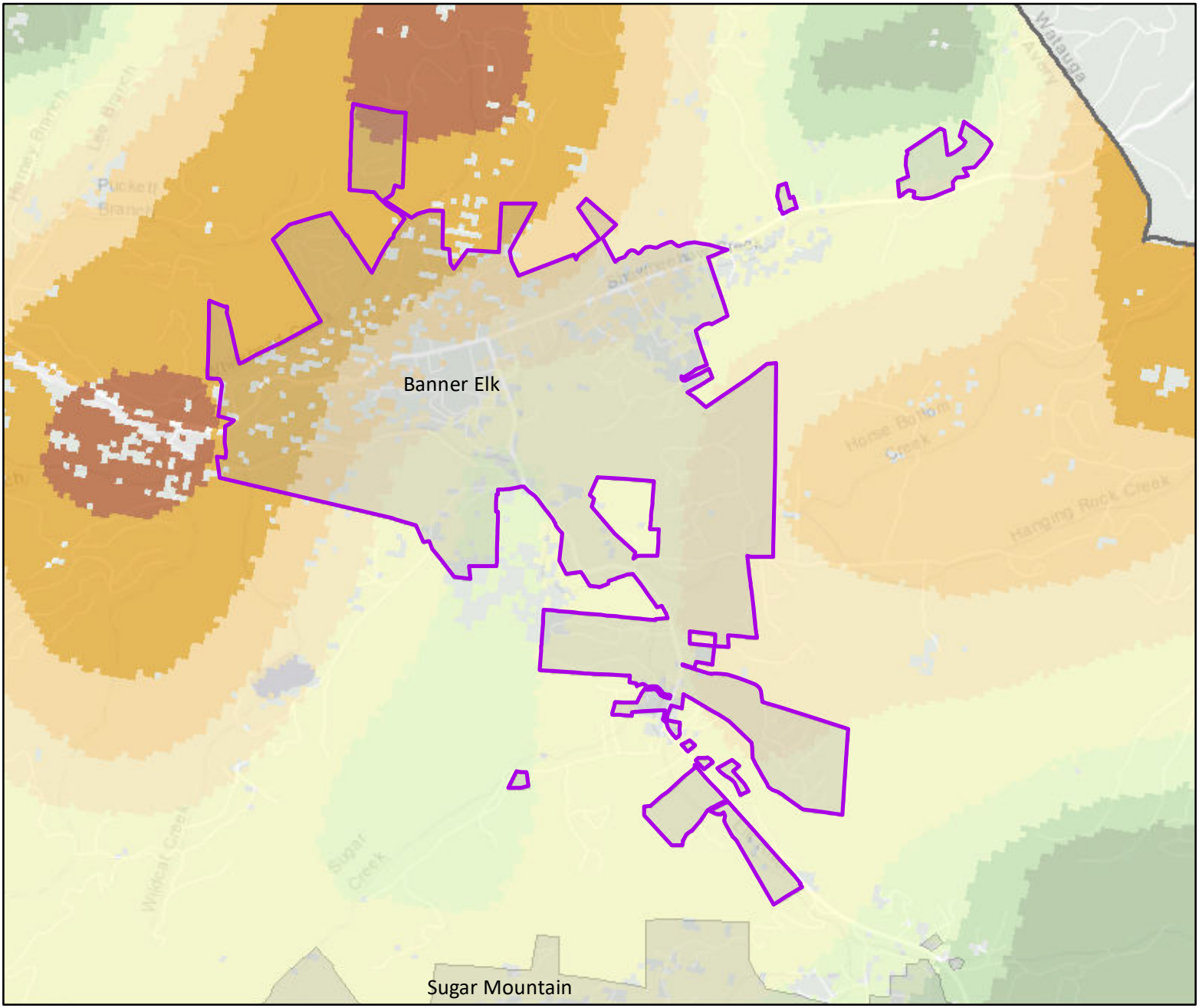
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.75 5.5 11 Miles

N

# Banner Elk - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

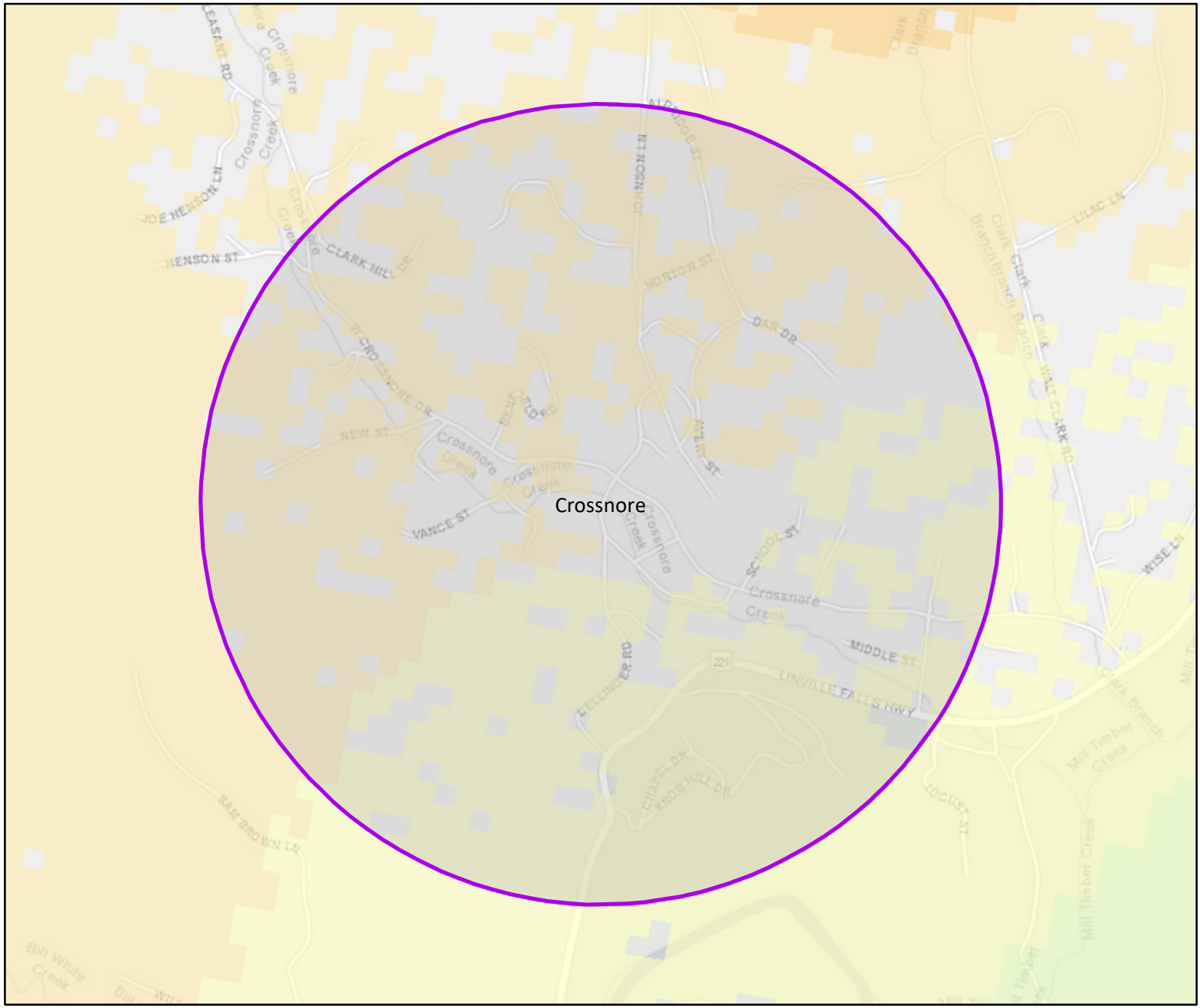
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.275 0.55 1.1 Miles

N

# Crossnore - Wildfire Ignition Density




**Legend**

- Municipal Boundary
- County Boundary

**Wildfire Ignition Density Index**

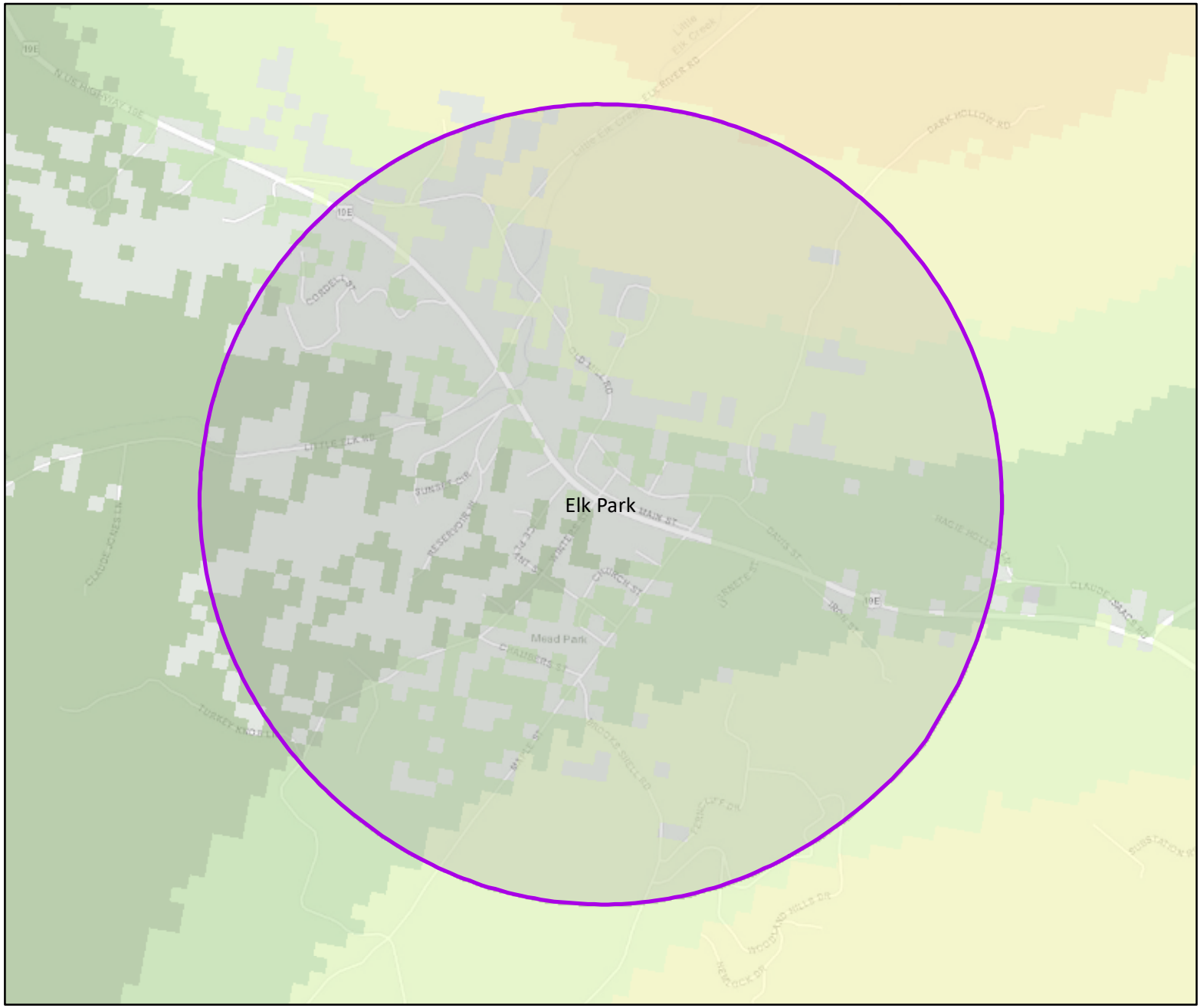
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.075 0.15 0.3 Miles

N

# Elk Park - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

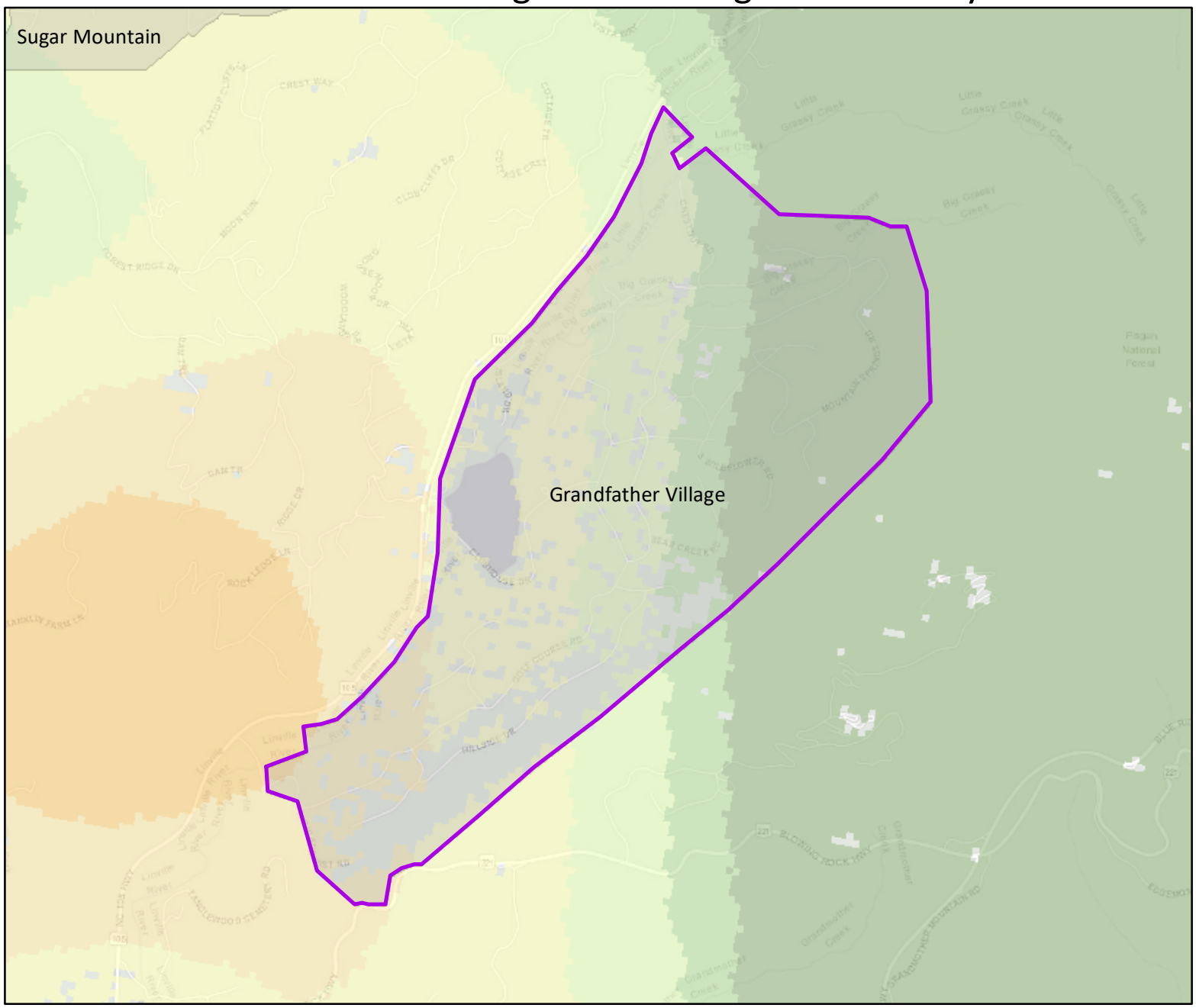
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.1 0.2 0.4 Miles

N

# Grandfather Village - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

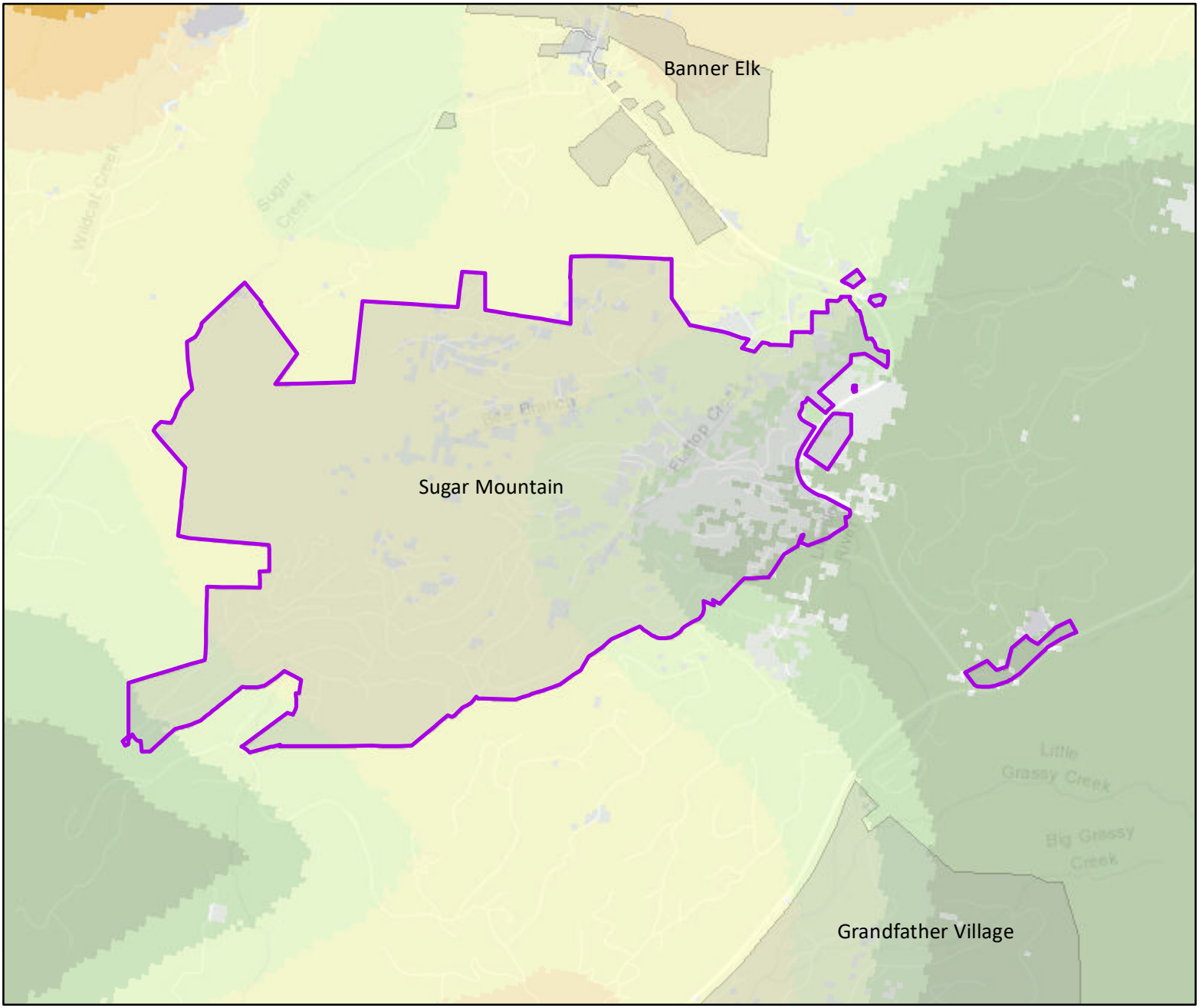
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.225 0.45 0.9 Miles

N

# Sugar Mountain - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

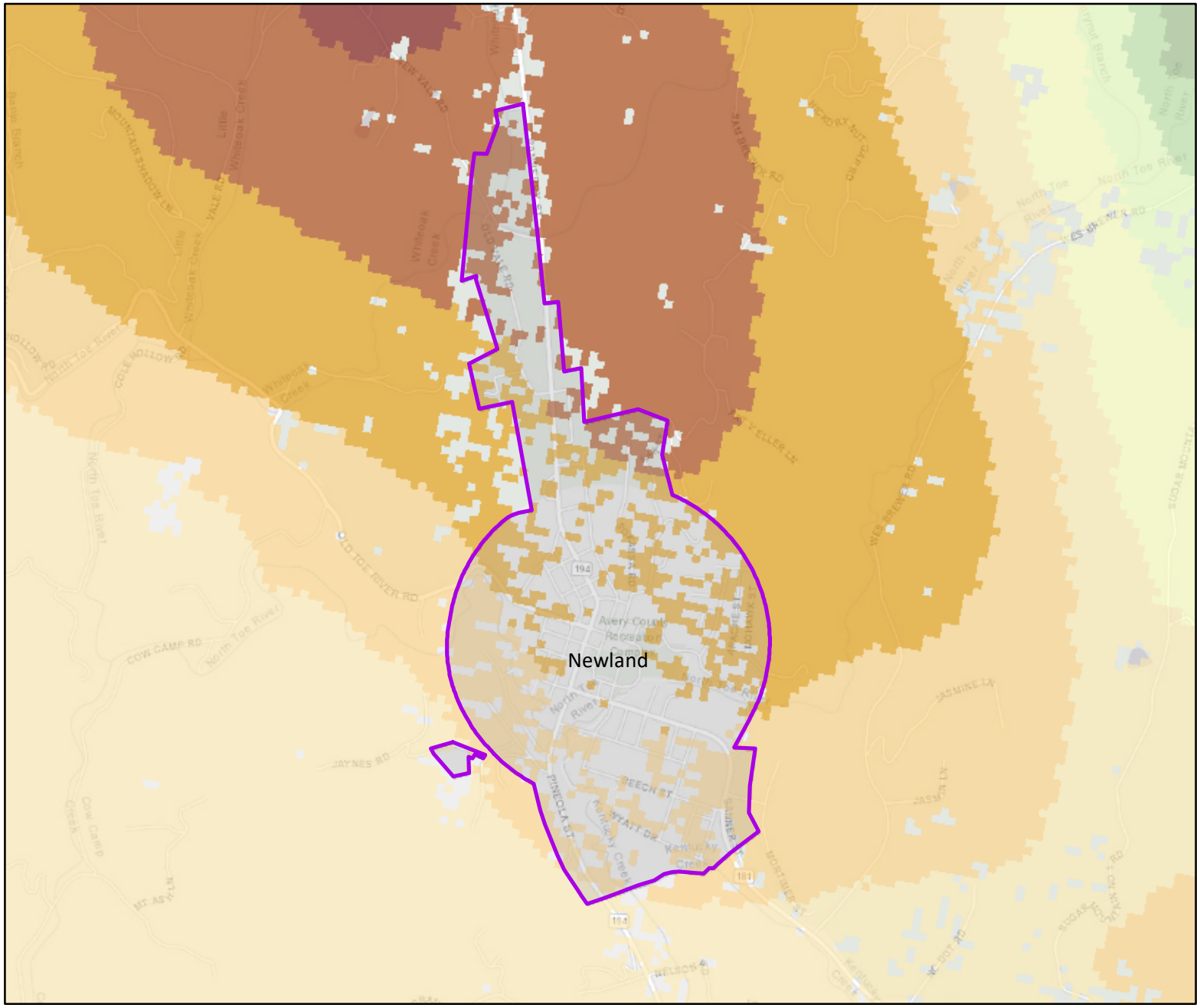
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.275 0.55 1.1 Miles

N

# Newland - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

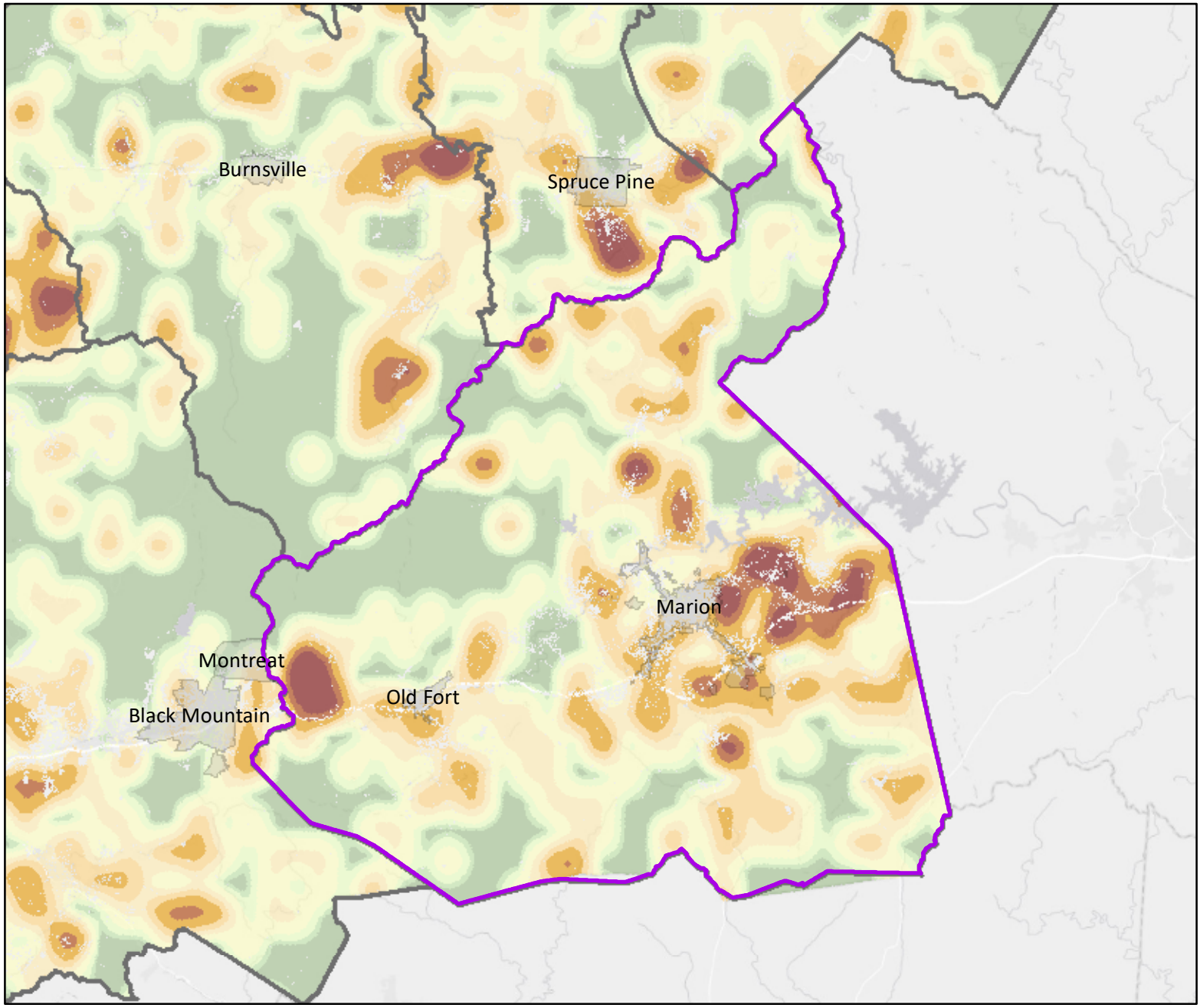
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

# McDowell County - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

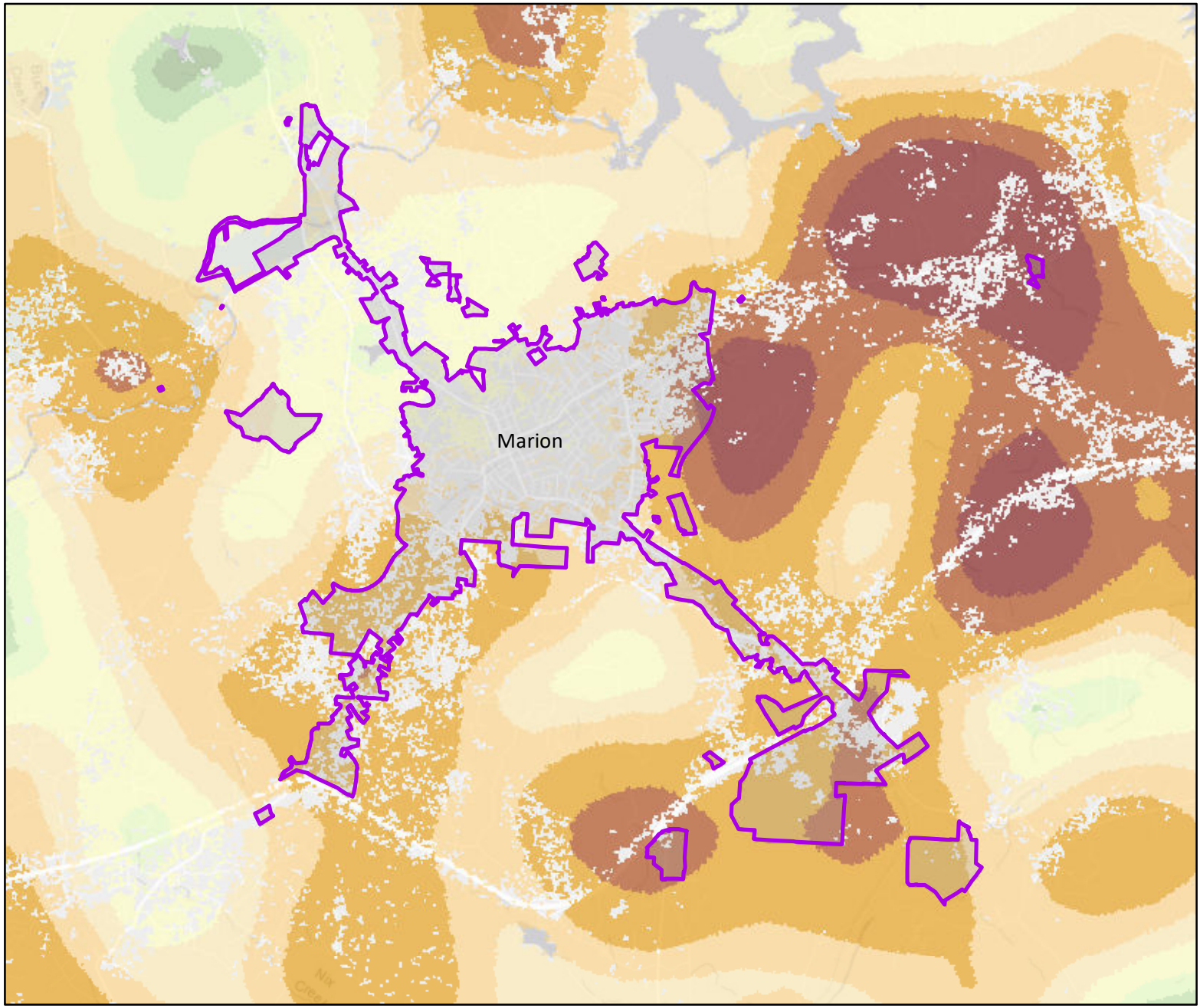
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3.25 6.5 13 Miles

N

# Marion - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

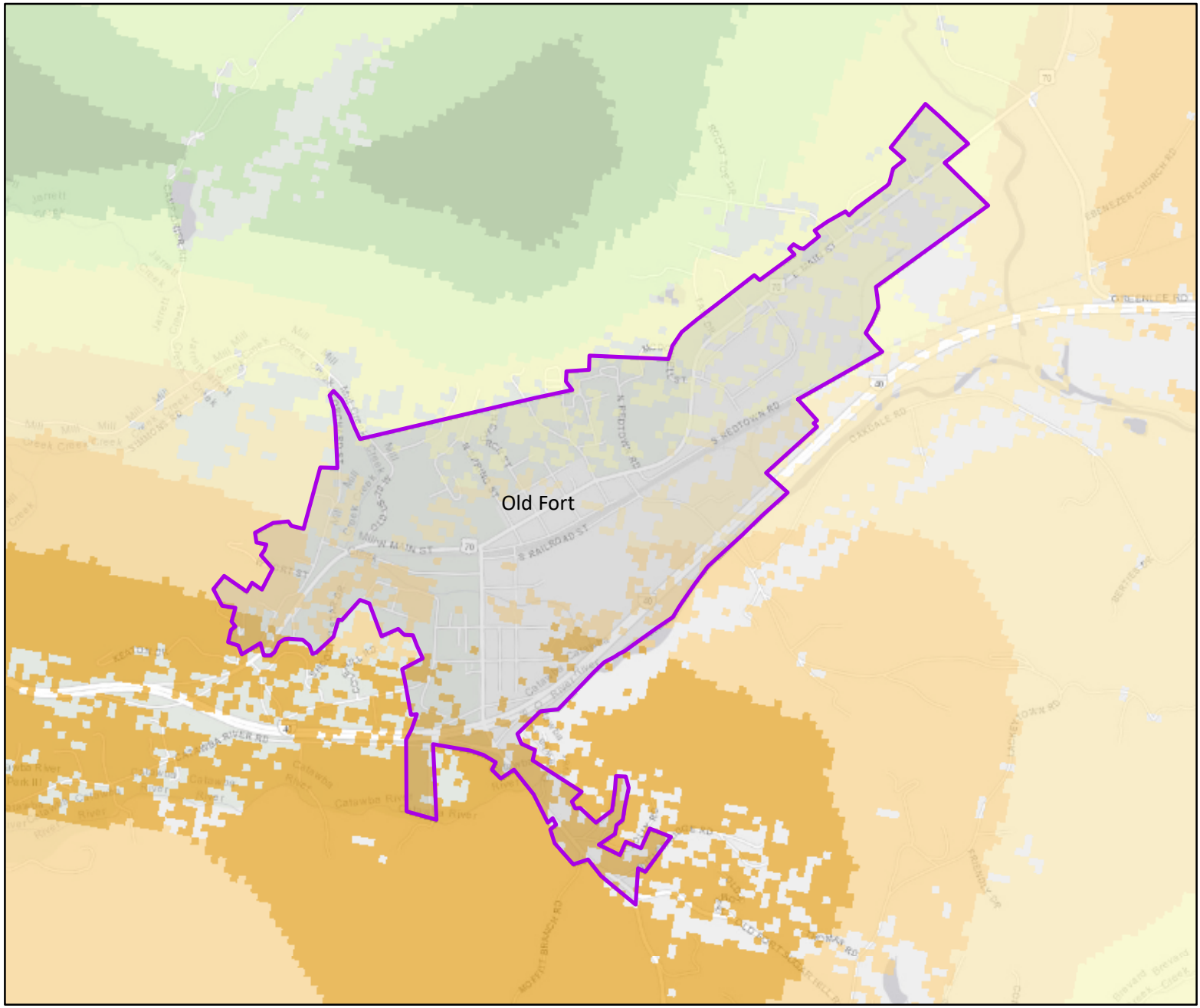
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

# Old Fort - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

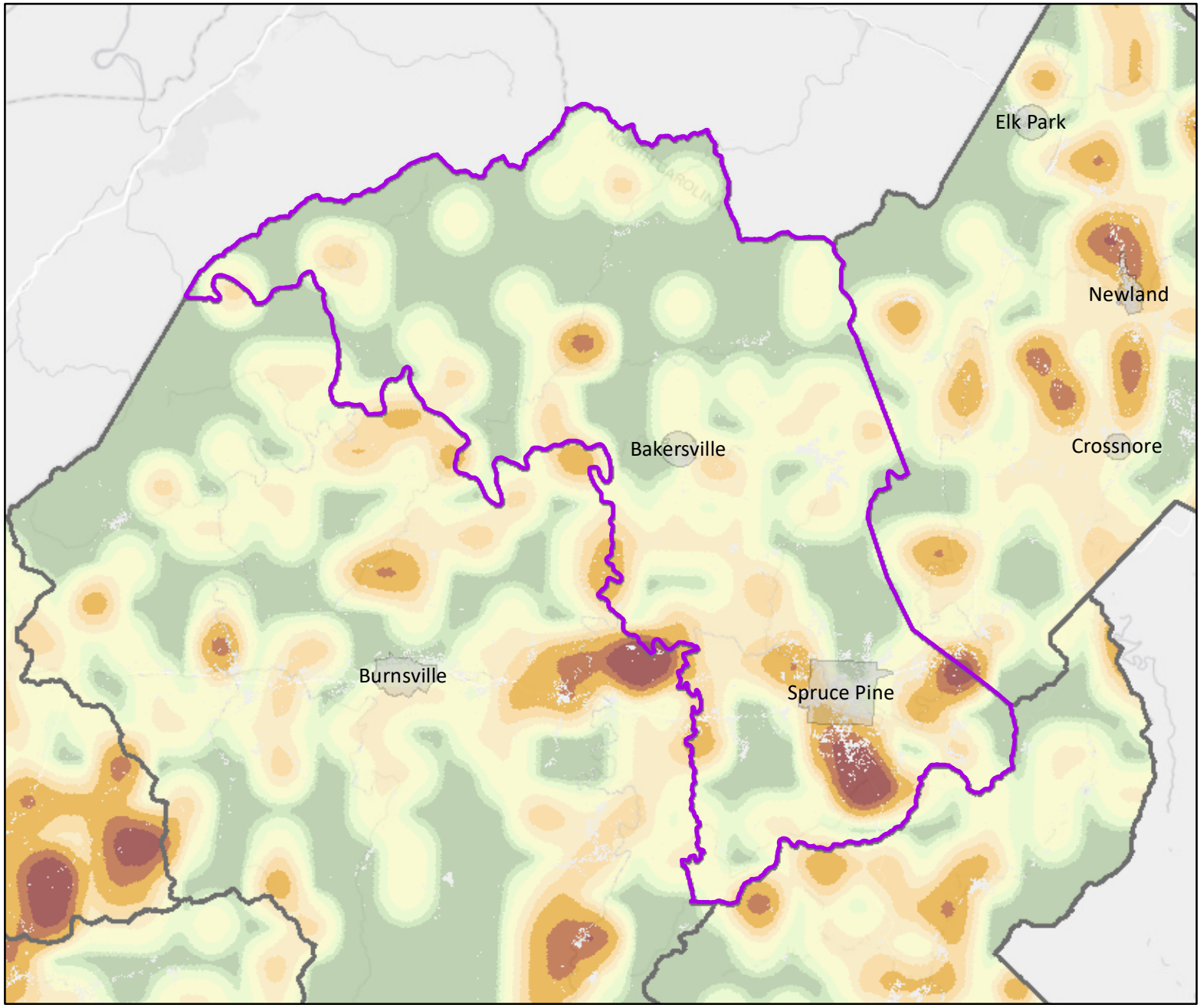
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

# Mitchell County - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

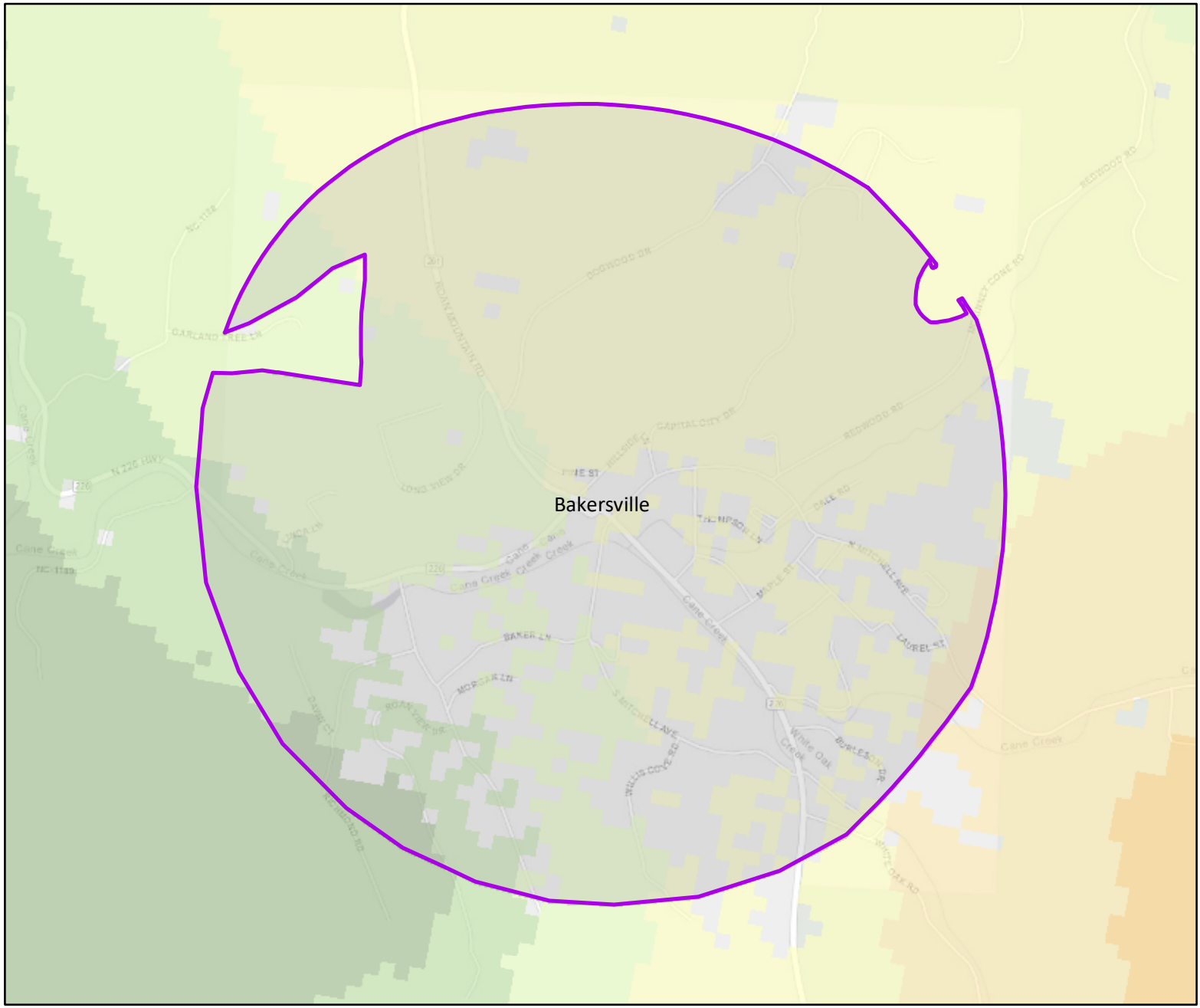
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.5 5 10 Miles

N

# Bakersville - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

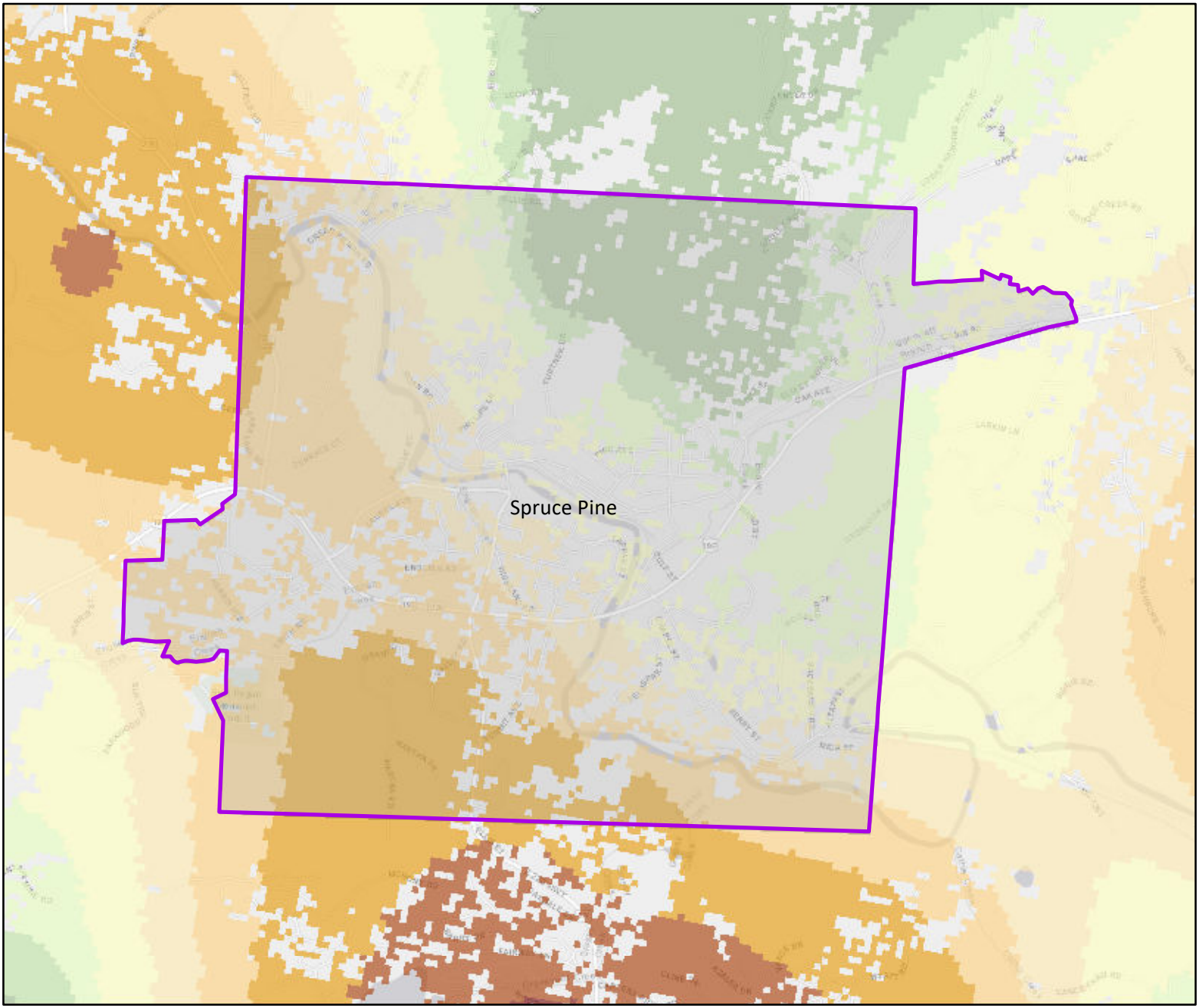
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.1 0.2 0.4 Miles

N

# Spruce Pine - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

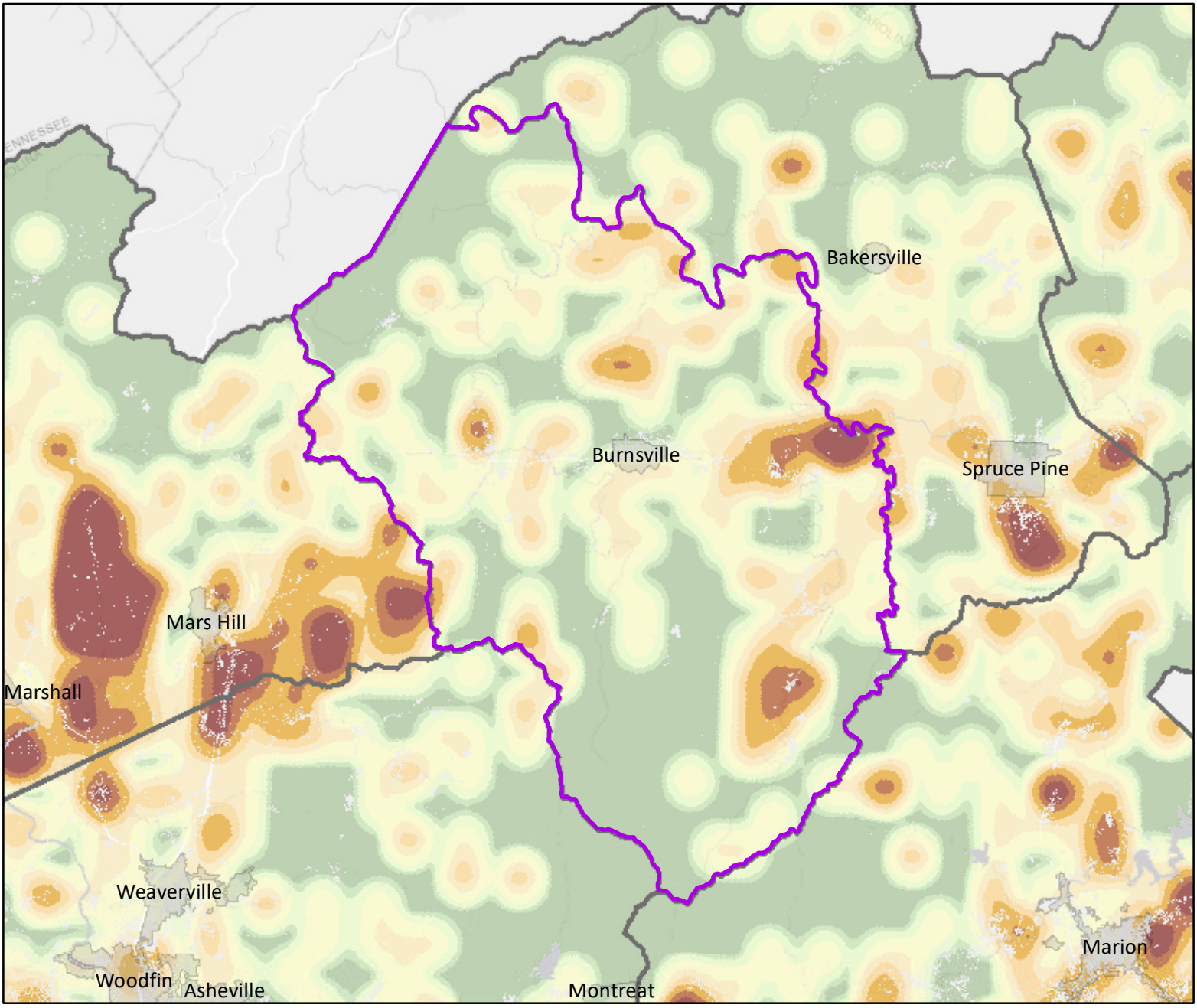
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.25 0.5 1 Miles

N

# Yancey County - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

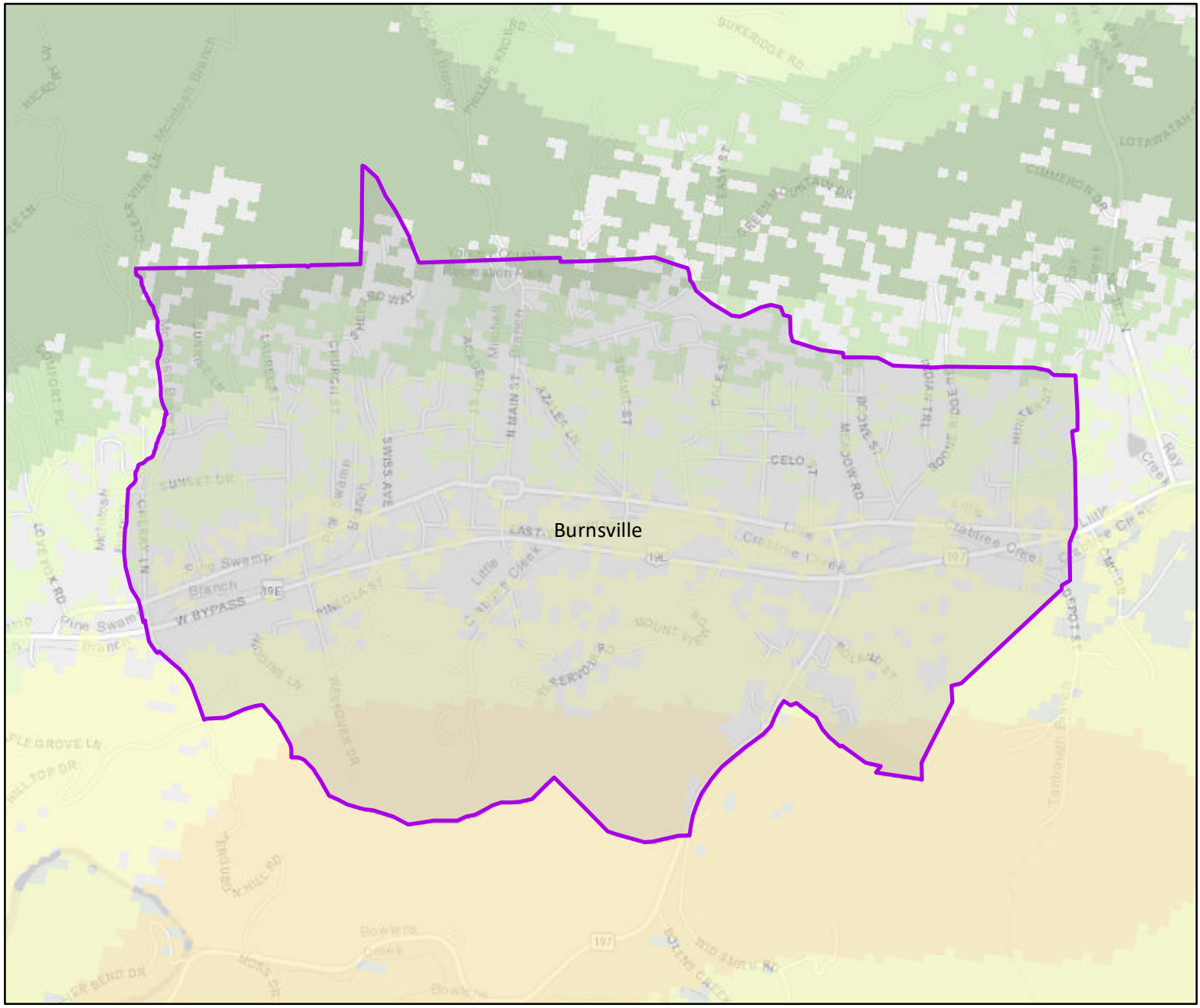
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3 6 12 Miles

N

# Burnsville - Wildfire Ignition Density




**Legend**

Municipal Boundary

County Boundary

**Wildfire Ignition Density Index**

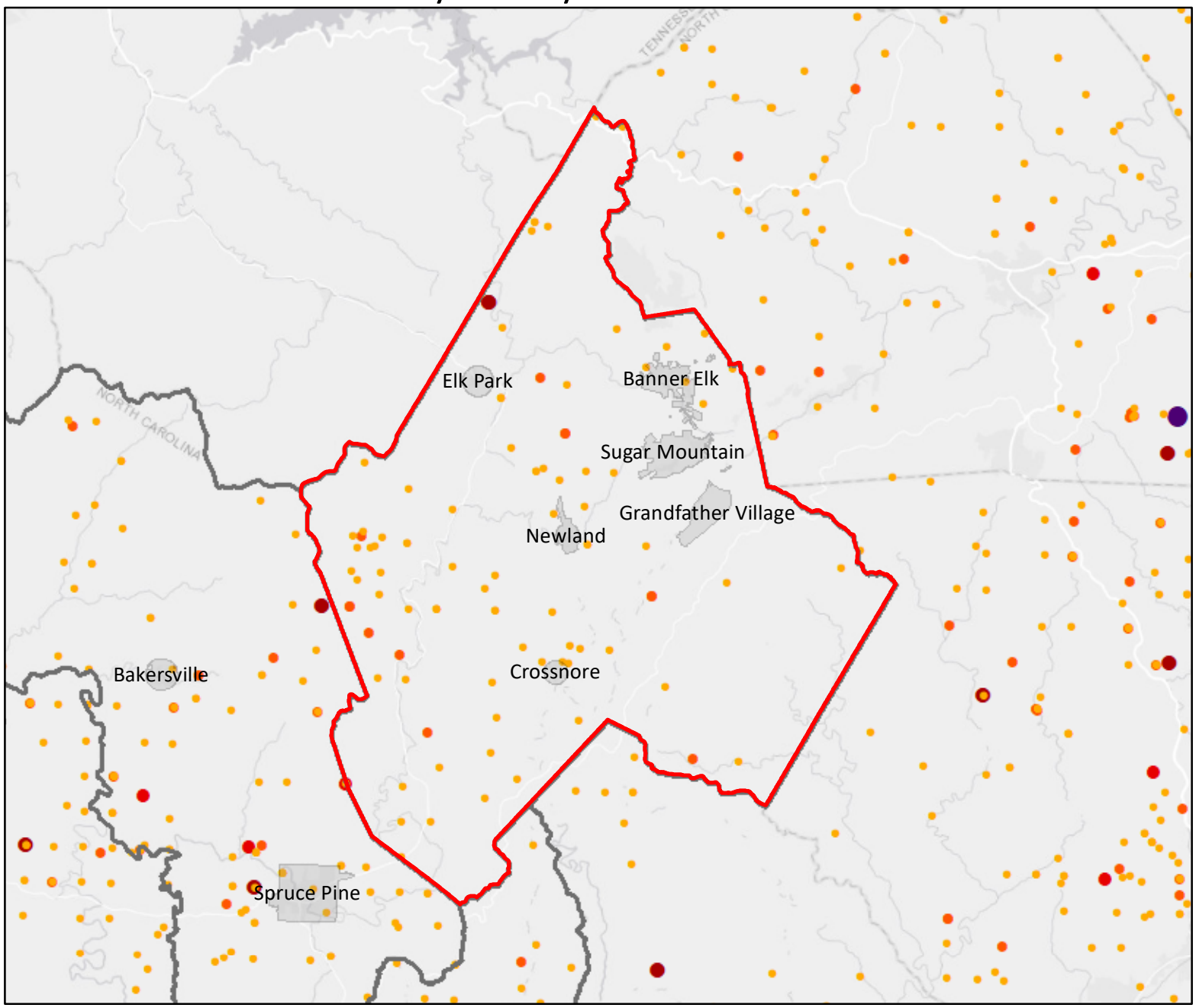
0 1 2 3 4 5 6 7 8 9

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.15 0.3 0.6 Miles

N

# Avery County - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

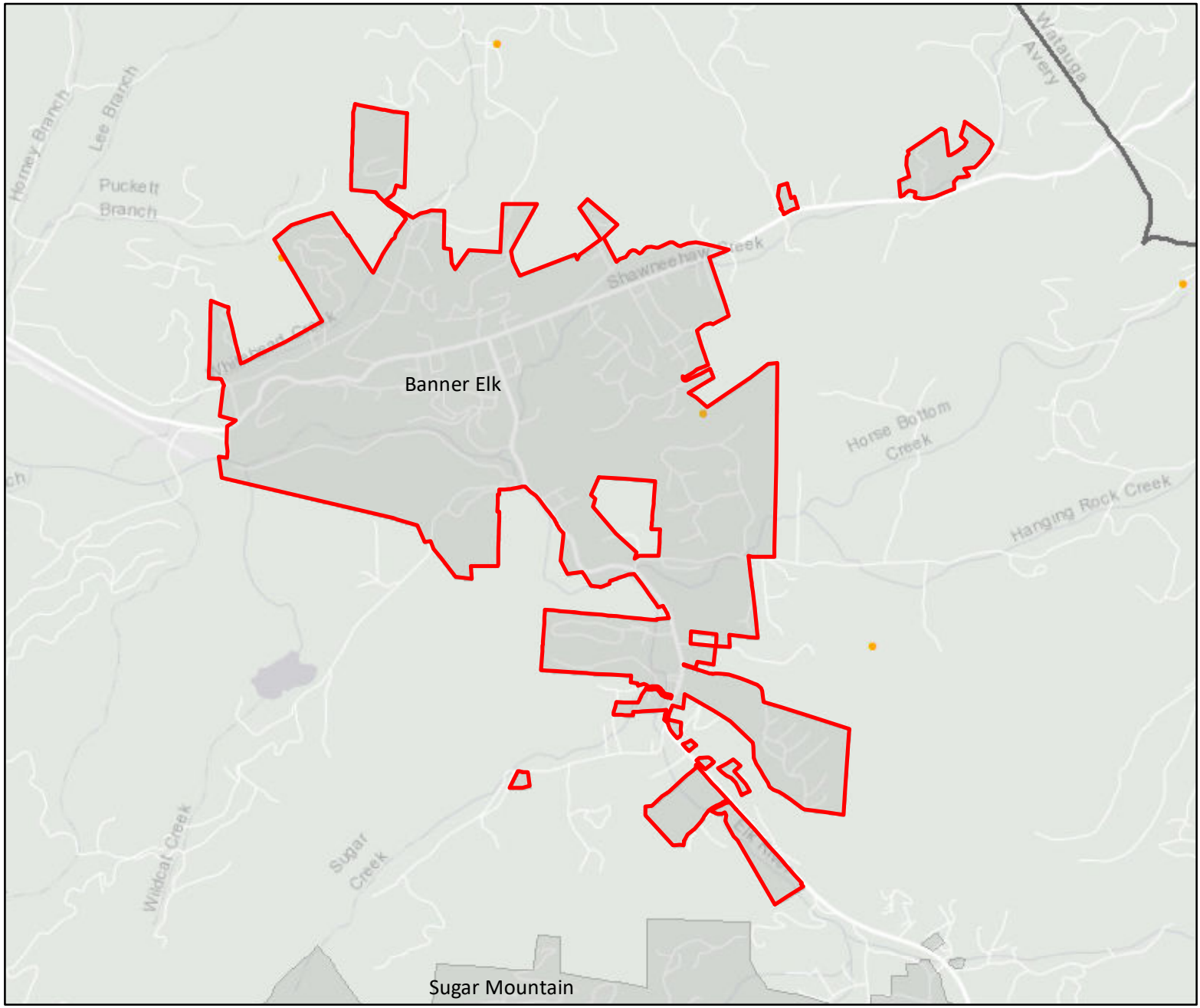
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.75 5.5 11 Miles

N

# Banner Elk - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

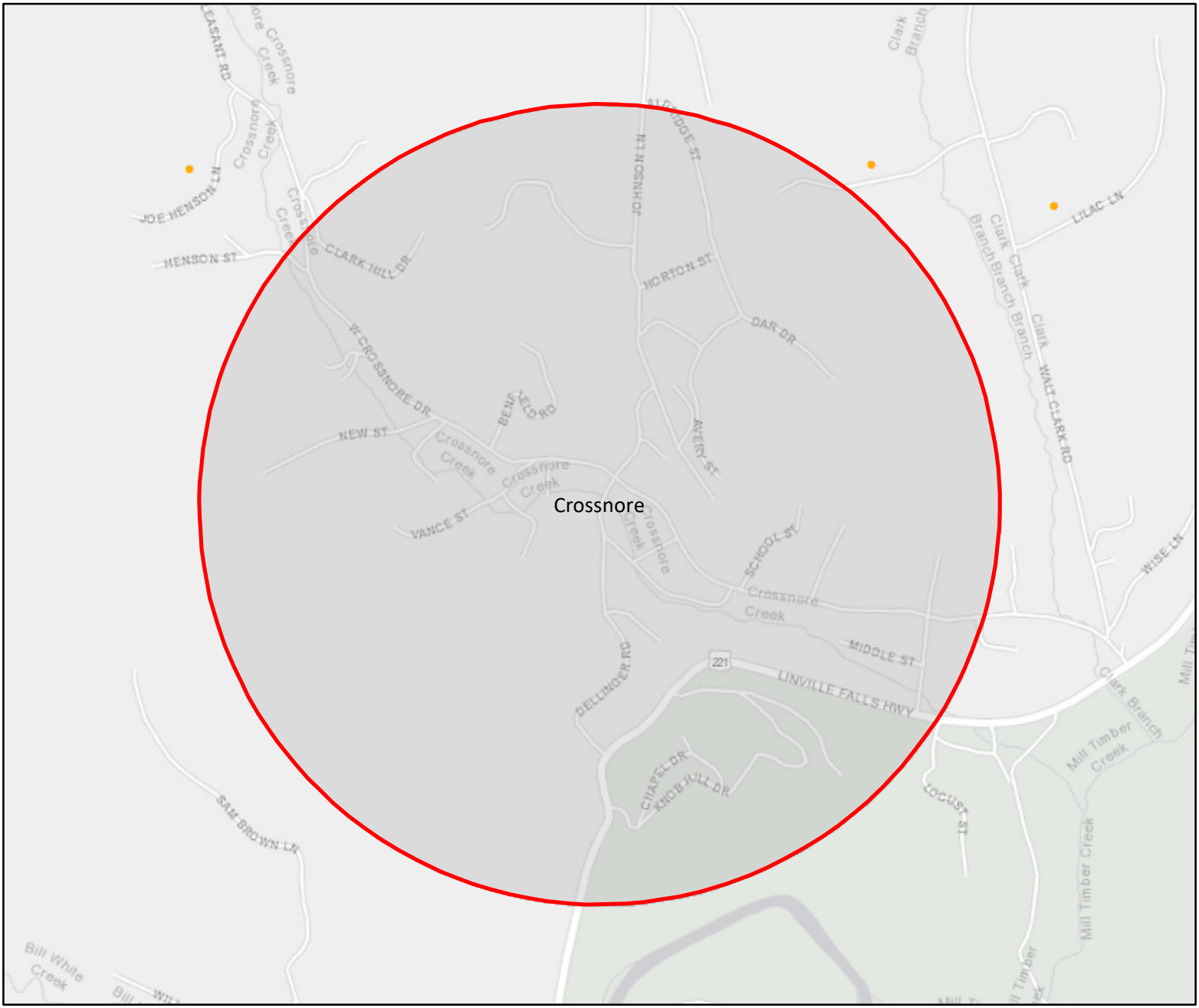
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.275 0.55 1.1 Miles

N

# Crossnore - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.075 0.15 0.3 Miles

N

# Elk Park - Wildfire Events


**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

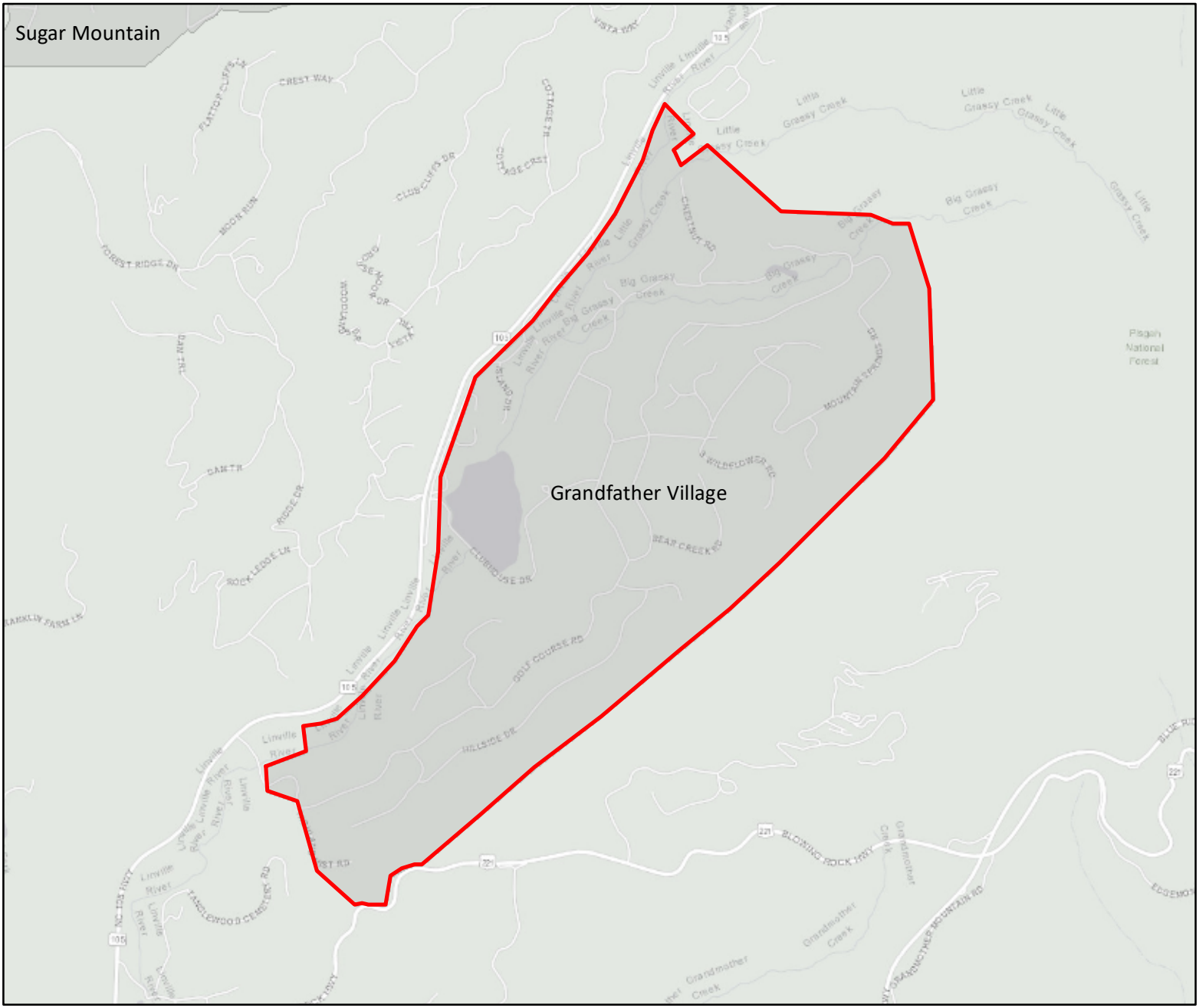
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.1 0.2 0.4 Miles

N

# Grandfather Village - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

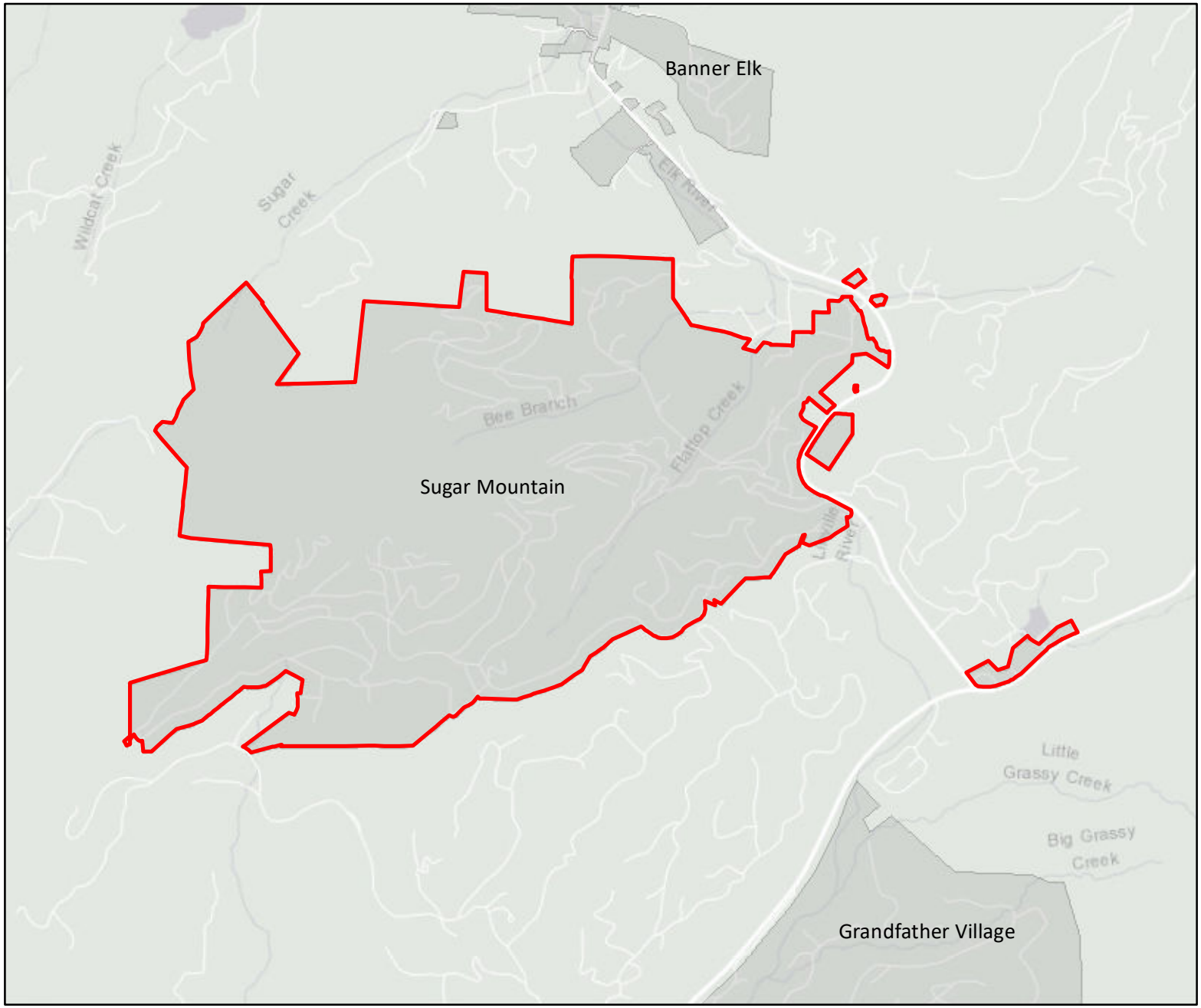
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.225 0.45 0.9 Miles

N

# Sugar Mountain - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

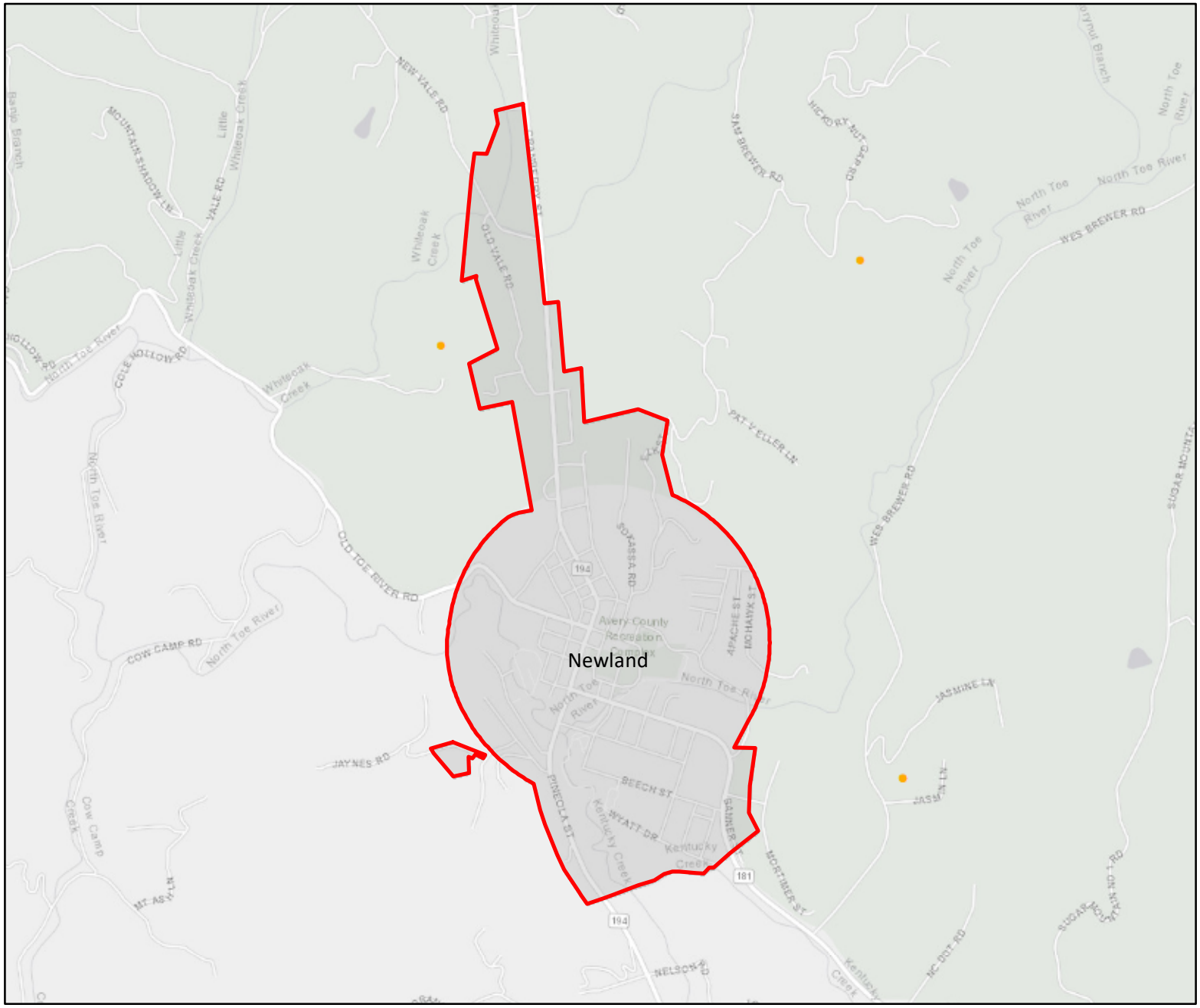
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.275 0.55 1.1 Miles

N

# Newland - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

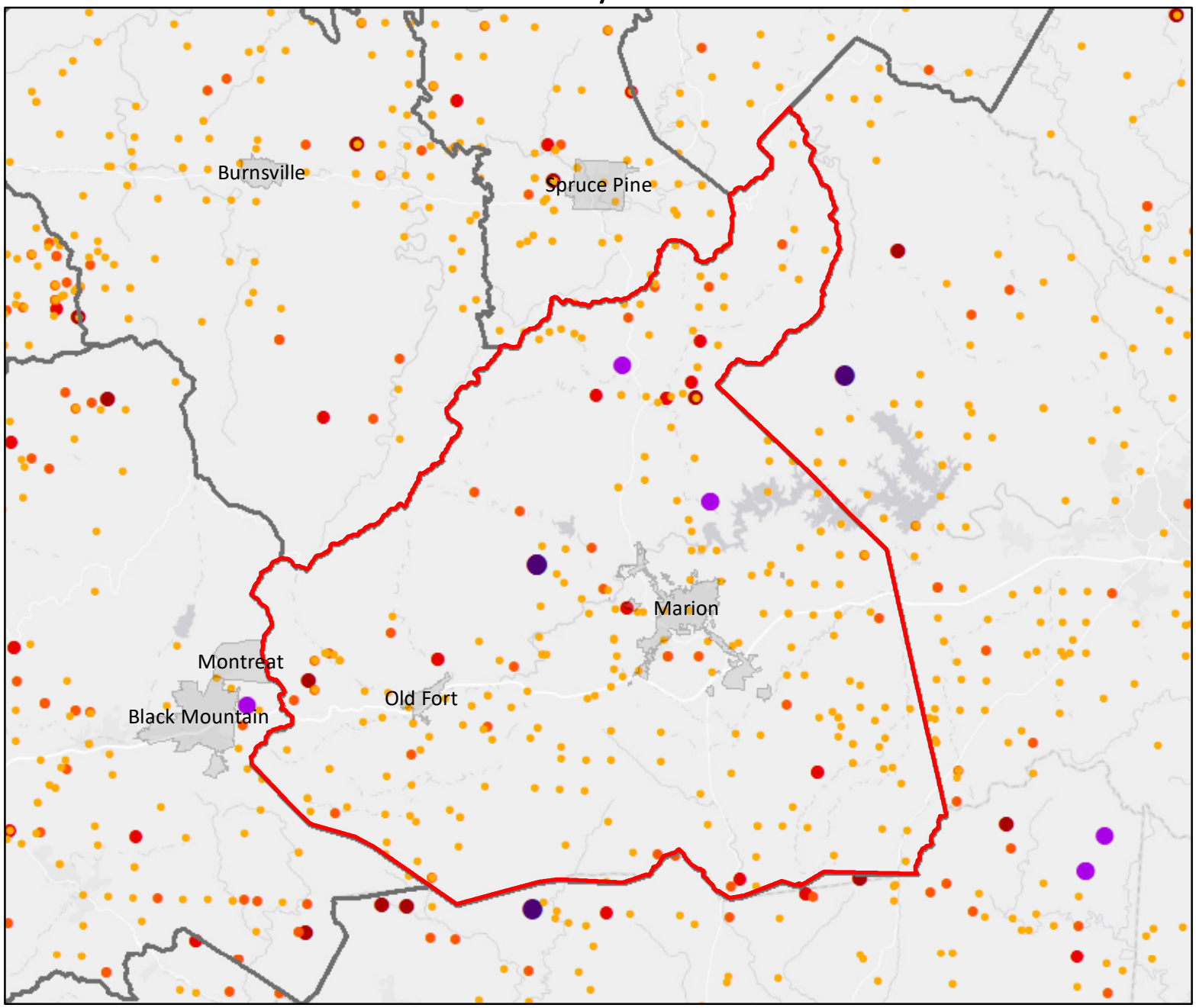
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

# McDowell County - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

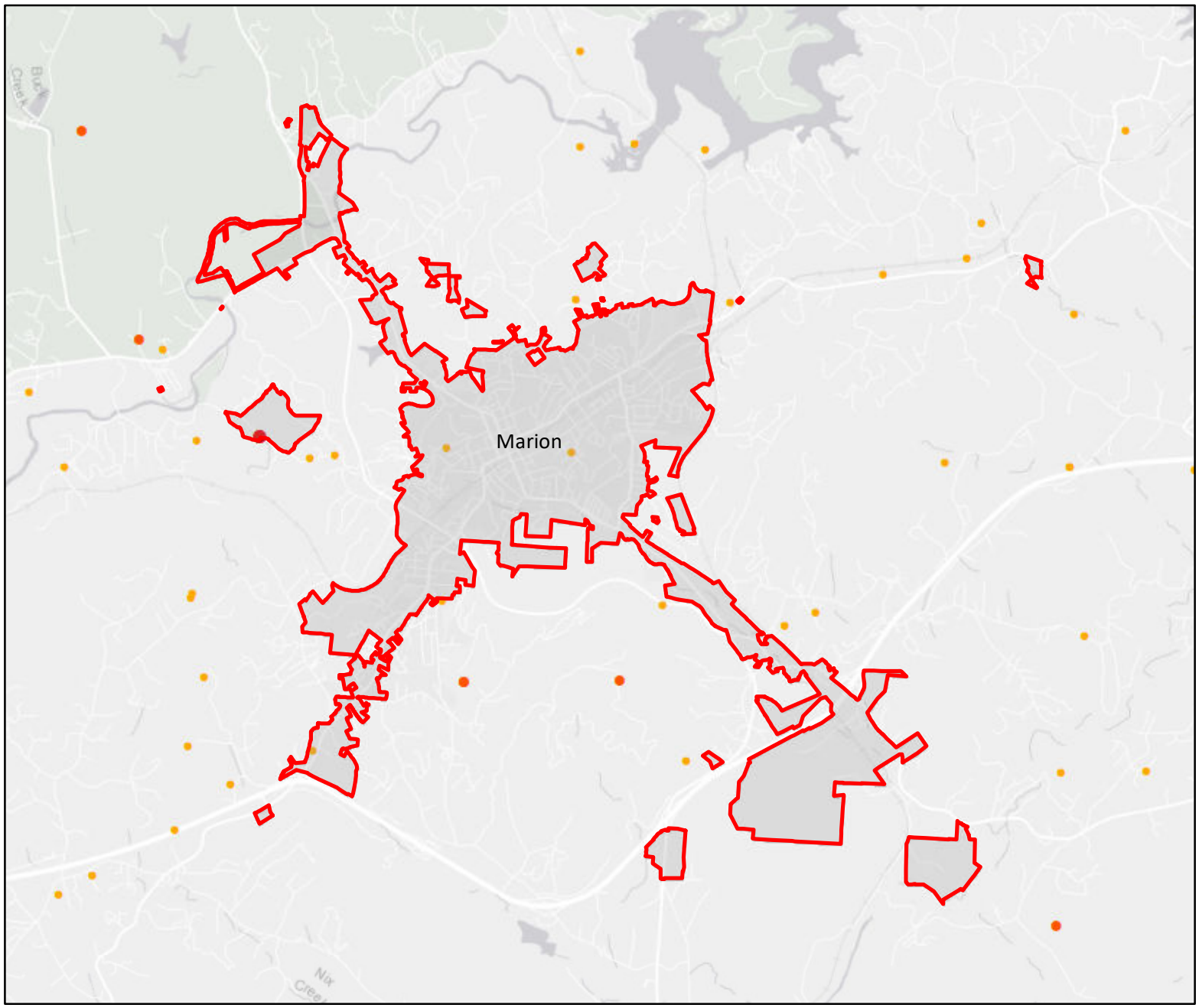
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3.25 6.5 13 Miles

N

# Marion - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

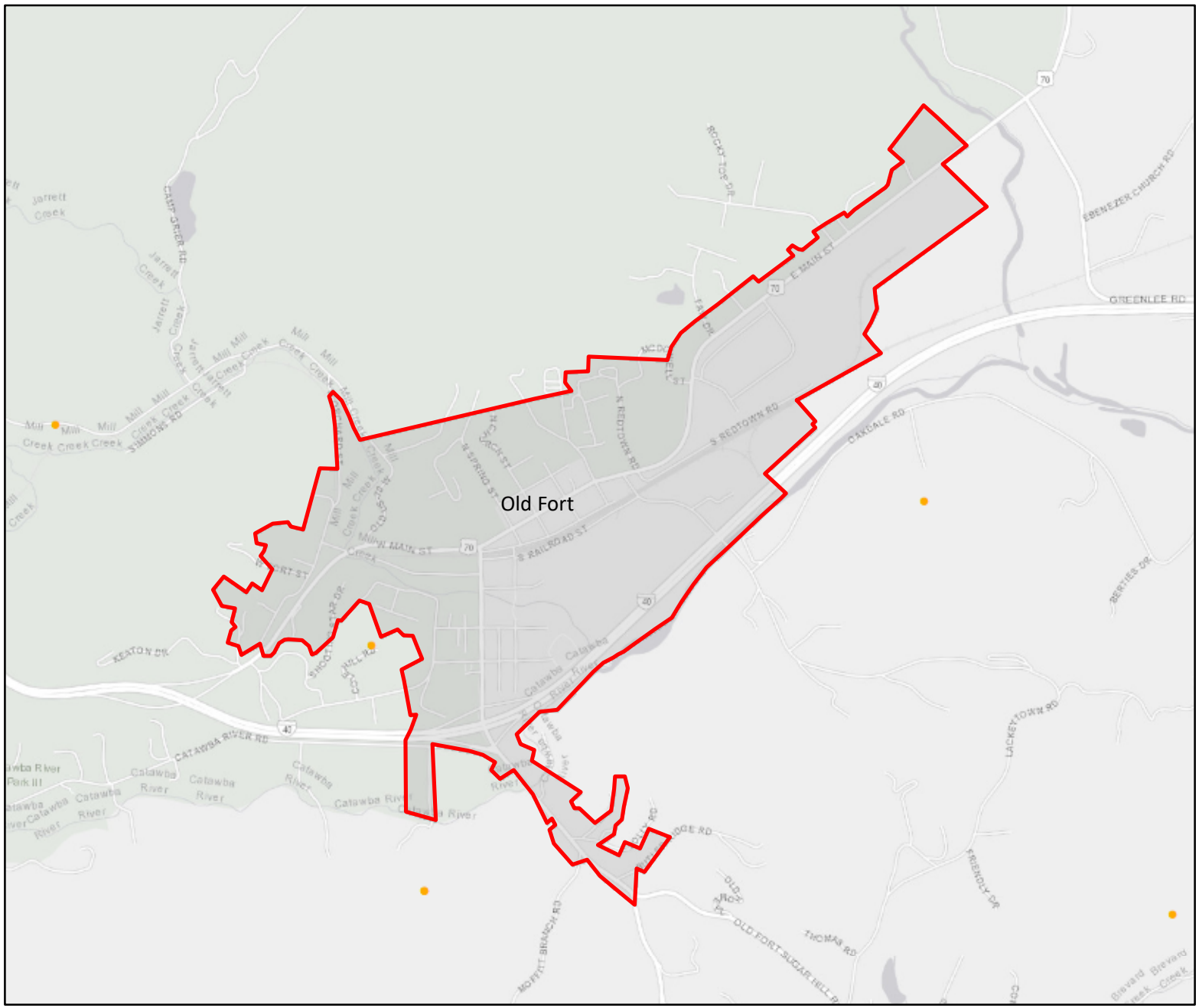
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

# Old Fort - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

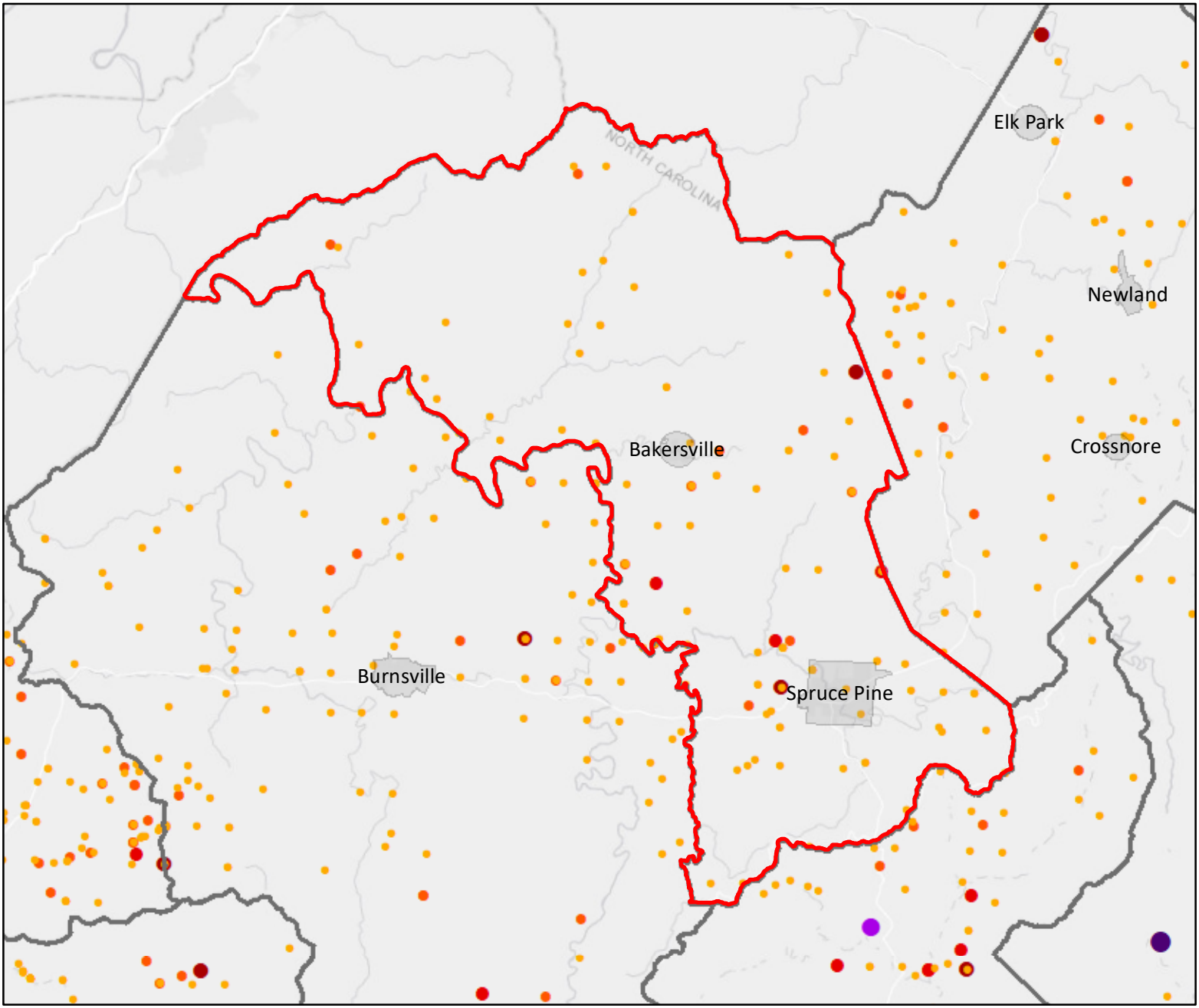
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

# Mitchell County - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

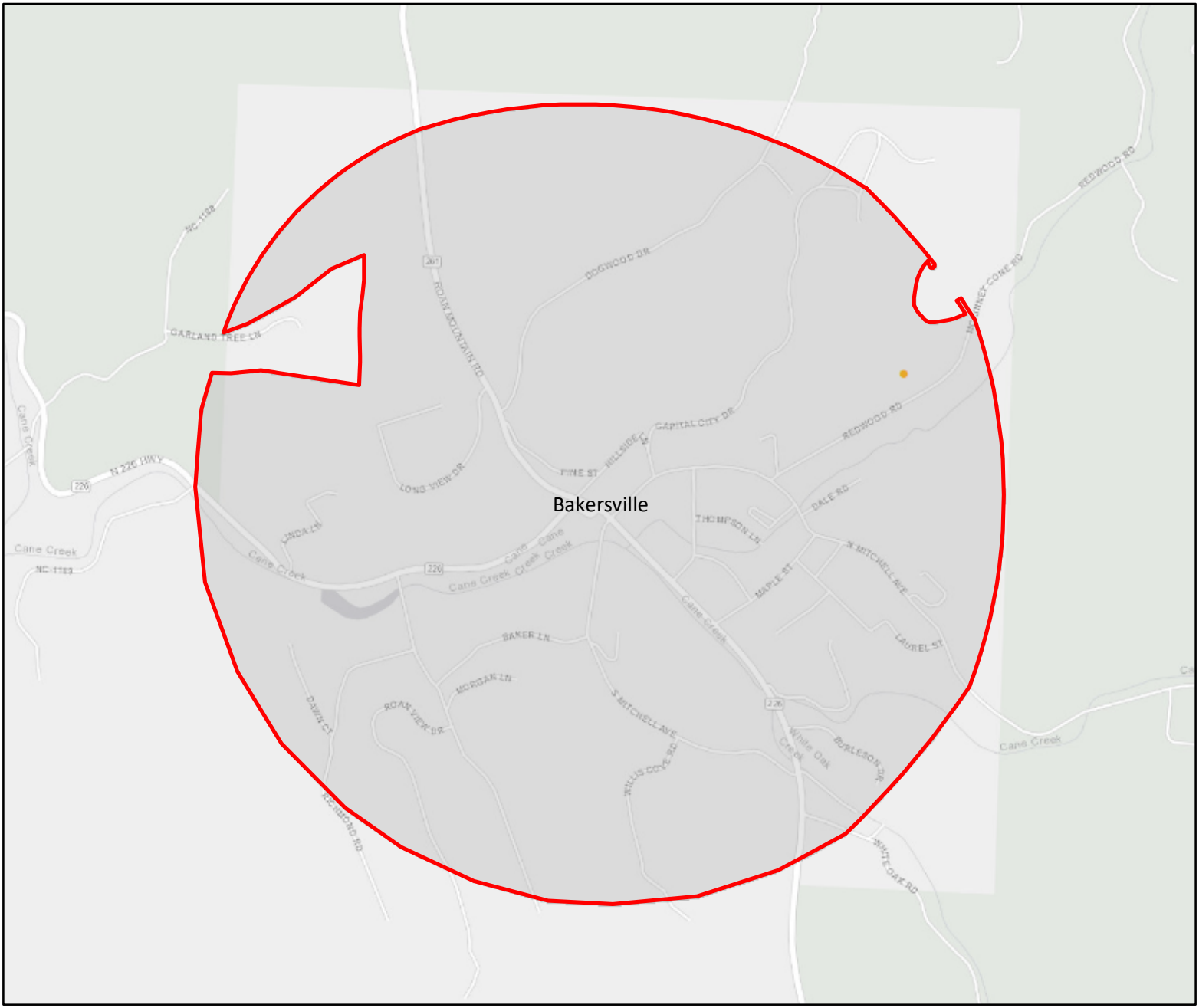
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.5 5 10 Miles

N

# Bakersville - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

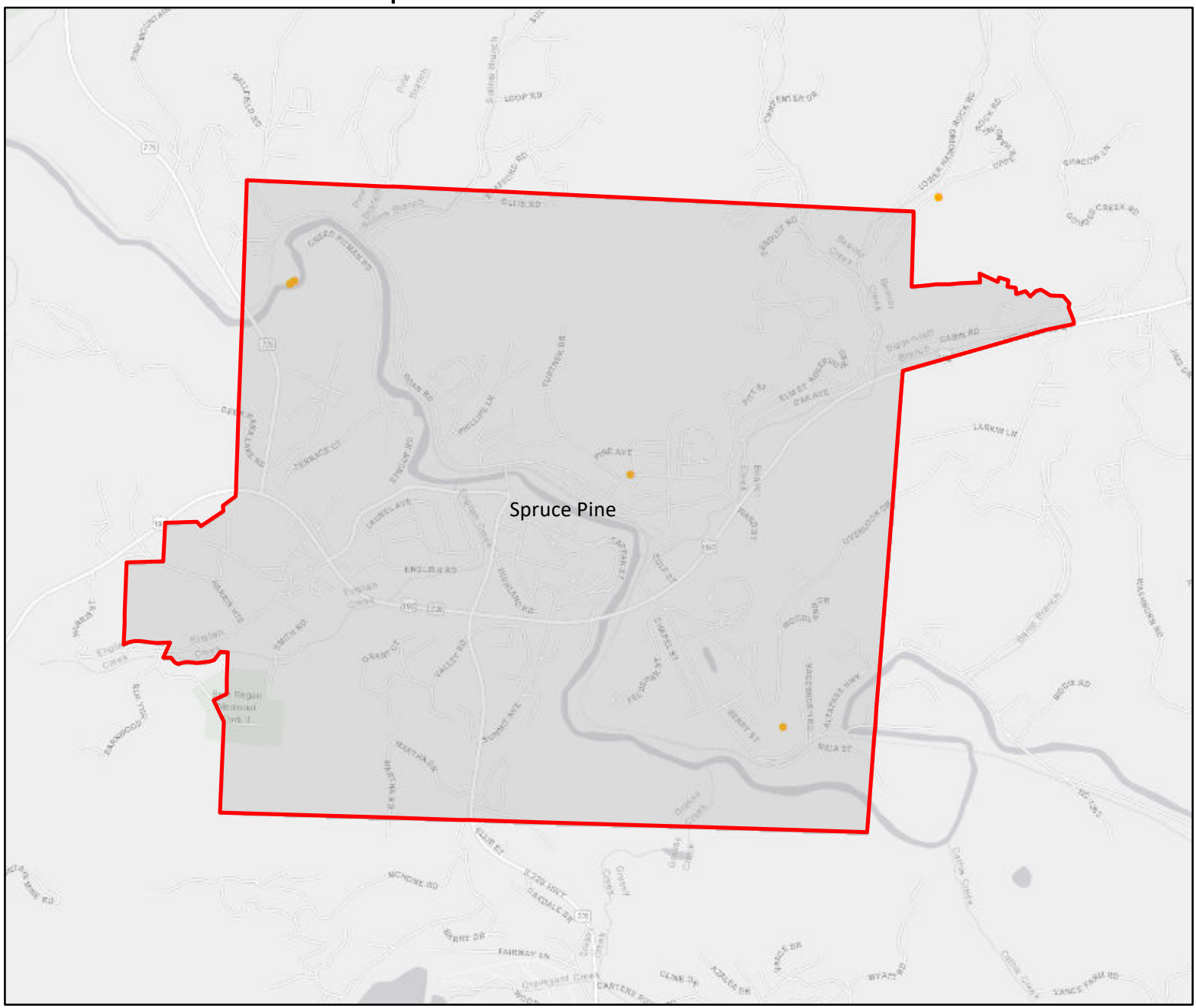
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.1 0.2 0.4 Miles

N

# Spruce Pine - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

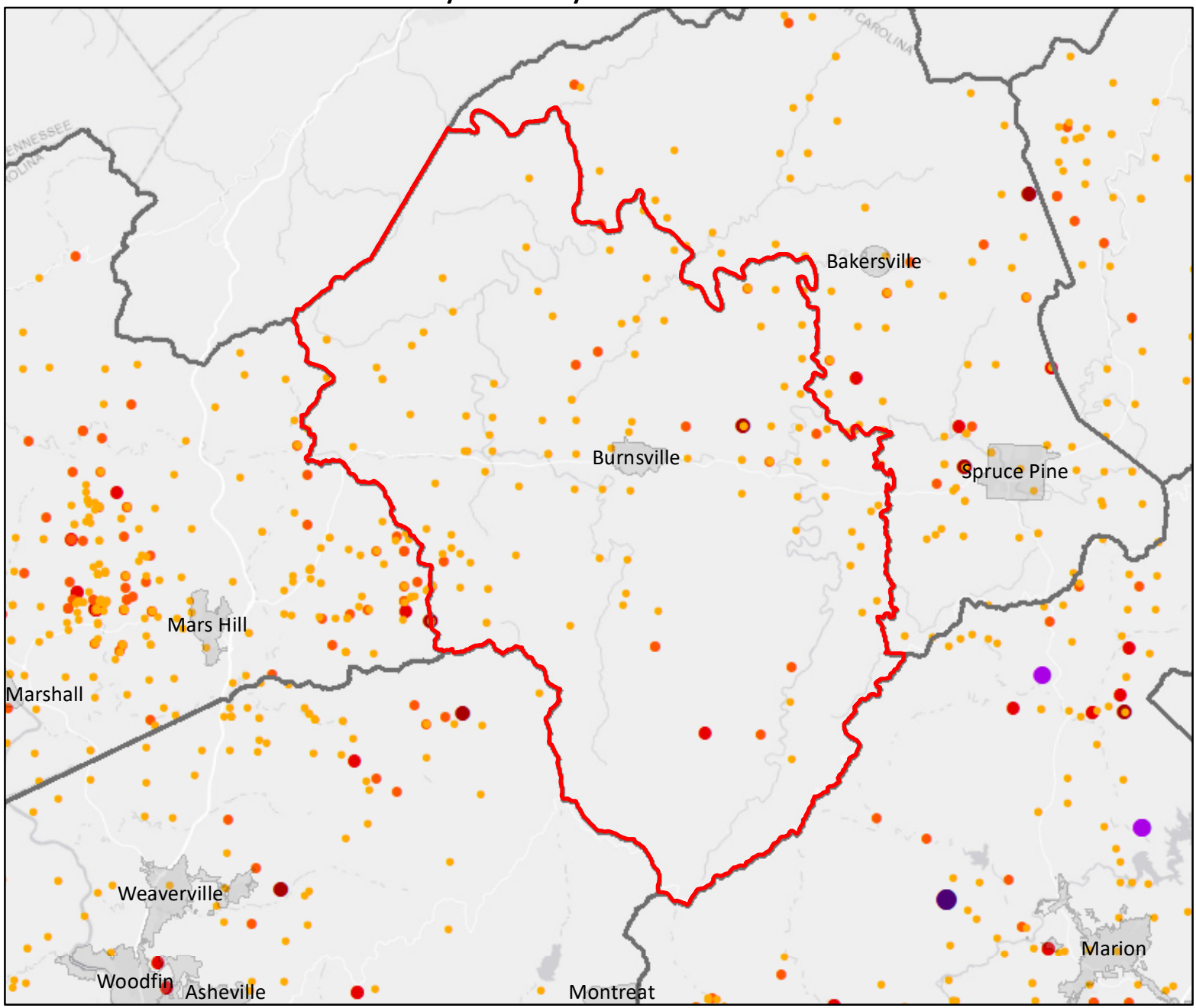
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.25 0.5 1 Miles

N

# Yancey County - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

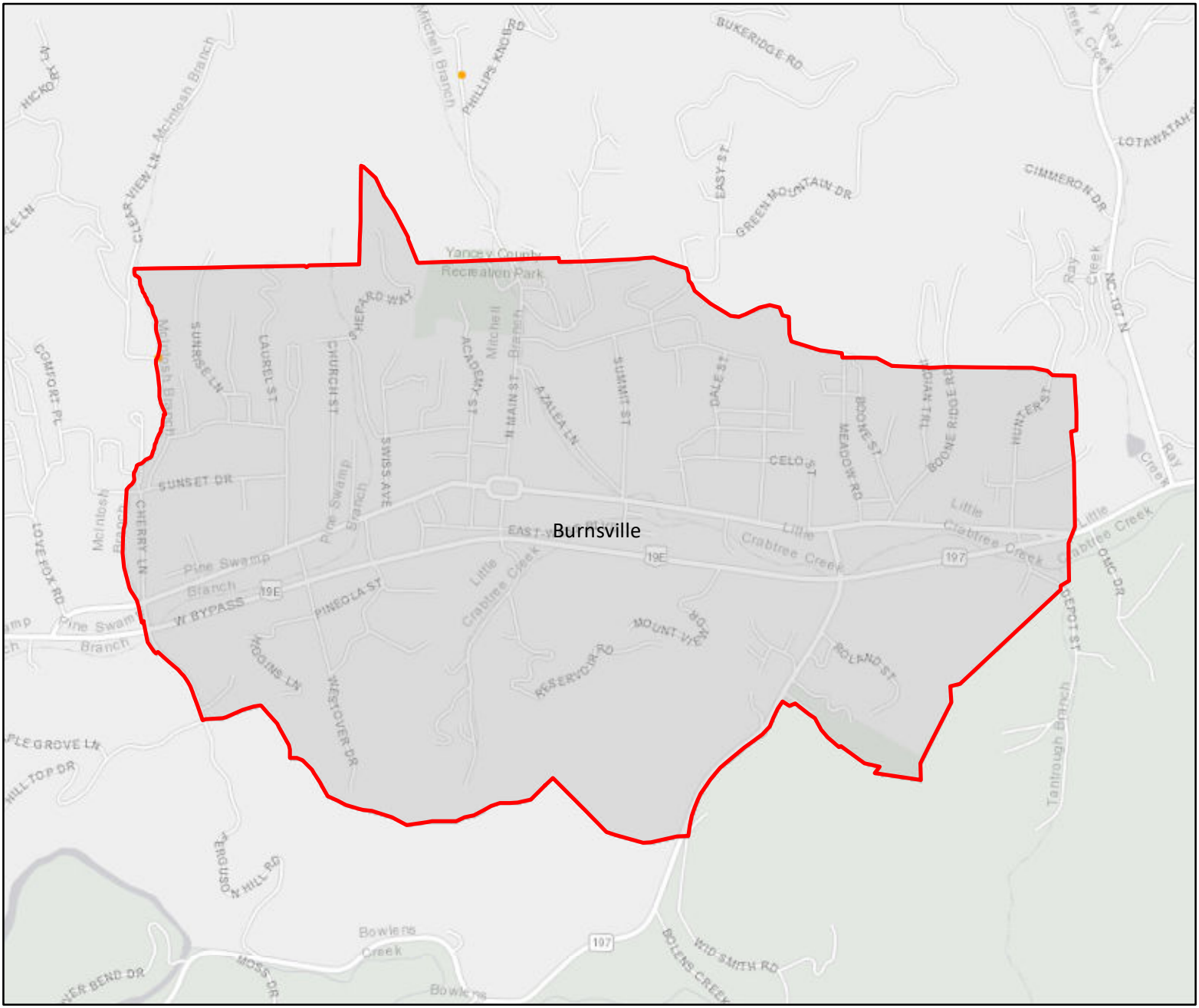
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3 6 12 Miles

N

# Burnsville - Wildfire Events




**Legend**

- Municipal Boundary
- County Boundary

**Acres Impacted**

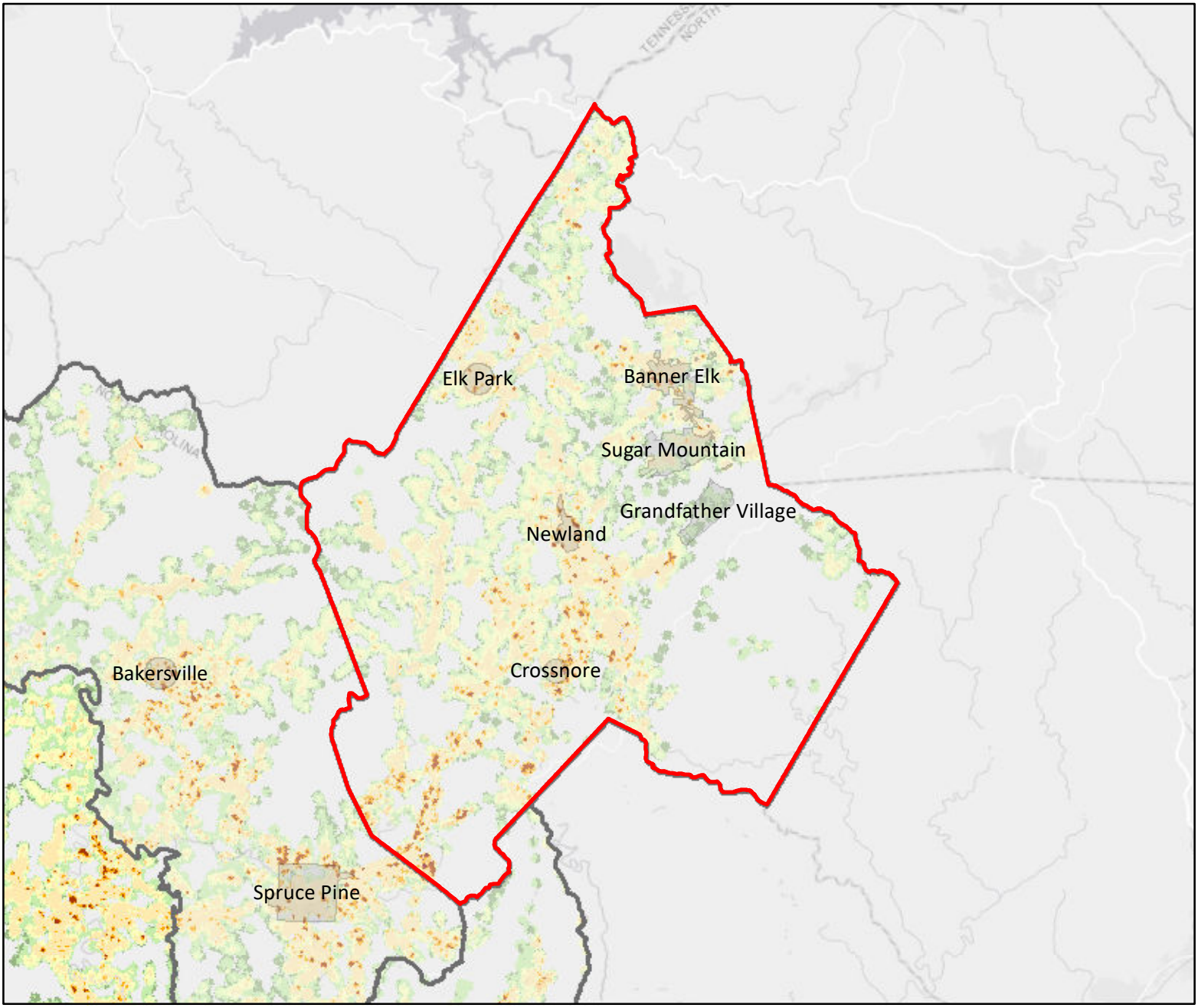
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 500
- 501 - 1000
- >1000

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.15 0.3 0.6 Miles

N

# Avery County - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

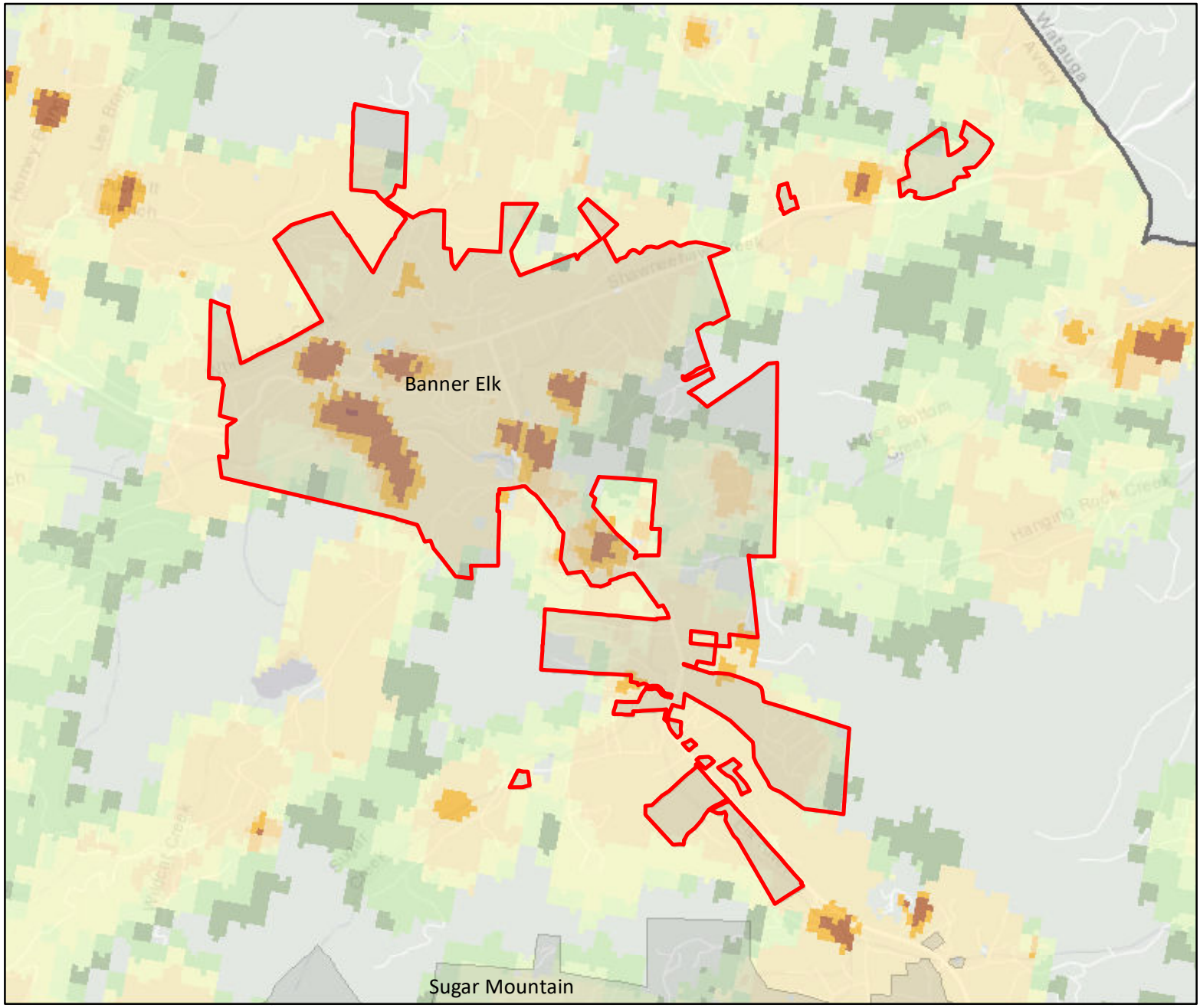
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.75 5.5 11 Miles

N

# Banner Elk - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

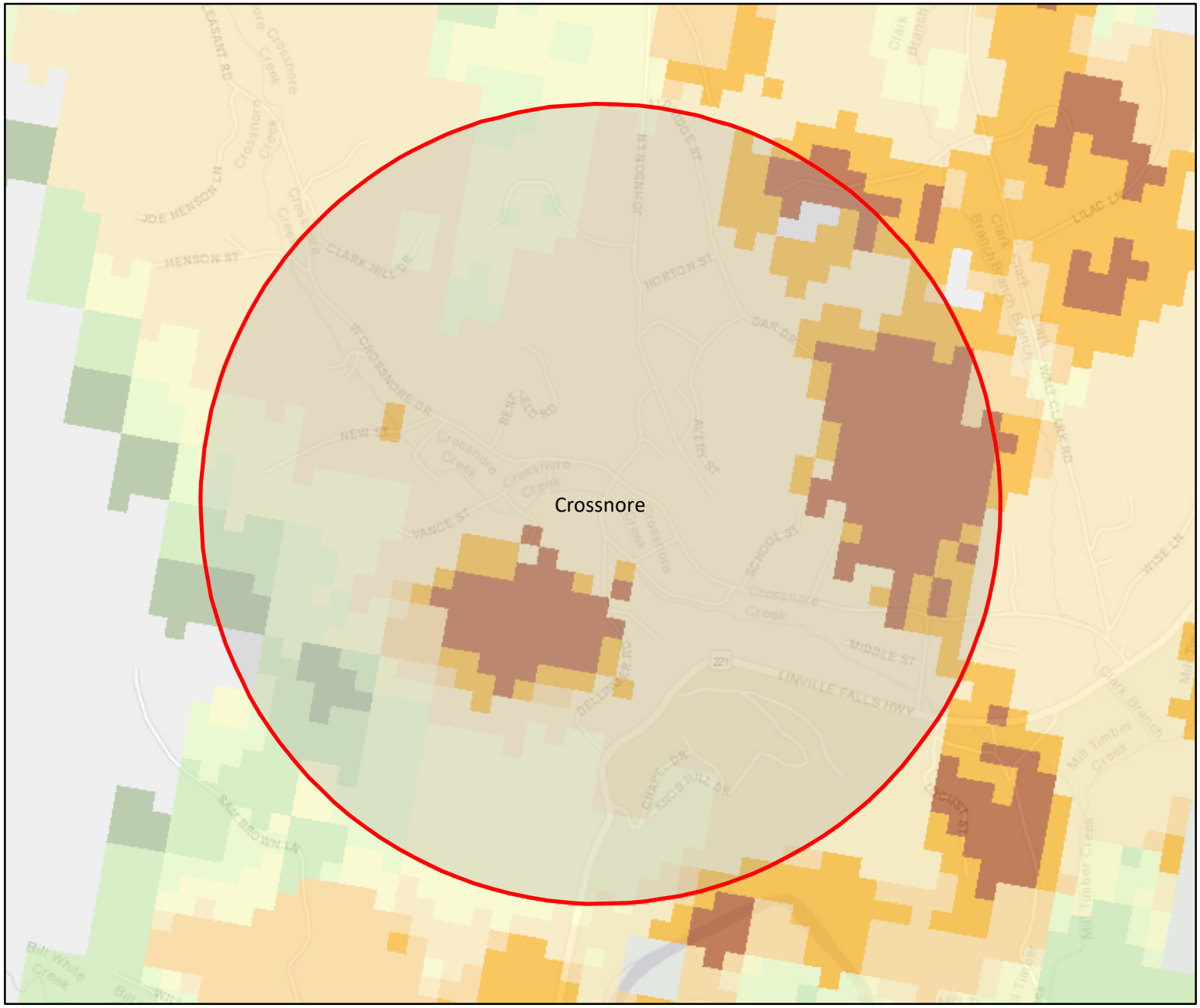
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.275 0.55 1.1 Miles

N

# Crossnore - Wildland Urban Interface Risk Index




**Legend**

- Municipal Boundary
- County Boundary

**WUI Risk Index**

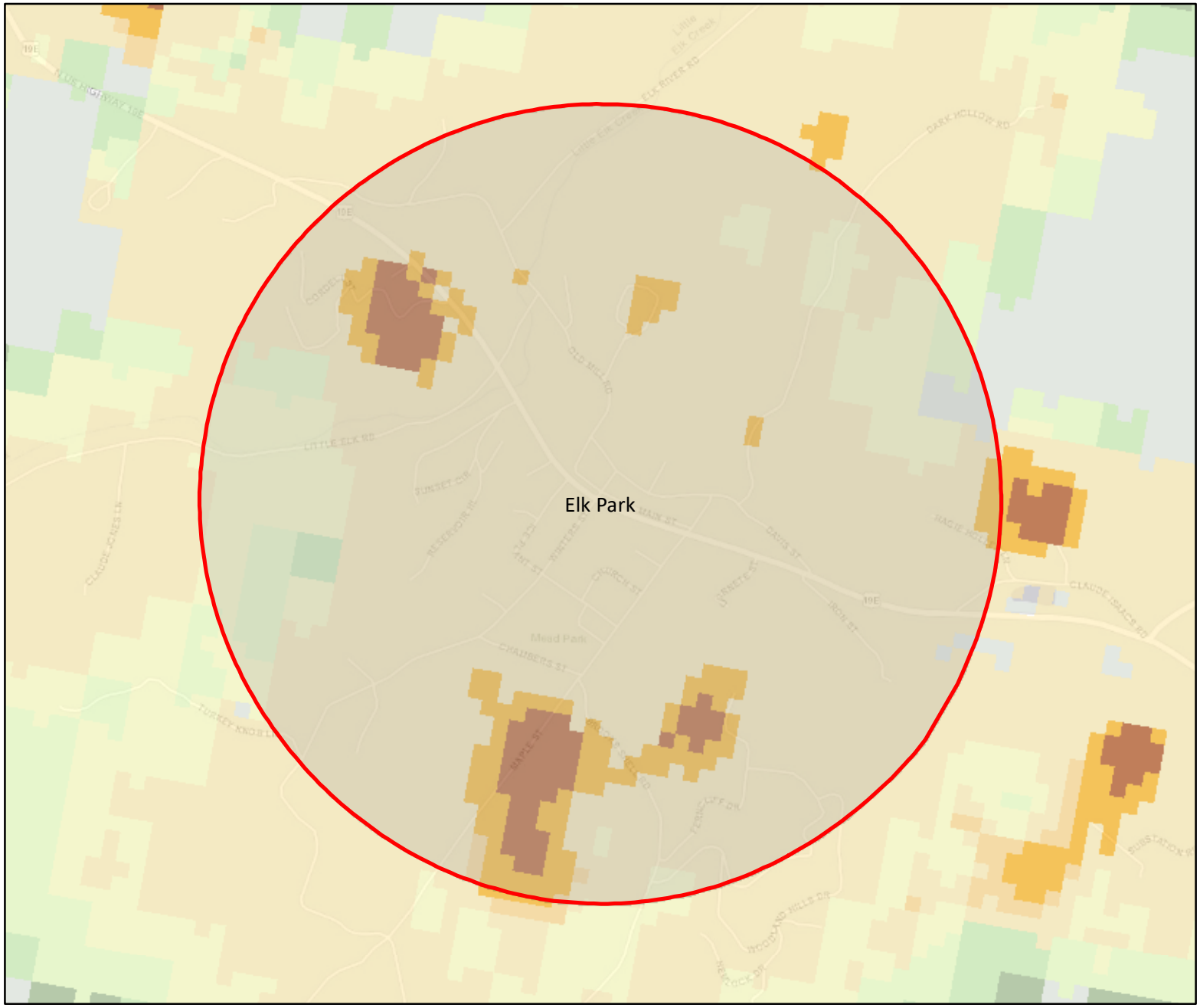
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.075 0.15 0.3 Miles

N

# Elk Park - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

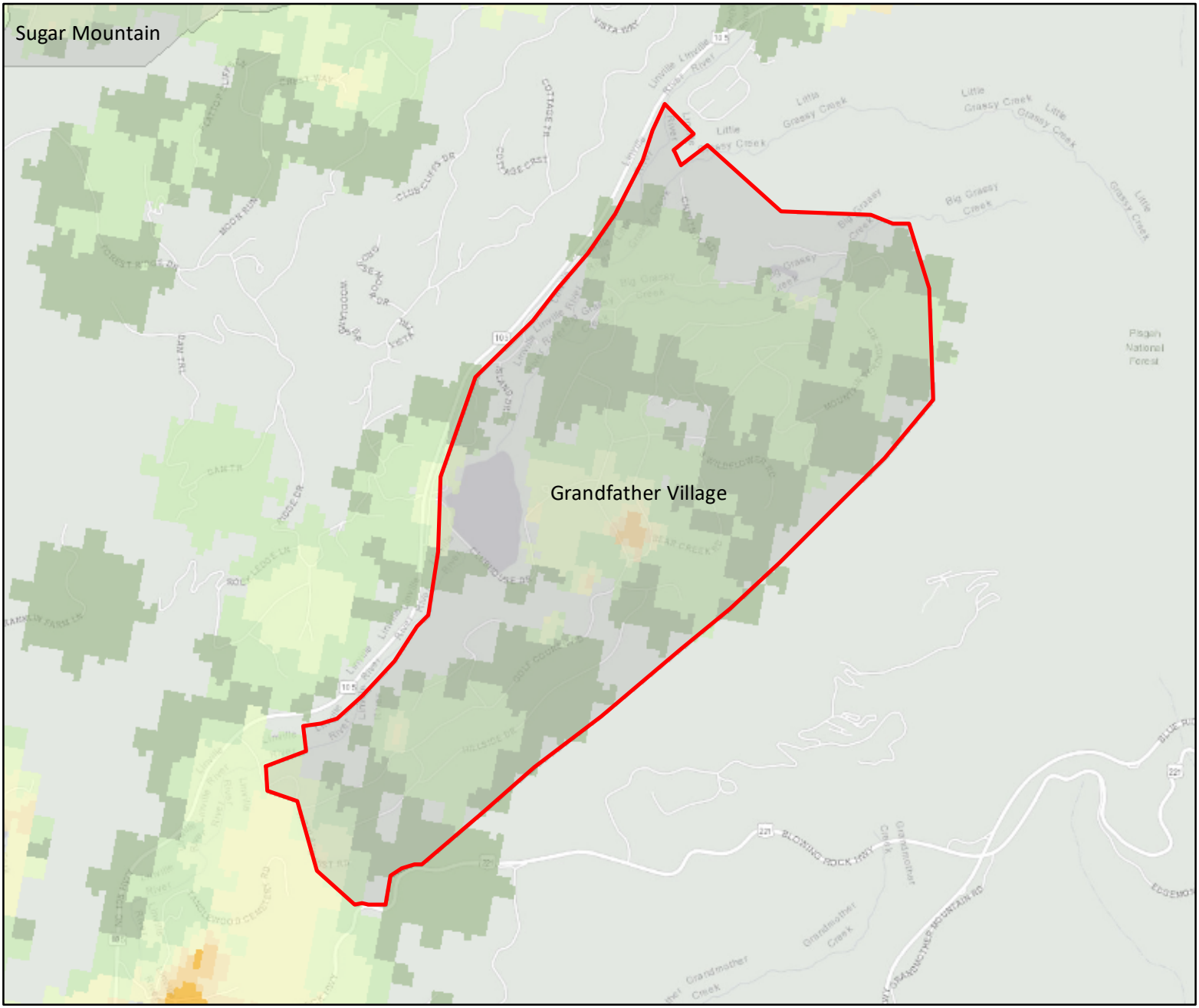
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.1 0.2 0.4 Miles

N

# Grandfather Village - Wildland Urban Interface Risk Index




**Legend**

- Municipal Boundary
- County Boundary

**WUI Risk Index**

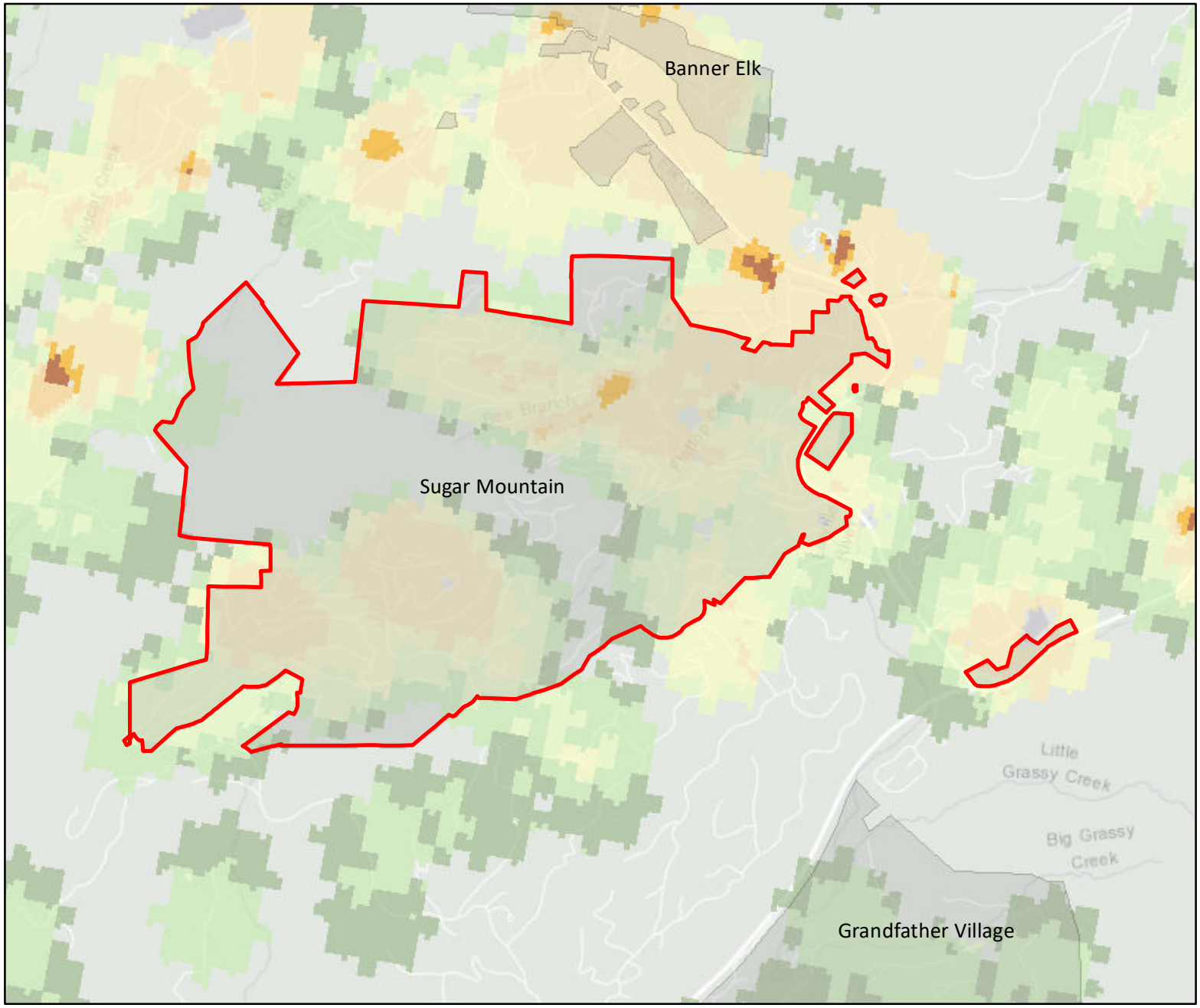
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.225 0.45 0.9 Miles

N

# Sugar Mountain - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

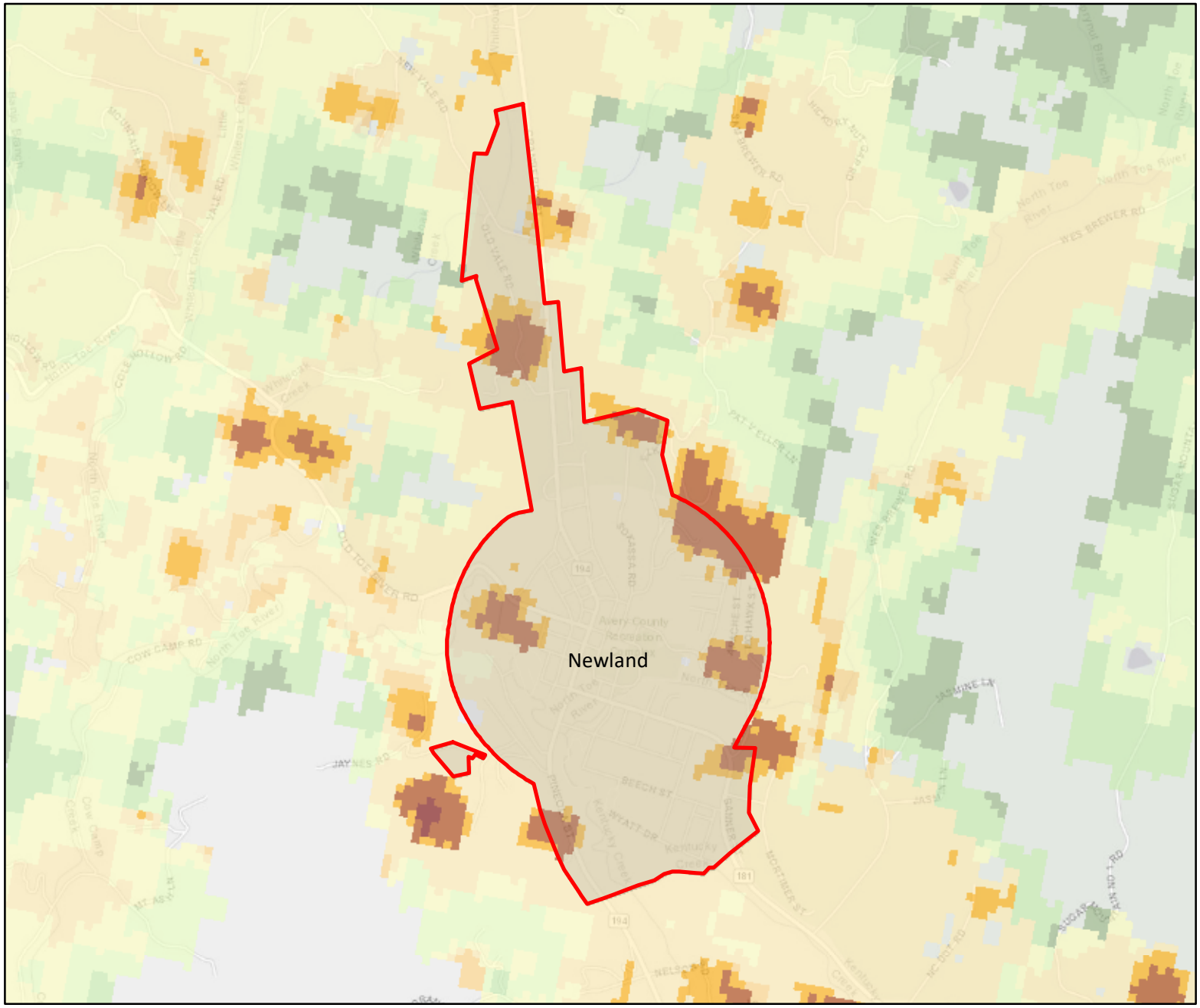
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.275 0.55 1.1 Miles

N

# Newland - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

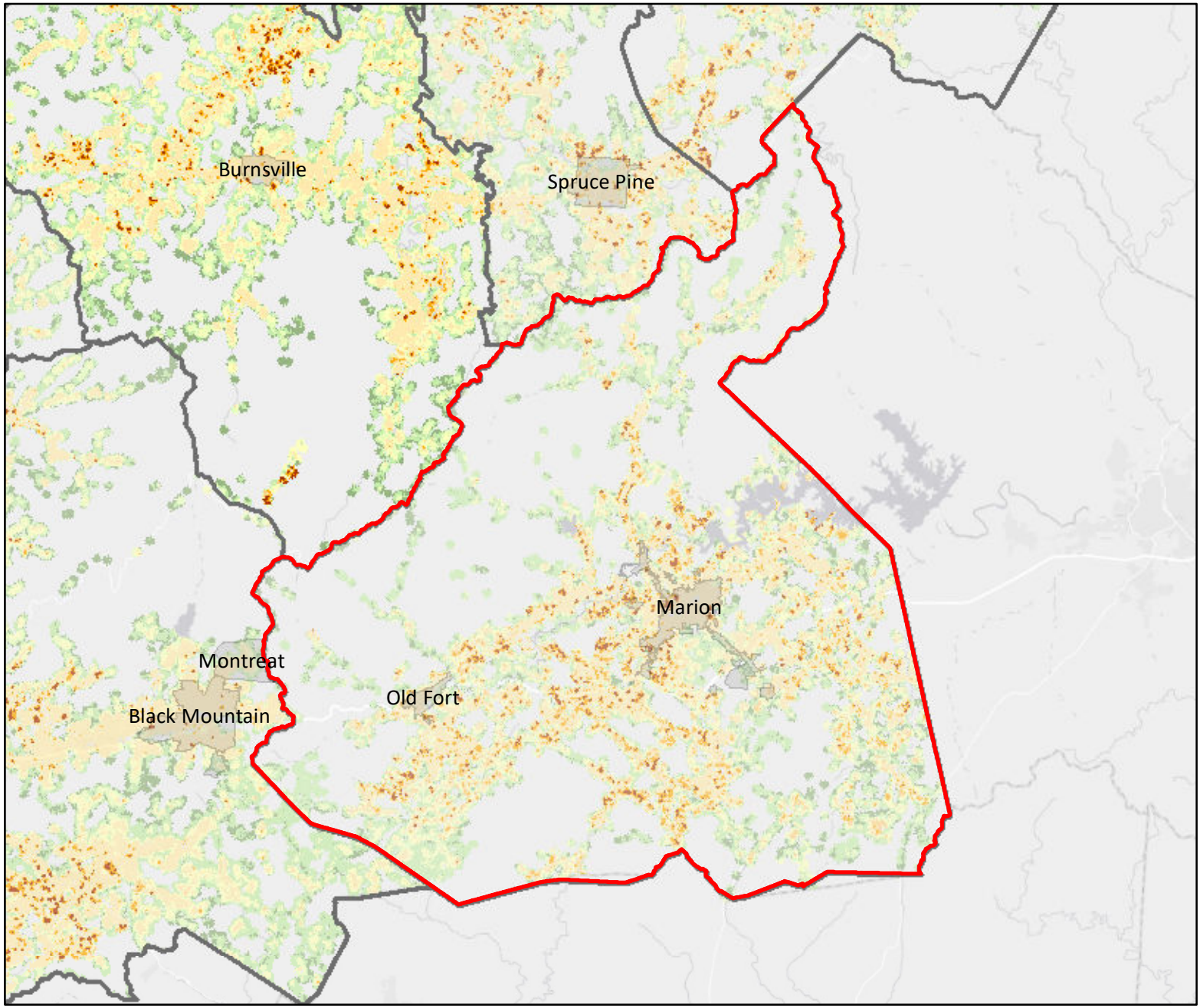
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

# McDowell County - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

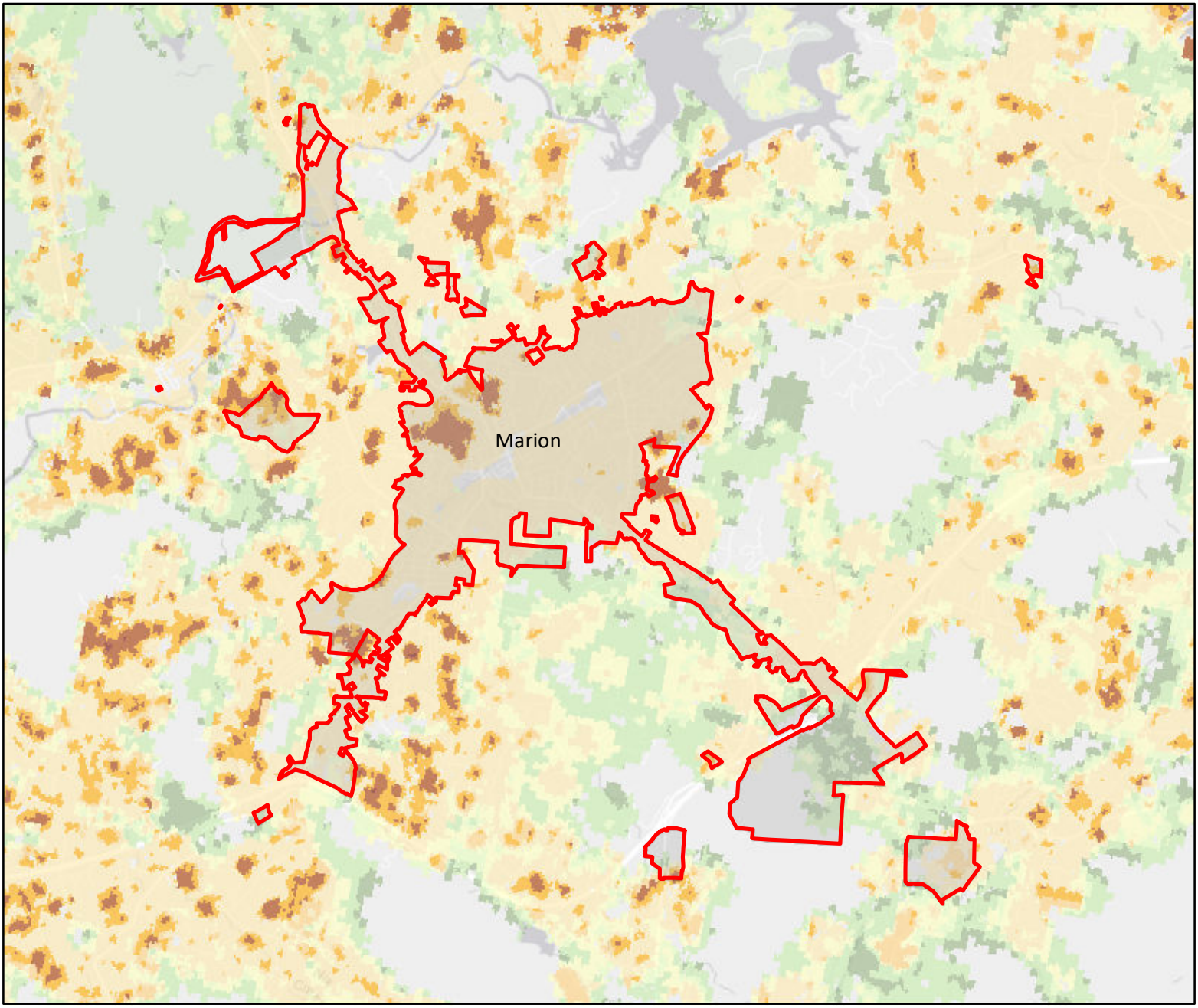
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3.25 6.5 13 Miles

N

# Marion - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

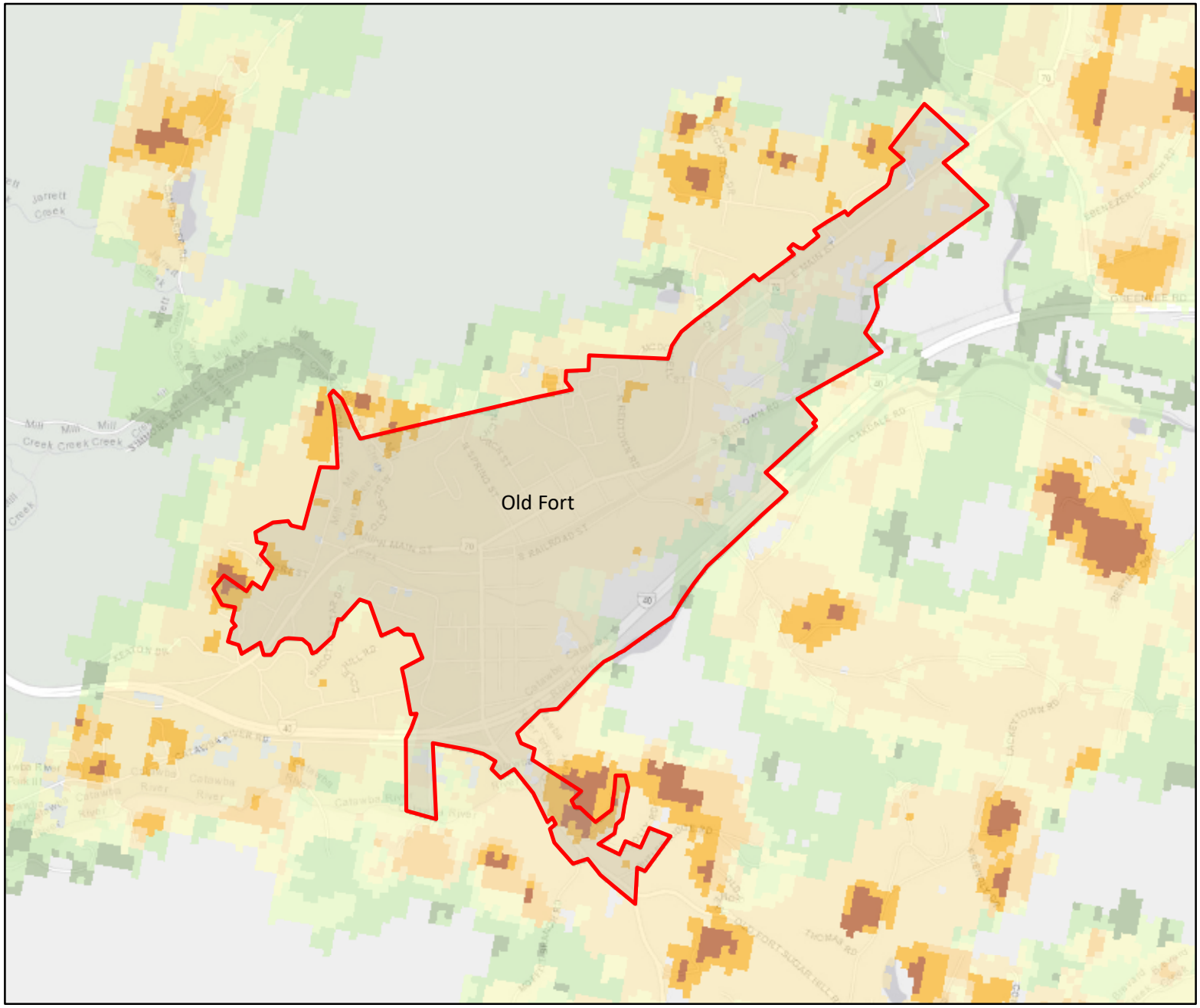
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.5 1 2 Miles

N

# Old Fort - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

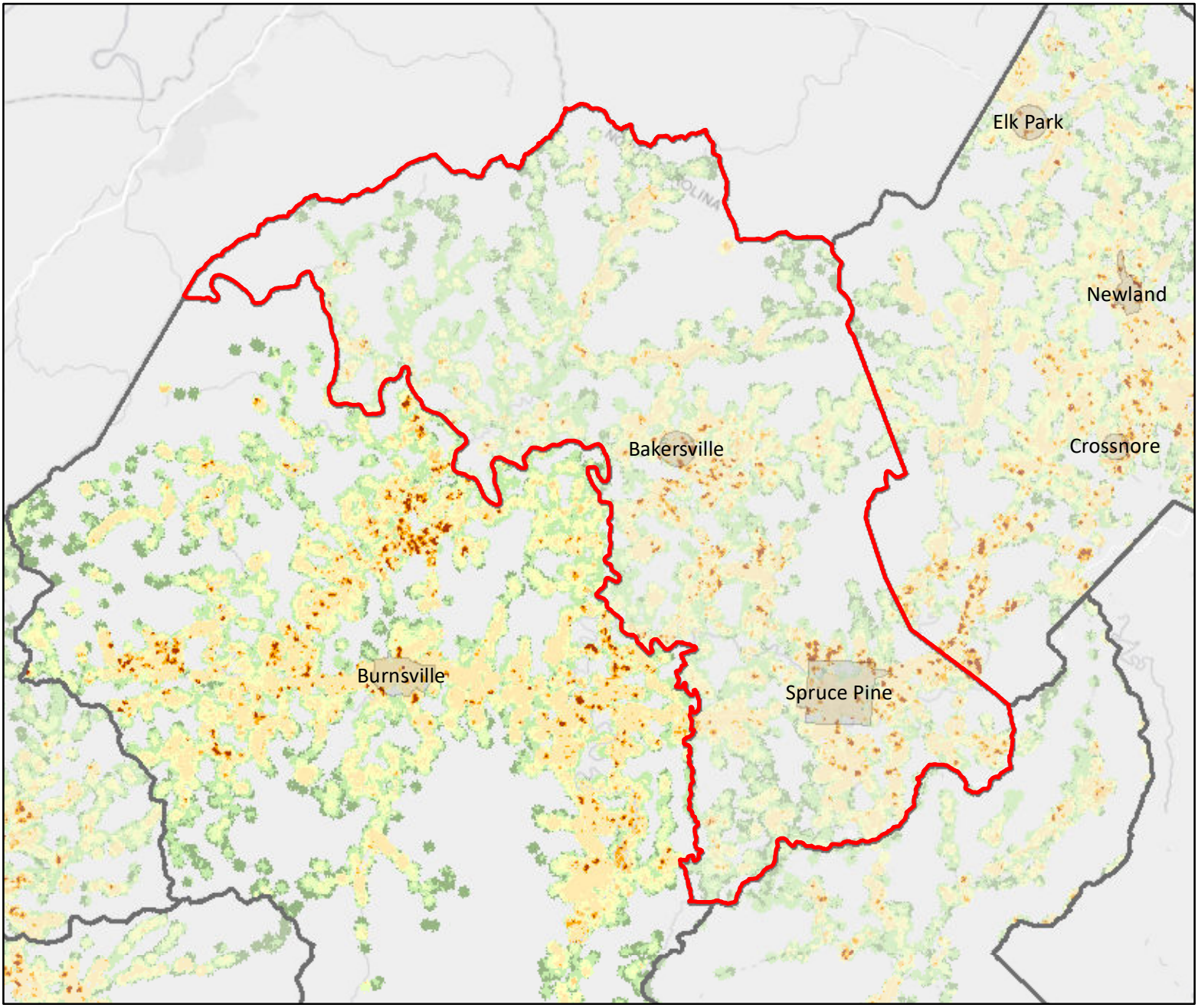
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.2 0.4 0.8 Miles

N

# Mitchell County - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

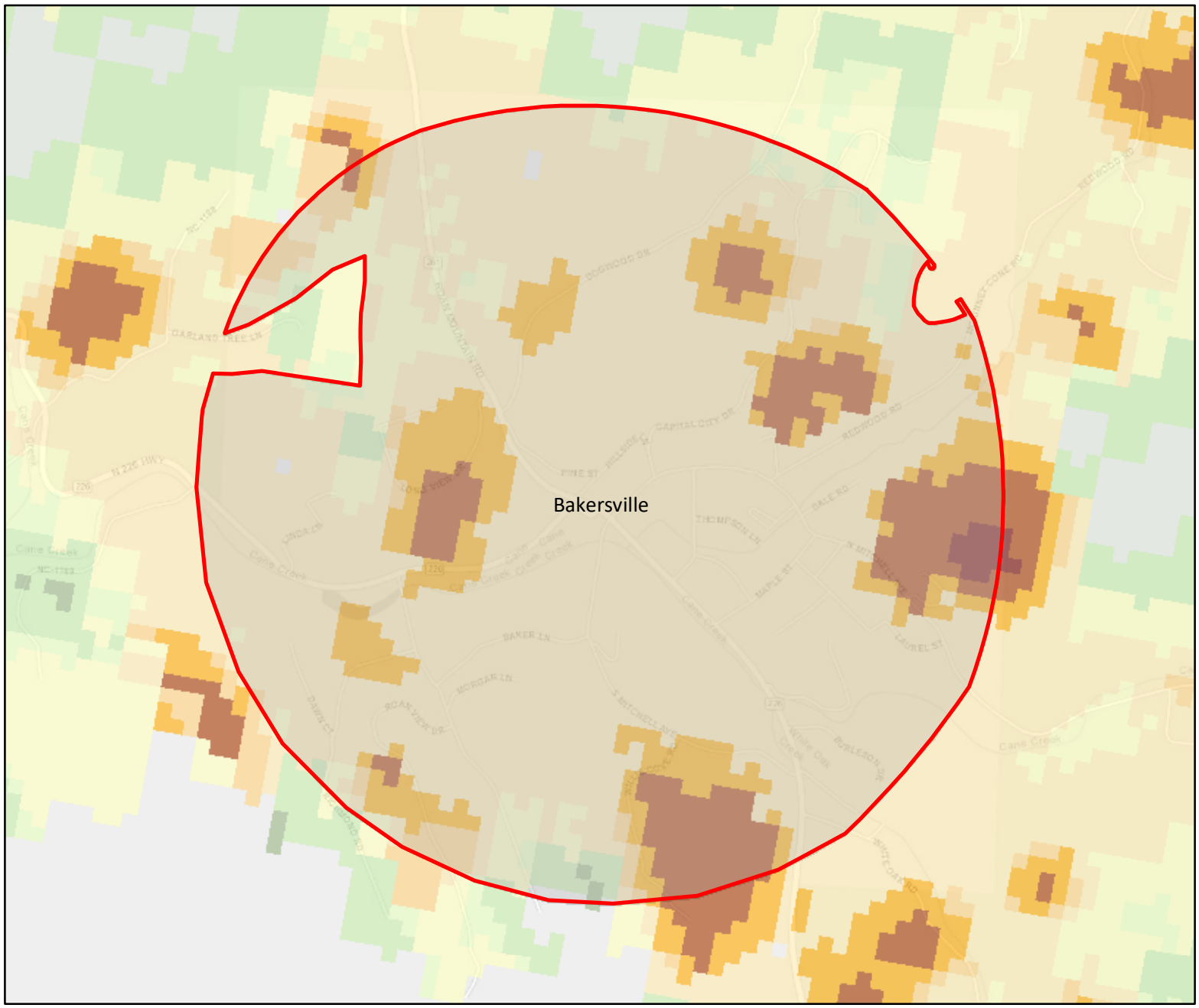
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 2.5 5 10 Miles

N

# Bakersville - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

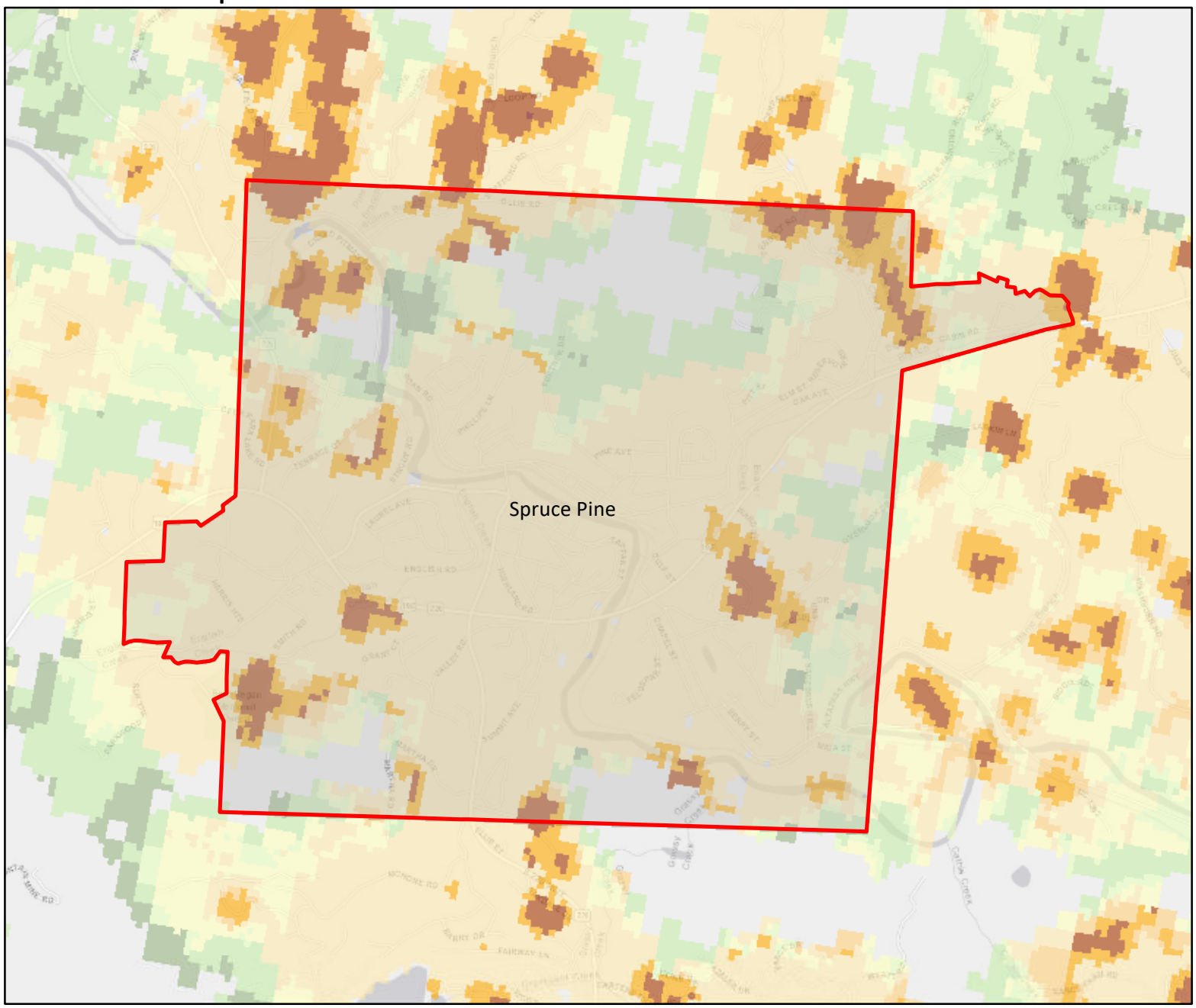
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.1 0.2 0.4 Miles

N

# Spruce Pine - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

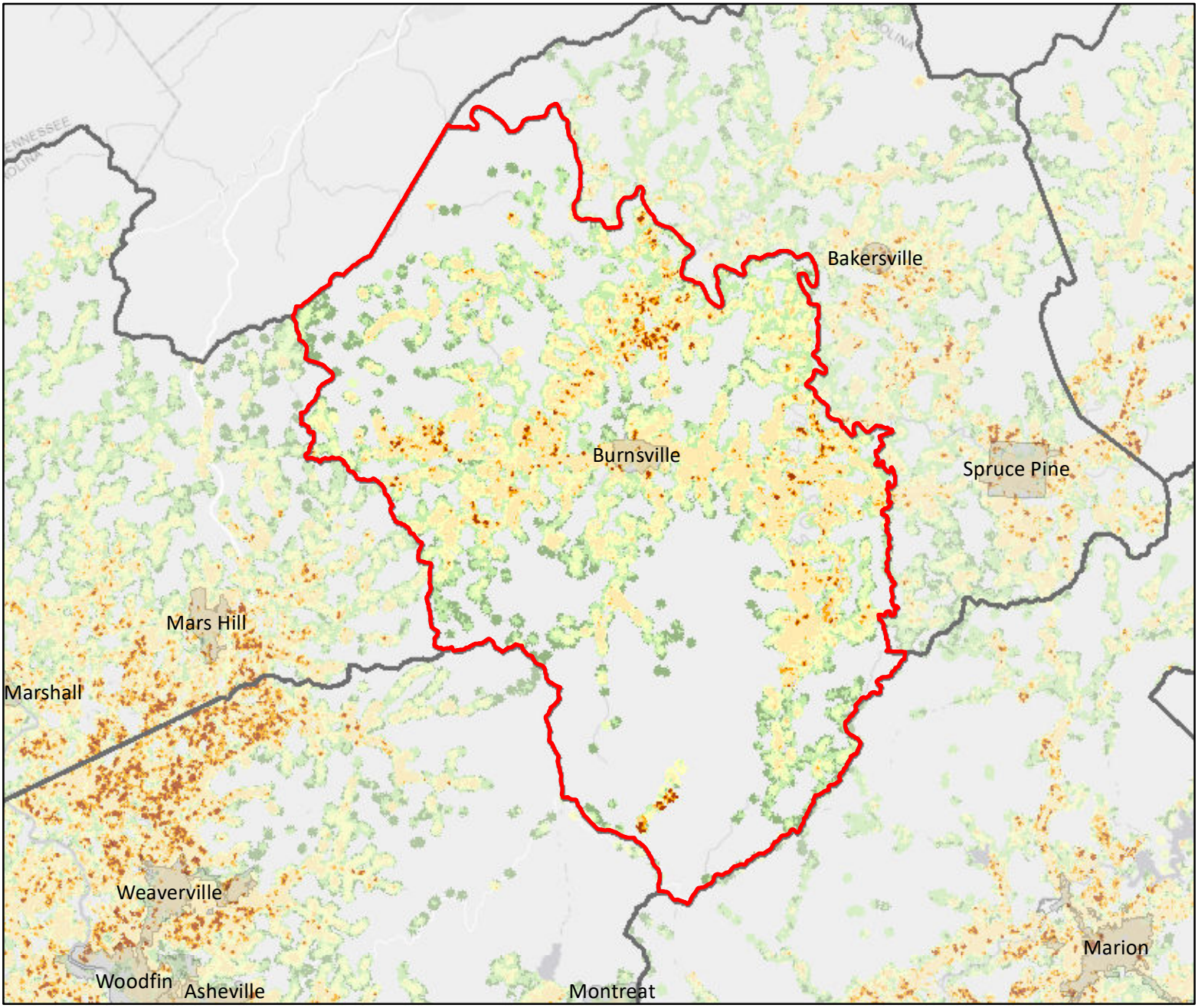
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS WILDFIRE RISK ASSESSMENT PORTAL

0 0.25 0.5 1 Miles

N

# Yancey County - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

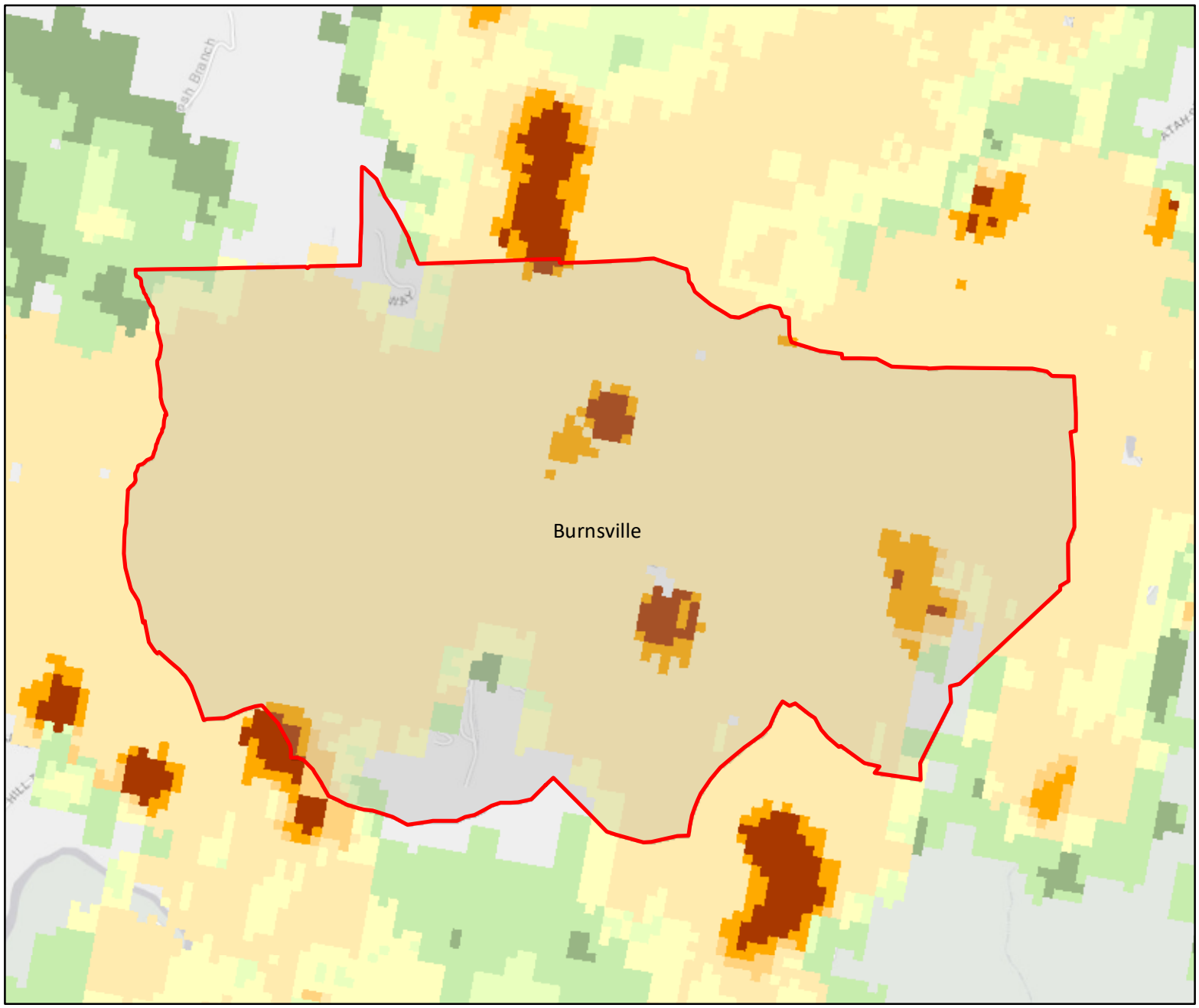
0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 3 6 12 Miles

N

# Burnsville - Wildland Urban Interface Risk Index




**Legend**

Municipal Boundary

County Boundary

**WUI Risk Index**

0 Low -3 -6 -9 High

Data Source:SOUTHERN GROUP OF STATE FORESTERS
WILDFIRE RISK ASSESSMENT PORTAL

0 0.15 0.3 0.6 Miles

N

# Appendix H:
# NCEI Storm Event Data

This section of the Plan includes the historic storm event data as reported to the National Centers for Environmental Information.

- H.1 – Cold/Wind Chill
- H.2 – Drought
- H.3 – Flood
- H.4 – Hail
- H.5 – Heavy Rain
- H.6 – Heavy Snow
- H.7 – High Wind
- H.8 – Ice Storm
- H.9 – Lightning
- H.10 – Sleet
- H.11 – Tornado
- H.12 – Thunderstorm
- H.13 – Winter Storm

# TABLE H.1: COLD/WIND CHILL EVENTS (2000-2019)

| Date | Description |
|---|---|
| | **Avery County** |
| 1/23/2003 | |
| 12/20/2004 | |
| 1/10/2015 | Another arctic cold front moved through the North Carolina mountains during the afternoon and evening of the 9th, bringing another round of gusty winds and reinforcing the cold wave that began late on the 7th. Temperatures in the teens and single digits combined with sustained winds of 10 to 25 mph to result in wind chill values of 0 to -10 across the northern mountains during the overnight and early morning of the 10th. Temperatures near 0 combined with stronger winds likely yielded wind chills of -20 or colder across the high peaks and ridge tops. |
| 1/18/2016 | An arctic cold front moved quickly across the North Carolina mountains during the evening of the 17th, bringing very cold air and gusty northwest winds to the region. Air temperatures in the teens and single digits combined with winds gusting to 30 to 40 mph to produce winds chills of -5 to -15 across much of the northern mountains. Some of the high peaks and ridge tops likely saw wind chills colder than -20. Although wind chills moderated as air temperatures warmed slightly during the afternoon of the 18th, they returned to the -5 to -15 range during the evening and persisted through the morning of the 19th. |
| 2/10/2016 | An arctic cold front that moved across western North Carolina on the 8th was reinforced by another surge of cold air on the 10th, which also brought gusty northwest winds. Air temperatures in the lower teens combined with winds gusting to 20 to 30 mph to produce winds chills of -5 to -10 across much of the northern mountains from late evening on the 10th through mid-morning on the 11th. Some of the high peaks and ridge tops likely saw wind chills of around -20 or lower. Although wind chills increased by noon on the 10th, and remained above 0 through the 12th, unusually cold temperatures persisted, as most locations remained below freezing through this period. Another reinforcing arctic surge then occurred early on the 13th, bringing another round of gusty winds, colder air, and wind chill values in the -5 to -15 range to much of the area. |
| 1/7/2017 | Gusty northwest winds ushering in an arctic air mass to the southern Appalachians combined with a snow packed ground to produce frigid temperatures and low wind chill values across the North Carolina mountains on the night of the 7th through the morning of the 8th. By daybreak on the 8th, air temperatures were in the single digits and lower teens across the mountain valleys, while the high peaks and ridge tops saw temperatures below 0. Valley wind chill values ranged from around 0 to -10 across the southern and central mountains, and from -5 to -15 from the French Broad Valley north. The high peaks and ridge tops likely saw wind chill values of -30 or lower at times. Although temperatures warmed slightly and winds abated during the day, conditions remained unseasonably cold across the mountains for a couple of days. Even some valley locations did not warm above freezing until the afternoon of the 10th. |
| 1/1/2018 | A large area of arctic high pressure slowly settled in over western North Carolina in the wake of a cold front that pushed through the area on 12/30, resulting in an extended period of unusually cold weather across the region. By the morning of the 1st, wind chill values of 0 to -15 were common in the mountain valleys and northern foothills, while high elevation wind chills as low as -40 were reported. These trends repeated during most nights and early morning hours through the 7th, when low temperatures were typically in the lower teens and single digits. Meanwhile, daytime temperatures remained at or below freezing in most areas through the week, with the few areas that did reach the melting level only staying there for a couple of hours during the afternoon. |
| 1/17/2018 | A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet. |
| 1/20/2019 | Gusty northwest winds developing in the wake of an arctic cold front ushered in a very cold air mass into the North Carolina mountains throughout the 20th and remained in place into the 21st. Wind chill values as of -5 to -10 occurred across the valleys the morning of the 21st, while values as low as -20 were reported across the high elevations throughout the night of the 20th and through much of the 21st. Meanwhile, air temperatures remained below freezing for more than 48 hours (from late morning of the 20th until the afternoon of the 22nd) in all areas except for the lowest valleys of far southwest North Carolina. |

| Date | Description |
|---|---|
| 1/29/2019 | An arctic cold front swept through the North Carolina mountains during the afternoon of the 29th, followed by a reinforcing front on the 30th. This led to an extended period of very cold weather and low wind chill across the high elevations. Temperatures remained in the single digits and teens throughout this time, with gusty northwest winds resulting in wind chill values of -5 to -15 across much of the area. Meanwhile, wind chills as low as -30 were reported on the high peaks and ridge tops above 5500 ft. Temperatures and wind speeds finally began to moderate by late morning on the 31st. |
| 3/5/2019 | Unseasonably cold air combined with gusty northwest winds in the wake of a cold front to produce very low wind chills in the high elevations of the North Carolina mountains during the night of the 5th into the morning of the 6th. Air temperatures in the teens and winds gusting to 20 to 30 mph generally produced wind chill values of -5 to -10 in areas above 3500 feet. However, locations above 5000 feet, where air temperatures dropped to as low as 0 and where winds gusted to 40 mph or higher, saw wind chills as low as -30. |
| **McDowell County** | |
| 1/7/2015 | An arctic cold front moved through the southern Appalachians and adjacent foothills during the morning and afternoon of the 7th, bringing strong winds and very cold air to the region. By late evening, sustained winds of 10 to 20 mph combined with air temperatures in the teens to yield wind chill values in the 0 to -5 range in the valleys. By daybreak on the 8th, air temperatures in the valleys were near 0 while the high elevations were well below 0. Wind chill values during this time ranged from 0 to -15 across the valleys, while stronger winds and colder temperatures likely yielded values as low as -50 across the high elevations of the Smokies and Balsams. The very low wind chills abated throughout the 8th, as temperatures warmed and winds diminished. However, air temperatures remained below freezing throughout the 8th. |
| 2/18/2015 | A strong arctic cold front blasted through the southern Appalachians and adjacent foothills during the afternoon and evening of the 18th, bringing strong winds and bitterly cold air to the region. By mid-evening, sustained winds of 10 to 25 mph combined with air temperatures in the single digits and teens to yield wind chill values in the 0 to -10 range in the valleys. By daybreak on the 19th, air temperatures in the valleys were near 0 while the high elevations were well below 0. Wind chill values during this time ranged from -5 to -20 across the valleys, while stronger winds and colder temperatures likely yielded values as low as -50 across the high elevations of the Smokies and Balsams. The low wind chills continued throughout the 19th, as air temperatures failed to warm above the mid-20s in even the lowest valleys, and the high elevations remained within a few degrees either side of 0. Wind chills remained no higher than the single digits across most of the area until late morning on the 20th. |
| 1/7/2017 | Gusty northwest winds ushering in an arctic air mass to the southern Appalachians combined with a snow packed ground to produce frigid temperatures and low wind chill values across the North Carolina mountains on the night of the 7th through the morning of the 8th. By daybreak on the 8th, air temperatures were in the single digits and lower teens across the mountain valleys, while the high peaks and ridge tops saw temperatures below 0. Valley wind chill values ranged from around 0 to -10 across the southern and central mountains, and from -5 to -15 from the French Broad Valley north. The high peaks and ridge tops likely saw wind chill values of -30 or lower at times. Although temperatures warmed slightly and winds abated during the day, conditions remained unseasonably cold across the mountains for a couple of days. Even some valley locations did not warm above freezing until the afternoon of the 10th. |
| 3/16/2017 | The 2017 growing season began early across western North Carolina, due to an unusually warm February and early March that saw average temperatures of almost 10 degrees above normal. An episode of cold arctic high pressure in the middle of March led to a hard freeze on the morning of the 16th, when low temperatures in the lower to mid-20s were reported. This caused significant damage to berry, wheat, apple, and peach crops. While subsequent days of freezing temperatures caused further damage, the vast majority of the damage occurred on the 16th. |
| 1/1/2018 | A large area of arctic high pressure slowly settled in over western North Carolina in the wake of a cold front that pushed through the area on 12/30, resulting in an extended period of unusually cold weather across the region. By the morning of the 1st, wind chill values of 0 to -15 were common in the mountain valleys and northern foothills, while high elevation wind chills as low as -40 were reported. These trends repeated during most nights and early morning hours through the 7th, when low temperatures were typically in the lower teens and single digits. Meanwhile, daytime temperatures remained at or below freezing in most areas through the week, with the few areas that did reach the melting level only staying there for a couple of hours during the afternoon. |

| Date | Description |
|---|---|
| 1/1/2018 | A large area of arctic high pressure slowly settled in over western North Carolina in the wake of a cold front that pushed through the area on 12/30, resulting in an extended period of unusually cold weather across the region. By the morning of the 1st, wind chill values of 0 to -15 were common in the mountain valleys and northern foothills, while high elevation wind chills as low as -40 were reported. These trends repeated during most nights and early morning hours through the 7th, when low temperatures were typically in the lower teens and single digits. Meanwhile, daytime temperatures remained at or below freezing in most areas through the week, with the few areas that did reach the melting level only staying there for a couple of hours during the afternoon. |
| 1/17/2018 | A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet. |
| 1/17/2018 | A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet. |
| 1/20/2019 | Gusty northwest winds developing in the wake of an arctic cold front ushered in a very cold air mass into the North Carolina mountains throughout the 20th and remained in place into the 21st. Wind chill values as of -5 to -10 occurred across the valleys the morning of the 21st, while values as low as -20 were reported across the high elevations throughout the night of the 20th and through much of the 21st. Meanwhile, air temperatures remained below freezing for more than 48 hours (from late morning of the 20th until the afternoon of the 22nd) in all areas except for the lowest valleys of far southwest North Carolina. |
| **Mitchell County** | |
| 1/23/2003 | |
| 12/20/2004 | |
| 1/10/2015 | Another arctic cold front moved through the North Carolina mountains during the afternoon and evening of the 9th, bringing another round of gusty winds and reinforcing the cold wave that began late on the 7th. Temperatures in the teens and single digits combined with sustained winds of 10 to 25 mph to result in wind chill values of 0 to -10 across the northern mountains during the overnight and early morning of the 10th. Temperatures near 0 combined with stronger winds likely yielded wind chills of -20 or colder across the high peaks and ridge tops. |
| 1/18/2016 | An arctic cold front moved quickly across the North Carolina mountains during the evening of the 17th, bringing very cold air and gusty northwest winds to the region. Air temperatures in the teens and single digits combined with winds gusting to 30 to 40 mph to produce winds chills of -5 to -15 across much of the northern mountains. Some of the high peaks and ridge tops likely saw wind chills colder than -20. Although wind chills moderated as air temperatures warmed slightly during the afternoon of the 18th, they returned to the -5 to -15 range during the evening and persisted through the morning of the 19th. |
| 2/10/2016 | An arctic cold front that moved across western North Carolina on the 8th was reinforced by another surge of cold air on the 10th, which also brought gusty northwest winds. Air temperatures in the lower teens combined with winds gusting to 20 to 30 mph to produce winds chills of -5 to -10 across much of the northern mountains from late evening on the 10th through mid-morning on the 11th. Some of the high peaks and ridge tops likely saw wind chills of around -20 or lower. Although wind chills increased by noon on the 10th, and remained above 0 through the 12th, unusually cold temperatures persisted, as most locations remained below freezing through this period. Another reinforcing arctic surge then occurred early on the 13th, bringing another round of gusty winds, colder air, and wind chill values in the -5 to -15 range to much of the area. |
| 1/7/2017 | Gusty northwest winds ushering in an arctic air mass to the southern Appalachians combined with a snow packed ground to produce frigid temperatures and low wind chill values across the North Carolina mountains on the night of the 7th through the morning of the 8th. By daybreak on the 8th, air temperatures were in the single digits and lower teens across the mountain valleys, while the high peaks and ridge tops saw temperatures below 0. Valley wind chill values ranged from around 0 to -10 across the southern and central mountains, and from -5 to -15 from the French Broad Valley north. The high peaks and ridge tops likely saw wind chill values of -30 or lower at times. |

| Date | Description |
|---|---|
| | Although temperatures warmed slightly and winds abated during the day, conditions remained unseasonably cold across the mountains for a couple of days. Even some valley locations did not warm above freezing until the afternoon of the 10th. |
| 1/1/2018 | A large area of arctic high pressure slowly settled in over western North Carolina in the wake of a cold front that pushed through the area on 12/30, resulting in an extended period of unusually cold weather across the region. By the morning of the 1st, wind chill values of 0 to -15 were common in the mountain valleys and northern foothills, while high elevation wind chills as low as -40 were reported. These trends repeated during most nights and early morning hours through the 7th, when low temperatures were typically in the lower teens and single digits. Meanwhile, daytime temperatures remained at or below freezing in most areas through the week, with the few areas that did reach the melting level only staying there for a couple of hours during the afternoon. |
| 1/17/2018 | A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet. |
| 1/20/2019 | Gusty northwest winds developing in the wake of an arctic cold front ushered in a very cold air mass into the North Carolina mountains throughout the 20th and remained in place into the 21st. Wind chill values as of -5 to -10 occurred across the valleys the morning of the 21st, while values as low as -20 were reported across the high elevations throughout the night of the 20th and through much of the 21st. Meanwhile, air temperatures remained below freezing for more than 48 hours (from late morning of the 20th until the afternoon of the 22nd) in all areas except for the lowest valleys of far southwest North Carolina. |
| 1/29/2019 | An arctic cold front swept through the North Carolina mountains during the afternoon of the 29th, followed by a reinforcing front on the 30th. This led to an extended period of very cold weather and low wind chill across the high elevations. Temperatures remained in the single digits and teens throughout this time, with gusty northwest winds resulting in wind chill values of -5 to -15 across much of the area. Meanwhile, wind chills as low as -30 were reported on the high peaks and ridge tops above 5500 ft. Temperatures and wind speeds finally began to moderate by late morning on the 31st. |
| 3/5/2019 | Unseasonably cold air combined with gusty northwest winds in the wake of a cold front to produce very low wind chills in the high elevations of the North Carolina mountains during the night of the 5th into the morning of the 6th. Air temperatures in the teens and winds gusting to 20 to 30 mph generally produced wind chill values of -5 to -10 in areas above 3500 feet. However, locations above 5000 feet, where air temperatures dropped to as low as 0 and where winds gusted to 40 mph or higher, saw wind chills as low as -30. |
| **Yancey County** | |
| 1/23/2003 | |
| 12/20/2004 | |
| 1/10/2015 | Another arctic cold front moved through the North Carolina mountains during the afternoon and evening of the 9th, bringing another round of gusty winds and reinforcing the cold wave that began late on the 7th. Temperatures in the teens and single digits combined with sustained winds of 10 to 25 mph to result in wind chill values of 0 to -10 across the northern mountains during the overnight and early morning of the 10th. Temperatures near 0 combined with stronger winds likely yielded wind chills of -20 or colder across the high peaks and ridge tops. |
| 1/18/2016 | An arctic cold front moved quickly across the North Carolina mountains during the evening of the 17th, bringing very cold air and gusty northwest winds to the region. Air temperatures in the teens and single digits combined with winds gusting to 30 to 40 mph to produce winds chills of -5 to -15 across much of the northern mountains. Some of the high peaks and ridge tops likely saw wind chills colder than -20. Although wind chills moderated as air temperatures warmed slightly during the afternoon of the 18th, they returned to the -5 to -15 range during the evening and persisted through the morning of the 19th. |
| 2/10/2016 | An arctic cold front that moved across western North Carolina on the 8th was reinforced by another surge of cold air on the 10th, which also brought gusty northwest winds. Air temperatures in the lower teens combined with winds gusting to 20 to 30 mph to produce winds chills of -5 to -10 across much of the northern mountains from late evening on the 10th through mid-morning on the 11th. Some of the high peaks and ridge tops likely saw wind chills of around -20 or lower. Although wind chills increased by noon on the 10th, and remained above 0 through the |

| Date | Description |
|---|---|
| | 12th, unusually cold temperatures persisted, as most locations remained below freezing through this period. Another reinforcing arctic surge then occurred early on the 13th, bringing another round of gusty winds, colder air, and wind chill values in the -5 to -15 range to much of the area. |
| 1/7/2017 | Gusty northwest winds ushering in an arctic air mass to the southern Appalachians combined with a snow packed ground to produce frigid temperatures and low wind chill values across the North Carolina mountains on the night of the 7th through the morning of the 8th. By daybreak on the 8th, air temperatures were in the single digits and lower teens across the mountain valleys, while the high peaks and ridge tops saw temperatures below 0. Valley wind chill values ranged from around 0 to -10 across the southern and central mountains, and from -5 to -15 from the French Broad Valley north. The high peaks and ridge tops likely saw wind chill values of -30 or lower at times. Although temperatures warmed slightly and winds abated during the day, conditions remained unseasonably cold across the mountains for a couple of days. Even some valley locations did not warm above freezing until the afternoon of the 10th. |
| 1/1/2018 | A large area of arctic high pressure slowly settled in over western North Carolina in the wake of a cold front that pushed through the area on 12/30, resulting in an extended period of unusually cold weather across the region. By the morning of the 1st, wind chill values of 0 to -15 were common in the mountain valleys and northern foothills, while high elevation wind chills as low as -40 were reported. These trends repeated during most nights and early morning hours through the 7th, when low temperatures were typically in the lower teens and single digits. Meanwhile, daytime temperatures remained at or below freezing in most areas through the week, with the few areas that did reach the melting level only staying there for a couple of hours during the afternoon. |
| 1/17/2018 | A cold arctic air mass built into western North Carolina on the heels of gusty northwest winds developing west of a storm system moving up the Southeast coast. The gusty winds and cold air passing over a fresh snowpack resulted in low wind chills across much of the high terrain and portions of the foothills. Wind chill values from 0 to -10 were common in elevations above 1500 feet or so. Meanwhile, wind chill values of -20 to -30 were measured above about 4000 feet. |
| 1/20/2019 | Gusty northwest winds developing in the wake of an arctic cold front ushered in a very cold air mass into the North Carolina mountains throughout the 20th and remained in place into the 21st. Wind chill values as of -5 to -10 occurred across the valleys the morning of the 21st, while values as low as -20 were reported across the high elevations throughout the night of the 20th and through much of the 21st. Meanwhile, air temperatures remained below freezing for more than 48 hours (from late morning of the 20th until the afternoon of the 22nd) in all areas except for the lowest valleys of far southwest North Carolina. |
| 1/29/2019 | An arctic cold front swept through the North Carolina mountains during the afternoon of the 29th, followed by a reinforcing front on the 30th. This led to an extended period of very cold weather and low wind chill across the high elevations. Temperatures remained in the single digits and teens throughout this time, with gusty northwest winds resulting in wind chill values of -5 to -15 across much of the area. Meanwhile, wind chills as low as -30 were reported on the high peaks and ridge tops above 5500 ft. Temperatures and wind speeds finally began to moderate by late morning on the 31st. |
| 3/5/2019 | Unseasonably cold air combined with gusty northwest winds in the wake of a cold front to produce very low wind chills in the high elevations of the North Carolina mountains during the night of the 5th into the morning of the 6th. Air temperatures in the teens and winds gusting to 20 to 30 mph generally produced wind chill values of -5 to -10 in areas above 3500 feet. However, locations above 5000 feet, where air temperatures dropped to as low as 0 and where winds gusted to 40 mph or higher, saw wind chills as low as -30. |

# TABLE H.2: DROUGHT EVENTS (2000-2019)

| Date | Description |
|---|---|
| 8/1/2000 | The 2-year drought was reaching a critical stage by late summer. Many 80 to 100-foot wells were going dry. Area lakes were at record low levels causing property damage to docks, boats, etc. |
| 9/1/2000 | Overall, drought conditions continued across western North Carolina despite some locations receiving near their month's average rainfall. Low stream flow and municipal water supply remained the largest issues with many towns and cities enacting water restrictions. Citizens were quoted as saying this is the driest, they have ever seen it. Despite the drought conditions, impact on crops seemed to be minimal. |
| 10/1/2000 | Effects of the drought intensified as many areas received absolutely no rain during the month, setting records for the longest stretch without measurable rainfall in several locations. Wells and mountain streams continued to dry up and lake levels continued to drop. Many communities were forced to start more stringent water conservation measures. |
| 11/1/2000 | The long-term drought continued to affect the region. Rainfall during the month was near or slightly above normal, but this had little effect on the ground water levels. Numerous wells dried up during the fall, and well borers and drillers could not keep up with the demand. Large lakes reported record low levels and some communities continued or initiated water control measures. |
| 2/1/2001 | The long-term drought's impact became more severe, even during the winter, as water levels in lakes dropped and stream flow on rivers reached the lowest in memory. More and more communities began water restrictions and started preparing for a busy fire weather season. |
| 3/1/2001 | Despite beneficial rain during March, the drought continued to grip most of the area. Severe water restrictions were implemented in parts of the North Carolina piedmont, where reservoir had dropped to all-time low levels. In Concord, food establishments were asked to use paper and plastic products to conserve water. |
| 4/1/2001 | Some relief to the long-term drought occurred at mid-month, but for the most part, the rainfall deficit for the three-year period actually grew larger by the end of April. Mandatory water restrictions continued at a few mountain locations, with voluntary water restrictions urged at many others. Numerous wells went dry during April. |
| 5/1/2001 | Unprecedented drought conditions continued. Some rivers and lakes reached record-low levels. Well-drilling companies in the North Carolina piedmont were recording twice as much business as usual. |
| 8/1/2001 | The effects of the long-term drought became more severe, especially in the North Carolina piedmont. Critical water conditions were beginning to concern officials and residents of Charlotte. |
| 11/1/2001 | Drought was again the major concern during November. An extended short-term dry spell exacerbated the 3.5-year drought, beginning in mid-October and persisted through late November. During that stretch of weeks, many areas received no measurable rainfall. Toward the end of the month, wildfires became common, burning many acres, especially in the higher terrain. Extremely low lake levels affected boating and water supplies. The North Carolina piedmont had received about half the normal rainfall for the calendar year by the end of November. Many additional wells and ponds dried up, tree farms closed and many communities began or expanded water restrictions. Streams were observed with record low flow levels. |
| 12/1/2001 | Very little active weather during December signaled that the drought was still present - and becoming critically important to more and more people. The Charlotte area recorded an all-time record dry calendar year with just 26.23 inches of rainfall during 2001. Records have been kept in the area since 1878. Many communities initiated either mandatory or voluntary water restrictions. At Kings Mountain, NC - a new pump was required at Lake Moss because the water level dropped below 2 of the 3 existing pumps. Record low ground water supplies, lake levels, and stream flows were reported across all of Western North Carolina. |
| 8/1/2002 | The water supply situation reached crisis levels in some communities, as the effects of the long-term drought continued to plague western North Carolina. Particularly hard hit were several Piedmont communities along the Interstate 77 corridor. The city of Shelby was forced to buy water from surrounding communities and even from private companies and citizens. In Statesville, emergency construction of wells and a dam was necessary to prevent the city from running out of water, as the South Yadkin River reached historically low levels. Water levels on area lakes were as much as 10 feet below full pond. Most of the larger towns and cities along the I-77 corridor had imposed mandatory water restrictions by the end of the month, including the Charlotte metro area. |
| 5/1/2007 | The effects of an extended period of dry weather were exacerbated by an abnormally dry May, with many locations reporting one of the driest Mays in recorded history. By the end of May, many climatological stations were reporting |

| Date | Description |
|---|---|
| | yearly rainfall deficits as high as 10 inches. The result was severe to extreme drought conditions across much of western North Carolina by the end of the month. Water restrictions were implemented in some counties across extreme western North Carolina. The very dry conditions added to agriculture hardships caused by a hard freeze and widespread damaging winds in April. |
| 6/1/2007 | Despite an increase in thunderstorm activity, drought conditions persisted across much of western North Carolina. The persistent drought continued to cause hardships to agricultural interests that were still recuperating from the April freeze. Dollar values for the drought damage should be included in either the August or September Storm Data for this region. |
| 7/1/2007 | Drought conditions persisted across much of western North Carolina during July. By the end of July, voluntary water restrictions were instituted in almost all North Carolina counties along and west of I-77. Some mandatory restrictions were introduced in Union County, NC. Agricultural interests continued to be especially hard hit. The absence of rain negatively affected the hay crop, creating concern for the loss of livestock. Dollar values for the drought damage should be included in either the August or September Storm Data for this region. |
| 8/1/2007 | Severe to extreme drought conditions persisted across much of western North Carolina during August. By the end of the month, voluntary water restrictions continued in almost all North Carolina counties along and west of I-77. Stream flows and groundwater levels approached record low levels. Water levels on some reservoirs decreased by as much as 1 foot every 10 days. Agricultural interests continued to be especially hard hit, and the North Carolina governor requested federal disaster aid by the end of the month. Dollar values for the drought should be included in either the September or October Storm Data for this region. |
| 9/1/2007 | Extreme drought conditions persisted across western North Carolina through September, as the region experienced another month of well-below normal precipitation. By the end of the month, most locations were running a yearly rainfall deficit of 11-17 inches. Stream flows and groundwater levels were near record low levels, with many streams running at 5 percent or less of normal flow. Water levels on area reservoirs were some of the lowest in recorded history. Agricultural interests continued to be especially hard hit. Farmers continued to struggle to feed livestock due to a lack of hay and poor pasture conditions, forcing many cattle to be sold or slaughtered. Agricultural and other losses attributed to the drought are estimated to be in the hundreds of millions of dollars. County-based losses for the growing season will be included in next month's Storm Data. |
| 10/1/2007 | Unusually dry weather continued across western North Carolina through October. Although a soaking rain near the end of the month resulted in near-normal monthly precipitation for the mountains, the piedmont saw another month of well-below normal rainfall. Most areas were on pace to break yearly rainfall deficit records. By the end of the month, exceptional drought conditions were reported across the majority of the area. Water flow on area streams continued at 3 to 6 percent of normal, while lake levels remained at near-record lows. Although most cities and towns were requesting voluntary water restrictions be observed, mandatory restrictions were ordered in quite a few communities. In some areas, the water situation was becoming dire, with Monroe, NC officials reporting that water supplies would be exhausted by early 2008 if significant rain did not occur. Also, private wells were beginning to dry up in many areas. Agriculture continued to be severely impacted by the drought. As of this writing, county by county dollar estimates of drought damage have not been made available. |
| 11/1/2007 | November provided no relief from the effects of the long-term drought. In fact, another month of well-below normal rainfall made an already dire situation even worse. Many locations remained on pace to set annual records for rainfall deficit. By the end of the month, the vast majority of the region was experiencing exceptional drought conditions. Streamflow on area rivers remained extremely low, generally less than 10 percent of normal. Meanwhile, lakes continued to gradually fall toward record low levels. |
| 12/1/2007 | The latter half of December saw a transition to a wetter pattern across the southeast. Most observing stations in western North Carolina reported above normal monthly rainfall for the first time since January 2007. However, this was not enough to put much of a dent in the long-term drought as extreme to exceptional drought conditions persisted into the New Year. Although the increase in rainfall did allow for some recharge of area streams, many were still running at less than 25 percent of normal flow at the end of the month. |
| 1/1/2008 | January saw a return to dry weather across western North Carolina. Most observing stations across the region reported a rainfall deficit of 1 to 2 inches during the month, resulting in another month of exceptional drought conditions across most of the area. Water levels on area lakes remained within a foot or two of record low stages. |

| Date | Description |
|---|---|
| | However, rivers and streams remained somewhat recharged from the December rains, with streamflow on most waterways running 25 to 75 percent of normal. |
| 6/1/2008 | Although near normal rainfall was observed across much of the area during the late winter and early spring, another period of abnormally dry weather in May and June exacerbated severe to extreme drought conditions over the western Carolinas and northeast Georgia. Much of the area saw less than 2 inches of rain during this period of time. By the end of the month, much of the mountains and foothills of western North Carolina were running 10 inches below normal annual rainfall. Total rainfall deficits since the beginning of 2007 were around 20 inches or more in the hardest hit areas. By the end of the month, flow on almost all major streams was running less than 10 percent of normal. Many area crops suffered. |
| 7/1/2008 | Unusually dry weather continued through the month of July, with severe to extreme drought conditions persisting across the area. Afternoon and evening thunderstorms provided some degree of relief across portions of the North Carolina piedmont, but locations across Upstate South Carolina and extreme western North Carolina reported annual rainfall deficits of nearly 11 inches by the end of the month. Mandatory water restrictions were instituted across much of the North Carolina foothills. Water well levels began to descend below record low levels, most of which were recorded during the 1999-2002 drought. The vast majority of major streams across the area continued to run 1-10 percent of normal flow. Agriculture continued to be hard hit, with some areas reporting a 100 percent loss of the corn crop. |
| 8/1/2008 | Dry weather persisted across much of the area for most of August, although portions of the North Carolina Piedmont began to see relief from the dry conditions early in the month, due to an increase in daily thunderstorm activity. Elsewhere, exceptional drought conditions persisted and even expanded slightly westward to cover more of far western North Carolina and northeast Georgia. During the early part of the month, flows on most of the major streams across the area were running at record low levels, with the French Broad River setting a minimum flow record that had stood for almost 100 years. Only a handful of streams were running at more than 1 to 7 percent of normal. Groundwater levels were 2-5 feet below normal. Significant agricultural impacts persisted, with losses to summer crops, including hay, estimated at 30%. The dry weather also affected the livestock industry, due to shortages of pasture crops necessary for feeding. By the end of the month, Tropical Storm Fay had dropped up to 11 inches of rainfall across the area, providing some relief from the drought conditions, especially across the North Carolina Piedmont. |
| 9/1/2008 | The heavy rain brought by Tropical Storm Fay in late August provided some relief to the drought conditions across the area. This was particularly true across the North Carolina piedmont, where improving conditions were aided by normal September rainfall. However, another dry month resulted in a persistence of extreme to exceptional drought conditions across the North Carolina mountains and foothills. Voluntary water restrictions remained widespread during the month. A few communities held onto mandatory restrictions early in the month, but many of these were lifted by the end of the month. Well water remained near record low levels in many areas, while lake levels persisted well below normal stages. Rainfall from Fay resulted in some improvement in streamflows, although most rivers and major streams remained at less than 25 percent of normal, with many still running at less than 10 percent of normal. By the end of the month, government officials had requested a federal disaster declaration for most of the counties in the area, due to crop damages. |
| 10/1/2008 | Another abnormally dry month resulted in a persistence of severe to exceptional drought conditions over much of the mountains and foothills of North Carolina. Some slight improvement was observed in well water levels, but they remained near record lows. Most rivers and major streams continued to flow at less than 10 percent of normal. Voluntary water restrictions continued in most areas, with a few areas continuing to institute mandatory restrictions. Meanwhile, severe crop losses resulted in a federal disaster declaration for much of the larger agricultural communities across the area. |
| 11/1/2008 | Another month of below normal rainfall resulted in a persistence of severe to exceptional drought conditions over much of western North Carolina through November. In fact, drought conditions actually worsened in some areas, with portions of the central North Carolina mountains deteriorating to exceptional drought conditions late in the month. Slight improvements in well water levels continued across the area. Most rivers and major streams continued to flow at less than 10 percent of normal. Voluntary water restrictions continued in most areas, with a few areas continuing to institute mandatory restrictions. |

# TABLE H.3: FLOOD EVENTS (2000-2019)

| Location | Date | Description |
|---|---|---|
| **Avery County** | | |
| COUNTYWIDE | 11/19/2003 | Some of the worst flooding in 5 years developed across the county during the morning hours. The Toe River system flooded across most of the county. This flooding and flooding along smaller creeks and streams required several evacuations across the county. Every town in the county reported sewage overflows. |
| COUNTYWIDE | 9/7/2004 | Persistent moderate to heavy rain led to widespread flooding along numerous creeks and streams across the northern foothills and northern mountains during the early evening. By early morning on the 8th, flooding was described as some of the worst in the history of the area. Numerous homes and businesses were damaged or destroyed, particularly in Avery County. One home in Burke County was swept down the Little River. Widespread damage and destruction to roads and bridges also occurred due to flooding or landslides, especially in the southern part of Mitchell County, which experienced severe flooding from Crabtree Creek and the Toe River. Large sections of the Blue Ridge Parkway were washed out. Total damage to the parkway was estimated to be in excess of 10 million dollars in western North Carolina, with the vast majority of that damage occurring between Asheville and Blowing Rock. |
| COUNTYWIDE | 9/17/2004 | Flooding began shortly after midnight across much of the northern mountains and northern foothills. The hardest hit locations were northern McDowell, Mitchell and Avery Counties, where flooding was at least as severe as that which accompanied Frances. Most of the streams in Mitchell County flooded. Property damage due to mudslides and flooding was extensive in Avery County, and there were numerous rescues and evacuations, particularly around Newland. Numerous roads were washed out, covered with water, or covered with debris from landslides. All roads into Banner Elk were impassable by sunrise on the 17th. Other roads affected included portions of highways 226, 221, and 19. A bridge was washed out on highway 194 in Avery County. Flooding was much less severe in Burke and Caldwell Counties, although some evacuations were required along the John's River in Caldwell County, and portions of highways 181 and 126 were closed briefly in Burke County. |
| SOUTH PORTION | 7/2/2002 | Several roads were washed out after 4 to 5 inches of rain fell in a short period of time. |
| ELK PARK | 2/22/2003 | Some small creeks and streams flooded in and around Elk Park. |
| NEWLAND | 6/12/2004 | Whitaker and Roaring Creeks overflowed their banks, flooding adjacent roads. Flooding was also reported in the Linville area at the intersection of highways 194 and 105. |
| LINVILLE | 9/1/2004 | Persistent heavy rainfall along the eastern slopes of the Blue Ridge resulted in rapid rises along the Linville River, which flooded a bridge in the town of Linville. A large creek flooded in the Land Harbor area, forcing some evacuations. Several small streams and creeks also flooded in Newland and Crossnore during the late evening, while some evacuations became necessary during the early morning hours as flooding developed in Altamont. |
| NEWLAND | 7/26/2007 | Flooding developed along the North Toe River, with about a foot of water flowing over the bridge on highway 194. |
| MINNEAPOLIS | 5/15/2009 | Flood waters entered a home along Row Branch. Birchfield Creek also flooded Birchfield Creek Rd. Flooding along Roaring Creek caused highway 19E to become impassable for a while, and some private bridges were washed out along Roaring Creek. |
| CRANBERRY | 5/16/2009 | Flooding along Cranberry Creek covered portions of highway 19 from a mile east of Elk Park to the Cranberry community, causing the road to be closed for a while. Water from the creek also entered some homes. |
| ELK PARK | 11/28/2011 | The Elk River flooded parts of Elk River Road in the northwest part of the county near Elk Park. |
| CROSSNORE | 11/28/2011 | Greene Rd, near the intersection of highway 221, was flooded by the Linville River in Crossnore. |
| THREE MILE | 9/5/2012 | Over three inches of rain fell in around an hourï¿½ï¿½ï¿½s time over southern Avery County. This caused Three Mile Creek to leave its banks and flood Three Mile Highway between Prison Camp Rd |

| Location | Date | Description |
|---|---|---|
| | | and Highway 19 East. Water was 3 to 4 feet deep in spots along the road. Some homes were flooded in the Three Mile community. Just a little south of there, a trailer park was flooded on Green Park Lane, just off of Highway 19 East. The county evacuated 15 people from the park. Mullen Hill Rd, in the same area, was closed for several hours as the fire department had to free stranded cars and clear off boulders that had washed onto the road. |
| CROSSNORE | 9/18/2012 | The low water bridge on Greene Rd (SR1536) was flooded by the Linville River next to US 221. |
| INGALLS | 9/18/2012 | Mullin Hill Road and lower US19E were flooded by Three Mile Creek. |
| NEWLAND | 1/30/2013 | Crossnore Creek flooded Maple St in the town of Crossnore. Water nearly entered a local restaurant. The North Toe River flooded parts of Pineola and Linville streets in Newland. Other areas of flooding were reported in the southern part of the county, including Mullen Hill Road off of Highway 19E. |
| ELK PARK | 5/6/2013 | Heavy rain affected Avery County from late on the 5th through the morning hours of the 6th. A Cocorahs observer near Linville reported 7.00 inches of rain for the 24-hour period from 7 am on the 5th until 7 am on the 6th, with another nearby observer reporting 6.92 inches. Several roads across the county were flooded or affected by rock and mud slides. A few of the flooded roads include Highway 184 in Banner Elk, Mullen Hill Road in Ingalls and Green Road in Altamont. Several private bridges were washed out along the Linville River with residences cut off from US 221 and NC 181. Some residences were evacuated in the Land Harbor subdivision between Linville and Crossnore. A fire and rescue vehicle was caught in rising waters along Elk River Road and had to be abandoned. On US 19E, Buck Hill Campground had to be evacuated, with campers taken across the road to the Green Valley Fire Department. Until 3 pm on the 6th. |
| ROARING CREEK | 7/3/2013 | Numerous creeks went out of their banks with several roads closed throughout the county. This includes locations along the North Toe River and Mullin Hill Road in the Ingals area. Based on social media reports and hourly rainfall, the worst of the flooding began around 6 pm EDT. |
| NEWLAND | 7/7/2013 | White Pine Creek flooded Clark Creek Road about 4 miles south of Newland. Flooding was reported on Mount Pleasant Road at Crossnore Creek as well as along Millers Gap Road. The North Toe River crested about 1 foot above flood stage in Newland at 559 pm EDT. |
| CROSSNORE | 4/19/2015 | County comms reported a bridge over the Linville River was covered with several feet of water of Greene Rd after 3-4 inches of rain fell along the Blue Ridge over about 10 hours. In addition, a campground in the Pineola area after Bunt Creek began overflowing its banks. |
| BANNER ELK | 5/11/2015 | FD reported Shawneehaw Creek overflowed its banks and flooded part of Main St in downtown Banner Elk after 2-3 inches of rain fell in the area in just over an hour. In addition, urban flooding was reported throughout the city due to poor drainage. |
| PLUMTREE | 10/23/2017 | A stream gauge on the Toe River exceeded established flood stage in western Avery County after 3 to 4 inches of rain fell in the basin, with much of that falling in only a couple of hours. Low-lying areas near the gauge were flooded, including a portion of Blue Bell Ln, just off Highway 19E. |
| LINVILLE | 5/18/2018 | County comms reported flash flooding developed in the area between Banner Elk and Grandfather after as much as 7 inches of rain fell across the area in just a few hours. The main impacts were in the Grandfather area, as multiple roads off of Highways 184 and 105 were closed due to flooding along tributaries of the Linville River. Closer to Banner Elk, a portion of Dobbins Rd was washed away due to flooding along Hanging Rock Creek. An addition, Ham Radio operator reported multiple small landslides along Highway 221 between Grandfather and Blowing Rock. |
| NEWLAND | 10/11/2018 | Two stream gauges along the North Toe River exceeded established flood stages in Avery County after 4 to 6 inches of rain fell across the basin in just a few hours. The main impacts were flooding of Pineola St and Linville St in the city of Newland. Blue Bell Ln was also flooded on the west side of the county. |
| MINNEAPOLIS | 4/19/2019 | A stream gauge on the North Toe River in the Frank community exceeded its established flood stage after up to 5 inches of rain fell in the basin in just a few hours. Several private bridges were flooded while water entered a business on Blue Bell Ln. |

| Location | Date | Description |
|---|---|---|
| NEWLAND | 6/9/2019 | County comms and stream gauges indicated flash flooding developed across Avery County after a couple of inches of rain fell in just a couple of hours on top of nearly saturated soil. Multiple roads were closed due to high water, including Greene Rd and Dobbins Rd, while multiple other areas were impacted in the Banner Elk area. A stream gauge on the North Toe River in Newland also exceeded its established flood stage, indicating inundation of Linville St. |
| **McDowell County** | | |
| NEBO | 6/15/2003 | Three to five feet of water covered some roads in the area. A portion of highway 70 was under water. Several bridges were also covered with water. |
| MARION | 7/12/2003 | Slow-moving thunderstorms producing very heavy rainfall caused several creeks to overflow their banks and flood adjacent roadways. Most of the flooding was concentrated in the Montford Cove area, where flood waters rose above car doors. |
| SUGAR HILL | 7/30/2003 | Several creeks overflowed their banks in southern portions of the county. At least 2 roads were closed. |
| MARION | 7/18/2005 | Cox Creek was reported to be out of its banks just south of Little Switzerland. |
| NEBO | 8/18/2005 | A portion of highway 126 was closed due to stream flooding. |
| DAVISTOWN | 8/26/2008 | Around 6 inches of water flowed over highway 70 due to flooding along the Catawba River. Catawba River Rd was also flooded in the western part of the county. Also, Crooked Creek flooded Crooked Creek Rd in the western part of the county. |
| NORTH COVE CROSSING | 3/6/2011 | The North Fork of the Catawba River in northern McDowell County flooded North Cove School Rd to a depth of 3 feet. The river also flooded one lane of Old Linville Rd. |
| NORTH COVE CROSSING | 5/5/2013 | Widespread flooding occurred across the north and west part of the county after several inches of rain fell on the 5th and early on the 6th. Several roads were closed and several rock and mud slides were reported. Closed roads included Resistoflex Road near Old Greenlee Road, Old Linville Road flooded near American Thread Road and Old Cove School Flooded by the North Fork Catawba River, among several others. The worst hit area in the county was the western shore of Lake James. Rising waters flooded at least 10 RVï¿½ï¿½ï¿½s at the Moose Lodge Campground. Several structures at the site were also flooded. Boat docks were damaged by high water and debris at the campground and at Burnetteï¿½ï¿½ï¿½s Landing. The water gradually receded starting on the 7th. |
| OLD FT | 10/3/2015 | EM reported flash flooding developed in the Old Fort area after more than four inches of rain fell in just a few hours. The main stream affected was the Catawba River, with a portion of Catawba River Campground flooded. |
| OLD FT | 10/3/2015 | As heavy rain began to taper off across the foothills during the afternoon, flooding continued along portions of the Catawba River. |
| SEVIER | 12/24/2015 | After around 2 inches of rain fell across McDowell County in less than 12 hours, Emergency Manager reported flash flooding developing along small streams across the northern half of the county. Affected streams included Johns Creek, which flooded River Bend Dr and Hankins Rd, Armstrong Creek, which flooded the Highways 221 and 226 intersection, as well as Toms Creek, Mackey Creek, and Clear Creek. A few minor mudslides and some downed trees also occurred in this general area. |
| GLENWOOD | 2/3/2016 | After scattered to numerous showers produced 1 to 1.5 inches of rain across McDowell County in about 24 hours, an area of widespread heavy rain moved over the area during the morning and early afternoon of the 3rd, resulting in an additional 1.5 to 2 inches that fell in only a couple of hours. EM reported flash flooding due to poor drainage and overflowing small streams developed as a result. Affected streams included a tributary of Stanfords Creek, which flooded Mud Cut Loop, where a driver had to be rescued after driving into the water. Additionally, Bobs Creek flooded Marlowe Rd, and the bridge over Walton Crawley Branch Rd was washed out over Calico Dr. Flash flooding was also reported along Muddy Creek and South Creek flooded South Creek Rd. Significant flooding due to poor drainage was also reported along Highway 70 in Nebo. |

| Location | Date | Description |
|---|---|---|
| SUGAR HILL | 6/15/2016 | EM reported flash flooding developed along West Fork Cove Creek in the Sugar Hill community after 3 to 4 inches of rain fell over a small area in around an hour. Several inches of water were reported flowing over Scenic Valley Dr. |
| GREENLEE | 8/7/2016 | EM reported a small tributary of Cane Creek overflowed its banks and surrounded a small apartment building across from the intersection of Highway 70 and Mackey Creek Rd after more than 3 inches of rain fell in a short period of time. Several occupants were rescued from the building. |
| NEBO | 5/24/2017 | FD reported flash flooding developed along Muddy Creek after 2 to 3 inches of rain fell in just a couple of hours. Gilbert Byrd Rd was closed for a while due to flood water from the creek. |
| OLD FT | 10/23/2017 | EM reported the Catawba River overflowed its banks near the headwaters after 3 to 4 inches fell throughout the basin throughout the 23rd. Catawba Falls Campground flooded off Catawba River Rd. Flooded roads included Eula Parker Rd and Oakdale Rd at Parker Padgett Rd. Additionally, Mill Creek overflowed its banks in downtown Old Fort, flooding Commerce St and Westerman St. At least one small mud slide was also reported in this general area. |
| NEBO | 10/23/2017 | EM reported flash flooding developed across eastern McDowell County after 3 to 4 inches of rain fell across the area, mostly within a couple of hours. Several small streams overflowed their banks and flooded adjacent roads in the southern part of the county, including Katy Creek, Moores Branch, and Stanfords Creek. Closer to Nebo, the main problem stream was Mud Creek, which flooded portions of Dixie Dr, South Creek Rd, Harmony Grove Rd, and Gilbert Byrd Rd. Additionally, Shadrick Creek flooded part of Highway 126. |
| MARION | 5/17/2018 | EM reported multiple roads in central McDowell County were impacted by stream flooding after 3 to 4 inches of rain fell in just a couple of hours. These included Mud Cut Road, Old Fort Sugar Hill Road, Zion Hill Road, and Bond Street in West Marion. Youngs Fork Creek overflowed its banks on the south side of Marion and briefly flooded Currier Court at Currier Avenue. Nix Creek also overflowed its banks and isolated some homes south of Marion. |
| GLENWOOD | 5/18/2018 | Emergency manager reported flooding developed along the Second Broad River after 2 to 3 inches of rain fell in a short period of time. Three campgrounds were evacuated due to the river overflowing its banks. Several driveways were also washed away by high water closer to Glenwood. |
| GREENLEE | 5/29/2018 | Media, Em, Stream gauges, and other sources indicated significant flash flooding developed across mainly western McDowell county after 4 to 6 inches of rain fell during the morning and afternoon of the 29th. The Catawba River exceeded its established Flood Stage according to a gauge in pleasant gardens, and most of the issues were due to the river and its tributaries. The Catawba overflowed its banks near its headwaters in Old Fort, with much of the downtown roads flooded and water entering many businesses. Swift water rescues were required at a couple of locations in the Old Fort area, including on Bat Cave Rd and Catawba River Rd. Closer to Marion, a structure collapsed under the weight of flood water on Roby Conley Rd. Several tractor trailer trucks became stalled in flood water on Columbia Carolina Rd near Old Fort, with at least one truck getting swept into the river. At least one campground was flooded and evacuated near Marion, while multiple roads were flooded due to small stream flooding throughout western McDowell County, including Cane Creek Rd, Hebron Rd, and Old Fort Sugar Hill Rd. Several mudslides also occurred throughout the area, including one that blocked and closed Interstate 40 near mile marker 67. A number of trees also fell in the saturated soil, including one that fell on a vehicle on Lytle Mountain Rd. |
| NORTH COVE CROSSING | 8/10/2018 | EM and public (via Social Media) reported flooding developed along a couple of tributaries of the North Fork Catawba River after 2 to 4 inches of rain fell across the basin throughout the afternoon into the evening. The main creeks affected were Armstrong Creek and Martin Branch, both of which overflowed onto adjacent roads, including Highway 221, where a swift water rescue became necessary. |
| ASHFORD | 8/20/2018 | EM reported flash flooding developed along several small tributaries to the North Fork Catawba River after as much as six inches of rain fell in the basin in just a couple of hours. A small tributary overflowed its banks along Blue Ridge Dr, with water entering the first floors of several structures. |

| Location | Date | Description |
|---|---|---|
| | | Another tributary eroded the sublayer beneath Blue Ridge Dr South, causing the road to be closed. Multiple small mudslides were also reported along the Highway 221 corridor. |
| ASHFORD | 8/21/2018 | Another round of heavy rain showers and thunderstorms produced the second flash flood event in less than 24 hours along the North Fork Catawba basin when up to 3 inches of rain fell on already saturated ground within a couple of hours. Impacts were similar, only slightly worse than the event that occurred during late evening of the 20th, with multiple tributaries of the North Fork, most notably Pond Branch and Dogback Spring Branch, overflowing their banks and flooding roads, including portions of Highway 221. Additionally, the same structures along Blue Ridge Dr that were flooded late on the 20th were again flooded during this time, with up to a foot of water entering first floors. A stream gauge on the North Fork just upstream of Ashford also exceeded its established flood stage of 9 feet, indicating flooding of a campground on Highway 221. Several new small landslides developed as well, especially along Blue Ridge Dr. |
| ASHFORD | 9/16/2018 | A stream gauge on the North Fork Catawba River near Ashford exceeded its established flood stage after 4 to 6 inches fell in the headwaters, mainly over a 12-hour period. Water from the river and its tributaries flooded a couple of roads off Highway 221. |
| OLD FT | 9/30/2018 | EM reported flash flooding along developed along the headwaters of the Catawba River and some of its tributaries after 4 to 8 inches of rain fell on the basin during the 29th and early on the 30th, with the bulk of that falling during the evening. A mobile home was damaged by flood water from a tributary on Catawba River Rd. A private bridge over the Catawba on Denny Bean Rd was also damaged. |
| OLD FT | 9/30/2018 | Although heavy rain ended across the area during the early morning hours, EM reported flooding continued along the upper Catawba and Crooked Creek basins into late morning and early afternoon. Several roads reportedly remained flooded along the Catawba in the Old Fort area, while a culvert was washed out and several private bridges washed out along Crooked Creek. |
| OLD FT | 10/11/2018 | EM reported flash flooding developed, mainly along small streams in the Old Fort area after 4 to 6 inches of rain fell in just a few hours. The main creeks impacted were Guthrie Branch which flooded a portion of Branson Creek Dr. Crooked Creek also flooded a portion of Hebron Rd where a swift water rescue became necessary. By late morning, heavy rain falling in and near the headwaters of the Catawba River caused the river to rise above its established flood stage at Pleasant Gardens. |
| OLD FT | 10/11/2018 | Although heavy rain ended within and near the headwaters of the Catawba River, minor flooding continued along the stream through much of the afternoon, with a few roads, campgrounds, and a couple of business being inundated. |
| ASHFORD | 10/11/2018 | Although rainfall tapered off across the area early in the afternoon, high water conditions persisted along the North Fork Catawba River before receding. |
| ASHFORD | 10/11/2018 | A stream gauge on the North Fork Catawba River exceeded its established flood stage after 3.5 to 5 inches of rain fell in the basin in just a few hours. A campground in the Ashford community was briefly inundated with flood water. |
| **Mitchell County** | | |
| COUNTYWIDE | 11/19/2003 | Flooding began in the eastern part of the county, where a trailer park was evacuated. Several small streams and small retention ponds overflowed their banks. This resulted in some roads being washed out. Some roads were impassable for most of the day. Eventually, flooding spread to the northern part of the county, where the North Toe and other streams flooded. Numerous evacuations were required. |
| COUNTYWIDE | 11/19/2003 | Additional flooding developed during the afternoon around Spruce Pine, as excess water produced by early morning heavy rainfall flowed from the higher elevations into the valleys. |
| COUNTYWIDE | 9/2/2004 | Although the heavy rainfall that led to earlier flash flooding relented, the North Toe remained above flood stage through the late morning hours. |
| COUNTYWIDE | 9/7/2004 | Persistent moderate to heavy rain led to widespread flooding along numerous creeks and streams across the northern foothills and northern mountains during the early evening. By early morning on the 8th, flooding was described as some of the worst in the history of the area. Numerous homes |

| Location | Date | Description |
|---|---|---|
| | | and businesses were damaged or destroyed, particularly in Avery County. One home in Burke County was swept down the Little River. Widespread damage and destruction to roads and bridges also occurred due to flooding or landslides, especially in the southern part of Mitchell County, which experienced severe flooding from Crabtree Creek and the Toe River. Large sections of the Blue Ridge Parkway were washed out. Total damage to the parkway was estimated to be in excess of 10 million dollars in western North Carolina, with the vast majority of that damage occurring between Asheville and Blowing Rock. |
| COUNTYWIDE | 9/17/2004 | Flooding began shortly after midnight across much of the northern mountains and northern foothills. The hardest hit locations were northern McDowell, Mitchell and Avery Counties, where flooding was at least as severe as that which accompanied Frances. Most of the streams in Mitchell County flooded. Property damage due to mudslides and flooding was extensive in Avery County, and there were numerous rescues and evacuations, particularly around Newland. Numerous roads were washed out, covered with water, or covered with debris from landslides. All roads into Banner Elk were impassable by sunrise on the 17th. Other roads affected included portions of highways 226, 221, and 19. A bridge was washed out on highway 194 in Avery County. Flooding was much less severe in Burke and Caldwell Counties, although some evacuations were required along the John's River in Caldwell County, and portions of highways 181 and 126 were closed briefly in Burke County. |
| COUNTYWIDE | 5/24/2000 | A few thunderstorms crossed the mountains, then exploded and quickly became large supercells as they moved into the foothills late in the afternoon. The most damaging of the supercells developed in northern McDowell county and became severe along the Burke/McDowell county line near Lake James, dropping baseball size hail. This severe storm tracked southeast along the county border, producing golf ball to softball size hail all the way to the Rutherford county line. In addition to the very large hail, this supercell was able to generate a few weak (F0) tornadoes. The first tornado briefly touched down near Bridgewater and blew windows out of a house. It may also have been responsible for wind damage at a nearby mobile home park where 15 to 25 mobile homes sustained damage from both wind and hail. The second tornado developed in extreme eastern McDowell county and blew down trees across Interstate 40 before crossing into Burke county. Several motorists on Interstate 40 sighted the tornado and had their vehicles damaged by softball size hail. A resident in extreme southwest Burke county, near the Rutherford county line measured a 94-mph gust of wind as the parent supercell moved overhead. A damage survey team did not find any tornadic damage in the vicinity but suspected this may have been the actual mesocyclone on the ground. There was extensive hail damage to homes, vehicles and plants from softball size hail that was seen bounding" down the hillside. The third tornado developed near South Mountain State Park in northeast Rutherford county and blew down numerous trees in the vicinity of the park. This storm went on to produce nickel to baseball size hail in Cleveland county. |
| BAKERSVILLE | 2/22/2003 | The Toe River flooded portions of highway 197. Also, Crabtree Creek flooded some locations near the Yancey County line. |
| BULADEAN | 8/23/2003 | As much as 5 inches of rain fell in only a couple of hours, resulting in flooding along some streams, including Spring Creek and Greasy Creek in the Hughes's Gap area. |
| BAKERSVILLE | 9/2/2004 | Heavy rainfall resulted in rapid rises and flooding along the North Toe River. Several roads and bridges were washed out or covered with water, including the Carpenter Island Rd bridge. |
| SPRUCE PINE | 7/18/2005 | Grassy Creek was reported to be out of its banks in the community of Grassy Creek. |
| SPRUCE PINE | 6/14/2008 | Several small creeks and streams came out of their banks and flooded roads and the basements of buildings in the Spruce Pine area. Portions of Highway 19 and Alatpass highway were flooded, with traffic being diverted around those areas. Crabtree Creek briefly flooded Crabtree Creek Rd along the Yancey County line. |
| SPRUCE PINE | 9/18/2012 | Carprenter Island Road and the bridge over the road were flooded by the North Toe River. |
| WEBBS | 5/6/2013 | Pictures on the Yancey county News Facebook Page showed that NC 197 was flooded and closed where Brummett Creek flows into the North Toe River near the Relief Community. The flooding |

| Location | Date | Description |
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| | | appears to be a backwater effect near the river. This is just inside Mitchell County on the Yancey, Mitchell County line. |
| WEBBS | 5/21/2013 | Private access bridges that lead to both Battle Branch Road and Aaron Branch Road were washed away by flood waters. Based on media reports it appears that stream levels were high enough to cover both roads, and possibly others in the northern part of the county. A couple homes also briefly had water in them. |
| TOECANE | 7/3/2013 | Cane Creek Road in the northeast part of the county was flooded. Water was reported over the road along 226 N in the northern part of the country. Sparks Road was reportedly flooded during the late afternoon. Heavy rain continued into the evening and overnight hours with more roads flooded as the event transitioned from a short-fused flash flood event to one of duration flooding. |
| TOECANE | 7/3/2013 | Numerous roads were closed by flooding throughout the county during the late afternoon and evening hours. |
| BAKERSVILLE | 5/28/2017 | County comms reported White Oak Creek overflowed its banks and flooded portions of White Oak Rd and Buchanan Dr after in excess of 2 inches of rain fell across Bakersville in an hour or less. Water briefly approached one home. Additionally, a stream gauge on Cane Creek approached, but did not exceed established flood stage, but the creek did overflow its banks briefly. |
| ALTAPASS | 10/23/2017 | County comms reported multiple streams overflowing their banks and flooded/closed roads in Mitchell County after 3-4 inches of rain fell across the county, mostly over the span of a few hours. |
| SPRUCE PINE | 4/19/2019 | A stream gauge on the North Toe River near Spruce Pine exceeded its established flood stage after around 4 inches of rain fell near the headwaters in just a few hours. Several low water crossings/bridges were flooded along the river. |
| SPRUCE PINE | 4/19/2019 | Although heavy rainfall ended across Mitchell County by early evening, flooding persisted into mid-evening along the North Toe River, with several low water crossings/bridges remaining inundated. |
| **Yancey County** | | |
| COUNTYWIDE | 11/19/2003 | The South Toe River and some of its tributaries flooded numerous locations in the southern part of the county. Several roads were closed for some time. |
| COUNTYWIDE | 9/7/2004 | Persistent moderate to heavy rain led to widespread flooding along numerous creeks and streams across the northern foothills and northern mountains during the early evening. By early morning on the 8th, flooding was described as some of the worst in the history of the area. Numerous homes and businesses were damaged or destroyed, particularly in Avery County. One home in Burke County was swept down the Little River. Widespread damage and destruction to roads and bridges also occurred due to flooding or landslides, especially in the southern part of Mitchell County, which experienced severe flooding from Crabtree Creek and the Toe River. Large sections of the Blue Ridge Parkway were washed out. Total damage to the parkway was estimated to be in excess of 10 million dollars in western North Carolina, with the vast majority of that damage occurring between Asheville and Blowing Rock. |
| COUNTYWIDE | 9/17/2004 | After an extended period of moderate to heavy rainfall, flooding began shortly after midnight. Almost every stream in the county reached or exceeded flood stage. Numerous roads were closed due to high water, and a mobile home park was evacuated when up to 1.5 feet of water entered some of the trailers. |
| COUNTYWIDE | 9/28/2004 | Some minor flooding developed along several streams during the early morning hours. |
| COUNTYWIDE | 8/30/2005 | After an extended period of moderate to heavy rainfall in association with the remnants of hurricane Katrina, flooding of small streams and creeks developed across the county. |
| CELO | 6/28/2001 | Lower Browns Creek flooded onto Browns Creek Road, closing it for a short time. |
| COUNTYWIDE | 1/23/2002 | A few creeks were reportedly flooding. |
| BURNSVILLE | 2/22/2003 | The Toe River flooded portions of highway 197. Also, some creeks flooded, including Crabtree Creek the Mitchell County line. |
| NORTHWEST PORTION | 7/5/2003 | Heavy rainfall produced by slow-moving thunderstorms caused flooding to develop rapidly on several creeks in the northwest part of the county, including Bald Mountain Creek. Water from |

| Location | Date | Description |
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| | | these overflowing creeks caused several roads to be washed away. The underpinning of a bridge was washed away on highway 19 at the Yancey/Madison county line. |
| PENSACOLA | 7/22/2003 | |
| CELO | 7/11/2005 | Flooding developed quickly along the South Toe River, when repeating thunderstorms produced 2 to 3 inches of rain in a short period of time near Celo. Flooding eventually developed downstream along the South Toe near Newdale. Lower Brown Creek also flooded, as did Black Mountain Campground. |
| BURNSVILLE | 7/19/2005 | Severe flooding along Little Creek, with water in several homes and a few roads closed. |
| WINDOM | 8/26/2008 | Several streams flooded across eastern portions of the county when up to 10 inches of rain fell in about a 24-hour period. Unofficial reports of up to 16 inches of rain were received. The South Toe River flooded portions of highway 80. Some streets were closed in Micaville due to urban flooding. A campground was flooded when the South Toe flooded just north of Celo. All of the camp sites were flooded, as were some outdoor facilities. |
| BALD MTN | 8/17/2010 | A stretch of Bald Mountain Rd was closed in the western part of the county due to flooding along Bald Mountain Creek. Several bridges were damaged by high water. A school bus was briefly stranded in the high water and two children were rescued from the bus. |
| SPIVEY GAP | 6/22/2012 | Several access roads and private bridges were washed out along Little Creek Rd. Water rose up to the bottom of several trailers. |
| DAY BOOK | 5/19/2013 | While occurring over a small area geographically, flash flooding affected the Jacks Creek community during the evening of the 19th. Watered entered the Jacks Creek Presbyterian Church to a depth of a few inches. Water also entered a few private residences in the area. A washed out culvert caused the road to collapse in front of the church, resulting in a 20 foot wide sink hole. Private bridges along the creek were swept away, isolating some residents and businesses. Residents said it was the worst flooding at this location since 1977. |
| BUSICK | 10/14/2014 | County comms and a stream gauge reported flooding developed along the South Toe River after 4-7 inches of rain fell, mostly within just a few hours. The main impact was to South Toe River Rd, which was closed for a while. In addition, several side roads off Highway 80 were also covered with water, while some campgrounds were flooded off Blue Rock Rd (7 ESE Burnsville). |
| BUSICK | 10/14/2014 | Although heavy rainfall tapered off during late evening, flooding continued along the South Toe Basin into the early morning hours. |
| BUSICK | 5/29/2018 | Media and a stream gauge indicated the South Toe River and some of its tributaries overflowed and their banks and flooded roads in eastern Yancey County after 4 to 6 inches of rain fell in the headwaters throughout the 29th, with much of that falling during the evening hours. Multiple roads along the river flooded, including Hannah Branch Rd, Halls Chapel Rd, and Wyatt Town Rd. Backwater effects from the river also caused Colbert Creek to flood Colberts Creek Rd and Middle Creek to flood Rock Creek Rd. |
| ESKOTA | 9/16/2018 | County comms and stream gauges reported flash flooding developed along the South Toe River and Cane River basins after 5 to 10 inches of rain fell in the headwaters in less than 24 hours. Numerous roads were closed throughout the area, including a portion of Highway 197 which was covered with water from the Cane River. The bridge over Still Fork Creek on South Toe River Rd was closed, cutting off the community of Alpine Village. Also, a stream gauge on the Cane River near Pensacola exceeded its established flood stage by a couple of feet, and remained in flood for several hours, while a gauge on the South Toe River near Celo briefly exceeded its established flood stage. |
| CONCORD | 10/11/2018 | County comms and stream gauges indicated flash flooding developed along the Cane River and South Toe River basins after 4 to 7 inches of rain fell in the headwaters in just a few hours. More than a dozen roads were flooded and/or closed across central and southern portions of the county, including Highway 80 east of Burnsville and State Rd 1112 south of Burnsville. |
| GREEN MTN | 6/18/2019 | County comms reported multiple roads closed due to flash flooding or small landslides after around 3 inches of rain fell in the Bakersville area in just a couple of hours. Flooded roads included Sweet Creek Rd, which was inundated with water near the confluence of Cub Creek and Sweet Creek. |

# TABLE H.4: HAIL EVENTS (2000-2019)

| Location | Date | Size | Description |
|---|---|---|---|
| **Avery County** | | | |
| LINVILLE | 4/17/2000 | 1 | Thunderstorms erupted in the afternoon and evening across western North Carolina. Several clusters of storms became severe and produced hail ranging in size from dimes to golf balls. The general public in Linville was quoted as saying the hailstorm was the worst ever seen due to the amount that covered the ground. Golf ball size hail dimpled cars in Waxhaw. Some damaging straight-line winds occurred as well with one tree falling on a car in Mecklenburg county and several trees downed in Waxhaw. |
| NEWLAND | 4/28/2002 | 1 | Numerous reports of dime to quarter size hail in and around Newland. |
| LINVILLE | 5/27/2002 | 1 | Hail accumulated to depths of 2 inches. |
| MINNEAPOLIS | 7/2/2002 | 0.75 | Hail accumulated to depths of 3 inches. |
| LINVILLE | 7/2/2002 | 0.75 | Hail was reported at Ned's Mountain. |
| LINVILLE | 5/15/2003 | 0.75 | |
| NEWLAND | 5/15/2003 | 1.75 | |
| NEWLAND | 5/15/2003 | 1.75 | |
| CROSSNORE | 6/8/2003 | 0.88 | Hail covered the ground. |
| CROSSNORE | 5/21/2004 | 0.75 | Penny-sized hail accumulated to depths of 2 inches on highway 221, stopping traffic for a while. |
| ELK PARK | 8/3/2005 | 0.88 | |
| NEWLAND | 8/4/2005 | 0.75 | |
| ELK PARK | 4/2/2006 | 1 | Quarter size hail in the Cranberry community. |
| NEWLAND | 4/19/2006 | 0.75 | |
| LINVILLE | 5/14/2006 | 0.75 | Penny size hail reported at Grandfather Mountain. |
| ELK PARK | 5/30/2006 | 0.88 | Hail reported between Elk Park and Banner Elk. |
| BANNER ELK | 5/30/2006 | 0.75 | |
| NEWLAND | 6/12/2007 | 0.88 | Scattered severe storms developed over western North Carolina for a second day in a row. The storms mainly produced large hail. |
| LINVILLE | 6/26/2007 | 0.75 | Scattered severe storms developed over western North Carolina. Most of the storms occurred during the late afternoon and evening hours. |
| NEWLAND | 8/23/2007 | 0.75 | Severe storms affected western North Carolina during the evening hours. |
| INGALLS | 8/24/2007 | 0.75 | Several severe storms affected western North Carolina during the afternoon hours. |
| NEWLAND | 6/7/2008 | 0.75 | Scattered severe storms affected western North Carolina during the afternoon and early evening hours. |
| BANNER ELK | 6/9/2008 | 2.75 | Reported in the Beech Mountain area. |
| BANNER ELK | 6/9/2008 | 1 | Several severe storms developed over western North Carolina during the afternoon and evening hours ahead of a cold front. |
| NEWLAND | 7/20/2009 | 0.75 | Scattered severe storms affected the mountains and foothills of North Carolina, as well as the Piedmont east of Charlotte, during the early evening hours. |
| NEWLAND | 4/9/2011 | 0.88 | Hail up to the size of nickels covered the ground in the Newland area. |
| PYATTE | 6/8/2011 | 0.88 | Numerous thunderstorms developed over the North Carolina mountains as an unseasonably hot airmass persisted across the region. The storms produced both large hail and damaging winds. |
| NEWLAND | 6/10/2011 | 1 | Scattered thunderstorms developed over the mountains as a hot, humid airmass remained over the region. A few of the storms produced damaging winds and large hail. |
| ROARING CREEK | 4/30/2012 | 2 | Hail larger than golf balls was reported about 5 miles west of Newland. |
| NEWLAND | 4/30/2012 | 0.75 | Penny size hail fell along highway 221 near Grandfather Mountain. |
| DARK RIDGE | 4/30/2012 | 0.75 | Scattered thunderstorms developed over the North Carolina Mountains during the late afternoon and evening hours. Some of the storms produced large hail. |

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| LINVILLE | 5/2/2012 | 1.75 | A nearly stationary thunderstorms dropped hail up to golf ball size fell for at least 20 minutes at Sugar Mountain. |
| BANNER ELK | 5/2/2012 | 0.75 | Penny size hail fell along Hickory Nut Gap Rd. |
| BALM | 7/3/2012 | 1.25 | Larger hail was reported in the Sugar Mountain area. |
| PINEOLA | 7/3/2012 | 1 | Quarter size hail fell along on Quarry Rd. |
| NEWLAND | 5/12/2014 | 0.75 | Spotters and county comms relayed multiple reports of hail, especially in the Pineola/Linville area, with the largest being 3/4 inch. Hail accumulated in some spots. |
| BALM | 7/2/2014 | 0.75 | Public reported 3/4-inch hail. |
| GRAGG | 8/1/2019 | 0.75 | Public reported penny size hail on the Blue Ridge Parkway. |
| | | | **McDowell County** |
| NEBO | 4/17/2000 | 0.75 | Thunderstorms erupted in the afternoon and evening across western North Carolina. Several clusters of storms became severe and produced hail ranging in size from dimes to golf balls. The general public in Linville was quoted as saying the hailstorm was the worst ever seen due to the amount that covered the ground. Golf ball size hail dimpled cars in Waxhaw. Some damaging straight-line winds occurred as well with one tree falling on a car in Mecklenburg county and several trees downed in Waxhaw. |
| MARION | 4/17/2000 | 0.75 | Thunderstorms erupted in the afternoon and evening across western North Carolina. Several clusters of storms became severe and produced hail ranging in size from dimes to golf balls. The general public in Linville was quoted as saying the hailstorm was the worst ever seen due to the amount that covered the ground. Golf ball size hail dimpled cars in Waxhaw. Some damaging straight-line winds occurred as well with one tree falling on a car in Mecklenburg county and several trees downed in Waxhaw. |
| OLD FT | 5/13/2000 | 0.88 | Thunderstorms developed in the mountains in the early afternoon with several becoming severe a few hours later. Other severe thunderstorms moved into or developed in the foothills and piedmont during the early evening. Hail up to the size of walnuts and some wind damage occurred in the mountains and foothills. Several trees were blown down near Fairview. In Cleveland county, 1.5-foot diameter trees were blown down in Belwood, and a number of structures were damaged in Polkville. Just west of Lincolnton several trees and power lines were downed, some on mobile homes. Lightning from the storm in Lincolnton knocked out power to the 911 center. Numerous trees and power lines were downed and a couple of storage buildings were blown over northeast of Gastonia. In Dallas, a trailer park sustained damage to a storage building, 3 young Bradford pear trees, underpinning, a power meter, and heavy doghouse. Mecklenburg county police reported 7 to 10 trees downed north of Charlotte. Considerable damage occurred in Cabarrus county with numerous trees blown down through the northern and central parts of Concord. Winds were estimated as high as 70 mph in western Cabarrus county due to a significant number of downed trees, with many on houses and some blocking roads. Crews had to work most of the night to clear trees and restore power. A deputy said he observed a tornado touch down, lift, and touch down again before ending as a waterspout over Coddle Creek Reservoir. However, there was not enough evidence to confirm the event as a tornado. |
| SUGAR HILL | 5/20/2000 | 0.75 | Severe thunderstorms rumbled across the northern foothills and northwest piedmont during the late afternoon. With the exception of one dime size hail report, severe weather was in the form of damaging straight-line winds. Winds were estimated to be as high as 70 mph near the Hickory Airport, Granite Falls and across Davie county. Large trees were blown down in Glenwood. Vinyl siding from a mobile home was seen blown across US Hwy 321, southeast of Granite Falls. Trees and power lines were downed in Bethlehem, north of Morganton, near Hickory, along Hwy 90 northwest of Stony Point, Turnersburg, and all over Davie county. Festival tents and a railroad crossing sign were blown down north of Hickory. Some urban flooding developed in the city of Morganton when a quick 2 inches of rain fell. |
| MARION | 5/24/2000 | 1.75 | A few thunderstorms crossed the mountains, then exploded and quickly became large supercells as they moved into the foothills late in the afternoon. The most damaging of the supercells developed in northern McDowell county and became severe along the |

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| | | | Burke/McDowell county line near Lake James, dropping baseball size hail. This severe storm tracked southeast along the county border, producing golf ball to softball size hail all the way to the Rutherford county line. In addition to the very large hail, this supercell was able to generate a few weak (F0) tornadoes. The first tornado briefly touched down near Bridgewater and blew windows out of a house. It may also have been responsible for wind damage at a nearby mobile home park where 15 to 25 mobile homes sustained damage from both wind and hail. The second tornado developed in extreme eastern McDowell county and blew down trees across Interstate 40 before crossing into Burke county. Several motorists on Interstate 40 sighted the tornado and had their vehicles damaged by softball size hail. A resident in extreme southwest Burke county, near the Rutherford county line measured a 94-mph gust of wind as the parent supercell moved overhead. A damage survey team did not find any tornadic damage in the vicinity but suspected this may have been the actual mesocyclone on the ground. There was extensive hail damage to homes, vehicles and plants from softball size hail that was seen bounding" down the hillside. The third tornado developed near South Mountain State Park in northeast Rutherford county and blew down numerous trees in the vicinity of the park. This storm went on to produce nickel to baseball size hail in Cleveland county. |
| MARION | 6/3/2000 | 0.75 | A severe thunderstorm produced damaging winds which blew down power lines and one tree in Candler. Another severe storm produced a considerable amount of dime size hail in the Greenlee community outside of Marion. |
| MARION | 6/14/2000 | 0.75 | Thunderstorms developed in the foothills and piedmont during the early afternoon. One became severe and produced dime size hail in the Greenlee community, outside of Marion. Another severe thunderstorm produced several small microbursts in the Sturdivants area. A brick well house was destroyed, a number of trees were downed, some fell on houses, tin was torn off of barns, and one barn had additional light structural damage. A woman hanging clothes out to dry was shocked and injured by lightning which struck nearby her Charlotte home. |
| OLD FT | 6/4/2001 | 1 | Public report of dime-sized to quarter-sized hail. |
| PLEASANT GARDENS | 8/2/2002 | 0.75 | |
| OLD FT | 5/15/2003 | 1 | A hail storm stopped traffic on I-40. |
| OLD FT | 6/8/2003 | 1 | |
| SUGAR HILL | 7/12/2003 | 0.75 | Hail fell near the Rutherford County line. |
| MARION | 7/18/2003 | 0.88 | |
| SUGAR HILL | 8/9/2003 | 0.75 | |
| LITTLE SWITZERLAND | 5/8/2004 | 1.75 | |
| MARION | 5/8/2004 | 1.75 | |
| ASHFORD | 5/19/2004 | 0.88 | Hail fell near Altapass, just inside the McDowell County border, and destroyed an entire apple crop. |
| MARION | 5/19/2004 | 0.75 | |
| MARION | 5/23/2004 | 0.75 | |
| MARION | 5/14/2005 | 0.88 | |
| MARION | 7/27/2005 | 0.88 | |
| MARION | 4/3/2006 | 0.88 | Nickel hail at the intersection of highway 221 and Toms Creek Rd. |
| DYSORTVILLE | 4/3/2006 | 1 | |
| PLEASANT GARDENS | 4/8/2006 | 0.75 | |
| MARION | 5/13/2006 | 0.88 | |
| MARION | 5/31/2006 | 0.75 | Hail reported at the intersection of Interstate 40 and highway 221. |

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| OLD FT | 5/31/2006 | 0.75 | Quite a few trees down. One tree fell on a power line, taking down the lines and damaging a transformer. |
| MARION | 6/2/2006 | 0.88 | Dime to nickel size hail and wind gusts estimated at 50 mph. |
| MARION | 6/11/2006 | 0.88 | |
| MARION | 6/23/2006 | 1.75 | Golfball size hail and numerous trees down on the west side of Marion. |
| OLD FT | 7/20/2006 | 0.75 | Penny hail reported near the Buncombe County line. |
| SUGAR HILL | 8/8/2006 | 0.75 | |
| MARION | 9/28/2006 | 0.88 | |
| MARION | 4/15/2007 | 0.75 | Reported on Fairview Rd south of Interstate 40. |
| MARION | 6/8/2007 | 1 | Severe storms developed over the North Carolina mountains during the afternoon hours. The storms moved east into the foothills and Piedmont during the late afternoon hours. |
| MARION | 6/8/2007 | 0.88 | Severe storms developed over the North Carolina mountains during the afternoon hours. The storms moved east into the foothills and Piedmont during the late afternoon hours. |
| MARION | 6/23/2007 | 0.88 | Isolated severe storms developed during the evening hours over the Mountains and western Foothills of North Carolina. |
| OLD FT | 6/28/2007 | 0.75 | Reported on Newberry Creek Rd. |
| OLD FT | 6/29/2007 | 0.75 | Reported along old highway 70. |
| OLD FT | 6/7/2008 | 0.75 | Reported on Curtis Creek Rd. |
| OLD FT | 6/7/2008 | 0.75 | Scattered severe storms affected western North Carolina during the afternoon and early evening hours. |
| MARION | 6/22/2008 | 0.88 | Severe storms developed over the North Carolina mountains during the early afternoon hours. The storms progressed eastward during the afternoon and evening affecting much of western North Carolina. |
| MARION | 6/22/2008 | 0.75 | Severe storms developed over the North Carolina mountains during the early afternoon hours. The storms progressed eastward during the afternoon and evening affecting much of western North Carolina. |
| MARION | 6/22/2008 | 1 | Severe storms developed over the North Carolina mountains during the early afternoon hours. The storms progressed eastward during the afternoon and evening affecting much of western North Carolina. |
| DAVISTOWN | 6/9/2009 | 0.75 | Hail was reported near the McDowell/Buncombe County line. |
| NEBO | 6/10/2009 | 0.75 | Several clusters of thunderstorms produced areas of severe weather over parts of western North Carolina during the afternoon and evening hours. Some flash flooding was also observed over the region. |
| CROSS MILL | 6/10/2009 | 0.88 | Several clusters of thunderstorms produced areas of severe weather over parts of western North Carolina during the afternoon and evening hours. Some flash flooding was also observed over the region. |
| DYSORTVILLE | 5/28/2010 | 0.88 | Penny to nickel size hail fell from Deer Park Rd, about 7 miles east southeast of Marion, to the Dysartsville community. |
| MARION ARPT | 4/9/2011 | 1.75 | Hail up to the size of golf balls fell across the Marion area. |
| EAST MARION | 4/9/2011 | 2.5 | Tennis ball size hail was reported on Rutherford Rd about 2 miles southeast of Marion. |
| WEST MARION | 4/9/2011 | 2 | The Blacksburg, VA Forecast Office relayed a report of 2-inch diameter hail near exit 81 on I-40. Other reports of large hail were received in the Marion area as far east as exit 88. |
| EAST MARION | 4/9/2011 | 2 | Two-inch diameter hail fell along Roy Hollifield Rd. |
| OLD FT | 4/9/2011 | 1 | Thunderstorms initiated over the mountains of North Carolina during the afternoon hours. As the afternoon progressed, several supercell thunderstorms developed which tracked southeast across the foothills and piedmont along a slow-moving surface cold front. With unusually steep lapse rates over the region, several of the storms produced large hail. Fortunately, the supercells were a little elevated in nature, and only one, brief, weak tornado developed. Still, hail ranging up to the size of a softballs did quite a bit of damage over the region. |

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| OLD FT | 5/13/2011 | 1.75 | Golf ball size hail fell along Interstate 40 west of Old Fort. |
| SUGAR HILL | 5/13/2011 | 0.75 | An approaching upper low helped trigger numerous thunderstorms over western North Carolina during the afternoon hours and into the overnight. Some of the storms produced large hail and damaging winds. |
| MARION | 5/26/2011 | 0.75 | Penny size hail was reported at McDowell Hospital. |
| MARION | 5/26/2011 | 0.75 | Numerous showers and thunderstorms affected the western Carolinas and northeast Georgia during the afternoon and evening hours. Some of the thunderstorms were severe, producing large hail and damaging straight line wind. |
| PLEASANT GARDENS | 6/9/2011 | 1 | Dime to quarter size hail fell at Lake Tahome Dam. |
| NORTH COVE CROSSING | 6/21/2011 | 1 | Nickel to quarter size hail fell along Honeycutt Rd in the Ashford community. |
| LITTLE SWITZERLAND | 6/28/2011 | 0.88 | Numerous pulse-type thunderstorms developed in a regime of weak shear and high instability over the North Carolina foothills and western piedmont. Several of the storms produced damaging winds and large hail. |
| CROSS MILL | 7/6/2011 | 0.88 | A couple severe storms affected western North Carolina during the afternoon and evening hours. |
| WOODLAWN | 3/24/2012 | 0.75 | Thunderstorms developed over western North Carolina, mainly the piedmont areas, as a strong upper low moved toward the region. Hail, some of it large, was reported with many of the storms. |
| WOODLAWN | 4/17/2012 | 1.75 | Hail up to golf ball size fell on Hidden Forest Dr. |
| WOODLAWN | 4/17/2012 | 2 | Two-inch diameter hail was reported on highway 221 near Woodlawn. |
| NEBO | 5/1/2012 | 1.75 | Golf ball size hail was reported at Lake James. |
| PLEASANT GARDENS | 5/1/2012 | 0.75 | Penny size hail was reported in the Pleasant Gardens community. |
| MARION ARPT | 5/1/2012 | 1 | Quarter size hail fell at Buck Creek campground. |
| NEBO | 6/13/2012 | 1 | An isolated thunderstorm developed along a weak back door cold front over the North Carolina Foothills. Large hail and wind damage were reported with the storm. |
| OLD FT | 7/1/2012 | 1.5 | After a day where temperatures rose to record levels, including 104 degrees at the Charlotte Douglas International Airport, numerous severe storms developed over western North Carolina during the afternoon and evening hours. The wind shear was fairly weak, but there was considerable instability. This allowed some of the storms to organize into small bowing clusters, though the dominant mode was pulse severe. |
| SUGAR HILL | 8/2/2012 | 0.75 | Penny size hail was reported in the Sugar Hill community. |
| GLENWOOD | 8/8/2012 | 1 | Quarter size hail was reported in the Glenwood community. |
| WEST MARION | 8/8/2012 | 0.75 | The combination of a dissipating frontal boundary and a hot and humid airmass resulted in numerous showers and thunderstorms over western North Carolina. Some of the thunderstorms caused localized wind damage and large hail. One storm dropped 3.5 inches of rain in a short period of time, causing a small area of flooding east of Charlotte. |
| NEBO | 6/11/2014 | 1 | Media reported quarter size hail near the Dysartsville community. |
| DAVISTOWN | 6/16/2014 | 1 | EM relayed Fire Dept report of quarter size hail. Public reported 3/4-inch hail south of Old Fort. |
| WHITEHOUSE | 6/19/2014 | 0.75 | Media relayed report of 3/4 inch hail in the Crooked Creek community. |
| DAVISTOWN | 6/19/2014 | 1 | Media relayed report of quarter size hail on Bat Cave Rd. |
| NEBO | 6/20/2014 | 0.75 | Public reported 3/4-inch hail on the shore of Lake James and between Etowah and Horse Shoe. |
| MARION | 7/2/2014 | 0.88 | County comms and public reported up to nickel size hail in and around Marion. |
| MARION ARPT | 8/20/2014 | 0.88 | County comms reported nickel size hail in the Hankins Rd area (3 N Marion) and near downtown. |
| MARION | 8/20/2014 | 1 | Spotter reported quarter size hail in downtown Marion. |

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| FERO | 6/17/2015 | 1 | FD reported quarter size hail along I-40 just east of Marion. |
| PLEASANT GARDENS | 6/17/2015 | 0.88 | Media reported nickel size hail west of Marion. |
| MARION | 6/17/2015 | 1 | Spotters and the public reported up to quarter size hail with two slow-moving severe thunderstorms that affected the Marion area. |
| SUGAR HILL | 5/1/2016 | 2 | EM reported up to 2-inch diameter hail caused considerable damage in the Sugar Hill area. At least one home received considerable exterior damage due to wind driven hail. |
| DAVISTOWN | 5/1/2016 | 1.25 | Media reported quarter to half dollar size south of Old Fort, including on Bat Cave Rd and Bethlehem Rd. |
| PLEASANT GARDENS | 5/1/2016 | 0.88 | Spotter reported dime to nickel size hail on Old River Rd. |
| PLEASANT GARDENS | 5/1/2016 | 1 | Spotter reported quarter size hail along Old River Rd. |
| DAVISTOWN | 5/2/2016 | 1.75 | Media reported golf ball size hail on Charles Monroe Dr. |
| GLENWOOD | 5/2/2016 | 1 | Public reported quarter size hail south of Marion. |
| DAVISTOWN | 5/2/2016 | 2 | Spotter reported golf ball to 2-inch diameter hail. |
| DAVISTOWN | 5/2/2016 | 0.88 | Spotter reported nickel size hail. |
| GRAPHITE | 7/8/2016 | 1 | Public reported quarter size hail. |
| OLD FT | 7/19/2016 | 0.75 | Media reported 3/4 inch hail near I-40 in western McDowell County. |
| SUGAR HILL | 5/19/2017 | 1 | Public reported dime to quarter size hail at the corner of Old Fort Sugar Hill Rd and Sugar Hill Rd. |
| WEST MARION | 6/16/2017 | 0.88 | Media reported nickel size hail at the I-40 rest area near Marion. |
| ASHFORD | 5/7/2018 | 0.75 | Public reported (via Social Media) 3/4 inch hail along Highway 221. |
| EAST MARION | 5/4/2019 | 1 | Media reported quarter size hail just east of Marion. |
| SUGAR HILL | 8/19/2019 | 0.75 | Media reported 3/4 inch hail in the Sugar Hill area. |
| | | | **Mitchell County** |
| BULADEAN | 4/28/2002 | 0.75 | |
| BAKERSVILLE | 7/2/2002 | 0.75 | |
| BAKERSVILLE | 5/15/2003 | 0.75 | |
| LEDGER | 5/15/2003 | 1 | |
| SPRUCE PINE | 5/15/2003 | 1.75 | |
| BULADEAN | 5/8/2004 | 0.75 | |
| SPRUCE PINE | 5/8/2004 | 1 | |
| SPRUCE PINE | 5/10/2005 | 0.88 | Mostly pea size hail, with some stones as large as nickels, accumulated to a depth of 2.5 inches in the Carters Ridge area south of Spruce Pine. Hail also accumulated to a depth of several inches in town. Several buildings received minor damage, mainly water damage due to ice dams developing on roofs and in gutters. |
| BULADEAN | 5/18/2006 | 0.88 | |
| SPRUCE PINE | 6/8/2007 | 0.75 | Reported on Crabtree Creek Rd, which parallels the Yancey County line. |
| BULADEAN | 6/9/2008 | 0.88 | Several severe storms developed over western North Carolina during the afternoon and evening hours ahead of a cold front. |
| BULADEAN | 6/9/2008 | 0.88 | Several severe storms developed over western North Carolina during the afternoon and evening hours ahead of a cold front. |
| BAKERSVILLE | 6/22/2008 | 0.75 | Severe storms developed over the North Carolina mountains during the early afternoon hours. The storms progressed eastward during the afternoon and evening affecting much of western North Carolina. |
| BAKERSVILLE | 6/22/2008 | 0.75 | Severe storms developed over the North Carolina mountains during the early afternoon hours. The storms progressed eastward during the afternoon and evening affecting much of western North Carolina. |

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| SPRUCE PINE | 6/26/2008 | 1 | Scattered severe storms affected parts of western North Carolina during the afternoon hours. |
| BULADEAN | 8/2/2008 | 0.88 | A cold front triggered several severe storms over western North Carolina during the afternoon and evening hours. |
| LEDGER | 6/9/2009 | 1 | Hail was reported on highway 226 in the Ledger community. |
| BAKERSVILLE | 4/9/2011 | 1.75 | Golf ball size hail was reported in the Bakersville area. |
| ALTAPASS | 6/7/2011 | 0.75 | Isolated thunderstorms developed over the North Carolina mountains as an unseasonably hot airmass affected the region. There was one report of wind damage and small hail during the afternoon hours. |
| BULADEAN | 6/9/2011 | 1 | Quarter size hail was reported in the Buladean community. |
| BULADEAN | 4/27/2012 | 1 | Quarter size hail fell in the Buladean community. |
| BULADEAN | 4/30/2012 | 1 | A second severe thunderstorm of the day produced another round of quarter size hail at this location. |
| GLEN AYRE | 4/30/2012 | 1 | Hail of at least quarter size damaged automobiles, roofs, and broke sky lights in the Valley of Roan community. |
| PENLAND | 4/30/2012 | 1.25 | Half dollar size hail was reported along highway 226. |
| BULADEAN | 7/3/2012 | 0.75 | Hail was reported to be covering the ground a little north of Buladean. |
| BAKERSVILLE | 5/21/2013 | 1 | Scattered, disorganized thunderstorms developed over the North Carolina Piedmont, and eventually the mountains, during the afternoon hours. A few of the storms became severe, producing large hail and wind damage. |
| BAKERSVILLE | 6/4/2014 | 1 | Public reported quarter size hail. |
| SPRUCE PINE | 6/13/2017 | 1 | Public reported (via Social Media) quarter size hail in the Spruce Pine area. |
| | | | **Yancey County** |
| BURNSVILLE | 6/4/2002 | 0.75 | |
| BUSICK | 6/4/2002 | 1.75 | |
| CELO | 4/30/2003 | 0.75 | Hail covered the ground along highway 80. |
| BUSICK | 4/30/2003 | 1 | Hail fell at Mt Mitchell State Park. |
| BUSICK | 4/30/2003 | 1 | Hail fell at Mt Mitchell State Park. |
| BUSICK | 4/30/2003 | 1 | Several hail storms affected Mt Mitchell State Park, and the hail eventually covered the ground. |
| BURNSVILLE | 4/30/2003 | 0.75 | |
| BURNSVILLE | 5/26/2004 | 0.75 | |
| BUSICK | 5/10/2005 | 0.75 | |
| BURNSVILLE | 4/2/2006 | 0.75 | |
| ESKOTA | 5/13/2006 | 0.75 | Dime size hail reported in Mt. Mitchell State Park and in the Busick community. |
| BURNSVILLE | 6/23/2006 | 0.75 | Penny size hail in the Mountain Air community. |
| BURNSVILLE | 6/8/2007 | 0.75 | Reported on Crabtree Creek Rd, which parallels the Mitchell County line. |
| BURNSVILLE | 6/28/2007 | 0.75 | A few severe storms affected western North Carolina during the afternoon and evening hours. |
| GREEN MTN | 6/22/2008 | 1 | Severe storms developed over the North Carolina mountains during the early afternoon hours. The storms progressed eastward during the afternoon and evening affecting much of western North Carolina. |
| HAMRICK | 4/10/2009 | 1 | Reported at Coop station. |
| CAVE RIVER | 4/24/2009 | 0.75 | Large hail was reported in the upper French Broad Valley. |
| BURNSVILLE | 6/11/2009 | 0.88 | Widespread severe weather affected western North Carolina as a line of storms moved across much of the region. Other severe storms also developed ahead of the line. |
| BURNSVILLE | 4/9/2011 | 1 | Quarter size hail was reported at the county communications center. |
| ESKOTA | 4/9/2011 | 1.25 | Quarter to half dollar size hail was reported in the extreme southern part of the county. |
| BALD CREEK | 6/9/2011 | 0.75 | Numerous thunderstorms again developed over western North Carolina as an unseasonably hot airmass persisted across the region. The storms produced both large hail and damaging winds. |

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| BURNSVILLE | 3/2/2012 | 0.75 | Two supercell thunderstorms entered the North Carolina mountains during the evening hours. One of the storms produced a strong tornado in the town of Murphy in Cherokee County. The supercell remained surprisingly strong as it crossed the southern mountains, producing large hail and eventually another weak tornado in Jackson County. Later at night, storms organized into a broken line across Upstate South Carolina. The northern part of the line crossed the southern North Carolina piedmont where it produced a strong, brief tornado on the northeast side of Charlotte. The storm did not exhibit supercell characteristics, and the tornado spun up quite quickly as the line intersected a low-level boundary. |
| BURNSVILLE | 4/30/2012 | 1 | Scattered thunderstorms developed over the North Carolina Mountains during the late afternoon and evening hours. Some of the storms produced large hail. |
| BURNSVILLE | 6/30/2012 | 1 | Quarter size hail fell in the Bakers Creek community. |
| ESKOTA | 5/1/2016 | 1 | Public reported a lot of pea size hail, with some stones as large as quarters mixed in at Mount Mitchell State Park. |

## TABLE H.5: HEAVY RAIN EVENTS (2000-2019)

| Location | Date | Description |
|---|---|---|
| **Avery County** | | |
| NEWLAND | 7/8/2001 | |
| COUNTYWIDE | 12/19/2002 | Heavy rain caused a few North Carolina mountain streams to rise to near bankfull. In addition, the wet soil combined with gusty winds to cause some drought weakened trees to fall across the area. |
| MINNEAPOLIS | 7/16/2013 | High flows along a stream damaged a private access bridge. |
| BANNER ELK | 7/27/2016 | County comms and EM reported water from backed up storm drains entering several businesses, including the fire department along Highway 184 on the south side of downtown Banner Elk after more than 3 inches of rain fell in a couple of hours. |
| **McDowell County** | | |
| MARION | 5/23/2004 | Very heavy rainfall caused water to pool to depths as high as 4 feet in poor drainage areas throughout the city. |
| MARION | 7/7/2005 | Several private driveways were washed out on Nix Creek Rd and a 25 to 30 feet diameter sink hole opened on Sugar Hill Rd. |
| MARION | 4/12/2013 | Clogged drains in the city of Marion caused water to enter several businesses to a depth of a few inches on North Garden and East Court streets during the early morning hours of April 14th. The flooding was the result of 1 to 1.5 inches of rain which fell over a period of about 2 hours. |
| LITTLE SWITZERLAND | 6/29/2014 | Media reported Cox Creek briefly overflowed its banks near Highway 226 after 2-3 inches of rain fell in a couple of hours. There were no reports of any threat to life or property, and no other information was available. |
| **Mitchell County** | | |
| SPRUCE PINE | 2/22/2003 | Mudslides resulting from heavy rainfall blocked some roads near Spruce Pine. |

# TABLE H.6: HEAVY SNOW EVENTS (2000-2019)

| Date | Description |
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| | **Avery County** |
| 1/4/2000 | Northwest flow snow showers fell overnight across the northern mountains and higher elevations of Haywood and Swain counties near the Tennessee border. Accumulations of 1 to 2 inches were common, with a maximum of 3 inches reported on Grandfather Mountain. |
| 1/18/2000 | Low pressure moved east across Tennessee and weakened as it ran into a surface high pressure ridge along the East Coast. Nevertheless, enough moisture was available to cause heavy snow to fall from Avery county, east across the northern foothills and northwest piedmont. Precipitation began as light rain in the mid-evening hours on the 17th, but quickly turned to snow as the atmosphere cooled to below freezing. Snowfall ranged between 3 and 6 inches across the area by noon on the 18th, with a narrow band of 1 to 3-inch accumulation of snow and sleet to the immediate south. |
| 1/20/2000 | A cold front crossed the mountains overnight, and low pressure formed along the front in the foothills by morning. Cold air was already in place across the region, so precipitation fell in the form of snow. By noon on the 20th, 3 to 6 inches of snow had fallen from Madison to Avery counties. Elsewhere across the central mountains, northern foothills and northwest piedmont, 1 to 3 inches of snow fell. There were isolated reports of 4 inches from the highest peaks in Swain and Haywood counties. The combination of snow and wind in the wake of the front caused some trees to fall, especially in Caldwell county. One tree fell across a mobile home and caused $24K in damage. Several other trees fell across roads. |
| 1/22/2000 | A cold dome of arctic high pressure centered over the Mid-Atlantic States provided very cold and dry air to western North Carolina. Meanwhile, weak low pressure moved east along a frontal boundary stalled across the Gulf Coast States to the Georgia coast. Abundant moisture flowed north into the sub-freezing air over western North Carolina, resulting in light snow as early as the afternoon on the 22nd. Snow became heavy by mid-afternoon across the mountains and by evening across the foothills and piedmont. A general 4 to 7-inch snowfall occurred in the mountains with as much as 10 inches reported in Jackson county. Generally, 4 to 6 inches of snow fell across the foothills and piedmont, with a local maximum of 7 inches in western Lincoln county. Rowan county failed to meet heavy snow criteria with accumulations of up to 3 inches. Freezing rain and sleet mixed with the snow for a short time before the precipitation ended, and for the most part, caused little additional problems. The one exception was across southern Union county where freezing rain lasted all night and through much of the morning on the 23rd. Ice accumulations reached damaging levels there around 3 am, causing a large number of trees and power lines to fall throughout the morning. This in turn, resulted in widespread power outages. |
| 1/26/2000 | An upper level disturbance and northwest flow combined to produce varying amounts of snow across the mountains from early evening on the 25th through noon on the 26th. One to three inches of snow fell from Macon county to Buncombe and Yancey counties. Heavy snow accumulated 4 to 6 inches across most of the Tennessee border counties from Graham to Avery. |
| 1/31/2000 | Northwest flow produced a light snowfall of 1 to 3 inches. |
| 2/4/2000 | A cold and moist northwest flow produced snow showers for about 24 hours across mainly the Tennessee border counties. Snow accumulations of 1 to 3 inches occurred as far east as northern Buncombe county. Four inches of snow fell across the northern part of Mitchell county. |
| 3/20/2000 | An area of precipitation which fell as rain in the low elevations, and snow in the higher elevations of the northern mountains, crossed western North Carolina early in the morning. Two to 4 inches of rain fell in a short time across portions of Buncombe and Henderson counties and caused small streams to flood briefly. Snowfall in the high elevations ranged between 2 and 3 inches, with 5 inches reported from the highest peaks. |
| 4/8/2000 | A cold and moist northwest flow behind a cold front produced light snow across the mountains. Accumulations were generally a dusting to one inch, but the highest mountains north of Asheville received 2 to 3 inches. |
| 11/19/2000 | Light to moderate snow started in the mountains and spread southeast, lasting through the day. Generally, 1 to 3 inches of snow fell, but some higher elevations of the central and southern mountains reported more than 4 inches. |
| 12/3/2000 | A developing surface cyclone off the Carolina Coast spread abundant moisture into western North Carolina, which was still mired in a cold, winter-like temperature regime. The result was another widespread snowfall. Accumulations ranged from a dusting in the northern foothills to more than 6 inches in western Macon County and 5 inches in Henderson County. Most accumulations were in the 1 to 3-inch range. |

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| 12/17/2000 | Heavy rain, with embedded thunderstorms, crossed the region from late morning through the afternoon on the 16th. Cold air trapped in some valleys of the northern mountains never completely scoured out, resulting in a light glaze south and west of Newland. Just as surface temperatures rose above freezing in the northern mountains, thunderstorms pushed out ahead of the strong front, with numerous small hail reports. As the front, and attendant pressure gradient, pushed its way into western North Carolina, winds increased into the 50 to 60 mph range, resulting in numerous downed trees and power lines. Nearly every county in the mountains reported some wind damage. The high winds eventually affected the foothills and piedmont. |
| 12/19/2000 | |
| 12/30/2000 | A strong northwest flow across the higher terrain produced a fresh blanket of 1 to 3-inch snowfall near the Tennessee border. |
| 12/30/2000 | A second round of upslope snow showers into the western facing slopes produced an additional 1 to 2-inch snow accumulation. |
| 1/1/2001 | A powerful upper level disturbance interacted with left-over cold air and abundant low-level moisture to wring out snow showers across the North Carolina mountains from midday New Year's Day through the early morning hours on the 2nd. Highest accumulations were in Haywood County, with several reports of 3-inch accumulations. |
| 1/2/2001 | A secondary cold front passing over the mountains resulted in light snowfall accumulations. |
| 1/8/2001 | A weak upper level disturbance crossed the mountains early on the 8th, producing a light blanket of fresh snow. |
| 1/8/2001 | Another fast-moving upper level disturbance produced more light snow, mostly in areas near the Tennessee border. |
| 1/20/2001 | Strong, northwest winds on the backside of a developing surface cyclone along the Carolina coast advected much colder air into the North Carolina mountains on the 20th, resulting in heavy snow along the slopes with a western exposure. Highest accumulations were in Avery and Mitchell counties, with Poplar reporting 5 to 6 inches, and Elk Park 5 to 8 inches. |
| 1/25/2001 | A cold front crossed the mountains early on the 25th, producing additional light snow accumulations in the northern North Carolina mountains. |
| 2/22/2001 | |
| 3/4/2001 | Rain changed over to snow and accumulated a bit. Most accumulations were on grassy areas but a few icy spots developed on roads. |
| 3/15/2001 | A cold front, accompanied by abundant low-level moisture, crossed the region early on the 15th, resulting in a light blanket of fresh snow. |
| 3/20/2001 | Low pressure developed off the South Carolina coast and steadily strengthened as it moved northward across the coastal waters of North Carolina, the Virginia tidewater and eventually out to sea. Rapid strengthening occurred as a strong upper level disturbance rotated around an upper low that was crossing the southeast states. As the cyclone strengthened, abundant moisture was wrapped around the storm and thrown back against the higher terrain of the Carolinas, resulting in high winds and very heavy snow. The heaviest snow accumulations were in far western North Carolina. The highest accumulations were 24 to 30 inches at Sugar Mountain, Beech Mountain and Newland in Avery County, at Mount Mitchell in southern Yancey County and in a narrow swath along the border between Madison and Haywood counties. Wind damage was far more widespread than the heavy snow, for most foothill and piedmont areas experienced numerous downed trees and power lines, although damage appeared to take on a more scattered character as one moved east away from the higher terrain. |
| 4/1/2001 | Wet snow fell through the morning, resulting in accumulations ranging from 1 to 3 inches. The southernmost sections of this area were only affected at the highest elevations. |
| 1/6/2002 | Snow began in the early morning, reaching accumulations of 4 to 8 inches by 3 pm. The highest accumulations were in the high elevations. Some sleet was mixed in with the snow. |
| 2/3/2002 | Light snow fell from late afternoon into late evening, resulting in 1 to 2.5 inches accumulations in some areas, and a few slick roads. |
| 2/17/2002 | Snow fell for most of the day across portions of the northern mountains. While much of Mitchell and Yancey Counties received only a dusting, amounts of 1 to 3 inches were reported across Avery County. Numerous traffic accidents occurred at Beech Mountain. |
| 2/26/2002 | Snow fell overnight into the morning hours, as an upper level storm system moved across the area, and was followed by strong northwest winds. Most of the snow fell immediately along the Tennessee border, but extended |

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| | east of there in some cases. Some of the higher elevations of Graham, Madison, and Avery Counties received as much as 5 inches of snow. In addition to the snow, wind chill values fell to zero and below in some locations. |
| 11/17/2002 | The first snow of the season brought an inch or two of accumulation to the higher elevations of the North Carolina mountains. Winds also gusted to 45 mph in some locations. |
| 11/22/2002 | Snow accumulated to as much as 5 inches on the highest peaks along the Tennessee border. Also, wind gusts resulted in scattered tree damage across the area. |
| 12/4/2002 | Snow began falling around sunrise across the mountains of North Carolina, and had accumulated to 3 to 6 inches by evening. |
| 1/16/2003 | Light snow began across the mountains of North Carolina during the afternoon of the 16th, and gradually intensified with time. By early morning of the 17th, 4 to 8 inches of snow had accumulated. As much as a foot was reported on some of the highest peaks. |
| 1/23/2003 | Snow began at around midnight across the mountains of North Carolina, and intensified as it spread into the foothills and the western piedmont. The hardest hit area was the foothills, where 8 to 12 inches of snow had fallen by mid-morning. Otherwise, snow accumulations were generally in the 3 to 6-inch range. |
| 2/6/2003 | Light snow began falling across the western mountains of North Carolina during the afternoon of the 6th, and gradually increased in intensity and coverage during the evening and overnight hours. General snowfall amounts of 4 to 5 inches were reported in the major valleys. However, accumulations of up to 8 inches occurred in the highest elevations along the Tennessee border. |
| 3/30/2003 | Snow intensity increased during the pre-dawn hours across the northern mountains, and heavy accumulations were realized by mid-morning. |
| 4/10/2003 | Light snow began across the North Carolina mountains during the early morning hours of the 10th, but due to a warm ground, accumulations were confined to the highest elevations through 8 AM. However, the snow intensified dramatically during the middle and late part of the morning, and by early afternoon, 2-4 inches had accumulated in valley locations near the Blue Ridge. In the higher elevations, 4 to 6-inch totals were common, while 8 to 12 inches accumulated on some of the highest peaks along the Tennessee border. The heavy, wet snow caused numerous trees and power lines to fall, and power outages were widespread. |
| 12/18/2003 | A prolonged period of snow produced heavy accumulations over a 2-day period across much of the North Carolina mountains. Most valley locations received total accumulations of 6 inches or less. However, most of the high elevation areas along the Tennessee border received between 1 and 2 feet. Northwest winds of 20 to 30 mph caused blowing and drifting snow. |
| 1/25/2004 | Light snow developed early in the morning across the mountains, foothills, and northern piedmont of North Carolina. The snow intensified throughout the morning and afternoon, and by early evening 3 to 5 inches had accumulated across much of the area. Accumulations as high as 8 inches occurred in mountainous areas along the Tennessee border. |
| 2/7/2004 | Snow fell during much of the afternoon, evening, and overnight hours across the western mountains of North Carolina. Three to five inches of snow accumulated, mainly in areas along the Tennessee border. |
| 2/12/2004 | Snow began during the late evening hours across the northern and central mountains, and continued overnight. By sunrise on the 12th, accumulations of 3 to 6 inches were common. The heaviest amounts occurred in the highest elevations along the Tennessee border. |
| 2/15/2004 | Snow fell for much of the afternoon and evening across the northern mountains and northern foothills of North Carolina. Accumulations totaled 3-5 inches in Avery County, and across the northern half of Alexander County. Some sleet mixed with the snow at times, creating hazardous driving conditions. |
| 2/26/2004 | Heavy snow began to fall across the foothills, piedmont, and northern mountains of North Carolina during the late morning. Although snowfall intensity decreased dramatically during the early-to-middle portion of the afternoon, heavy snow redeveloped during the late afternoon, and continued into the evening and overnight hours. Scattered thunderstorms contributed to intense snowfall rates of 2 to 3 inches per hour from time to time, especially in the piedmont, where total snowfall of 12-22 inches occurred. The heaviest amounts occurred in the southwest piedmont, particularly in southern portions of Charlotte metro. Thousands of people were stranded on I-77 during the early afternoon, and some required rescue. The weight of the snowfall caused damage to numerous roofs, while some roofs completely collapsed. Across the foothills and northern mountains, accumulations were |

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| | considerably lighter, generally in the 4-8-inch range, although amounts of 10-16 inches fell along the Blue Ridge north of I-40. |
| 12/11/2004 | Heavy snow fell across the mountains and accumulated in the high elevations to 3 to 6 inches. The heavy snow level in most locations was 4000 feet, but dropped off to as low as 3000 feet in the southwest mountains. Elevations between 2500 feet and 3500 feet generally had an inch or two. |
| 12/19/2004 | Heavy snow fell for about 7 hours, along with wind gusts to near 50 mph. The highest accumulations were along the Tennessee border, especially in Graham County where some drifts reached a reported 2 feet. The snow and wind were accompanied by very cold weather. The Asheville Regional Airport reached a record low of 7 degrees the morning of the 20th. Buncombe County had heavy snowfall in the western and northern part of the county, although areas from Asheville south to the Henderson County line only had a trace to an inch. The temperature fell to below zero overnight in parts of the northern mountains, even the valleys, with single digits common elsewhere. |
| 1/22/2005 | Heavy snow fell during the overnight hours across the northern mountains. Occasional heavy snow and blowing snow caused blizzard-like conditions at times, especially in Avery County. Snowfall ranged from 2 to 4 inches in the valleys and 4 to 6 inches in the higher elevations. As wet roads froze underneath the snow, they became quite slick and hazardous, causing quite a few accidents. In addition, temperatures in the single digits combined with strong winds to produce wind chills of 10 below. |
| 2/10/2005 | Snow fell across the northern mountains during the evening. By the time the snow ended during the early morning of the 11th, accumulations totaled 2 to 5 inches across the area, with some isolated heavier amounts observed in the highest elevations near the state line. |
| 2/28/2005 | The wet snow became heavier across the mountains and northern foothills during the early morning hours on the 28th. Most locations below 3000 feet changed back to rain before the precipitation ended. A quick 3 to 7 inches of snow accumulated across much of this area. Isolated heavier totals up to 13 inches occurred along the Blue Ridge, north of I-40, while the lower elevations of the foothills generally received only 1 to 3 inches. |
| 3/1/2005 | Snow developed during the evening across the northern mountains, as strong northwest winds developed in the wake of a cold front. 2 to 4 inches of snow accumulated in addition to that which fell across the area on the morning of the 28th. |
| 3/11/2005 | By late evening, heavy snowfall accumulations were observed across Avery County. By the time the snow ended during the pre-dawn hours of the 12th, snowfall amounts ranged from 2-3 inches in the valleys, to 4-6 inches in the higher elevations. |
| 4/2/2005 | Persistent snowfall resulted in heavy accumulations of wet snow in the high elevations of the North Carolina mountains, mainly in areas above 4000 feet. Accumulations were generally 4 to 6 inches, although some areas above 5000 feet received higher amounts, including 16 inches at Mount Mitchell, and 13 inches at Soco Gap. U.S. 19 and 441 were closed through the high elevations of the Balsams and Smokies. Several bicyclists were stranded in the snow in Jackson County, and had to be rescued. |
| 1/14/2006 | As snow showers continued across the western mountains, accumulations reached 2-5 inches across the area by early afternoon. There were locally heavier amounts in the higher elevations. |
| 2/5/2006 | Light to occasionally moderate snow fell through much of the overnight and early morning hours, culminating in heavy snowfall totals by mid-morning on the 5th. Snowfall ranged from 1-3 inches across the central and southern part of the county to 3-5 inches along the Tennessee border. |
| 2/11/2006 | Northwest flow, a very cold airmass, and upper air disturbances combined to produce an unusually strong upslope snow event across the far western counties of North Carolina. Widespread, heavy snow showers began to develop during the early evening of the 11th, and by late evening, heavy snowfall accumulations were common across the area. The snow lasted for a very long period, continuing through the 12th and the early morning hours of the 13th before finally tapering off. Combined with the light snow that fell across the area on the morning of the 11th, storm total accumulations of 5 to 10 inches occurred within the valleys near the Tennessee border. Meanwhile, accumulations were generally in the 1-2-foot range across the higher elevations. There were unofficial reports of as much as 4 feet in the Smoky Mountains. This event was unusual in that heavy snowfall extended as far east as the higher elevations of eastern Buncombe county, while the valleys of northern Buncombe received 3 to 6 inches. |
| 3/25/2006 | An extended period of upslope flow and an unstable airmass resulted in numerous snow showers across the western mountains of North Carolina. The snow showers began on the evening of the 24th and continued through the evening of the 25th. Snowfall accumulated to 4 to 8 inches in the higher elevations along the Tennessee |

| Date | Description |
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| | border. Although snowfall totals in the valleys were lower, 2 to 3 inches did accumulate at the lower end of the French Broad valley, and in the Pigeon River gorge. In many cases, heavy bursts of snow would cause a quick inch or so to accumulate in the valleys before melting rapidly under the influence of warm temperatures. Therefore, actual snowfall in the valleys was probably higher than reported. |
| 1/9/2007 | An upper level disturbance brought fairly uniform 1 to 4-inch snowfall amounts across the mountains during the late morning. The snow was quite heavy in spots and accumulated rapidly. Roads became slick and hazardous, especially in the higher elevations. Quite a few traffic accidents occurred in Madison County, including 1 fatal accident. Highway 441 was closed through the Smoky Mountains. Once the upper disturbance moved east of the area, scattered to numerous snow showers continued to affect the mountains through much of the afternoon and evening. Most areas along the Tennessee border began to see heavy snowfall accumulations by early evening. Total accumulations in the higher elevations were fairly uniform in the 3 to 5-inch range, although some locations right along the Tennessee border saw up to 7 inches, particularly along the Cherohala Skyway in Graham County, and across the northern mountains. The valleys saw less snow, with generally 1 to 2 inches observed south of the French Broad River, and 1 to 4 inches observed from the French Broad north. |
| 2/17/2007 | Light snow developed during the early evening across the northern mountains and continued through much of the overnight hours. By sunrise, snowfall totals of 1 to 3 inches had occurred. As snow showers continued to affect the northern mountains, heavy snowfall levels were finally reached shortly after sunrise. Accumulations generally ranged from 2-4 inches, although some higher elevation locations along the Tennessee border saw slightly higher totals. |
| 4/6/2007 | A record-setting cold airmass, northwest flow, and a strong upper air disturbance resulted in a late season snow shower event across the North Carolina mountains. By 3 am, snow had accumulated to as much as 2 inches in the valleys, with as much as 6 inches reported in the higher elevations. Snow showers continued through the morning hours, with heavy snowfall totals reported during the pre-dawn hours. Snowfall was highly variable across the region, with generally only 2-3 inches accumulating in the lower elevations. However, some of the higher elevations of the northern mountains saw as much as 10 inches. |
| 4/15/2007 | As a strong cold front moved across the mountains and snow levels dropped rapidly, rain showers changed to snow showers and caused rapid accumulation of heavy snow, mainly in the higher elevations along the Tennessee border. Total accumulations generally ranged from 2-5 inches, mainly in areas above 3500 feet, while the valleys saw amounts ranging from a trace up to an inch. |
| 1/1/2008 | Snow showers developed New Yearï¿½ï¿½ï¿½s Evening across the western slopes of the Appalachians. As snow showers, heavy at times, continued across the western Mountains of North Carolina, accumulations began to pile up during the pre-dawn hours of the 2nd. Many locations reported 2-4 inches of accumulation by sunrise. By the time the snow tapered off to flurries (during late morning), total accumulations ranged from a couple of inches in the valleys away from the Tennessee border, to 4-6 inches in areas along the state line. Although accumulating snow tapered off during mid-morning, flurries continued for much of the day, while very windy conditions resulted in blowing and drifting snow. |
| 1/16/2008 | Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas and northeast Georgia. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall across the central and northern mountains, and much of the foothills of North Carolina, during the early morning hours. Total accumulations of 2-5 inches were reached across the area during the pre-dawn hours. Some amounts as high as 8 inches were reported in the higher elevations. Snow changed briefly to sleet and freezing rain before ending across the foothills. |
| 2/26/2008 | Snow showers developed across the western mountains during the late evening. The snow showers increased in coverage and intensity through the early morning hours of the 27th, resulting in heavy snow accumulations across much of the western mountains before sunrise. Snow continued through the day and evening hours and did not begin tapering off until the early morning hours on the 28th. Total accumulations were highly variable across the area. While locations such as Bryson City and Waynesville saw less than 2 inches, areas along the Tennessee border received as much as a foot. Even the valley floors near the state line received as much as 8 inches. |
| 11/21/2008 | Snow showers, heavy at times, fell across the northern mountains into the afternoon, with many locations achieving heavy snowfall accumulations by late morning. Accumulations ranged from 3 inches in areas along the Blue Ridge, to 7 inches or more in the higher elevations along the Tennessee border. |

| Date | Description |
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| 12/1/2008 | Snow showers developed during the early morning hours and continued through much of the day across the Tennessee border counties. Snow showers, heavy at times, continued near the Tennessee border, with heavy snowfall accumulations reported by early evening. The snow tapered off to flurries during the early morning hours. Total snowfall amounts ranged from an inch or 2 along the Blue Ridge, to as much as 6-7 inches in the higher elevations near the state line. |
| 1/8/2009 | Snow showers developed across the Tennessee border counties around sunrise, and persisted until the late afternoon hours. Snowfall amounts ranged from 2-5 inches, mainly in elevations above 3000 feet or so. Some locally higher amounts were reported on the higher peaks. |
| 1/18/2009 | Snow showers developed over the western mountains during the late evening of the 18th, and continued off and on through the evening hours of the 20th. Snowfall totals ranged from 4 to 6 inches at the higher elevations of the southwest and central mountains, to 1 to 3 inches in the valleys. Over the northern mountains, totals ranged from 4 to 7 inches, with 1 to 3 inches along the eastern slopes of the Blue Ridge. |
| 4/7/2009 | After an extended period of snow showers, heavy snowfall accumulations were reached across the northern mountains by mid-afternoon on the 7th. Total accumulations were generally in the 2 to 4-inch range across the area, but amounts approaching 10 inches occurred in the higher elevations along the Tennessee border. |
| 1/2/2010 | A very cold and moist northwest flow resulted in the development of scattered to numerous snow showers across the Tennessee border counties, and the higher elevations of Buncombe County, during the early morning hours. The higher elevations along the Tennessee line saw 2 to 4 inches of powdery snow, while the lower elevations received anywhere from trace amounts to 2 inches. The snow was a little heavier in Avery County, were total accumulations ranged from 2 to 3 inches in the lower valleys to 4-6 inches in the higher elevations along the state line. |
| 1/4/2010 | Another round of very cold and moist northwest flow resulted in development of scattered to numerous snow showers across the western mountains overnight on the 4th. The showers persisted off and on through the day of the 5th. 24-hour snowfall totals of 1-4 inches were common across the area, with the highest amounts occurring over the higher elevations. Over Avery County, heavy snow accumulations occurred, with amounts ranging from 2-3 inches near the Blue Ridge, to 6-8 inches in the higher elevations along the Tennessee border. |
| 1/7/2010 | A very cold and moist northwest flow resulted in development of scattered to numerous snow showers across the western mountains during the evening of the 7th. The snow showers continued across much of the Tennessee border counties through the day on the 8th, with heavy accumulations reached in some areas by late morning. Total accumulations ranged from 1-3 inches over the lower French Broad Valley, to 3-6 inches across the northern mountains. Over the southwest mountains, total snowfall accumulations ranged from trace amounts in the valleys beneath the Smokies, to 2-4 inches in the higher elevations along the Tennessee border. |
| 1/29/2010 | Low pressure tracked across southern Georgia during the night of the 29th, and then off the southeast cost on the 30th. As the low passed well south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. \|\|Snow became heavy during the evening, and quickly accumulated to yield heavy snowfall totals. Total accumulations ranged from 5-9 inches across much of the northern mountains, foothills and western piedmont of North Carolina, as well as in a small part of the South Carolina mountains. A 55-year-old man died of exposure after falling in the snow in Gastonia (indirect). The precipitation changed to freezing rain and sleet near the end of the event, resulting in light accumulations of ice. |
| 2/15/2010 | Northwest flow snow showers developed over the northern mountains during the evening and persisted over the next 24 hours. By the evening of the 16th, accumulations of 5-6 inches were common near the Tennessee border, while only an inch or so had fallen in areas closer to the Blue Ridge. The snow continued off and on for almost two more days, before finally tapering off during the morning of the 18th. Accumulations along the Tennessee border totaled a foot or more in some areas. Meanwhile, locations closer to the Blue Ridge only saw a couple of inches. Over Avery County, total accumulations were higher, with 1-2 feet near the Tennessee border. |
| 2/24/2010 | Northwest flow snow showers developed during the evening across the northern mountains, and continued along the Tennessee border through much of the 25th, with heavy snowfall accumulations reached across much of the area shortly after sunrise. Total accumulations ranged from only a couple of inches along the Blue Ridge, to 7 inches in the lower valleys along the Tennessee border. Meanwhile, some of the higher elevations received a foot or more of snowfall. |

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| 3/2/2010 | Snow began to fall around sunrise across the North Carolina mountains along the Blue Ridge escarpment. Snow became moderate to heavy at times during the late morning and early afternoon, resulting in accumulations of 1 to 4 inches across most of the area. Snow, heavy at times, continued into the afternoon across the Blue Ridge, with heavy accumulations realized in most areas by mid-afternoon. By early evening, total snowfall ranged from 3 to 6 inches. Localized snowfall amounts as high as 10 inches occurred, especially in the higher elevations along the escarpment. |
| 12/12/2010 | Light snow began falling over the northern mountains and Madison County during the early morning hours of the 12th. By mid-morning, accumulations of 1 to 3 inches were observed across the area. After a strong cold front swept through the mountains, northwest winds resulted in development of numerous snow showers by early afternoon. By mid-evening, snowfall totals ranged from 1 to 5 inches across the area. As snow showers continued in the northwest flow, snow continued to gradually accumulate in the higher elevations along the Tennessee border. By the time the snow tapered off early on the 14th, accumulations generally ranged from 4 to 8 inches in the higher elevations, generally above 3500 feet, although some areas saw as much as 20 inches. The lower elevations saw considerably lower amounts, generally in the 2-5-inch range. Very windy conditions and very cold temperatures resulted in wind chill values below 0 in many areas during the overnight and early morning hours. |
| 12/25/2010 | A developing coastal storm system brought light to moderate snow, with occasional heavy bursts to the northern mountains beginning shortly after sunrise on Christmas. Snow, heavy at times, continued through the afternoon across the northern mountains and surrounding areas. By Christmas evening, most locations had 3 to 6 inches of fresh snowpack. A brief lull in snowfall occurred overnight. However, snowfall began to increase again during the morning of the 26th, as strong northwest flow resulted in development of numerous snow showers along the Tennessee border. The snow showers continued until the afternoon of the 27th. This resulted in additional accumulations that ranged from 2 to 6 inches in the valleys to a foot or more in the higher elevations. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, especially in the high elevations. |
| 1/7/2011 | Light to moderate snow developed ahead of a cold front across the western mountains of North Carolina around noon, and continued through the afternoon. After the cold front passed during the early evening, snow showers, some of which were heavy developed within a moist northwest flow, adding to accumulations across the Tennessee border counties. Snow showers continued into the overnight and through much of the 8th before tapering off during the evening and the early morning hours of the 9th. Total accumulations were highly variable across the area and depended largely upon terrain. Storm total amounts ranged from 3 to 5 inches in the southwest mountain valleys, to 4 to 8 inches in the lower French Broad Valley and the northern mountain valleys. The high elevations along the state line received as much as 2 feet. |
| 1/26/2011 | As low pressure developed off the southeast coast, rain changed to snow across the higher elevations of the North Carolina mountains during the morning, and gradually worked its way toward the valleys as colder air filtered into the region. The widespread precipitation moved away from the region during the afternoon, but developing moist northwest flow resulted in the development of scattered to numerous snow showers across the area. By the time the snow showers tapered off during the early morning hours of the 27th, 3 to 6 inches of snow had fallen above 3500 feet. Some of the highest peaks and ridgetops had around 8 inches. Meanwhile, accumulations in the lower valleys ranged from a dusting to a couple of inches. |
| 2/11/2012 | Snow showers developed over much of the North Carolina mountains during the early morning hours, and continued throughout the day. Snow showers continued off and on across the Tennessee border counties during the evening and early part of the overnight. Total accumulations ranged from a couple of inches in the lower valleys, to as much as 8 inches in the higher elevations of the Newfound Mountains and northern mountains. |
| 10/29/2012 | As ï¿½ï¿½ï¿½Superstorm Sandyï¿½ï¿½ï¿½ï¿½ moved across New England and stalled over the northern Mid-Atlantic region, abundant moisture was transported into the mountains. The first snow showers of the season developed within this moist northwest flow across the northern mountains of North Carolina during the pre-dawn hours of the 29th. Snow showers, some heavy continued through the day and overnight, and by the pre-dawn hours of the 30th, heavy snowfall accumulations were observed, mainly across the higher elevations of the northern mountains and Madison County. By the time the snow showers tapered off during the early morning hours of the 31st, 1 to 3 feet of snow was reported in the high elevations (above 4000 feet or so), with the heaviest amounts occurring at the peaks along the Tennessee border. Meanwhile, the lower valleys saw storm totals of only a few inches. |

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| 1/17/2013 | Heavy rain changed to snow across the higher elevations of the North Carolina mountains during the late afternoon hours. Snow levels lowered in elevation through early evening, during which time snow quickly accumulated to as much as 4 inches across the higher elevations. Snow levels finally fell to the valley floors by the time precipitation ended during the late evening. Heavy snowfall totals were mainly confined to elevations above 3000 feet. Some locations in the northern mountains near the Tennessee border saw as much as 9 inches. Meanwhile, the late transition to snow resulted in only an inch or two accumulating in the valleys. |
| 2/2/2013 | Snow developed quickly across the northern mountains during the early evening, and became moderate to heavy at times. Snow became more intermittent overnight, and by sunrise of the 3rd, accumulations generally ranged from 2 to 5 inches across the area. Snow showers, heavy at times, continued through much of the 3rd before tapering off by during the evening. Total accumulations ranged from 3-5 inches in most valley locations to as much as a foot in the higher elevations. |
| 1/21/2014 | Widespread snow showers developed along the Tennessee border along and immediately behind a cold front during the late morning and continued through the evening hours across the Tennessee border counties. Heavy snowfall accumulations were realized in the favored northwest flow locations by late evening. Total accumulations ranged from 3 to 6 inches across much of the area, although the valleys southwest of the French Broad generally saw less. Locally higher amounts up to 10 inches were observed in the high elevations of the northern mountains. |
| 3/6/2014 | An intensifying cyclone off the Southeast coast and cold air damming combined to produce heavy snow and occasional sleet along and near the eastern Blue Ridge escarpment. Rain mixed with sleet developed across the Blue Ridge mountains and North Carolina foothills during the evening, then changed to mainly sleet in most areas. Up to a quarter inch of sleet accumulated during the late evening and early morning hours. Precipitation then changed mostly to rain in most areas, before transitioning to snow during the pre-dawn hours of the 7th. As heavy snow continued to fall across the foothills and Blue Ridge mountains in North Carolina throughout the morning, heavy accumulations of snow became common. The region of heavy snowfall accumulation was confined to a very narrow corridor along the Blue Ridge south of I-40, but became more widespread across the northern mountains and foothills. Total snowfall accumulation generally ranged from 4-6 inches in these areas, with locally higher amounts reported in some high elevation locations near the Blue Ridge. This was in addition to the quarter inch or so of sleet that fell earlier in the morning. Meanwhile, accumulations were quite a bit lower in the areas of the northern mountains adjacent to the Tennessee border. The snow changed back to rain in most areas before ending late in the morning. |
| 11/1/2014 | Precipitation associated with a strong upper level disturbance and associated strong cold front changed to snow at the highest peaks and ridge tops by early evening Halloween evening, with snow levels dropping rapidly to the valley floors by the end of the evening as an arctic air mass infiltrated the region behind the front. By the pre-dawn hours of the 1st, snow accumulation ranged from a dusting to a couple of inches on the valley floors, to a foot or more in the high elevations along the Tennessee border. Snow became more showery and sporadic in nature during the morning of the 1st, especially across the valleys, but not before heavy snowfall totals were reached within much of the Tennessee border counties. 2-6 inches of snowfall accumulated across many valley areas by daybreak. Meanwhile, snow showers, heavy at times continued across the high elevations into early afternoon. Total accumulations of 1-2 feet were reported in locations above 4000 feet along the state line, mainly across the Smokies and the Newfound Mountains. |
| 1/22/2016 | An area of low pressure spread light snow into the mountains and foothills of North Carolina by around midnight on the 22nd. The snow continued through the early morning hours, gradually increasing in intensity. By mid-morning, amounts ranged from 2-4 inches across the foothills to 3-5 inches across the mountains, with locally higher amounts, especially in the high elevations near the Blue Ridge. Road conditions deteriorated quickly around sunrise, resulting in many traffic accidents. Moderate to heavy snow continued into the afternoon, gradually tapering off during the evening. The snow briefly changed to sleet before ending across the foothills. By the time the snow tapered off, accumulations ranged from 4-8 inches across the low elevations of the foothills, to 8-14 inches across the mountains. Locally higher amounts occurred, especially on the high peaks near the Blue Ridge, where several feet were reported. |
| 1/6/2017 | As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread western North Carolina throughout the 6th. While precipitation initially fell as rain and sleet across the foothills and Piedmont, it changed to snow fairly quickly. The snow was light at first, and even ended briefly before beginning |

| Date | Description |
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| | again late in the evening. Snow, heavy at times continued across the area through the overnight. By the time the heavier snowfall rates tapered off shortly after sunrise, total accumulations ranged from 3 to 5 inches in the valleys of the far southwest mountains, to 6 to 8 inches across the remainder of the area. Locally higher amounts of 9 inches or more were reported, mainly in the high elevations, and in the far northern foothills and Piedmont. |
| 3/13/2018 | Snow showers developed across the northern mountains in response to a strong and moist northwest flow developing in the wake of a cold front. While snow showers were initially light, they increased in intensity, becoming moderate to heavy during the pre-dawn hours. By the time the snow tapered off, accumulations ranged from 3 to 5 inches in the lower elevations along the Blue Ridge, to 6-9 inches across the lower elevations near the Tennessee border and across the higher elevations. |
| 12/8/2018 | Snow developed across northwest North Carolina around midnight the morning of the 9th, and began accumulating quickly. Moderate to heavy snow continued through the morning of the 9th before tapering off during the early afternoon. Storm total accumulations were generally in the 10 to 15-inch range, with slightly lower amounts south of I-40, and locally higher amounts across the mountains, particularly the high peaks along the Blue Ridge, where more than two feet fell. Travel was paralyzed across this area for a couple of days. |
| **McDowell County** | |
| 1/16/2008 | Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas and northeast Georgia. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall across the central and northern mountains, and much of the foothills of North Carolina, during the early morning hours. Total accumulations of 2-5 inches were reached across the area during the pre-dawn hours. Some amounts as high as 8 inches were reported in the higher elevations. Snow changed briefly to sleet and freezing rain before ending across the foothills. |
| 1/16/2008 | Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas and northeast Georgia. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall across the central and northern mountains, and much of the foothills of North Carolina, during the early morning hours. Total accumulations of 2-5 inches were reached across the area during the pre-dawn hours. Some amounts as high as 8 inches were reported in the higher elevations. Snow changed briefly to sleet and freezing rain before ending across the foothills. |
| 1/29/2010 | Low pressure tracked across southern Georgia during the night of the 29th, and then off the southeast cost on the 30th. As the low passed well south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. \|\|Snow became heavy during the evening, and quickly accumulated to yield heavy snowfall totals. Total accumulations ranged from 5-9 inches across much of the northern mountains, foothills and western piedmont of North Carolina, as well as in a small part of the South Carolina mountains. A 55-year-old man died of exposure after falling in the snow in Gastonia (indirect). The precipitation changed to freezing rain and sleet near the end of the event, resulting in light accumulations of ice. |
| 1/29/2010 | Low pressure tracked across southern Georgia during the night of the 29th, and then off the southeast cost on the 30th. As the low passed well south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. \|\|Snow became heavy during the evening, and quickly accumulated to yield heavy snowfall totals. Total accumulations ranged from 5-9 inches across much of the northern mountains, foothills and western piedmont of North Carolina, as well as in a small part of the South Carolina mountains. A 55-year-old man died of exposure after falling in the snow in Gastonia (indirect). The precipitation changed to freezing rain and sleet near the end of the event, resulting in light accumulations of ice. |
| 3/2/2010 | Snow began to fall around sunrise across the North Carolina mountains along the Blue Ridge escarpment. Snow became moderate to heavy at times during the late morning and early afternoon, resulting in accumulations of 1 to 4 inches across most of the area. Snow, heavy at times, continued into the afternoon across the Blue Ridge, with heavy accumulations realized in most areas by mid-afternoon. By early evening, total snowfall ranged from 3 to 6 inches. Localized snowfall amounts as high as 10 inches occurred, especially in the higher elevations along the escarpment. |
| 12/25/2010 | A developing coastal storm system brought light to moderate snow to the foothills and northwest piedmont of North Carolina starting late on Christmas morning. By mid-afternoon, most locations enjoyed a rare white Christmas, with 1 to 4 inches of snow reported. Snow, heavy at times, continued until around midnight. Snow was mixed with rain at times over the southern foothills and northwest piedmont. By the time snow tapered off to |

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| | flurries and light snow showers early on the 26th, snowfall totals ranged from 5 to 9 inches across the northern foothills, with 4 to 7 inches over the southern foothills and northwest piedmont. |
| 12/25/2010 | A developing coastal storm system brought light to moderate snow, with occasional heavy bursts to the mountains beginning around sunrise on Christmas, and continuing through the morning. Snow, heavy at times, continued through the afternoon across the central and southern mountains. By Christmas evening, most locations had 6 to 10 inches of fresh snowpack. Although snow ended in most areas during the evening of the 25th, a strong northwest flow resulted in development of numerous snow showers along the Tennessee border on the 26th through the 27th. Many of these snow showers managed to add to snowfall totals, mainly in the higher elevations of the Nantahala Mountains and the Balsams, where total accumulations of more than a foot became common. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, mainly in the high elevations. |
| 1/10/2011 | Moderate to heavy snow associated with a Gulf Coast storm system spread northward across the foothills and western piedmont of North Carolina during the early morning hours. The heavy snow accumulated quickly, and by sunrise parts of the southwest foothills and piedmont had received 4 inches of snow. The snow was lighter across the northern most foothills and piedmont, where only an inch or two of snow had fallen by mid-morning. The snow became lighter during the day, but continued to accumulate. By early afternoon, snowfall totals ranged from around 7 inches over the southern foothill and southwest piedmont locations, to around 3 inches over the northern most parts of the foothills and piedmont. During the afternoon, precipitation changed to light to moderate freezing rain, which continued into the evening hours. This added as much as a tenth to a quarter inch of ice to the heavy snowfall totals, resulting in sporadic power outages, particularly in the Charlotte metro area. Persistent cold air resulted in only gradual improvement in road conditions, with some businesses and schools remaining closed for several days. |
| 1/10/2011 | Moderate to heavy snow associated with a Gulf Coast storm system spread from south to north across the mountains of western North Carolina during the nighttime hours. Heavy snow accumulations of up to 4 inches were reported over the southern mountains by as early as 4 am. Heavy snow accumulations were not reported over the northern mountains until mid-morning. The snow became lighter around sunrise, but continued to accumulate through the morning. By early afternoon, snowfall totals ranged from 7 to 10 inches over the southern and central mountains and 3 to 6 inches over the northern mountains. During early afternoon, precipitation changed to light freezing rain and continued into the evening hours. This added as much as a tenth of an inch of ice to the heavy snowfall totals. Persistent cold temperatures ensured that many roads remained snow-packed or ice covered for several days. Some schools and businesses remained closed for as much as 5 days. |
| 3/6/2014 | An intensifying cyclone off the Southeast coast and cold air damming combined to produce heavy snow and occasional sleet along and near the eastern Blue Ridge escarpment. Rain mixed with sleet developed across the Blue Ridge mountains and North Carolina foothills during the evening, then changed to mainly sleet in most areas. Up to a quarter inch of sleet accumulated during the late evening and early morning hours. Precipitation then changed mostly to rain in most areas, before transitioning to snow during the pre-dawn hours of the 7th. As heavy snow continued to fall across the foothills and Blue Ridge mountains in North Carolina throughout the morning, heavy accumulations of snow became common. The region of heavy snowfall accumulation was confined to a very narrow corridor along the Blue Ridge south of I-40, but became more widespread across the northern mountains and foothills. Total snowfall accumulation generally ranged from 4-6 inches in these areas, with locally higher amounts reported in some high elevation locations near the Blue Ridge. This was in addition to the quarter inch or so of sleet that fell earlier in the morning. Meanwhile, accumulations were quite a bit lower in the areas of the northern mountains adjacent to the Tennessee border. The snow changed back to rain in most areas before ending late in the morning. |
| 1/22/2016 | An area of low pressure spread light snow into the mountains and foothills of North Carolina by around midnight on the 22nd. The snow continued through the early morning hours, gradually increasing in intensity. By mid-morning, amounts ranged from 2-4 inches across the foothills to 3-5 inches across the mountains, with locally higher amounts, especially in the high elevations near the Blue Ridge. Road conditions deteriorated quickly around sunrise, resulting in many traffic accidents. Moderate to heavy snow continued into the afternoon, gradually tapering off during the evening. The snow briefly changed to sleet before ending across the foothills. By the time the snow tapered off, accumulations ranged from 4-8 inches across the low elevations of the foothills, to 8-14 |

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| | inches across the mountains. Locally higher amounts occurred, especially on the high peaks near the Blue Ridge, where several feet were reported. |
| 1/22/2016 | An area of low pressure spread light snow into the mountains and foothills of North Carolina by around midnight on the 22nd. The snow continued through the early morning hours, gradually increasing in intensity. By mid-morning, amounts ranged from 2-4 inches across the foothills to 3-5 inches across the mountains, with locally higher amounts, especially in the high elevations near the Blue Ridge. Road conditions deteriorated quickly around sunrise, resulting in many traffic accidents. Moderate to heavy snow continued into the afternoon, gradually tapering off during the evening. The snow briefly changed to sleet before ending across the foothills. By the time the snow tapered off, accumulations ranged from 4-8 inches across the low elevations of the foothills, to 8-14 inches across the mountains. Locally higher amounts occurred, especially on the high peaks near the Blue Ridge, where several feet were reported. |
| 1/6/2017 | As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread western North Carolina throughout the 6th. While precipitation initially fell as rain and sleet across the foothills and Piedmont, it changed to snow fairly quickly. The snow was light at first, and even ended briefly before beginning again late in the evening. Snow, heavy at times continued across the area through the overnight. By the time the heavier snowfall rates tapered off shortly after sunrise, total accumulations ranged from 3 to 5 inches in the valleys of the far southwest mountains, to 6 to 8 inches across the remainder of the area. Locally higher amounts of 9 inches or more were reported, mainly in the high elevations, and in the far northern foothills and Piedmont. |
| 1/6/2017 | As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread western North Carolina throughout the 6th. While precipitation initially fell as rain and sleet across the foothills and Piedmont, it changed to snow fairly quickly. The snow was light at first, and even ended briefly before beginning again late in the evening. Snow, heavy at times continued across the area through the overnight. By the time the heavier snowfall rates tapered off shortly after sunrise, total accumulations ranged from 3 to 5 inches in the valleys of the far southwest mountains, to 6 to 8 inches across the remainder of the area. Locally higher amounts of 9 inches or more were reported, mainly in the high elevations, and in the far northern foothills and Piedmont. |
| 1/17/2018 | As a strengthening upper level disturbance and associated cold front approached the region from the Tennessee Valley, light precipitation developed across the North Carolina foothills during the early morning hours. While the precipitation may have started as rain or a rain/snow mix, a transition to snow had occurred in most locations by daybreak. As the snow band moved east throughout the morning and early afternoon, snowfall rates increased, and heavy snowfall accumulation was reported across much of the area before noon. By the time the snow tapered off to flurries during mid-afternoon, total accumulations ranged from 4 to 6 inches, with some locally higher amounts were reported across the area. |
| 3/13/2018 | Snow showers developed across the northern mountains in response to a strong and moist northwest flow developing in the wake of a cold front. While snow showers were initially light, they increased in intensity, becoming moderate to heavy during the pre-dawn hours. By the time the snow tapered off, accumulations ranged from 3 to 5 inches in the lower elevations along the Blue Ridge, to 6-9 inches across the lower elevations near the Tennessee border and across the higher elevations. |
| 12/8/2018 | Snow developed across northwest North Carolina around midnight the morning of the 9th, and began accumulating quickly. Moderate to heavy snow continued through the morning of the 9th before tapering off during the early afternoon. Storm total accumulations were generally in the 10 to 15-inch range, with slightly lower amounts south of I-40, and locally higher amounts across the mountains, particularly the high peaks along the Blue Ridge, where more than two feet fell. Travel was paralyzed across this area for a couple of days. |
| 12/8/2018 | Snow developed across northwest North Carolina around midnight the morning of the 9th, and began accumulating quickly. Moderate to heavy snow continued through the morning of the 9th before tapering off during the early afternoon. Storm total accumulations were generally in the 10 to 15-inch range, with slightly lower amounts south of I-40, and locally higher amounts across the mountains, particularly the high peaks along the Blue Ridge, where more than two feet fell. Travel was paralyzed across this area for a couple of days. |
| **Mitchell County** | |
| 1/4/2000 | Northwest flow snow showers fell overnight across the northern mountains and higher elevations of Haywood and Swain counties near the Tennessee border. Accumulations of 1 to 2 inches were common, with a maximum of 3 inches reported on Grandfather Mountain. |

| Date | Description |
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| 1/18/2000 | Low pressure moved east across Tennessee and weakened as it ran into a surface high pressure ridge along the East Coast. Nevertheless, enough moisture was available to cause heavy snow to fall from Avery county, east across the northern foothills and northwest piedmont. Precipitation began as light rain in the mid-evening hours on the 17th, but quickly turned to snow as the atmosphere cooled to below freezing. Snowfall ranged between 3 and 6 inches across the area by noon on the 18th, with a narrow band of 1 to 3-inch accumulation of snow and sleet to the immediate south. |
| 1/20/2000 | A cold front crossed the mountains overnight, and low pressure formed along the front in the foothills by morning. Cold air was already in place across the region, so precipitation fell in the form of snow. By noon on the 20th, 3 to 6 inches of snow had fallen from Madison to Avery counties. Elsewhere across the central mountains, northern foothills and northwest piedmont, 1 to 3 inches of snow fell. There were isolated reports of 4 inches from the highest peaks in Swain and Haywood counties. The combination of snow and wind in the wake of the front caused some trees to fall, especially in Caldwell county. One tree fell across a mobile home and caused $24K in damage. Several other trees fell across roads. |
| 1/22/2000 | A cold dome of arctic high pressure centered over the Mid-Atlantic States provided very cold and dry air to western North Carolina. Meanwhile, weak low pressure moved east along a frontal boundary stalled across the Gulf Coast States to the Georgia coast. Abundant moisture flowed north into the sub-freezing air over western North Carolina, resulting in light snow as early as the afternoon on the 22nd. Snow became heavy by mid-afternoon across the mountains and by evening across the foothills and piedmont. A general 4 to 7-inch snowfall occurred in the mountains with as much as 10 inches reported in Jackson county. Generally, 4 to 6 inches of snow fell across the foothills and piedmont, with a local maximum of 7 inches in western Lincoln county. Rowan county failed to meet heavy snow criteria with accumulations of up to 3 inches. Freezing rain and sleet mixed with the snow for a short time before the precipitation ended, and for the most part, caused little additional problems. The one exception was across southern Union county where freezing rain lasted all night and through much of the morning on the 23rd. Ice accumulations reached damaging levels there around 3 am, causing a large number of trees and power lines to fall throughout the morning. This in turn, resulted in widespread power outages. |
| 1/26/2000 | An upper level disturbance and northwest flow combined to produce varying amounts of snow across the mountains from early evening on the 25th through noon on the 26th. One to three inches of snow fell from Macon county to Buncombe and Yancey counties. Heavy snow accumulated 4 to 6 inches across most of the Tennessee border counties from Graham to Avery. |
| 1/31/2000 | Northwest flow produced a light snowfall of 1 to 3 inches. |
| 2/4/2000 | A cold and moist northwest flow produced snow showers for about 24 hours across mainly the Tennessee border counties. Snow accumulations of 1 to 3 inches occurred as far east as northern Buncombe county. Four inches of snow fell across the northern part of Mitchell county. |
| 3/20/2000 | An area of precipitation which fell as rain in the low elevations, and snow in the higher elevations of the northern mountains, crossed western North Carolina early in the morning. Two to 4 inches of rain fell in a short time across portions of Buncombe and Henderson counties and caused small streams to flood briefly. Snowfall in the high elevations ranged between 2 and 3 inches, with 5 inches reported from the highest peaks. |
| 4/8/2000 | A cold and moist northwest flow behind a cold front produced light snow across the mountains. Accumulations were generally a dusting to one inch, but the highest mountains north of Asheville received 2 to 3 inches. |
| 11/19/2000 | Light to moderate snow started in the mountains and spread southeast, lasting through the day. Generally, 1 to 3 inches of snow fell, but some higher elevations of the central and southern mountains reported more than 4 inches. |
| 12/3/2000 | A developing surface cyclone off the Carolina Coast spread abundant moisture into western North Carolina, which was still mired in a cold, winter-like temperature regime. The result was another widespread snowfall. Accumulations ranged from a dusting in the northern foothills to more than 6 inches in western Macon County and 5 inches in Henderson County. Most accumulations were in the 1 to 3-inch range. |
| 12/17/2000 | Heavy rain, with embedded thunderstorms, crossed the region from late morning through the afternoon on the 16th. Cold air trapped in some valleys of the northern mountains never completely scoured out, resulting in a light glaze south and west of Newland. Just as surface temperatures rose above freezing in the northern mountains, thunderstorms pushed out ahead of the strong front, with numerous small hail reports. As the front, and attendant pressure gradient, pushed its way into western North Carolina, winds increased into the 50 to 60 mph range, |

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| | resulting in numerous downed trees and power lines. Nearly every county in the mountains reported some wind damage. The high winds eventually affected the foothills and piedmont. In Charlotte, numerous trees were downed and furniture was blown off porches. In the wake of the frontal passage, much colder air invaded the region, and as another shortwave affected the region on the 17th, a wide swath of 1 to 3-inch snow blanketed the higher terrain. |
| 12/19/2000 | |
| 12/30/2000 | A strong northwest flow across the higher terrain produced a fresh blanket of 1 to 3-inch snowfall near the Tennessee border. |
| 1/1/2001 | A powerful upper level disturbance interacted with left-over cold air and abundant low-level moisture to wring out snow showers across the North Carolina mountains from midday New Year's Day through the early morning hours on the 2nd. Highest accumulations were in Haywood County, with several reports of 3-inch accumulations. |
| 1/2/2001 | A secondary cold front passing over the mountains resulted in light snowfall accumulations. |
| 1/8/2001 | Another fast-moving upper level disturbance produced more light snow, mostly in areas near the Tennessee border. |
| 1/20/2001 | Strong, northwest winds on the backside of a developing surface cyclone along the Carolina coast advected much colder air into the North Carolina mountains on the 20th, resulting in heavy snow along the slopes with a western exposure. Highest accumulations were in Avery and Mitchell counties, with Poplar reporting 5 to 6 inches, and Elk Park 5 to 8 inches. |
| 2/22/2001 | |
| 3/4/2001 | Rain changed over to snow and accumulated a bit. Most accumulations were on grassy areas but a few icy spots developed on roads. |
| 3/20/2001 | Low pressure developed off the South Carolina coast and steadily strengthened as it moved northward across the coastal waters of North Carolina, the Virginia tidewater and eventually out to sea. Rapid strengthening occurred as a strong upper level disturbance rotated around an upper low that was crossing the southeast states. As the cyclone strengthened, abundant moisture was wrapped around the storm and thrown back against the higher terrain of the Carolinas, resulting in high winds and very heavy snow. The heaviest snow accumulations were in far western North Carolina. |
| 4/1/2001 | A potent upper level disturbance rotating across the southeast states behind a strong cold front that crossed the area late in March interacted with cold, moist air remaining over the mountains to produce a light blanket of snow early on the 1st. |
| 1/6/2002 | Snow began in the early morning, reaching accumulations of 4 to 8 inches by 3 pm. The highest accumulations were in the high elevations. Some sleet was mixed in with the snow. |
| 2/3/2002 | Light snow fell from late afternoon into late evening, resulting in 1 to 2.5 inches accumulations in some areas, and a few slick roads. |
| 2/17/2002 | Snow fell for most of the day across portions of the northern mountains. While much of Mitchell and Yancey Counties received only a dusting, amounts of 1 to 3 inches were reported across Avery County. Numerous traffic accidents occurred at Beech Mountain. |
| 2/26/2002 | Snow fell overnight into the morning hours, as an upper level storm system moved across the area, and was followed by strong northwest winds. Most of the snow fell immediately along the Tennessee border, but extended east of there in some cases. Some of the higher elevations of Graham, Madison, and Avery Counties received as much as 5 inches of snow. In addition to the snow, wind chill values fell to zero and below in some locations. |
| 11/17/2002 | The first snow of the season brought an inch or two of accumulation to the higher elevations of the North Carolina mountains. Winds also gusted to 45 mph in some locations. |
| 11/22/2002 | Snow accumulated to as much as 5 inches on the highest peaks along the Tennessee border. Also, wind gusts resulted in scattered tree damage across the area. |
| 12/4/2002 | Snow began falling around sunrise across the mountains of North Carolina, and had accumulated to 3 to 6 inches by evening. |
| 1/16/2003 | Light snow began across the mountains of North Carolina during the afternoon of the 16th, and gradually intensified with time. By early morning of the 17th, 4 to 8 inches of snow had accumulated. As much as a foot was reported on some of the highest peaks. |

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| 1/23/2003 | Snow began at around midnight across the mountains of North Carolina, and intensified as it spread into the foothills and the western piedmont. The hardest hit area was the foothills, where 8 to 12 inches of snow had fallen by mid-morning. Otherwise, snow accumulations were generally in the 3 to 6-inch range. |
| 2/6/2003 | Light snow began falling across the western mountains of North Carolina during the afternoon of the 6th, and gradually increased in intensity and coverage during the evening and overnight hours. General snowfall amounts of 4 to 5 inches were reported in the major valleys. However, accumulations of up to 8 inches occurred in the highest elevations along the Tennessee border. |
| 3/30/2003 | Snow intensity increased during the pre-dawn hours across the northern mountains, and heavy accumulations were realized by mid-morning. |
| 4/10/2003 | Light snow began across the North Carolina mountains during the early morning hours of the 10th, but due to a warm ground, accumulations were confined to the highest elevations through 8 AM. However, the snow intensified dramatically during the middle and late part of the morning, and by early afternoon, 2-4 inches had accumulated in valley locations near the Blue Ridge. In the higher elevations, 4 to 6-inch totals were common, while 8 to 12 inches accumulated on some of the highest peaks along the Tennessee border. The heavy, wet snow caused numerous trees and power lines to fall, and power outages were widespread. |
| 12/18/2003 | A prolonged period of snow produced heavy accumulations over a 2-day period across much of the North Carolina mountains. Most valley locations received total accumulations of 6 inches or less. However, most of the high elevation areas along the Tennessee border received between 1 and 2 feet. Northwest winds of 20 to 30 mph caused blowing and drifting snow. |
| 1/25/2004 | Light snow developed early in the morning across the mountains, foothills, and northern piedmont of North Carolina. The snow intensified throughout the morning and afternoon, and by early evening 3 to 5 inches had accumulated across much of the area. Accumulations as high as 8 inches occurred in mountainous areas along the Tennessee border. |
| 2/7/2004 | Snow fell during much of the afternoon, evening, and overnight hours across the western mountains of North Carolina. Three to five inches of snow accumulated, mainly in areas along the Tennessee border. |
| 2/12/2004 | Snow began during the late evening hours across the northern and central mountains, and continued overnight. By sunrise on the 12th, accumulations of 3 to 6 inches were common. The heaviest amounts occurred in the highest elevations along the Tennessee border. |
| 2/26/2004 | Heavy snow began to fall across the foothills, piedmont, and northern mountains of North Carolina during the late morning. Although snowfall intensity decreased dramatically during the early-to-middle portion of the afternoon, heavy snow redeveloped during the late afternoon, and continued into the evening and overnight hours. Scattered thunderstorms contributed to intense snowfall rates of 2 to 3 inches per hour from time to time, especially in the piedmont, where total snowfall of 12-22 inches occurred. The heaviest amounts occurred in the southwest piedmont, particularly in southern portions of Charlotte metro. Thousands of people were stranded on I-77 during the early afternoon, and some required rescue. The weight of the snowfall caused damage to numerous roofs, while some roofs completely collapsed. Across the foothills and northern mountains, accumulations were considerably lighter, generally in the 4-8-inch range, although amounts of 10-16 inches fell along the Blue Ridge north of I-40. |
| 12/11/2004 | Heavy snow fell across the mountains and accumulated in the high elevations to 3 to 6 inches. The heavy snow level in most locations was 4000 feet, but dropped off to as low as 3000 feet in the southwest mountains. Elevations between 2500 feet and 3500 feet generally had an inch or two. |
| 12/19/2004 | Heavy snow fell for about 7 hours, along with wind gusts to near 50 mph. The highest accumulations were along the Tennessee border, especially in Graham County where some drifts reached a reported 2 feet. The snow and wind were accompanied by very cold weather. The Asheville Regional Airport reached a record low of 7 degrees the morning of the 20th. Buncombe County had heavy snowfall in the western and northern part of the county, although areas from Asheville south to the Henderson County line only had a trace to an inch. The temperature fell to below zero overnight in parts of the northern mountains, even the valleys, with single digits common elsewhere. |
| 1/22/2005 | Heavy snow fell during the overnight hours across the northern mountains. Occasional heavy snow and blowing snow caused blizzard-like conditions at times, especially in Avery County. Snowfall ranged from 2 to 4 inches in the valleys an 4 to 6 inches in the higher elevations. As wet roads froze underneath the snow, they became quite slick |

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| | and hazardous, causing quite a few accidents. In addition, temperatures in the single digits combined with strong winds to produce wind chills of 10 below. |
| 2/10/2005 | Snow fell across the northern mountains during the evening. By the time the snow ended during the early morning of the 11th, accumulations totaled 2 to 5 inches across the area, with some isolated heavier amounts observed in the highest elevations near the state line. |
| 2/28/2005 | The wet snow became heavier across the mountains and northern foothills during the early morning hours on the 28th. Most locations below 3000 feet changed back to rain before the precipitation ended. A quick 3 to 7 inches of snow accumulated across much of this area. Isolated heavier totals up to 13 inches occurred along the Blue Ridge, north of I-40, while the lower elevations of the foothills generally received only 1 to 3 inches. |
| 3/1/2005 | Snow developed during the evening across the northern mountains, as strong northwest winds developed in the wake of a cold front. 2 to 4 inches of snow accumulated in addition to that which fell across the area on the morning of the 28th. |
| 4/2/2005 | Persistent snowfall resulted in heavy accumulations of wet snow in the high elevations of the North Carolina mountains, mainly in areas above 4000 feet. Accumulations were generally 4 to 6 inches, although some areas above 5000 feet received higher amounts, including 16 inches at Mount Mitchell, and 13 inches at Soco Gap. U.S. 19 and 441 were closed through the high elevations of the Balsams and Smokies. Several bicyclists were stranded in the snow in Jackson County, and had to be rescued. |
| 2/11/2006 | Northwest flow, a very cold airmass, and upper air disturbances combined to produce an unusually strong upslope snow event across the far western counties of North Carolina. Widespread, heavy snow showers began to develop during the early evening of the 11th, and by late evening, heavy snowfall accumulations were common across the area. The snow lasted for a very long period, continuing through the 12th and the early morning hours of the 13th before finally tapering off. Combined with the light snow that fell across the area on the morning of the 11th, storm total accumulations of 5 to 10 inches occurred within the valleys near the Tennessee border. Meanwhile, accumulations were generally in the 1-2-foot range across the higher elevations. There were unofficial reports of as much as 4 feet in the Smoky Mountains. This event was unusual in that heavy snowfall extended as far east as the higher elevations of eastern Buncombe county, while the valleys of northern Buncombe received 3 to 6 inches. |
| 3/25/2006 | An extended period of upslope flow and an unstable airmass resulted in numerous snow showers across the western mountains of North Carolina. The snow showers began on the evening of the 24th and continued through the evening of the 25th. Snowfall accumulated to 4 to 8 inches in the higher elevations along the Tennessee border. Although snowfall totals in the valleys were lower, 2 to 3 inches did accumulate at the lower end of the French Broad valley, and in the Pigeon River gorge. In many cases, heavy bursts of snow would cause a quick inch or so to accumulate in the valleys before melting rapidly under the influence of warm temperatures. Therefore, actual snowfall in the valleys was probably higher than reported. |
| 1/9/2007 | An upper level disturbance brought fairly uniform 1 to 4-inch snowfall amounts across the mountains during the late morning. The snow was quite heavy in spots and accumulated rapidly. Roads became slick and hazardous, especially in the higher elevations. Quite a few traffic accidents occurred in Madison County, including 1 fatal accident. Highway 441 was closed through the Smoky Mountains. Once the upper disturbance moved east of the area, scattered to numerous snow showers continued to affect the mountains through much of the afternoon and evening. Most areas along the Tennessee border began to see heavy snowfall accumulations by early evening. Total accumulations in the higher elevations were fairly uniform in the 3 to 5-inch range, although some locations right along the Tennessee border saw up to 7 inches, particularly along the Cherohala Skyway in Graham County, and across the northern mountains. The valleys saw less snow, with generally 1 to 2 inches observed south of the French Broad River, and 1 to 4 inches observed from the French Broad north. |
| 2/17/2007 | Light snow developed during the early evening across the northern mountains and continued through much of the overnight hours. By sunrise, snowfall totals of 1 to 3 inches had occurred. As snow showers continued to affect the northern mountains, heavy snowfall levels were finally reached shortly after sunrise. Accumulations generally ranged from 2-4 inches, although some higher elevation locations along the Tennessee border saw slightly higher totals. |
| 4/6/2007 | A record-setting cold airmass, northwest flow, and a strong upper air disturbance resulted in a late season snow shower event across the North Carolina mountains. By 3 am, snow had accumulated to as much as 2 inches in the valleys, with as much as 6 inches reported in the higher elevations. Snow showers continued through the morning |

| Date | Description |
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| | hours, with heavy snowfall totals reported during the pre-dawn hours. Snowfall was highly variable across the region, with generally only 2-3 inches accumulating in the lower elevations. However, some of the higher elevations of the northern mountains saw as much as 10 inches. |
| 4/15/2007 | As a strong cold front moved across the mountains and snow levels dropped rapidly, rain showers changed to snow showers and caused rapid accumulation of heavy snow, mainly in the higher elevations along the Tennessee border. Total accumulations generally ranged from 2-5 inches, mainly in areas above 3500 feet, while the valleys saw amounts ranging from a trace up to an inch. |
| 1/1/2008 | Snow showers developed New Yearï¿½ï¿½ï¿½s Evening across the western slopes of the Appalachians. As snow showers, heavy at times, continued across the western Mountains of North Carolina, accumulations began to pile up during the pre-dawn hours of the 2nd. Many locations reported 2-4 inches of accumulation by sunrise. By the time the snow tapered off to flurries (during late morning), total accumulations ranged from a couple of inches in the valleys away from the Tennessee border, to 4-6 inches in areas along the state line. Although accumulating snow tapered off during mid-morning, flurries continued for much of the day, while very windy conditions resulted in blowing and drifting snow. |
| 1/16/2008 | Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas and northeast Georgia. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall across the central and northern mountains, and much of the foothills of North Carolina, during the early morning hours. Total accumulations of 2-5 inches were reached across the area during the pre-dawn hours. Some amounts as high as 8 inches were reported in the higher elevations. Snow changed briefly to sleet and freezing rain before ending across the foothills. |
| 2/26/2008 | Snow showers developed across the western mountains during the late evening. The snow showers increased in coverage and intensity through the early morning hours of the 27th, resulting in heavy snow accumulations across much of the western mountains before sunrise. Snow continued through the day and evening hours and did not begin tapering off until the early morning hours on the 28th. Total accumulations were highly variable across the area. While locations such as Bryson City and Waynesville saw less than 2 inches, areas along the Tennessee border received as much as a foot. Even the valley floors near the state line received as much as 8 inches. |
| 11/21/2008 | Snow showers, heavy at times, fell across the northern mountains into the afternoon, with many locations achieving heavy snowfall accumulations by late morning. Accumulations ranged from 3 inches in areas along the Blue Ridge, to 7 inches or more in the higher elevations along the Tennessee border. |
| 12/1/2008 | Snow showers developed during the early morning hours and continued through much of the day across the Tennessee border counties. Snow showers, heavy at times, continued near the Tennessee border, with heavy snowfall accumulations reported by early evening. The snow tapered off to flurries during the early morning hours. Total snowfall amounts ranged from an inch or 2 along the Blue Ridge, to as much as 6-7 inches in the higher elevations near the state line. |
| 1/8/2009 | Snow showers developed across the Tennessee border counties around sunrise, and persisted until the late afternoon hours. Snowfall amounts ranged from 2-5 inches, mainly in elevations above 3000 feet or so. Some locally higher amounts were reported on the higher peaks. |
| 1/18/2009 | Snow showers developed over the western mountains during the late evening of the 18th, and continued off and on through the evening hours of the 20th. Snowfall totals ranged from 4 to 6 inches at the higher elevations of the southwest and central mountains, to 1 to 3 inches in the valleys. Over the northern mountains totals ranged from 4 to 7 inches, with 1 to 3 inches along the eastern slopes of the Blue Ridge. |
| 4/7/2009 | After an extended period of snow showers, heavy snowfall accumulations were reached across the northern mountains by mid-afternoon on the 7th. Total accumulations were generally in the 2 to 4-inch range across the area, but amounts approaching 10 inches occurred in the higher elevations along the Tennessee border. |
| 1/7/2010 | A very cold and moist northwest flow resulted in development of scattered to numerous snow showers across the western mountains during the evening of the 7th. The snow showers continued across much of the Tennessee border counties through the day on the 8th, with heavy accumulations reached in some areas by late morning. Total accumulations ranged from 1-3 inches over the lower French Broad Valley, to 3-6 inches across the northern mountains. Over the southwest mountains, total snowfall accumulations ranged from trace amounts in the valleys beneath the Smokies, to 2-4 inches in the higher elevations along the Tennessee border. |

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| 1/29/2010 | Low pressure tracked across southern Georgia during the night of the 29th, and then off the southeast cost on the 30th. As the low passed well south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. \|\|Snow became heavy during the evening, and quickly accumulated to yield heavy snowfall totals. Total accumulations ranged from 5-9 inches across much of the northern mountains, foothills and western piedmont of North Carolina, as well as in a small part of the South Carolina mountains. A 55-year-old man died of exposure after falling in the snow in Gastonia (indirect). The precipitation changed to freezing rain and sleet near the end of the event, resulting in light accumulations of ice. |
| 2/15/2010 | Northwest flow snow showers developed over the northern mountains during the evening and persisted over the next 24 hours. By the evening of the 16th, accumulations of 5-6 inches were common near the Tennessee border, while only an inch or so had fallen in areas closer to the Blue Ridge. The snow continued off and on for almost two more days, before finally tapering off during the morning of the 18th. Accumulations along the Tennessee border totaled a foot or more in some areas. Meanwhile, locations closer to the Blue Ridge only saw a couple of inches. Over Avery County, total accumulations were higher, with 1-2 feet near the Tennessee border. |
| 2/24/2010 | Northwest flow snow showers developed during the evening across the northern mountains, and continued along the Tennessee border through much of the 25th, with heavy snowfall accumulations reached across much of the area shortly after sunrise. Total accumulations ranged from only a couple of inches along the Blue Ridge, to 7 inches in the lower valleys along the Tennessee border. Meanwhile, some of the higher elevations received a foot or more of snowfall. |
| 3/2/2010 | Snow began to fall around sunrise across the North Carolina mountains along the Blue Ridge escarpment. Snow became moderate to heavy at times during the late morning and early afternoon, resulting in accumulations of 1 to 4 inches across most of the area. Snow, heavy at times, continued into the afternoon across the Blue Ridge, with heavy accumulations realized in most areas by mid-afternoon. By early evening, total snowfall ranged from 3 to 6 inches. Localized snowfall amounts as high as 10 inches occurred, especially in the higher elevations along the escarpment. |
| 12/12/2010 | Light snow began falling over the northern mountains and Madison County during the early morning hours of the 12th. By mid-morning, accumulations of 1 to 3 inches were observed across the area. After a strong cold front swept through the mountains, northwest winds resulted in development of numerous snow showers by early afternoon. By mid-evening, snowfall totals ranged from 1 to 5 inches across the area. As snow showers continued in the northwest flow, snow continued to gradually accumulate in the higher elevations along the Tennessee border. By the time the snow tapered off early on the 14th, accumulations generally ranged from 4 to 8 inches in the higher elevations, generally above 3500 feet, although some areas saw as much as 20 inches. The lower elevations saw considerably lower amounts, generally in the 2-5-inch range. Very windy conditions and very cold temperatures resulted in wind chill values below 0 in many areas during the overnight and early morning hours. |
| 12/25/2010 | A developing coastal storm system brought light to moderate snow, with occasional heavy bursts to the northern mountains beginning shortly after sunrise on Christmas. Snow, heavy at times, continued through the afternoon across the northern mountains and surrounding areas. By Christmas evening, most locations had 3 to 6 inches of fresh snowpack. A brief lull in snowfall occurred overnight. However, snowfall began to increase again during the morning of the 26th, as strong northwest flow resulted in development of numerous snow showers along the Tennessee border. The snow showers continued until the afternoon of the 27th. This resulted in additional accumulations that ranged from 2 to 6 inches in the valleys to a foot or more in the higher elevations. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, especially in the high elevations. |
| 1/7/2011 | Light to moderate snow developed ahead of a cold front across the western mountains of North Carolina around noon, and continued through the afternoon. After the cold front passed during the early evening, snow showers, some of which were heavy developed within a moist northwest flow, adding to accumulations across the Tennessee border counties. Snow showers continued into the overnight and through much of the 8th before tapering off during the evening and the early morning hours of the 9th. Total accumulations were highly variable across the area and depended largely upon terrain. Storm total amounts ranged from 3 to 5 inches in the southwest mountain valleys, to 4 to 8 inches in the lower French Broad Valley and the northern mountain valleys. The high elevations along the state line received as much as 2 feet. |

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| 1/10/2011 | Moderate to heavy snow associated with a Gulf Coast storm system spread from south to north across the mountains of western North Carolina during the nighttime hours. Heavy snow accumulations of up to 4 inches were reported over the southern mountains by as early as 4 am. Heavy snow accumulations were not reported over the northern mountains until mid-morning. The snow became lighter around sunrise, but continued to accumulate through the morning. By early afternoon, snowfall totals ranged from 7 to 10 inches over the southern and central mountains and 3 to 6 inches over the northern mountains. During early afternoon, precipitation changed to light freezing rain and continued into the evening hours. This added as much as a tenth of an inch of ice to the heavy snowfall totals. Persistent cold temperatures ensured that many roads remained snow-packed or ice covered for several days. Some schools and businesses remained closed for as much as 5 days. |
| 1/26/2011 | As low pressure developed off the southeast coast, rain changed to snow across the higher elevations of the North Carolina mountains during the morning, and gradually worked its way toward the valleys as colder air filtered into the region. The widespread precipitation moved away from the region during the afternoon, but developing moist northwest flow resulted in the development of scattered to numerous snow showers across the area. By the time the snow showers tapered off during the early morning hours of the 27th, 3 to 6 inches of snow had fallen above 3500 feet. Some of the highest peaks and ridgetops had around 8 inches. Meanwhile, accumulations in the lower valleys ranged from a dusting to a couple of inches. |
| 2/11/2012 | Snow showers developed over much of the North Carolina mountains during the early morning hours, and continued throughout the day. Snow showers continued off and on across the Tennessee border counties during the evening and early part of the overnight. Total accumulations ranged from a couple of inches in the lower valleys, to as much as 8 inches in the higher elevations of the Newfound Mountains and northern mountains. |
| 10/29/2012 | As ï¿½ï¿½ï¿½Superstorm Sandyï¿½ï¿½ï¿½ moved across New England and stalled over the northern Mid-Atlantic region, abundant moisture was transported into the mountains. The first snow showers of the season developed within this moist northwest flow across the northern mountains of North Carolina during the pre-dawn hours of the 29th. Snow showers, some heavy continued through the day and overnight, and by the pre-dawn hours of the 30th, heavy snowfall accumulations were observed, mainly across the higher elevations of the northern mountains and Madison County. By the time the snow showers tapered off during the early morning hours of the 31st, 1 to 3 feet of snow was reported in the high elevations (above 4000 feet or so), with the heaviest amounts occurring at the peaks along the Tennessee border. Meanwhile, the lower valleys saw storm totals of only a few inches. |
| 1/17/2013 | Heavy rain changed to snow across the higher elevations of the North Carolina mountains during the late afternoon hours. Snow levels lowered in elevation through early evening, during which time snow quickly accumulated to as much as 4 inches across the higher elevations. Snow levels finally fell to the valley floors by the time precipitation ended during the late evening. Heavy snowfall totals were mainly confined to elevations above 3000 feet. Some locations in the northern mountains near the Tennessee border saw as much as 9 inches. Meanwhile, the late transition to snow resulted in only an inch or two accumulating in the valleys. |
| 2/2/2013 | Snow developed quickly across the northern mountains during the early evening, and became moderate to heavy at times. Snow became more intermittent overnight, and by sunrise of the 3rd, accumulations generally ranged from 2 to 5 inches across the area. Snow showers, heavy at times, continued through much of the 3rd before tapering off by during the evening. Total accumulations ranged from 3-5 inches in most valley locations to as much as a foot in the higher elevations. |
| 1/21/2014 | Widespread snow showers developed along the Tennessee border along and immediately behind a cold front during the late morning and continued through the evening hours across the Tennessee border counties. Heavy snowfall accumulations were realized in the favored northwest flow locations by late evening. Total accumulations ranged from 3 to 6 inches across much of the area, although the valleys southwest of the French Broad generally saw less. Locally higher amounts up to 10 inches were observed in the high elevations of the northern mountains. |
| 3/6/2014 | An intensifying cyclone off the Southeast coast and cold air damming combined to produce heavy snow and occasional sleet along and near the eastern Blue Ridge escarpment. Rain mixed with sleet developed across the Blue Ridge mountains and North Carolina foothills during the evening, then changed to mainly sleet in most areas. Up to a quarter inch of sleet accumulated during the late evening and early morning hours. Precipitation then changed mostly to rain in most areas, before transitioning to snow during the pre-dawn hours of the 7th. As heavy snow continued to fall across the foothills and Blue Ridge mountains in North Carolina throughout the morning, heavy accumulations of snow became common. The region of heavy snowfall accumulation was confined to a very |

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| | narrow corridor along the Blue Ridge south of I-40, but became more widespread across the northern mountains and foothills. Total snowfall accumulation generally ranged from 4-6 inches in these areas, with locally higher amounts reported in some high elevation locations near the Blue Ridge. This was in addition to the quarter inch or so of sleet that fell earlier in the morning. Meanwhile, accumulations were quite a bit lower in the areas of the northern mountains adjacent to the Tennessee border. The snow changed back to rain in most areas before ending late in the morning. |
| 11/1/2014 | Precipitation associated with a strong upper level disturbance and associated strong cold front changed to snow at the highest peaks and ridge tops by early evening Halloween evening, with snow levels dropping rapidly to the valley floors by the end of the evening as an arctic air mass infiltrated the region behind the front. By the pre-dawn hours of the 1st, snow accumulation ranged from a dusting to a couple of inches on the valley floors, to a foot or more in the high elevations along the Tennessee border. Snow became more showery and sporadic in nature during the morning of the 1st, especially across the valleys, but not before heavy snowfall totals were reached within much of the Tennessee border counties. 2-6 inches of snowfall accumulated across many valley areas by daybreak. Meanwhile, snow showers, heavy at times continued across the high elevations into early afternoon. Total accumulations of 1-2 feet were reported in locations above 4000 feet along the state line, mainly across the Smokies and the Newfound Mountains. |
| 1/22/2016 | An area of low pressure spread light snow into the mountains and foothills of North Carolina by around midnight on the 22nd. The snow continued through the early morning hours, gradually increasing in intensity. By mid-morning, amounts ranged from 2-4 inches across the foothills to 3-5 inches across the mountains, with locally higher amounts, especially in the high elevations near the Blue Ridge. Road conditions deteriorated quickly around sunrise, resulting in many traffic accidents. Moderate to heavy snow continued into the afternoon, gradually tapering off during the evening. The snow briefly changed to sleet before ending across the foothills. By the time the snow tapered off, accumulations ranged from 4-8 inches across the low elevations of the foothills, to 8-14 inches across the mountains. Locally higher amounts occurred, especially on the high peaks near the Blue Ridge, where several feet were reported. |
| 1/6/2017 | As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread western North Carolina throughout the 6th. While precipitation initially fell as rain and sleet across the foothills and Piedmont, it changed to snow fairly quickly. The snow was light at first, and even ended briefly before beginning again late in the evening. Snow, heavy at times continued across the area through the overnight. By the time the heavier snowfall rates tapered off shortly after sunrise, total accumulations ranged from 3 to 5 inches in the valleys of the far southwest mountains, to 6 to 8 inches across the remainder of the area. Locally higher amounts of 9 inches or more were reported, mainly in the high elevations, and in the far northern foothills and Piedmont. |
| 3/13/2018 | Snow showers developed across the northern mountains in response to a strong and moist northwest flow developing in the wake of a cold front. While snow showers were initially light, they increased in intensity, becoming moderate to heavy during the pre-dawn hours. By the time the snow tapered off, accumulations ranged from 3 to 5 inches in the lower elevations along the Blue Ridge, to 6-9 inches across the lower elevations near the Tennessee border and across the higher elevations. |
| 12/8/2018 | Snow developed across northwest North Carolina around midnight the morning of the 9th, and began accumulating quickly. Moderate to heavy snow continued through the morning of the 9th before tapering off during the early afternoon. Storm total accumulations were generally in the 10 to 15-inch range, with slightly lower amounts south of I-40, and locally higher amounts across the mountains, particularly the high peaks along the Blue Ridge, where more than two feet fell. Travel was paralyzed across this area for a couple of days. |
| **Yancey County** | |
| 1/4/2000 | Northwest flow snow showers fell overnight across the northern mountains and higher elevations of Haywood and Swain counties near the Tennessee border. Accumulations of 1 to 2 inches were common, with a maximum of 3 inches reported on Grandfather Mountain. |
| 1/18/2000 | Low pressure moved east across Tennessee and weakened as it ran into a surface high pressure ridge along the East Coast. Nevertheless, enough moisture was available to cause heavy snow to fall from Avery county, east across the northern foothills and northwest piedmont. Precipitation began as light rain in the mid-evening hours on the 17th, but quickly turned to snow as the atmosphere cooled to below freezing. Snowfall ranged between 3 and 6 |

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| | inches across the area by noon on the 18th, with a narrow band of 1 to 3-inch accumulation of snow and sleet to the immediate south. |
| 1/20/2000 | A cold front crossed the mountains overnight, and low pressure formed along the front in the foothills by morning. Cold air was already in place across the region, so precipitation fell in the form of snow. By noon on the 20th, 3 to 6 inches of snow had fallen from Madison to Avery counties. Elsewhere across the central mountains, northern foothills and northwest piedmont, 1 to 3 inches of snow fell. There were isolated reports of 4 inches from the highest peaks in Swain and Haywood counties. The combination of snow and wind in the wake of the front caused some trees to fall, especially in Caldwell county. One tree fell across a mobile home and caused $24K in damage. Several other trees fell across roads. |
| 1/22/2000 | A cold dome of arctic high pressure centered over the Mid-Atlantic States provided very cold and dry air to western North Carolina. Meanwhile, weak low pressure moved east along a frontal boundary stalled across the Gulf Coast States to the Georgia coast. Abundant moisture flowed north into the sub-freezing air over western North Carolina, resulting in light snow as early as the afternoon on the 22nd. Snow became heavy by mid-afternoon across the mountains and by evening across the foothills and piedmont. A general 4 to 7-inch snowfall occurred in the mountains with as much as 10 inches reported in Jackson county. Generally, 4 to 6 inches of snow fell across the foothills and piedmont, with a local maximum of 7 inches in western Lincoln county. Rowan county failed to meet heavy snow criteria with accumulations of up to 3 inches. Freezing rain and sleet mixed with the snow for a short time before the precipitation ended, and for the most part, caused little additional problems. The one exception was across southern Union county where freezing rain lasted all night and through much of the morning on the 23rd. Ice accumulations reached damaging levels there around 3 am, causing a large number of trees and power lines to fall throughout the morning. This in turn, resulted in widespread power outages. |
| 1/26/2000 | An upper level disturbance and northwest flow combined to produce varying amounts of snow across the mountains from early evening on the 25th through noon on the 26th. One to three inches of snow fell from Macon county to Buncombe and Yancey counties. Heavy snow accumulated 4 to 6 inches across most of the Tennessee border counties from Graham to Avery. |
| 1/31/2000 | Northwest flow produced a light snowfall of 1 to 3 inches. |
| 2/4/2000 | A cold and moist northwest flow produced snow showers for about 24 hours across mainly the Tennessee border counties. Snow accumulations of 1 to 3 inches occurred as far east as northern Buncombe county. Four inches of snow fell across the northern part of Mitchell county. |
| 3/20/2000 | An area of precipitation which fell as rain in the low elevations, and snow in the higher elevations of the northern mountains, crossed western North Carolina early in the morning. Two to 4 inches of rain fell in a short time across portions of Buncombe and Henderson counties and caused small streams to flood briefly. Snowfall in the high elevations ranged between 2 and 3 inches, with 5 inches reported from the highest peaks. |
| 4/8/2000 | A cold and moist northwest flow behind a cold front produced light snow across the mountains. Accumulations were generally a dusting to one inch, but the highest mountains north of Asheville received 2 to 3 inches. |
| 11/19/2000 | Light to moderate snow started in the mountains and spread southeast, lasting through the day. Generally, 1 to 3 inches of snow fell, but some higher elevations of the central and southern mountains reported more than 4 inches. |
| 12/3/2000 | A developing surface cyclone off the Carolina Coast spread abundant moisture into western North Carolina, which was still mired in a cold, winter-like temperature regime. The result was another widespread snowfall. Accumulations ranged from a dusting in the northern foothills to more than 6 inches in western Macon County and 5 inches in Henderson County. Most accumulations were in the 1 to 3-inch range. |
| 12/17/2000 | A fresh blanket of 1 to 3 inches of snow covered the mountains of North Carolina from early morning through early afternoon on the 17th. |
| 12/19/2000 | |
| 12/30/2000 | A strong northwest flow across the higher terrain produced a fresh blanket of 1 to 3-inch snowfall near the Tennessee border. |
| 12/30/2000 | A second round of upslope snow showers into the western facing slopes produced an additional 1 to 2-inch snow accumulation. |

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| 1/1/2001 | A powerful upper level disturbance interacted with left-over cold air and abundant low-level moisture to wring out snow showers across the North Carolina mountains from midday New Year's Day through the early morning hours on the 2nd. Highest accumulations were in Haywood County, with several reports of 3-inch accumulations. |
| 1/2/2001 | Light snow and snow showers resulted in 1 to 2-inch accumulations in the northern mountains. |
| 1/8/2001 | Another fast-moving upper level disturbance produced more light snow, mostly in areas near the Tennessee border. |
| 1/20/2001 | Strong, northwest winds on the backside of a developing surface cyclone along the Carolina coast advected much colder air into the North Carolina mountains on the 20th, resulting in heavy snow along the slopes with a western exposure. Highest accumulations were in Avery and Mitchell counties, with Poplar reporting 5 to 6 inches, and Elk Park 5 to 8 inches. |
| 1/25/2001 | Light snow began falling in the predawn hours, accumulating 1 to 3 inches before ending at midday. |
| 3/4/2001 | Rain changed over to snow and accumulated a bit. Most accumulations were on grassy areas but a few icy spots developed on roads. |
| 3/20/2001 | Heavy, wet snow accumulated from early morning, through the day and into the evening in some locations. Combined with the wind, numerous power outages resulted and many thousands of trees were downed. Numerous traffic accidents resulted from the weather, causing fatalities and injuries in some cases. |
| 4/1/2001 | A potent upper level disturbance rotating across the southeast states behind a strong cold front that crossed the area late in March<br><br>interacted with cold, moist air remaining over the mountains to produce a light blanket of snow early on the 1st. |
| 1/6/2002 | Snow began in the early morning, reaching accumulations of 4 to 8 inches by 3 pm. The highest accumulations were in the high elevations. Some sleet was mixed in with the snow. |
| 2/17/2002 | Snow fell for most of the day across portions of the northern mountains. While much of Mitchell and Yancey Counties received only a dusting, amounts of 1 to 3 inches were reported across Avery County. Numerous traffic accidents occurred at Beech Mountain. |
| 2/26/2002 | Snow fell overnight into the morning hours, as an upper level storm system moved across the area, and was followed by strong northwest winds. Most of the snow fell immediately along the Tennessee border, but extended east of there in some cases. Some of the higher elevations of Graham, Madison, and Avery Counties received as much as 5 inches of snow. In addition to the snow, wind chill values fell to zero and below in some locations. |
| 11/17/2002 | The first snow of the season brought an inch or two of accumulation to the higher elevations of the North Carolina mountains. Winds also gusted to 45 mph in some locations. |
| 11/22/2002 | Snow accumulated to as much as 5 inches on the highest peaks along the Tennessee border. Also, wind gusts resulted in scattered tree damage across the area. |
| 12/4/2002 | Snow began falling around sunrise across the mountains of North Carolina, and had accumulated to 3 to 6 inches by evening. |
| 1/16/2003 | Light snow began across the mountains of North Carolina during the afternoon of the 16th, and gradually intensified with time. By early morning of the 17th, 4 to 8 inches of snow had accumulated. As much as a foot was reported on some of the highest peaks. |
| 1/23/2003 | Snow began at around midnight across the mountains of North Carolina, and intensified as it spread into the foothills and the western piedmont. The hardest hit area was the foothills, where 8 to 12 inches of snow had fallen by mid-morning. Otherwise, snow accumulations were generally in the 3 to 6-inch range. |
| 2/6/2003 | Light snow began falling across the western mountains of North Carolina during the afternoon of the 6th, and gradually increased in intensity and coverage during the evening and overnight hours. General snowfall amounts of 4 to 5 inches were reported in the major valleys. However, accumulations of up to 8 inches occurred in the highest elevations along the Tennessee border. |
| 3/30/2003 | Snow intensity increased during the pre-dawn hours across the northern mountains, and heavy accumulations were realized by mid-morning. |
| 4/10/2003 | Light snow began across the North Carolina mountains during the early morning hours of the 10th, but due to a warm ground, accumulations were confined to the highest elevations through 8 AM. However, the snow intensified dramatically during the middle and late part of the morning, and by early afternoon, 2-4 inches had accumulated in valley locations near the Blue Ridge. In the higher elevations, 4 to 6-inch totals were common, while 8 to 12 inches |

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| | accumulated on some of the highest peaks along the Tennessee border. The heavy, wet snow caused numerous trees and power lines to fall, and power outages were widespread. |
| 12/18/2003 | A prolonged period of snow produced heavy accumulations over a 2-day period across much of the North Carolina mountains. Most valley locations received total accumulations of 6 inches or less. However, most of the high elevation areas along the Tennessee border received between 1 and 2 feet. Northwest winds of 20 to 30 mph caused blowing and drifting snow. |
| 1/25/2004 | Light snow developed early in the morning across the mountains, foothills, and northern piedmont of North Carolina. The snow intensified throughout the morning and afternoon, and by early evening 3 to 5 inches had accumulated across much of the area. Accumulations as high as 8 inches occurred in mountainous areas along the Tennessee border. |
| 2/7/2004 | Snow fell during much of the afternoon, evening, and overnight hours across the western mountains of North Carolina. Three to five inches of snow accumulated, mainly in areas along the Tennessee border. |
| 2/12/2004 | Snow began during the late evening hours across the northern and central mountains, and continued overnight. By sunrise on the 12th, accumulations of 3 to 6 inches were common. The heaviest amounts occurred in the highest elevations along the Tennessee border. |
| 2/26/2004 | Heavy snow began to fall across the foothills, piedmont, and northern mountains of North Carolina during the late morning. Although snowfall intensity decreased dramatically during the early-to-middle portion of the afternoon, heavy snow redeveloped during the late afternoon, and continued into the evening and overnight hours. Scattered thunderstorms contributed to intense snowfall rates of 2 to 3 inches per hour from time to time, especially in the piedmont, where total snowfall of 12-22 inches occurred. The heaviest amounts occurred in the southwest piedmont, particularly in southern portions of Charlotte metro. Thousands of people were stranded on I-77 during the early afternoon, and some required rescue. The weight of the snowfall caused damage to numerous roofs, while some roofs completely collapsed. Across the foothills and northern mountains, accumulations were considerably lighter, generally in the 4-8-inch range, although amounts of 10-16 inches fell along the Blue Ridge north of I-40. |
| 12/11/2004 | Heavy snow fell across the mountains and accumulated in the high elevations to 3 to 6 inches. The heavy snow level in most locations was 4000 feet, but dropped off to as low as 3000 feet in the southwest mountains. Elevations between 2500 feet and 3500 feet generally had an inch or two. |
| 12/19/2004 | Heavy snow fell for about 7 hours, along with wind gusts to near 50 mph. The highest accumulations were along the Tennessee border, especially in Graham County where some drifts reached a reported 2 feet. The snow and wind were accompanied by very cold weather. The Asheville Regional Airport reached a record low of 7 degrees the morning of the 20th. Buncombe County had heavy snowfall in the western and northern part of the county, although areas from Asheville south to the Henderson County line only had a trace to an inch. The temperature fell to below zero overnight in parts of the northern mountains, even the valleys, with single digits common elsewhere. |
| 1/22/2005 | Heavy snow fell during the overnight hours across the northern mountains. Occasional heavy snow and blowing snow caused blizzard-like conditions at times, especially in Avery County. Snowfall ranged from 2 to 4 inches in the valleys and 4 to 6 inches in the higher elevations. As wet roads froze underneath the snow, they became quite slick and hazardous, causing quite a few accidents. In addition, temperatures in the single digits combined with strong winds to produce wind chills of 10 below. |
| 2/28/2005 | The wet snow became heavier across the mountains and northern foothills during the early morning hours on the 28th. Most locations below 3000 feet changed back to rain before the precipitation ended. A quick 3 to 7 inches of snow accumulated across much of this area. Isolated heavier totals up to 13 inches occurred along the Blue Ridge, north of I-40, while the lower elevations of the foothills generally received only 1 to 3 inches. |
| 3/1/2005 | Snow developed during the evening across the northern mountains, as strong northwest winds developed in the wake of a cold front. 2 to 4 inches of snow accumulated in addition to that which fell across the area on the morning of the 28th. |
| 2/11/2006 | Northwest flow, a very cold airmass, and upper air disturbances combined to produce an unusually strong upslope snow event across the far western counties of North Carolina. Widespread, heavy snow showers began to develop during the early evening of the 11th, and by late evening, heavy snowfall accumulations were common across the area. The snow lasted for a very long period, continuing through the 12th and the early morning hours of the 13th before finally tapering off. Combined with the light snow that fell across the area on the morning of the 11th, storm |

| Date | Description |
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| | total accumulations of 5 to 10 inches occurred within the valleys near the Tennessee border. Meanwhile, accumulations were generally in the 1-2-foot range across the higher elevations. There were unofficial reports of as much as 4 feet in the Smoky Mountains. This event was unusual in that heavy snowfall extended as far east as the higher elevations of eastern Buncombe county, while the valleys of northern Buncombe received 3 to 6 inches. |
| 1/9/2007 | An upper level disturbance brought fairly uniform 1 to 4-inch snowfall amounts across the mountains during the late morning. The snow was quite heavy in spots and accumulated rapidly. Roads became slick and hazardous, especially in the higher elevations. Quite a few traffic accidents occurred in Madison County, including 1 fatal accident. Highway 441 was closed through the Smoky Mountains. Once the upper disturbance moved east of the area, scattered to numerous snow showers continued to affect the mountains through much of the afternoon and evening. Most areas along the Tennessee border began to see heavy snowfall accumulations by early evening. Total accumulations in the higher elevations were fairly uniform in the 3 to 5-inch range, although some locations right along the Tennessee border saw up to 7 inches, particularly along the Cherohala Skyway in Graham County, and across the northern mountains. The valleys saw less snow, with generally 1 to 2 inches observed south of the French Broad River, and 1 to 4 inches observed from the French Broad north. |
| 2/17/2007 | Light snow developed during the early evening across the northern mountains and continued through much of the overnight hours. By sunrise, snowfall totals of 1 to 3 inches had occurred. As snow showers continued to affect the northern mountains, heavy snowfall levels were finally reached shortly after sunrise. Accumulations generally ranged from 2-4 inches, although some higher elevation locations along the Tennessee border saw slightly higher totals. |
| 4/6/2007 | A record-setting cold airmass, northwest flow, and a strong upper air disturbance resulted in a late season snow shower event across the North Carolina mountains. By 3 am, snow had accumulated to as much as 2 inches in the valleys, with as much as 6 inches reported in the higher elevations. Snow showers continued through the morning hours, with heavy snowfall totals reported during the pre-dawn hours. Snowfall was highly variable across the region, with generally only 2-3 inches accumulating in the lower elevations. However, some of the higher elevations of the northern mountains saw as much as 10 inches. |
| 4/15/2007 | As a strong cold front moved across the mountains and snow levels dropped rapidly, rain showers changed to snow showers and caused rapid accumulation of heavy snow, mainly in the higher elevations along the Tennessee border. Total accumulations generally ranged from 2-5 inches, mainly in areas above 3500 feet, while the valleys saw amounts ranging from a trace up to an inch. |
| 1/1/2008 | Snow showers developed New Yearï¿½ï¿½ï¿½s Evening across the western slopes of the Appalachians. As snow showers, heavy at times, continued across the western Mountains of North Carolina, accumulations began to pile up during the pre-dawn hours of the 2nd. Many locations reported 2-4 inches of accumulation by sunrise. By the time the snow tapered off to flurries (during late morning), total accumulations ranged from a couple of inches in the valleys away from the Tennessee border, to 4-6 inches in areas along the state line. Although accumulating snow tapered off during mid-morning, flurries continued for much of the day, while very windy conditions resulted in blowing and drifting snow. |
| 1/16/2008 | Light snow began during the early evening hours across the southern mountains and foothills of the western Carolinas and northeast Georgia. Snowfall intensity began to increase during the mid and late evening. Snow continued to fall across the central and northern mountains, and much of the foothills of North Carolina, during the early morning hours. Total accumulations of 2-5 inches were reached across the area during the pre-dawn hours. Some amounts as high as 8 inches were reported in the higher elevations. Snow changed briefly to sleet and freezing rain before ending across the foothills. |
| 2/26/2008 | Snow showers developed across the western mountains during the late evening. The snow showers increased in coverage and intensity through the early morning hours of the 27th, resulting in heavy snow accumulations across much of the western mountains before sunrise. Snow continued through the day and evening hours and did not begin tapering off until the early morning hours on the 28th. Total accumulations were highly variable across the area. While locations such as Bryson City and Waynesville saw less than 2 inches, areas along the Tennessee border received as much as a foot. Even the valley floors near the state line received as much as 8 inches. |
| 11/21/2008 | Snow showers, heavy at times, fell across the northern mountains into the afternoon, with many locations achieving heavy snowfall accumulations by late morning. Accumulations ranged from 3 inches in areas along the Blue Ridge, to 7 inches or more in the higher elevations along the Tennessee border. |

| Date | Description |
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| 12/1/2008 | Snow showers developed during the early morning hours and continued through much of the day across the Tennessee border counties. Snow showers, heavy at times, continued near the Tennessee border, with heavy snowfall accumulations reported by early evening. The snow tapered off to flurries during the early morning hours. Total snowfall amounts ranged from an inch or 2 along the Blue Ridge, to as much as 6-7 inches in the higher elevations near the state line. |
| 1/8/2009 | Snow showers developed across the Tennessee border counties around sunrise, and persisted until the late afternoon hours. Snowfall amounts ranged from 2-5 inches, mainly in elevations above 3000 feet or so. Some locally higher amounts were reported on the higher peaks. |
| 1/18/2009 | Snow showers developed over the western mountains during the late evening of the 18th, and continued off and on through the evening hours of the 20th. Snowfall totals ranged from 4 to 6 inches at the higher elevations of the southwest and central mountains, to 1 to 3 inches in the valleys. Over the northern mountains totals ranged from 4 to 7 inches, with 1 to 3 inches along the eastern slopes of the Blue Ridge. |
| 4/7/2009 | After an extended period of snow showers, heavy snowfall accumulations were reached across the northern mountains by mid-afternoon on the 7th. Total accumulations were generally in the 2 to 4-inch range across the area, but amounts approaching 10 inches occurred in the higher elevations along the Tennessee border. |
| 1/7/2010 | A very cold and moist northwest flow resulted in development of scattered to numerous snow showers across the western mountains during the evening of the 7th. The snow showers continued across much of the Tennessee border counties through the day on the 8th, with heavy accumulations reached in some areas by late morning. Total accumulations ranged from 1-3 inches over the lower French Broad Valley, to 3-6 inches across the northern mountains. Over the southwest mountains, total snowfall accumulations ranged from trace amounts in the valleys beneath the Smokies, to 2-4 inches in the higher elevations along the Tennessee border. |
| 1/29/2010 | Low pressure tracked across southern Georgia during the night of the 29th, and then off the southeast cost on the 30th. As the low passed well south of the region, most of the precipitation fell as snow, though other precipitation types mixed in toward the end. \|\|Snow became heavy during the evening, and quickly accumulated to yield heavy snowfall totals. Total accumulations ranged from 5-9 inches across much of the northern mountains, foothills and western piedmont of North Carolina, as well as in a small part of the South Carolina mountains. A 55-year-old man died of exposure after falling in the snow in Gastonia (indirect). The precipitation changed to freezing rain and sleet near the end of the event, resulting in light accumulations of ice. |
| 2/15/2010 | Northwest flow snow showers developed over the northern mountains during the evening and persisted over the next 24 hours. By the evening of the 16th, accumulations of 5-6 inches were common near the Tennessee border, while only an inch or so had fallen in areas closer to the Blue Ridge. The snow continued off and on for almost two more days, before finally tapering off during the morning of the 18th. Accumulations along the Tennessee border totaled a foot or more in some areas. Meanwhile, locations closer to the Blue Ridge only saw a couple of inches. Over Avery County, total accumulations were higher, with 1-2 feet near the Tennessee border. |
| 2/24/2010 | Northwest flow snow showers developed during the evening across the northern mountains, and continued along the Tennessee border through much of the 25th, with heavy snowfall accumulations reached across much of the area shortly after sunrise. Total accumulations ranged from only a couple of inches along the Blue Ridge, to 7 inches in the lower valleys along the Tennessee border. Meanwhile, some of the higher elevations received a foot or more of snowfall. |
| 3/2/2010 | Snow began to fall around sunrise across the North Carolina mountains along the Blue Ridge escarpment. Snow became moderate to heavy at times during the late morning and early afternoon, resulting in accumulations of 1 to 4 inches across most of the area. Snow, heavy at times, continued into the afternoon across the Blue Ridge, with heavy accumulations realized in most areas by mid-afternoon. By early evening, total snowfall ranged from 3 to 6 inches. Localized snowfall amounts as high as 10 inches occurred, especially in the higher elevations along the escarpment. |
| 12/12/2010 | Light snow began falling over the northern mountains and Madison County during the early morning hours of the 12th. By mid-morning, accumulations of 1 to 3 inches were observed across the area. After a strong cold front swept through the mountains, northwest winds resulted in development of numerous snow showers by early afternoon. By mid-evening, snowfall totals ranged from 1 to 5 inches across the area. As snow showers continued in the northwest flow, snow continued to gradually accumulate in the higher elevations along the Tennessee border. By the time the snow tapered off early on the 14th, accumulations generally ranged from 4 to 8 inches in |

| Date | Description |
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| | the higher elevations, generally above 3500 feet, although some areas saw as much as 20 inches. The lower elevations saw considerably lower amounts, generally in the 2-5-inch range. Very windy conditions and very cold temperatures resulted in wind chill values below 0 in many areas during the overnight and early morning hours. |
| 12/25/2010 | A developing coastal storm system brought light to moderate snow, with occasional heavy bursts to the northern mountains beginning shortly after sunrise on Christmas. Snow, heavy at times, continued through the afternoon across the northern mountains and surrounding areas. By Christmas evening, most locations had 3 to 6 inches of fresh snowpack. A brief lull in snowfall occurred overnight. However, snowfall began to increase again during the morning of the 26th, as strong northwest flow resulted in development of numerous snow showers along the Tennessee border. The snow showers continued until the afternoon of the 27th. This resulted in additional accumulations that ranged from 2 to 6 inches in the valleys to a foot or more in the higher elevations. Very gusty winds and cold temperatures resulted in wind chill values less than 0 and considerable blowing and drifting of snow, especially in the high elevations. |
| 1/7/2011 | Light to moderate snow developed ahead of a cold front across the western mountains of North Carolina around noon, and continued through the afternoon. After the cold front passed during the early evening, snow showers, some of which were heavy developed within a moist northwest flow, adding to accumulations across the Tennessee border counties. Snow showers continued into the overnight and through much of the 8th before tapering off during the evening and the early morning hours of the 9th. Total accumulations were highly variable across the area and depended largely upon terrain. Storm total amounts ranged from 3 to 5 inches in the southwest mountain valleys, to 4 to 8 inches in the lower French Broad Valley and the northern mountain valleys. The high elevations along the state line received as much as 2 feet. |
| 1/10/2011 | Moderate to heavy snow associated with a Gulf Coast storm system spread from south to north across the mountains of western North Carolina during the nighttime hours. Heavy snow accumulations of up to 4 inches were reported over the southern mountains by as early as 4 am. Heavy snow accumulations were not reported over the northern mountains until mid-morning. The snow became lighter around sunrise, but continued to accumulate through the morning. By early afternoon, snowfall totals ranged from 7 to 10 inches over the southern and central mountains and 3 to 6 inches over the northern mountains. During early afternoon, precipitation changed to light freezing rain and continued into the evening hours. This added as much as a tenth of an inch of ice to the heavy snowfall totals. Persistent cold temperatures ensured that many roads remained snow-packed or ice covered for several days. Some schools and businesses remained closed for as much as 5 days. |
| 10/29/2012 | As ï¿½ï¿½ï¿½Superstorm Sandyï¿½ï¿½ï¿½ï¿½ moved across New England and stalled over the northern Mid-Atlantic region, abundant moisture was transported into the mountains. The first snow showers of the season developed within this moist northwest flow across the northern mountains of North Carolina during the pre-dawn hours of the 29th. Snow showers, some heavy continued through the day and overnight, and by the pre-dawn hours of the 30th, heavy snowfall accumulations were observed, mainly across the higher elevations of the northern mountains and Madison County. By the time the snow showers tapered off during the early morning hours of the 31st, 1 to 3 feet of snow was reported in the high elevations (above 4000 feet or so), with the heaviest amounts occurring at the peaks along the Tennessee border. Meanwhile, the lower valleys saw storm totals of only a few inches. |
| 1/17/2013 | Heavy rain changed to snow across the higher elevations of the North Carolina mountains during the late afternoon hours. Snow levels lowered in elevation through early evening, during which time snow quickly accumulated to as much as 4 inches across the higher elevations. Snow levels finally fell to the valley floors by the time precipitation ended during the late evening. Heavy snowfall totals were mainly confined to elevations above 3000 feet. Some locations in the northern mountains near the Tennessee border saw as much as 9 inches. Meanwhile, the late transition to snow resulted in only an inch or two accumulating in the valleys. |
| 2/2/2013 | Snow developed across Madison and Yancey counties during the early evening and continued off and on through the morning of the 3rd. By the late morning, heavy snowfall accumulations were reported in many locations. Snow showers, heavy at times continued through much of the 3rd before tapering off by during the evening. Total accumulations ranged from 3-5 inches in most valley locations to as much as a foot in the higher elevations. |
| 1/21/2014 | Widespread snow showers developed along the Tennessee border along and immediately behind a cold front during the late morning and continued through the evening hours across the Tennessee border counties. Heavy snowfall accumulations were realized in the favored northwest flow locations by late evening. Total accumulations |

| Date | Description |
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| | ranged from 3 to 6 inches across much of the area, although the valleys southwest of the French Broad generally saw less. Locally higher amounts up to 10 inches were observed in the high elevations of the northern mountains. |
| 3/6/2014 | An intensifying cyclone off the Southeast coast and cold air damming combined to produce heavy snow and occasional sleet along and near the eastern Blue Ridge escarpment. Rain mixed with sleet developed across the Blue Ridge mountains and North Carolina foothills during the evening, then changed to mainly sleet in most areas. Up to a quarter inch of sleet accumulated during the late evening and early morning hours. Precipitation then changed mostly to rain in most areas, before transitioning to snow during the pre-dawn hours of the 7th. As heavy snow continued to fall across the foothills and Blue Ridge mountains in North Carolina throughout the morning, heavy accumulations of snow became common. The region of heavy snowfall accumulation was confined to a very narrow corridor along the Blue Ridge south of I-40, but became more widespread across the northern mountains and foothills. Total snowfall accumulation generally ranged from 4-6 inches in these areas, with locally higher amounts reported in some high elevation locations near the Blue Ridge. This was in addition to the quarter inch or so of sleet that fell earlier in the morning. Meanwhile, accumulations were quite a bit lower in the areas of the northern mountains adjacent to the Tennessee border. The snow changed back to rain in most areas before ending late in the morning. |
| 11/1/2014 | Precipitation associated with a strong upper level disturbance and associated strong cold front changed to snow at the highest peaks and ridge tops by early evening Halloween evening, with snow levels dropping rapidly to the valley floors by the end of the evening as an arctic air mass infiltrated the region behind the front. By the pre-dawn hours of the 1st, snow accumulation ranged from a dusting to a couple of inches on the valley floors, to a foot or more in the high elevations along the Tennessee border. Snow became more showery and sporadic in nature during the morning of the 1st, especially across the valleys, but not before heavy snowfall totals were reached within much of the Tennessee border counties. 2-6 inches of snowfall accumulated across many valley areas by daybreak. Meanwhile, snow showers, heavy at times continued across the high elevations into early afternoon. Total accumulations of 1-2 feet were reported in locations above 4000 feet along the state line, mainly across the Smokies and the Newfound Mountains. |
| 1/22/2016 | An area of low pressure spread light snow into the mountains and foothills of North Carolina by around midnight on the 22nd. The snow continued through the early morning hours, gradually increasing in intensity. By mid-morning, amounts ranged from 2-4 inches across the foothills to 3-5 inches across the mountains, with locally higher amounts, especially in the high elevations near the Blue Ridge. Road conditions deteriorated quickly around sunrise, resulting in many traffic accidents. Moderate to heavy snow continued into the afternoon, gradually tapering off during the evening. The snow briefly changed to sleet before ending across the foothills. By the time the snow tapered off, accumulations ranged from 4-8 inches across the low elevations of the foothills, to 8-14 inches across the mountains. Locally higher amounts occurred, especially on the high peaks near the Blue Ridge, where several feet were reported. |
| 1/6/2017 | As an area of surface low pressure moved northeast along the Gulf and Southeast coasts, moisture overspread western North Carolina throughout the 6th. While precipitation initially fell as rain and sleet across the foothills and Piedmont, it changed to snow fairly quickly. The snow was light at first, and even ended briefly before beginning again late in the evening. Snow, heavy at times continued across the area through the overnight. By the time the heavier snowfall rates tapered off shortly after sunrise, total accumulations ranged from 3 to 5 inches in the valleys of the far southwest mountains, to 6 to 8 inches across the remainder of the area. Locally higher amounts of 9 inches or more were reported, mainly in the high elevations, and in the far northern foothills and Piedmont. |
| 3/13/2018 | Snow showers developed across the northern mountains in response to a strong and moist northwest flow developing in the wake of a cold front. While snow showers were initially light, they increased in intensity, becoming moderate to heavy during the pre-dawn hours. By the time the snow tapered off, accumulations ranged from 3 to 5 inches in the lower elevations along the Blue Ridge, to 6-9 inches across the lower elevations near the Tennessee border and across the higher elevations. |
| 12/8/2018 | Snow developed across northwest North Carolina around midnight the morning of the 9th, and began accumulating quickly. Moderate to heavy snow continued through the morning of the 9th before tapering off during the early afternoon. Storm total accumulations were generally in the 10 to 15-inch range, with slightly lower amounts south of I-40, and locally higher amounts across the mountains, particularly the high peaks along the Blue Ridge, where more than two feet fell. Travel was paralyzed across this area for a couple of days. |

## TABLE H.7: HIGH WIND EVENTS (2000-2019)

| Date | MPH | Description |
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| **Avery County** | | |
| 1/13/2000 | 52 | Strong and damaging northwest winds behind a strong cold front, gusted to 60 mph or more. Many trees and power lines were blown down which resulted in power outages for some mountain residents. The highest winds in the foothills occurred near the Blue Ridge Parkway. |
| 3/19/2000 | 55 | High gradient winds blowing from the south knocked down numerous trees and power lines across the mountains. Only light structural damage occurred, except in Avery county. Roofs were blown off several houses around Banner Elk, Beech Mountain police reported the door of their office was nearly blown off, and there was an unofficial measurement of a 135-mph wind gust on Beech Mountain. The highest winds occurred between 11 pm and 4 am. |
| 4/8/2000 | 50 | High winds following a cold front blew down a number of trees and power lines. Scattered power outages occurred as well. |
| 12/12/2000 | 50 | High winds following a frontal passage downed trees and powerlines in part of the northern mountains. In Bakersville, a door was blown off a house. |
| 3/6/2001 | 55 | |
| 11/29/2001 | 50 | High winds developed overnight as a strong low-level jet, boosted by weak convection, brought damaging wind gusts to the surface. Damaging winds started in a few counties late in the evening, peaking between midnight and 6 am in most locations. Damage was mostly limited to downed trees and power lines, with resulting power outages, but in Madison County, a barn was blown into the road near Laurel. |
| 2/4/2002 | 50 | High winds starting picking up during the late morning, and by noon reached damaging levels in some areas. Scattered to numerous trees and power lines were blown down, depending on the county. Some structural damage resulted - mostly from trees falling on vehicles and buildings. After a brief respite around sunset, the wind picked up again to damaging levels during mid and late evening. |
| 3/10/2002 | 50 | Strong winds following a cold front reached damaging levels in a few locations. Most damage was limited to downed trees and power lines, which blocked roads for a while in some areas. |
| 9/27/2002 | 50 | Winds associated with Isidore increased in the early morning hours across the North Carolina mountains, resulting in more widespread damage to trees and power lines. Widespread power outages were reported. Numerous roads were blocked by fallen trees, and a church tent was blown down and destroyed in Brevard. |
| 12/25/2002 | 50 | Very strong winds developed during the late morning across the mountains and foothills. Wind gusts reached an estimated 60 to 75 mph across the higher elevations. Damage to trees and power lines was widespread, and power outages were numerous. Some trees fell on vehicles and structures. |
| 5/12/2003 | 58 | Numerous trees were blown down. Some fell onto power lines near the Avery and Burke County line. |
| 10/14/2003 | 50 | High winds developed just ahead of and behind a cold front across the mountains and foothills of North Carolina. Numerous trees and power lines were blown down. |
| 11/13/2003 | 50 | High winds developed behind a cold front across the mountains and foothills of North Carolina. Sustained winds of 40 mph developed during the pre-dawn hours, and persisted for much of the day, especially in the highest elevations. Numerous trees were blown down. Along the Blue Ridge Parkway in Buncombe County, the Craggy Gardens visitors' center was heavily damaged. |
| 11/18/2003 | 50 | High winds developed ahead of a cold front, mainly across the higher elevations of the North Carolina mountains. Scattered trees and power lines were blown down in most counties. However, damage was most extensive in Madison, Swain, and Macon counties. Numerous downed trees and power outages occurred in these counties. |
| 3/7/2004 | 50 | Strong winds developed across the mountains just ahead of and along a strong cold front. Numerous trees and power lines were blown down. Weak thunderstorms may have contributed to the high winds across the northern mountains, but damage extended to areas far away from those affected by the storms. |
| 9/7/2004 | 50 | High winds associated with the remnants of Hurricane Frances produced fairly widespread damage to trees and power lines across portions of the North Carolina mountains, and the higher elevations of the foothills. |
| 9/16/2004 | 55 | High winds developed across the mountains, as the remnants of Hurricane Ivan moved just west of the area. Locations near the southern exposure of the Blue Ridge were the hardest hit, with major damage occurring |

| Date | MPH | Description |
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| | | in and around Highlands, Cashiers, Brevard, and southern Henderson County. Thousands of trees were blown down, including 90,000 apple trees in Henderson County. Numerous trees fell on structures and vehicles. A 55-year-old man was killed shortly after midnight near Hendersonville, when a tree fell through his house. Hundreds of structures in Henderson County were damaged by fallen trees and debris. A woman in Highlands was injured when a tree limb hit her in the head. |
| 9/17/2004 | 50 | As the remnants of Ivan retreated toward the mid-Atlantic region, high pressure building in behind the circulation caused a resurgence of strong winds across the mountains and foothills. This resulted in additional tree and power line damage. |
| 1/22/2005 | 50 | High winds developed across the mountains behind a strong cold front that swept through the region during the evening. Numerous trees were blown down. There were scattered power outages throughout the mountains. |
| 3/8/2005 | 60 | High winds developed across portions of the mountains during the morning, mainly from the French Broad Valley north. Trees and power lines were blown down, resulting in some power outages. Several gusts were measured in the 60-70 mph range by home weather equipment. The most significant winds/damage occurred around Black Mountain. |
| 4/2/2005 | 60 | High winds developed across the mountains and foothills during the evening, and continued through the overnight hours before subsiding during the late morning of the 3rd. Numerous trees, power poles, and power lines were blown down, resulting in fairly widespread power outages. The northern foothill counties appeared to the hardest hit. In McDowell County, several homes and vehicles were damaged by falling trees. In Caldwell County, the roof of the County office building was damaged in Lenoir, and at least two homes were damaged by falling trees in the northern part of the county. |
| 8/30/2005 | 50 | As the remnants of hurricane Katrina moved across middle and west Tennessee, high winds developed over the mountains of North Carolina. Numerous trees and power lines were blown down, with damage being most concentrated in the southwest mountains, and in Avery County of the northern mountains. At least 2 trees fell on and damaged structures. |
| 1/25/2006 | 55 | High winds developed across the mountains and the foothills during the overnight hours, and continued through about mid-morning. The hardest hit areas were locations along and near the Blue Ridge from I-40 north, and Jackson county in North Carolina. In Avery County, a steeple was blown off of a church. Scattered to widespread tree damage occurred, with quite a few power outages, mainly concentrated along the I-40 corridor from Black Mountain to Old Fort. |
| 4/3/2006 | 50 | Strong winds developed during the evening across the North Carolina foothills and mountains behind a strong cold front. Most of the damaging winds occurred in the foothills, where quite a few trees and some power lines were blown down. In Avery County, part of a roof was blown off a house along highway 19 east of Newland. |
| 4/15/2007 | 70 | Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on. |
| 4/16/2007 | 60 | After an intense, but relatively brief high wind event affected the mountains and foothills on the evening of the 15th, another widespread damaging high wind event developed during the day of the 16th. However, this particular event included much of the piedmont. Thousands of trees fell across the area, resulting in widespread power outages. Numerous trees fell on roads, homes, and vehicles. The Blue Ridge mountains and the foothills received the brunt of the strongest winds. In Highlands, NC, two homes were heavily damaged by fallen trees, while approximately 100 homes received minor to moderate damage. A tree fell on and severely damaged a home in Otto, NC. Two businesses received significant roof damage in Cashiers, NC. Three construction workers were injured in Mount Holly when an inflatable structure collapsed at a constructions site. Five homes were damaged by fallen trees in Lincoln County, NC alone. Three homes were |

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| | | damaged in Iredell County and in In Catawba County, a 30-foot brick wall on top of a building in Newton was blown down, while sections of a metal roof were torn off a business in Viewmont. |
| 2/10/2008 | 55 | As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon. |
| 5/11/2008 | 60 | Strong winds developed behind a cold front over the North Carolina mountains. Numerous trees and power lines were blown down across the region. Several structures were damaged by fallen trees. Twenty-two homes were damaged by fallen trees in the town of Lake Lure in Rutherford County alone. |
| 12/31/2008 | 50 | High winds developed near the Blue Ridge around sunrise, peaking in the mid to late morning, before tapering off during the afternoon. Numerous trees and power lines were blown down, with some scattered power outages. |
| 12/9/2009 | 55 | After a period of heavy rain that left the ground saturated, strong winds developed behind a cold front during the late morning hours over the North Carolina mountains. The combination of very windy conditions and wet ground resulted in numerous fallen trees, which brought down power lines and damaged homes and cars. |
| 12/21/2012 | 55 | Although gusty northwest winds were observed across much of the mountains beginning during the evening of the 20th, with a few trees blown down through the morning of the 21st, stronger winds developed during the afternoon of the 21st. A scattering of downed trees occurred through the afternoon, with a few power outages reported. However, the strongest winds occurred during the overnight hours. Numerous trees were blown down on the night of the 21st and early on the 22nd, with most of the damage occurring within a few miles of the Blue Ridge escarpment. Multiple trees fell on structures, especially in Buncombe and Henderson counties. Trees falling on power lines also resulted in quite a few power outages. |
| 3/29/2014 | 56 | Strong northwest winds developed across the northern mountains late on the 29th, with the strongest winds affecting locations along and near the eastern escarpment of the Blue Ridge. The winds gusted to over 60 mph at times, with gusts in excess of 80 mph likely occurring across the higher elevations. Numerous trees were blown down in these areas. Sporadic minor damage was reported to roofs across the area and a downed power lines resulted in scattered power outages. A few trees fell on homes as well. The strong winds continued through much of the 30th before tapering off by mid-evening. Snow showers also developed within the northwest flow and produced 1-2 inches of accumulation during the overnight hours. |
| 2/14/2015 | 50 | Strong northwest winds developed during the evening of the 14th across the northern mountains and foothills in the wake of an arctic cold front. Quite a few trees and power lines were reported down in addition to some minor structural damage. |
| 4/2/2016 | 50 | Strong northwest winds developed across the mountains and northern foothills in the wake of an arctic cold front around midnight and continued through the overnight hours. Numerous trees were blown down across the area, along with some power lines. One tree fell on a camping trailer in Steele Creek Park in northwest Burke County, resulting in injury to an occupant. Another tree fell on a car in the Lake Lure area of Rutherford County. |
| 3/2/2018 | 50 | As low pressure strengthened rapidly off the Mid-Atlantic and Northeast coast, strong northwest winds developed across the North Carolina mountains early on the 2nd, with the most intense winds observed from around sunrise into the early afternoon. Numerous trees were blown down across the area, with quite a few power outages reported. Some sporadic structural damage occurred, mainly due to falling trees and large limbs. |
| 2/24/2019 | 50 | Strong west to northwest winds developed across the northern mountains of North Carolina in the wake of a cold front. Although winds became very gusty immediately after the cold front passed during the afternoon, the damaging winds primarily occurred during the evening and overnight hours, when many trees and power lines were blown down. Multiple outbuildings were also damaged or blown over and at least one tree fell on a structure in Old Fort. |
| | | **McDowell County** |

| Date | MPH | Description |
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| 12/1/2006 | 55 | Numerous trees were blown down, mainly near the Blue Ridge escarpment, during the mid and late morning. Some of the trees fell on power lines, resulting in outages. |
| 2/22/2007 | 50 | Numerous tree limbs blown down in the Woodlawn area of McDowell County. |
| 4/15/2007 | 70 | Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on. |
| 4/15/2007 | 70 | Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on. |
| 4/16/2007 | 65 | After abating somewhat in the early morning hours, there was a resurgence in damaging winds across the Blue Ridge Mountains and surrounding areas during the daylight hours. Thousands of trees and numerous power lines fell across the area, with many trees falling on roads and damaging homes and vehicles. A 59-year-old man was killed when the vehicle he was driving on Turnpike Rd near Mills River was crushed by a fallen tree. In Saluda, a 75-year-old man was critically injured when a tree fell on his car. He died several days later. A utility worker was also seriously injured in in the Hickory Grove area of Polk County, when a falling tree pinned him to his vehicle. At the height of the event, about 30,000 customers were without power in Henderson County alone, with power outages numbering in the hundreds of thousands across the area as a whole. Some customers remained without power until the 19th. |
| 4/16/2007 | 65 | After abating somewhat in the early morning hours, there was a resurgence in damaging winds across the Blue Ridge Mountains and surrounding areas during the daylight hours. Thousands of trees and numerous power lines fell across the area, with many trees falling on roads and damaging homes and vehicles. A 59-year-old man was killed when the vehicle he was driving on Turnpike Rd near Mills River was crushed by a fallen tree. In Saluda, a 75-year-old man was critically injured when a tree fell on his car. He died several days later. A utility worker was also seriously injured in in the Hickory Grove area of Polk County, when a falling tree pinned him to his vehicle. At the height of the event, about 30,000 customers were without power in Henderson County alone, with power outages numbering in the hundreds of thousands across the area as a whole. Some customers remained without power until the 19th. |
| 2/10/2008 | 55 | As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon. |
| 2/10/2008 | 55 | As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon. |
| 5/11/2008 | 60 | Strong winds developed behind a cold front over the North Carolina mountains. Numerous trees and power lines were blown down across the region. Several structures were damaged by fallen trees. Twenty-two homes were damaged by fallen trees in the town of Lake Lure in Rutherford County alone. |
| 5/12/2008 | 50 | Strong winds developed during the early morning hours behind a cold front over the North Carolina mountains just to the east of the Blue Ridge. Several trees and power lines were blown down, some onto houses. |

| Date | MPH | Description |
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| 12/9/2009 | 55 | After a period of heavy rain that left the ground saturated, strong winds developed behind a cold front during the late morning hours over the North Carolina mountains. The combination of very windy conditions and wet ground resulted in numerous fallen trees, which brought down power lines and damaged homes and cars. |
| 2/10/2010 | 50 | Strong west and northwest winds developed during the afternoon over the foothills and northwest piedmont in the wake of a cold front. Numerous trees and power lines were downed throughout the afternoon and early evening. A tree fell through a mobile home in Lenoir. Another tree fell on a home 5 SW Marion. A tree fell and power lines fell on a moving vehicle in Salisbury, briefly trapping the occupants. One person was injured by flying debris at a construction site in Lenoir. |
| 2/11/2012 | 50 | Strong winds developed across the upper French Broad Valley and along parts of the eastern escarpment of the Blue Ridge as northwest flow developed across the region. The winds blew down numerous trees and power lines in McDowell County, with at least one tree falling on a vehicle. Multiple business signs were blown in Marion. Parts of western Rutherford County and Henderson County were also affected by damaging winds. |
| 2/11/2012 | 50 | Strong winds developed across the upper French Broad Valley and along parts of the eastern escarpment of the Blue Ridge as northwest flow developed across the region. The winds blew down numerous trees and power lines in McDowell County, with at least one tree falling on a vehicle. Multiple business signs were blown in Marion. Parts of western Rutherford County and Henderson County were also affected by damaging winds. |
| 12/21/2012 | 55 | Although gusty northwest winds were observed across the foothills beginning during the evening of the 20th, with a few trees blown down through the 21st, the strongest winds developed during the evening and overnight hours of the 21st. Numerous trees were blown down on the night of the 21st and early on the 22nd, with most of the damage occurring within a few miles of the Blue Ridge escarpment. Trees falling on power lines also resulted in quite a few power outages. |
| 12/21/2012 | 55 | Although gusty northwest winds were observed across the foothills beginning during the evening of the 20th, with a few trees blown down through the 21st, the strongest winds developed during the evening and overnight hours of the 21st. Numerous trees were blown down on the night of the 21st and early on the 22nd, with most of the damage occurring within a few miles of the Blue Ridge escarpment. Trees falling on power lines also resulted in quite a few power outages. |
| 1/30/2013 | 50 | Strong winds over the mountains became damaging near the eastern Blue Ridge during the afternoon, as a line of weakening rain showers moved across the area. Multiple trees and large limbs were blown down in a short period of time. |
| 3/29/2014 | 50 | Strong northwest winds developed across the mountains and portions of the foothills behind a cold front late on the 29th, with the strongest winds affecting locations along and near the eastern escarpment of the Blue Ridge. The winds gusted to over 60 mph at times (a peak gust of 62 mph was measured by the ASOS at the Asheville Regional Airport at around 730 AM). Gusts in excess of 80 mph likely occurred across the higher elevations. Numerous trees were blown down in these areas. Sporadic minor damage was reported to roofs across the area and a downed power lines resulted in scattered power outages, especially across the mid/upper French Broad Valley and surrounding locations. A few trees fell on homes as well. The strong winds continued through much of the 30th before tapering off by mid-evening. |
| 3/29/2014 | 56 | Strong northwest winds developed across the mountains and portions of the foothills behind a cold front late on the 29th, with the strongest winds affecting locations along and near the eastern escarpment of the Blue Ridge. The winds gusted to over 60 mph at times (a peak gust of 62 mph was measured by the ASOS at the Asheville Regional Airport at around 730 AM). Gusts in excess of 80 mph likely occurred across the higher elevations. Numerous trees were blown down in these areas. Sporadic minor damage was reported to roofs across the area and a downed power lines resulted in scattered power outages, especially across the mid/upper French Broad Valley and surrounding locations. A few trees fell on homes as well. The strong winds continued through much of the 30th before tapering off by mid-evening. |
| 4/2/2016 | 50 | Strong northwest winds developed across the mountains and northern foothills in the wake of an arctic cold front around midnight and continued through the overnight hours. Numerous trees were blown down across the area, along with some power lines. One tree fell on a camping trailer in Steele Creek Park in |

| Date | MPH | Description |
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| | | northwest Burke County, resulting in injury to an occupant. Another tree fell on a car in the Lake Lure area of Rutherford County. |
| 4/2/2016 | 50 | Strong northwest winds developed across the mountains and northern foothills in the wake of an arctic cold front around midnight and continued through the overnight hours. Numerous trees were blown down across the area, along with some power lines. One tree fell on a camping trailer in Steele Creek Park in northwest Burke County, resulting in injury to an occupant. Another tree fell on a car in the Lake Lure area of Rutherford County. |
| 3/2/2018 | 50 | As low pressure strengthened rapidly off the Mid-Atlantic and Northeast coast, strong northwest winds developed across the North Carolina mountains early on the 2nd, with the most intense winds observed from around sunrise into the early afternoon. Numerous trees were blown down across the area, with quite a few power outages reported. Some sporadic structural damage occurred, mainly due to falling trees and large limbs. |
| 3/2/2018 | 50 | As low pressure strengthened rapidly off the Mid-Atlantic and Northeast coast, strong northwest winds developed across the North Carolina mountains early on the 2nd, with the most intense winds observed from around sunrise into the early afternoon. Numerous trees were blown down across the area, with quite a few power outages reported. Some sporadic structural damage occurred, mainly due to falling trees and large limbs. |
| 1/20/2019 | 50 | Northwest winds in the wake of a strong cold front increased after sunrise and became damaging across the middle French Broad Valley and across the higher elevations of Rutherford and McDowell counties. Numerous trees and power lines were blown down in this area, with some minor structural damage also reported. The winds began to diminish during the afternoon. |
| 2/24/2019 | 50 | Strong west to northwest winds developed across the northern mountains of North Carolina in the wake of a cold front. Although winds became very gusty immediately after the cold front passed during the afternoon, the damaging winds primarily occurred during the evening and overnight hours, when many trees and power lines were blown down. Multiple outbuildings were also damaged or blown over and at least one tree fell on a structure in Old Fort. |
| 4/26/2019 | 50 | Very gusty to damaging northwest winds developed across the foothills and Piedmont in the wake of an unseasonably strong cold front. Scattered to numerous trees were blown down across the area, with some trees falling on structures and vehicles, especially in McDowell and Gaston Counties. Additionally, an occupied shed collapsed on Zion Church Rd near Concord, killing a 28-year-old man. |
| 4/26/2019 | 50 | Very gusty to damaging northwest winds developed across the foothills and Piedmont in the wake of an unseasonably strong cold front. Scattered to numerous trees were blown down across the area, with some trees falling on structures and vehicles, especially in McDowell and Gaston Counties. Additionally, an occupied shed collapsed on Zion Church Rd near Concord, killing a 28-year-old man. |
| | | **Mitchell County** |
| 1/13/2000 | 52 | Strong and damaging northwest winds behind a strong cold front, gusted to 60 mph or more. Many trees and power lines were blown down which resulted in power outages for some mountain residents. The highest winds in the foothills occurred near the Blue Ridge Parkway. |
| 3/19/2000 | 55 | High gradient winds blowing from the south knocked down numerous trees and power lines across the mountains. Only light structural damage occurred, except in Avery county. Roofs were blown off several houses around Banner Elk, Beech Mountain police reported the door of their office was nearly blown off, and there was an unofficial measurement of a 135-mph wind gust on Beech Mountain. The highest winds occurred between 11 pm and 4 am. |
| 4/8/2000 | 50 | High winds following a cold front blew down a number of trees and power lines. Scattered power outages occurred as well. |
| 12/12/2000 | 50 | High winds following a frontal passage downed trees and powerlines in part of the northern mountains. In Bakersville, a door was blown off a house. |
| 3/6/2001 | 55 | |
| 3/20/2001 | 55 | |
| 2/4/2002 | 50 | High winds starting picking up during the late morning, and by noon reached damaging levels in some areas. Scattered to numerous trees and power lines were blown down, depending on the county. Some structural |

| Date | MPH | Description |
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| | | damage resulted - mostly from trees falling on vehicles and buildings. After a brief respite around sunset, the wind picked up again to damaging levels during mid and late evening. |
| 3/10/2002 | 50 | Strong winds following a cold front reached damaging levels in a few locations. Most damage was limited to downed trees and power lines, which blocked roads for a while in some areas. |
| 9/27/2002 | 50 | Winds associated with Isidore increased in the early morning hours across the North Carolina mountains, resulting in more widespread damage to trees and power lines. Widespread power outages were reported. Numerous roads were blocked by fallen trees, and a church tent was blown down and destroyed in Brevard. |
| 11/6/2002 | 50 | High winds behind a cold front caused numerous trees to fall across portions of the mountains and foothills of North Carolina. |
| 11/30/2002 | 50 | Numerous trees and large tree limbs were blown down. Power outages were also reported. |
| 12/25/2002 | 50 | Very strong winds developed during the late morning across the mountains and foothills. Wind gusts reached an estimated 60 to 75 mph across the higher elevations. Damage to trees and power lines was widespread, and power outages were numerous. Some trees fell on vehicles and structures. |
| 2/4/2003 | 60 | Some trees and power lines were blown down. |
| 10/14/2003 | 50 | High winds developed just ahead of and behind a cold front across the mountains and foothills of North Carolina. Numerous trees and power lines were blown down. |
| 11/13/2003 | 50 | High winds developed behind a cold front across the mountains and foothills of North Carolina. Sustained winds of 40 mph developed during the pre-dawn hours, and persisted for much of the day, especially in the highest elevations. Numerous trees were blown down. Along the Blue Ridge Parkway in Buncombe County, the Craggy Gardens visitors' center was heavily damaged. |
| 11/18/2003 | 50 | High winds developed ahead of a cold front, mainly across the higher elevations of the North Carolina mountains. Scattered trees and power lines were blown down in most counties. However, damage was most extensive in Madison, Swain, and Macon counties. Numerous downed trees and power outages occurred in these counties. |
| 3/7/2004 | 50 | Strong winds developed across the mountains just ahead of and along a strong cold front. Numerous trees and power lines were blown down. Weak thunderstorms may have contributed to the high winds across the northern mountains, but damage extended to areas far away from those affected by the storms. |
| 9/16/2004 | 55 | High winds developed across the mountains, as the remnants of Hurricane Ivan moved just west of the area. Locations near the southern exposure of the Blue Ridge were the hardest hit, with major damage occurring in and around Highlands, Cashiers, Brevard, and southern Henderson County. Thousands of trees were blown down, including 90,000 apple trees in Henderson County. Numerous trees fell on structures and vehicles. A 55-year-old man was killed shortly after midnight near Hendersonville, when a tree fell through his house. Hundreds of structures in Henderson County were damaged by fallen trees and debris. A woman in Highlands was injured when a tree limb hit her in the head. |
| 9/17/2004 | 50 | As the remnants of Ivan retreated toward the mid-Atlantic region, high pressure building in behind the circulation caused a resurgence of strong winds across the mountains and foothills. This resulted in additional tree and power line damage. |
| 12/1/2004 | 50 | The counties reported damage from high winds, mainly trees and power lines, with some structural damage possible, mainly from falling trees. |
| 1/22/2005 | 50 | |
| 2/10/2005 | 50 | High winds developed across portions of the northern mountains during the evening, blowing a few large tree limbs into power lines, which resulted in some outages. |
| 4/2/2005 | 60 | High winds developed across the mountains and foothills during the evening, and continued through the overnight hours before subsiding during the late morning of the 3rd. Numerous trees, power poles, and power lines were blown down, resulting in fairly widespread power outages. The northern foothill counties appeared to the hardest hit. In McDowell County, several homes and vehicles were damaged by falling trees. In Caldwell County, the roof of the County office building was damaged in Lenoir, and at least two homes were damaged by falling trees in the northern part of the county. |
| 1/25/2006 | 55 | High winds developed across the mountains and the foothills during the overnight hours, and continued through about mid-morning. The hardest hit areas were locations along and near the Blue Ridge from I-40 north, and Jackson county in North Carolina. In Avery County, a steeple was blown off of a church. Scattered |

| Date | MPH | Description |
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| | | to widespread tree damage occurred, with quite a few power outages, mainly concentrated along the I-40 corridor from Black Mountain to Old Fort. |
| 4/15/2007 | 70 | Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on. |
| 4/16/2007 | 60 | After an intense, but relatively brief high wind event affected the mountains and foothills on the evening of the 15th, another widespread damaging high wind event developed during the day of the 16th. However, this particular event included much of the piedmont. Thousands of trees fell across the area, resulting in widespread power outages. Numerous trees fell on roads, homes, and vehicles. The Blue Ridge mountains and the foothills received the brunt of the strongest winds. In Highlands, NC, two homes were heavily damaged by fallen trees, while approximately 100 homes received minor to moderate damage. A tree fell on and severely damaged a home in Otto, NC. Two businesses received significant roof damage in Cashiers, NC. Three construction workers were injured in Mount Holly when an inflatable structure collapsed at a constructions site. Five homes were damaged by fallen trees in Lincoln County, NC alone. Three homes were damaged in Iredell County and in In Catawba County, a 30-foot brick wall on top of a building in Newton was blown down, while sections of a metal roof were torn off a business in Viewmont. |
| 2/10/2008 | 55 | As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon. |
| 5/11/2008 | 60 | Strong winds developed behind a cold front over the North Carolina mountains. Numerous trees and power lines were blown down across the region. Several structures were damaged by fallen trees. Twenty-two homes were damaged by fallen trees in the town of Lake Lure in Rutherford County alone. |
| 12/9/2009 | 55 | After a period of heavy rain that left the ground saturated, strong winds developed behind a cold front during the late morning hours over the North Carolina mountains. The combination of very windy conditions and wet ground resulted in numerous fallen trees, which brought down power lines and damaged homes and cars. |
| 12/21/2012 | 55 | Although gusty northwest winds were observed across much of the mountains beginning during the evening of the 20th, with a few trees blown down through the morning of the 21st, stronger winds developed during the afternoon of the 21st. A scattering of downed trees occurred through the afternoon, with a few power outages reported. However, the strongest winds occurred during the overnight hours. Numerous trees were blown down on the night of the 21st and early on the 22nd, with most of the damage occurring within a few miles of the Blue Ridge escarpment. Multiple trees fell on structures, especially in Buncombe and Henderson counties. Trees falling on power lines also resulted in quite a few power outages. |
| 3/29/2014 | 56 | Strong northwest winds developed across the northern mountains late on the 29th, with the strongest winds affecting locations along and near the eastern escarpment of the Blue Ridge. The winds gusted to over 60 mph at times, with gusts in excess of 80 mph likely occurring across the higher elevations. Numerous trees were blown down in these areas. Sporadic minor damage was reported to roofs across the area and a downed power lines resulted in scattered power outages. A few trees fell on homes as well. The strong winds continued through much of the 30th before tapering off by mid-evening. Snow showers also developed within the northwest flow and produced 1-2 inches of accumulation during the overnight hours. |
| 2/14/2015 | 50 | Strong northwest winds developed during the evening of the 14th across the northern mountains and foothills in the wake of an arctic cold front. Quite a few trees and power lines were reported down in addition to some minor structural damage. |
| 4/2/2016 | 50 | Strong northwest winds developed across the mountains and northern foothills in the wake of an arctic cold front around midnight and continued through the overnight hours. Numerous trees were blown down |

| Date | MPH | Description |
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| | | across the area, along with some power lines. One tree fell on a camping trailer in Steele Creek Park in northwest Burke County, resulting in injury to an occupant. Another tree fell on a car in the Lake Lure area of Rutherford County. |
| 3/2/2018 | 50 | As low pressure strengthened rapidly off the Mid-Atlantic and Northeast coast, strong northwest winds developed across the North Carolina mountains early on the 2nd, with the most intense winds observed from around sunrise into the early afternoon. Numerous trees were blown down across the area, with quite a few power outages reported. Some sporadic structural damage occurred, mainly due to falling trees and large limbs. |
| 2/24/2019 | 50 | Strong west to northwest winds developed across the northern mountains of North Carolina in the wake of a cold front. Although winds became very gusty immediately after the cold front passed during the afternoon, the damaging winds primarily occurred during the evening and overnight hours, when many trees and power lines were blown down. Multiple outbuildings were also damaged or blown over and at least one tree fell on a structure in Old Fort. |
| | | **Yancey County** |
| 1/13/2000 | 52 | Strong and damaging northwest winds behind a strong cold front, gusted to 60 mph or more. Many trees and power lines were blown down which resulted in power outages for some mountain residents. The highest winds in the foothills occurred near the Blue Ridge Parkway. |
| 12/16/2000 | 55 | HIGH WINDS BLEW DOWN A NUMBER OF TREES AND POWER LINES FROM EARLY EVENING ON THE 16TH TO EARLY MORNING ON THE 17TH. WIND SPEED WAS ESTIMATED AT 60 TO 65 MPH IN SOME CASES. ALTHOUGH THUNDERSTORMS WERE MOVING THROUGH THE AREA DURING THIS TIME, THE HIGH WINDS WERE PRIMARILY GRADIENT WINDS. |
| 3/6/2001 | 55 | |
| 3/20/2001 | 55 | |
| 2/4/2002 | 50 | High winds starting picking up during the late morning, and by noon reached damaging levels in some areas. Scattered to numerous trees and power lines were blown down, depending on the county. Some structural damage resulted - mostly from trees falling on vehicles and buildings. After a brief respite around sunset, the wind picked up again to damaging levels during mid and late evening. |
| 9/27/2002 | 50 | Winds associated with Isidore increased in the early morning hours across the North Carolina mountains, resulting in more widespread damage to trees and power lines. Widespread power outages were reported. Numerous roads were blocked by fallen trees, and a church tent was blown down and destroyed in Brevard. |
| 1/20/2003 | 50 | High winds blew the tin roof off of a store in Burnsville. A few trees and power lines were blown down in the same area. |
| 2/4/2003 | 60 | Some trees and power lines were blown down. |
| 5/12/2003 | 58 | Numerous trees were blown down. Some fell onto power lines near the Avery and Burke County line. |
| 10/14/2003 | 50 | High winds developed just ahead of and behind a cold front across the mountains and foothills of North Carolina. Numerous trees and power lines were blown down. |
| 11/13/2003 | 50 | High winds developed behind a cold front across the mountains and foothills of North Carolina. Sustained winds of 40 mph developed during the pre-dawn hours, and persisted for much of the day, especially in the highest elevations. Numerous trees were blown down. Along the Blue Ridge Parkway in Buncombe County, the Craggy Gardens visitors' center was heavily damaged. |
| 3/7/2004 | 50 | Strong winds developed across the mountains just ahead of and along a strong cold front. Numerous trees and power lines were blown down. Weak thunderstorms may have contributed to the high winds across the northern mountains, but damage extended to areas far away from those affected by the storms. |
| 7/5/2004 | 55 | A small area of high winds developed across the mountains and the higher terrain of the foothills in the wake of a thunderstorm complex. Numerous trees and power lines were blown down. |
| 9/16/2004 | 55 | High winds developed across the mountains, as the remnants of Hurricane Ivan moved just west of the area. Locations near the southern exposure of the Blue Ridge were the hardest hit, with major damage occurring in and around Highlands, Cashiers, Brevard, and southern Henderson County. Thousands of trees were blown down, including 90,000 apple trees in Henderson County. Numerous trees fell on structures and vehicles. A 55-year-old man was killed shortly after midnight near Hendersonville, when a tree fell through |

| Date | MPH | Description |
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| | | his house. Hundreds of structures in Henderson County were damaged by fallen trees and debris. A woman in Highlands was injured when a tree limb hit her in the head. |
| 9/17/2004 | 50 | As the remnants of Ivan retreated toward the mid-Atlantic region, high pressure building in behind the circulation caused a resurgence of strong winds across the mountains and foothills. This resulted in additional tree and power line damage. |
| 1/22/2005 | 50 | |
| 4/2/2005 | 60 | High winds developed across the mountains and foothills during the evening, and continued through the overnight hours before subsiding during the late morning of the 3rd. Numerous trees, power poles, and power lines were blown down, resulting in fairly widespread power outages. The northern foothill counties appeared to the hardest hit. In McDowell County, several homes and vehicles were damaged by falling trees. In Caldwell County, the roof of the County office building was damaged in Lenoir, and at least two homes were damaged by falling trees in the northern part of the county. |
| 1/25/2006 | 55 | High winds developed across the mountains and the foothills during the overnight hours, and continued through about mid-morning. The hardest hit areas were locations along and near the Blue Ridge from I-40 north, and Jackson county in North Carolina. In Avery County, a steeple was blown off of a church. Scattered to widespread tree damage occurred, with quite a few power outages, mainly concentrated along the I-40 corridor from Black Mountain to Old Fort. |
| 2/22/2007 | 55 | Several trees down. Some trees fell on an apartment complex in Burnsville. A steeple was blown off a church in Spruce Pine. |
| 4/15/2007 | 70 | Very strong winds developed in areas along and near the Blue Ridge during the early evening of the 15th, and continued through the early morning hours of the 16th. A 66-mph gust was recorded at Asheville Regional Airport during the evening. However, winds likely gusted to 70-80 mph at times in other areas. Widespread damage occurred to trees and power lines, with widespread power outages reported. Some trees fell on homes, vehicles, and roads. Three injuries occurred in the Hendersonville area due to the wind: a tree fell on a mobile home in Hendersonville, injuring two occupants. Also, a utility worker was injured when high winds knocked him from the power pole he was working on. |
| 4/16/2007 | 60 | After an intense, but relatively brief high wind event affected the mountains and foothills on the evening of the 15th, another widespread damaging high wind event developed during the day of the 16th. However, this particular event included much of the piedmont. Thousands of trees fell across the area, resulting in widespread power outages. Numerous trees fell on roads, homes, and vehicles. The Blue Ridge mountains and the foothills received the brunt of the strongest winds. In Highlands, NC, two homes were heavily damaged by fallen trees, while approximately 100 homes received minor to moderate damage. A tree fell on and severely damaged a home in Otto, NC. Two businesses received significant roof damage in Cashiers, NC. Three construction workers were injured in Mount Holly when an inflatable structure collapsed at a constructions site. Five homes were damaged by fallen trees in Lincoln County, NC alone. Three homes were damaged in Iredell County and in In Catawba County, a 30-foot brick wall on top of a building in Newton was blown down, while sections of a metal roof were torn off a business in Viewmont. |
| 2/10/2008 | 55 | As the polar vortex dropped into New England, an unusually tight gradient developed over the western Carolinas and Northeast Georgia. This gradient, combined with afternoon heating, helped to mix down areas of strong winds. Areas along and east of the Blue Ridge were hardest hit, with numerous trees reported down, some across roads and on homes. The gusty winds combined with ongoing drought conditions to produce numerous brush fires across the area during the afternoon. |
| 5/11/2008 | 60 | Strong winds developed behind a cold front over the North Carolina mountains. Numerous trees and power lines were blown down across the region. Several structures were damaged by fallen trees. Twenty-two homes were damaged by fallen trees in the town of Lake Lure in Rutherford County alone. |
| 12/31/2008 | 50 | High winds developed near the Blue Ridge around sunrise, peaking in the mid to late morning, before tapering off during the afternoon. Numerous trees and power lines were blown down, with some scattered power outages. |
| 12/9/2009 | 55 | After a period of heavy rain that left the ground saturated, strong winds developed behind a cold front during the late morning hours over the North Carolina mountains. The combination of very windy |

| Date | MPH | Description |
|---|---|---|
| | | conditions and wet ground resulted in numerous fallen trees, which brought down power lines and damaged homes and cars. |
| 12/21/2012 | 55 | Although gusty northwest winds were observed across much of the mountains beginning during the evening of the 20th, with a few trees blown down through the morning of the 21st, stronger winds developed during the afternoon of the 21st. A scattering of downed trees occurred through the afternoon, with a few power outages reported. However, the strongest winds occurred during the overnight hours. Numerous trees were blown down on the night of the 21st and early on the 22nd, with most of the damage occurring within a few miles of the Blue Ridge escarpment. Multiple trees fell on structures, especially in Buncombe and Henderson counties. Trees falling on power lines also resulted in quite a few power outages. |
| 3/29/2014 | 56 | Strong northwest winds developed across the northern mountains late on the 29th, with the strongest winds affecting locations along and near the eastern escarpment of the Blue Ridge. The winds gusted to over 60 mph at times, with gusts in excess of 80 mph likely occurring across the higher elevations. Numerous trees were blown down in these areas. Sporadic minor damage was reported to roofs across the area and a downed power lines resulted in scattered power outages. A few trees fell on homes as well. The strong winds continued through much of the 30th before tapering off by mid-evening. Snow showers also developed within the northwest flow and produced 1-2 inches of accumulation during the overnight hours. |
| 2/14/2015 | 50 | Strong northwest winds developed during the evening of the 14th across the northern mountains and foothills in the wake of an arctic cold front. Quite a few trees and power lines were reported down in addition to some minor structural damage. |
| 4/2/2016 | 50 | Strong northwest winds developed across the mountains and northern foothills in the wake of an arctic cold front around midnight and continued through the overnight hours. Numerous trees were blown down across the area, along with some power lines. One tree fell on a camping trailer in Steele Creek Park in northwest Burke County, resulting in injury to an occupant. Another tree fell on a car in the Lake Lure area of Rutherford County. |
| 2/24/2019 | 50 | Strong west to northwest winds developed across the northern mountains of North Carolina in the wake of a cold front. Although winds became very gusty immediately after the cold front passed during the afternoon, the damaging winds primarily occurred during the evening and overnight hours, when many trees and power lines were blown down. Multiple outbuildings were also damaged or blown over and at least one tree fell on a structure in Old Fort. |

# TABLE H.8: ICE STORM EVENTS (2000-2019)

| Date | Description |
|---|---|
| | **Avery County** |
| 1/29/2000 | Weakening low pressure in the Ohio River Valley, developing low pressure along the Gulf Coast and cold, arctic air in place across the Carolinas resulted in a wintry mess across western North Carolina. This was the last in a series of 5 winter storms that wreaked havoc on western North Carolina in an 11-day span. The ice storm in the mountains consisted mainly of a couple inches of sleet. However, the combined accumulation of the mixture of sleet and snow was generally 2 to 3 inches. Some freezing rain mixed in during the morning of the 30th. Across the foothills and piedmont, precipitation which briefly began as some light sleet and snow, turned quickly to freezing rain. The freezing rain was heavy enough across the southern piedmont, including the Charlotte area, to result in a 1/4 to 1/2-inch glaze. Scattered power outages resulted, with Gaston county reporting 2500 people without power. The entire Duke Power system reported 77,000 people without power. |
| 12/15/2005 | By late morning, ice accretion finally began to cause damage across the northern mountains and foothills of North Carolina. Quite a few trees fell, and power outages were fairly widespread, especially from the Blue Ridge east. Ice accumulation ranged from more than a half inch along the Blue Ridge to an eighth of an inch or less along the Tennessee border. Several trees and large limbs fell on and damaged homes and vehicles. Plenty of slick spots also developed on roads, mainly in the mountains, where quite a few accidents occurred. |
| 2/1/2008 | Freezing rain continued through the early morning hours of the 1st in areas along the Blue Ridge. Ice accumulations of up to 1/2 inch occurred, resulting to significant damage to trees and power lines. Power outages were widespread from Brevard to Hendersonville. Sleet mixed in with the freezing rain, resulting in up to 2 inches of sleet accumulation in the Northern Mountains. Precipitation actually began during the evening of January 31st, but ice storm criteria were not met until the early morning hours of February 1st. |
| 12/24/2009 | Light freezing rain developed late on Christmas Eve and continued throughout the overnight before becoming heavier shortly before sunrise. Light ice accretion occurred, mainly on elevated surfaces during this time. Quite a few slick spots also developed, mainly on bridges and overpasses. Freezing rain continued through the morning hours along the eastern escarpment of the Blue Ridge, and became heavy at times by mid-morning. By the time the precipitation tapered off, ice accretion ranged from .25 to .5 inch across much of the area. The combination of ice and wind gusts up to 60 mph (with gusts up to 80 mph in the higher elevations) caused numerous trees and power lines to fall. The resultant widespread power outages exacerbated the problems for areas that had yet to recover from the December 18th snowstorm. |
| 11/14/2018 | Precipitation developed in association with weak low pressure moving across the Southeast during the overnight of the 14th and early morning of the 15th. Precipitation began as rain and/or snow across the mountains, but transitioned to liquid as temperatures warmed aloft. However, a wedge of cool air remained in place across the Blue Ridge, resulting in freezing rain, mainly within a few miles either side of the Continental Divide. While most areas saw around a tenth of an inch or less of ice accretion, damaging ice accumulations were reported across the high elevations of Caldwell and Burke Counties, as well as eastern portions of Avery County. |
| 11/24/2018 | For the second time in 10 days, a freezing rain event developed across portions of the mountains and foothills of North Carolina. Precipitation developed during the overnight, as a wave of low pressure moved along the Gulf Coast. Precipitation began as rain and snow, but transitioned to freezing rain across all but the highest elevations (where more of a wintry mix was reported), as a wedge of cold air locked in near the Blue Ridge. As freezing rain continued through daybreak, damaging accumulations of ice, generally between one quarter and in half inch were reported across the area. Quite a few trees and power lines, along with numerous power outages were reported across the area. |
| 1/12/2019 | Moist air flowing over a wedge of cold air banked against the eastern slopes of the Appalachians resulted in precipitation development across the Blue Ridge and surrounding areas beginning during the evening of the 12th. The atmosphere quickly cooled to or below freezing near the escarpment and out across the lower elevations of the foothills and far northwest Piedmont. This resulted in much of the precipitation falling as freezing rain in these areas. The freezing rain continued through the overnight across the Blue Ridge and surrounding areas before tapering off around daybreak on the 13th. Total ice accretion of one quarter to one half inch was reported, with the heaviest amounts being across the foothills and immediately along the Blue Ridge escarpment. Scattered downed trees and power outages were reported throughout the area. |
| | **McDowell County** |

| Date | Description |
|---|---|
| 2/1/2008 | Freezing rain continued through the early morning hours of the 1st in areas along the Blue Ridge. Ice accumulations of up to 1/2 inch occurred, resulting to significant damage to trees and power lines. Power outages were widespread from Brevard to Hendersonville. Sleet mixed in with the freezing rain, resulting in up to 2 inches of sleet accumulation in the Northern Mountains. Precipitation actually began during the evening of January 31st, but ice storm criteria were not met until the early morning hours of February 1st. |
| 12/24/2009 | Light freezing rain developed late on Christmas Eve and continued throughout the overnight before becoming heavier shortly before sunrise. Light ice accretion occurred, mainly on elevated surfaces during this time. Quite a few slick spots also developed, mainly on bridges and overpasses. Freezing rain continued through the morning hours along the eastern escarpment of the Blue Ridge, and became heavy at times by mid-morning. By the time the precipitation tapered off, ice accretion ranged from .25 to .5 inch across much of the area. The combination of ice and wind gusts up to 60 mph (with gusts up to 80 mph in the higher elevations) caused numerous trees and power lines to fall. The resultant widespread power outages exacerbated the problems for areas that had yet to recover from the December 18th snowstorm. |
| 2/26/2013 | Rain and freezing rain began across the southern mountains shortly after midnight and continued through the pre-dawn hours. Many locations saw mainly rain. However, cold air locked in near the escarpment resulted in an all-freezing rain event there. By the time temperatures warmed above freezing during late morning, up to a half inch of ice had accumulated within a few miles of the continental divide. Meanwhile, locations farther away from the Blue Ridge saw only trace amounts of ice. There were scattered downed trees and power lines, resulting in quite a number of power outages, especially in McDowell and Henderson counties. |
| 2/15/2016 | Very light freezing rain, freezing drizzle, and freezing mist developed across the Blue Ridge of western North Carolina during late morning, in association with low pressure developing along a warm front across the Gulf Coast states/Tennessee Valley. Owing to about a week of unseasonably cold weather, the precipitation froze to surfaces very quickly, and roads became very slick, resulting in numerous traffic accidents. The freezing rain rates increased during the evening, and moderate to heavy freezing rain continued through the overnight hours. By the pre-dawn hours of the 16th, total ice accretion ranged from one-quarter to one-half inch across the area. This resulted in quite a few trees and power lines, with at least scattered power outages reported. |
| 11/24/2018 | For the second time in 10 days, a freezing rain event developed across portions of the mountains and foothills of North Carolina. Precipitation developed during the overnight, as a wave of low pressure moved along the Gulf Coast. Precipitation began as rain and snow, but transitioned to freezing rain across all but the highest elevations (where more of a wintry mix was reported), as a wedge of cold air locked in near the Blue Ridge. As freezing rain continued through daybreak, damaging accumulations of ice, generally between one quarter and ine half inch were reported across the area. Quite a few trees and power lines, along with numerous power outages were reported across the area. |
| 11/24/2018 | For the second time in 10 days, a freezing rain event developed across portions of the mountains and foothills of North Carolina. Precipitation developed during the overnight, as a wave of low pressure moved along the Gulf Coast. Precipitation began as rain and snow, but transitioned to freezing rain across all but the highest elevations (where more of a wintry mix was reported), as a wedge of cold air locked in near the Blue Ridge. As freezing rain continued through daybreak, damaging accumulations of ice, generally between one quarter and ine half inch were reported across the area. Quite a few trees and power lines, along with numerous power outages were reported across the area. |
| 1/12/2019 | Moist air flowing over a wedge of cold air banked against the eastern slopes of the Appalachians resulted in precipitation development across the Blue Ridge and surrounding areas beginning during the evening of the 12th. The atmosphere quickly cooled to or below freezing near the escarpment and out across the lower elevations of the foothills and far northwest Piedmont. This resulted in much of the precipitation falling as freezing rain in these areas. The freezing rain continued through the overnight across the Blue Ridge and surrounding areas before tapering off around daybreak on the 13th. Total ice accretion of one quarter to one half inch was reported, with the heaviest amounts being across the foothills and immediately along the Blue Ridge escarpment. Scattered downed trees and power outages were reported throughout the area. |
| **Mitchell County** | |
| 1/29/2000 | Weakening low pressure in the Ohio River Valley, developing low pressure along the Gulf Coast and cold, arctic air in place across the Carolinas resulted in a wintry mess across western North Carolina. This was the last in a series of |

| Date | Description |
|---|---|
| | 5 winter storms that wreaked havoc on western North Carolina in an 11-day span. The ice storm in the mountains consisted mainly of a couple inches of sleet. However, the combined accumulation of the mixture of sleet and snow was generally 2 to 3 inches. Some freezing rain mixed in during the morning of the 30th. Across the foothills and piedmont, precipitation which briefly began as some light sleet and snow, turned quickly to freezing rain. The freezing rain was heavy enough across the southern piedmont, including the Charlotte area, to result in a 1/4 to 1/2-inch glaze. Scattered power outages resulted, with Gaston county reporting 2500 people without power. The entire Duke Power system reported 77,000 people without power. |
| 2/6/2002 | A burst of heavy sleet and freezing rain culminated a day of mostly light snowfall. The rapid accumulation of ice brought down power lines, causing outages to 875 customers in the Spruce Pine area. |
| 2/3/2005 | Scattered damage to trees and power lines began to occur across the mountains during the pre-dawn hours, and continued into mid-morning, as freezing rain fell. |
| 12/15/2005 | By late morning, ice accretion finally began to cause damage across the northern mountains and foothills of North Carolina. Quite a few trees fell, and power outages were fairly widespread, especially from the Blue Ridge east. Ice accumulation ranged from more than a half inch along the Blue Ridge to an eighth of an inch or less along the Tennessee border. Several trees and large limbs fell on and damaged homes and vehicles. Plenty of slick spots also developed on roads, mainly in the mountains, where quite a few accidents occurred. |
| 2/1/2008 | Freezing rain continued through the early morning hours of the 1st in areas along the Blue Ridge. Ice accumulations of up to 1/2 inch occurred, resulting to significant damage to trees and power lines. Power outages were widespread from Brevard to Hendersonville. Sleet mixed in with the freezing rain, resulting in up to 2 inches of sleet accumulation in the Northern Mountains. Precipitation actually began during the evening of January 31st, but ice storm criteria were not met until the early morning hours of February 1st. |
| 12/24/2009 | Light freezing rain developed late on Christmas Eve and continued throughout the overnight before becoming heavier shortly before sunrise. Light ice accretion occurred, mainly on elevated surfaces during this time. Quite a few slick spots also developed, mainly on bridges and overpasses. Freezing rain continued through the morning hours along the eastern escarpment of the Blue Ridge, and became heavy at times by mid-morning. By the time the precipitation tapered off, ice accretion ranged from .25 to .5 inch across much of the area. The combination of ice and wind gusts up to 60 mph (with gusts up to 80 mph in the higher elevations) caused numerous trees and power lines to fall. The resultant widespread power outages exacerbated the problems for areas that had yet to recover from the December 18th snowstorm. |
| 11/24/2018 | For the second time in 10 days, a freezing rain event developed across portions of the mountains and foothills of North Carolina. Precipitation developed during the overnight, as a wave of low pressure moved along the Gulf Coast. Precipitation began as rain and snow, but transitioned to freezing rain across all but the highest elevations (where more of a wintry mix was reported), as a wedge of cold air locked in near the Blue Ridge. As freezing rain continued through daybreak, damaging accumulations of ice, generally between one quarter and ine half inch were reported across the area. Quite a few trees and power lines, along with numerous power outages were reported across the area. |
| 1/12/2019 | Moist air flowing over a wedge of cold air banked against the eastern slopes of the Appalachians resulted in precipitation development across the Blue Ridge and surrounding areas beginning during the evening of the 12th. The atmosphere quickly cooled to or below freezing near the escarpment and out across the lower elevations of the foothills and far northwest Piedmont. This resulted in much of the precipitation falling as freezing rain in these areas. The freezing rain continued through the overnight across the Blue Ridge and surrounding areas before tapering off around daybreak on the 13th. Total ice accretion of one quarter to one half inch was reported, with the heaviest amounts being across the foothills and immediately along the Blue Ridge escarpment. Scattered downed trees and power outages were reported throughout the area. |
| **Yancey County** | |
| 1/29/2000 | Weakening low pressure in the Ohio River Valley, developing low pressure along the Gulf Coast and cold, arctic air in place across the Carolinas resulted in a wintry mess across western North Carolina. This was the last in a series of 5 winter storms that wreaked havoc on western North Carolina in an 11-day span. The ice storm in the mountains consisted mainly of a couple inches of sleet. However, the combined accumulation of the mixture of sleet and snow was generally 2 to 3 inches. Some freezing rain mixed in during the morning of the 30th. Across the foothills and piedmont, precipitation which briefly began as some light sleet and snow, turned quickly to freezing rain. The |

| Date | Description |
|---|---|
| | freezing rain was heavy enough across the southern piedmont, including the Charlotte area, to result in a 1/4 to 1/2-inch glaze. Scattered power outages resulted, with Gaston county reporting 2500 people without power. The entire Duke Power system reported 77,000 people without power. |
| 12/15/2005 | By late morning, ice accretion finally began to cause damage across the northern mountains and foothills of North Carolina. Quite a few trees fell, and power outages were fairly widespread, especially from the Blue Ridge east. Ice accumulation ranged from more than a half inch along the Blue Ridge to an eighth of an inch or less along the Tennessee border. Several trees and large limbs fell on and damaged homes and vehicles. Plenty of slick spots also developed on roads, mainly in the mountains, where quite a few accidents occurred. |
| 2/1/2008 | Freezing rain continued through the early morning hours of the 1st in areas along the Blue Ridge. Ice accumulations of up to 1/2 inch occurred, resulting to significant damage to trees and power lines. Power outages were widespread from Brevard to Hendersonville. Sleet mixed in with the freezing rain, resulting in up to 2 inches of sleet accumulation in the Northern Mountains. Precipitation actually began during the evening of January 31st, but ice storm criteria were not met until the early morning hours of February 1st. |
| 12/24/2009 | Light freezing rain developed late on Christmas Eve and continued throughout the overnight before becoming heavier shortly before sunrise. Light ice accretion occurred, mainly on elevated surfaces during this time. Quite a few slick spots also developed, mainly on bridges and overpasses. Freezing rain continued through the morning hours along the eastern escarpment of the Blue Ridge, and became heavy at times by mid-morning. By the time the precipitation tapered off, ice accretion ranged from .25 to .5 inch across much of the area. The combination of ice and wind gusts up to 60 mph (with gusts up to 80 mph in the higher elevations) caused numerous trees and power lines to fall. The resultant widespread power outages exacerbated the problems for areas that had yet to recover from the December 18th snowstorm. |
| 11/24/2018 | For the second time in 10 days, a freezing rain event developed across portions of the mountains and foothills of North Carolina. Precipitation developed during the overnight, as a wave of low pressure moved along the Gulf Coast. Precipitation began as rain and snow, but transitioned to freezing rain across all but the highest elevations (where more of a wintry mix was reported), as a wedge of cold air locked in near the Blue Ridge. As freezing rain continued through daybreak, damaging accumulations of ice, generally between one quarter and one-half inch were reported across the area. Quite a few trees and power lines, along with numerous power outages were reported across the area. |
| 1/12/2019 | Moist air flowing over a wedge of cold air banked against the eastern slopes of the Appalachians resulted in precipitation development across the Blue Ridge and surrounding areas beginning during the evening of the 12th. The atmosphere quickly cooled to or below freezing near the escarpment and out across the lower elevations of the foothills and far northwest Piedmont. This resulted in much of the precipitation falling as freezing rain in these areas. The freezing rain continued through the overnight across the Blue Ridge and surrounding areas before tapering off around daybreak on the 13th. Total ice accretion of one quarter to one half inch was reported, with the heaviest amounts being across the foothills and immediately along the Blue Ridge escarpment. Scattered downed trees and power outages were reported throughout the area. |

## TABLE H.9: LIGHTNING EVENTS (2000-2019)

| Location | Date | Description |
|---|---|---|
| **Avery County** | | |
| MONTEZUMA | 5/15/2009 | Lightning struck a home on Braswell Rd, igniting a fire that damaged a garage apartment. |
| **McDowell County** | | |
| MARION | 8/4/2003 | Lightning struck two men in a rain shelter at a golf course. |
| EAST MARION | 8/17/2016 | Broadcast media reported a man was struck by lightning and injured on Jacktown Rd. |
| MARION | 8/22/2019 | Emergency manager reported a person was injured due to a lightning strike in Marion. |
| **Mitchell County** | | |
| BAKERSVILLE | 6/25/2000 | Strong to severe thunderstorms developed in the mountains during the early afternoon and rumbled east across the foothills and into the western piedmont by early evening. All of the damage was produced by straight-line winds estimated almost as high as 70 mph that downed trees and power lines. In the Asheville, Biltmore, and Skyland areas 3300 people were left without power. A couple of houses were damaged by falling trees in Weaverville and Barnardsville. Fifteen to twenty trees were downed in Black Mountain - with some on cars. In Union county, sections of a church roof blew off, doors blew out, nails were pulled out the wall, and shingles were blown away. Gusty winds between 40 and 45 mph blew down one tree which landed on and flattened a car near Stony Point. Lightning struck a tree in a picnic area on top of Roan Mountain. A family was shocked as the lightning spread through the adjacent ground and pavement. One man fell back and hit his head on the pavement. He died five days later from a blood clot in his brain. The other five people suffered minor burns, cuts, and bruises. |
| SPRUCE PINE | 5/30/2004 | Lightning struck a home. |
| **Yancey County** | | |
| ESKOTA | 7/16/2016 | Newspaper reported a motorcyclist was killed after being struck by lightning at the intersection of Highway 128 and the Blue Ridge Parkway. |

# TABLE H.10: SLEET EVENTS (2000-2019)

| Date | Description |
|---|---|
| **Avery County** | |
| 2/16/2003 | A light freezing rain developed over the northern mountains and northern foothills of North Carolina during the early morning hours. By mid-morning, the precipitation began to intensify, and a transition to sleet occurred. The sleet accumulated rapidly to a depth of 1 inch in most locations, while periods of afternoon and evening sleet increased total accumulations to around 2 inches in most areas. Numerous traffic accidents and road closures resulted. |
| 2/2/2004 | Sleet fell during the late evening and overnight hours, accumulating to 1 to 2 inches across portions of the mountains and foothills of North Carolina. The sleet accumulated on top of the thin layer of ice that resulted from freezing rain that fell earlier in the day. In addition, 2 to 3 inches of snow fell across portions of Avery County. |
| 1/25/2013 | Sleet developed across the northern mountains and foothills during the morning, and continued off and on through the remainder of the day. Some snow mixed in early across the higher elevations. Numerous accidents were reported across the area. Sleet continued to fall into early afternoon, accumulating to around an inch across the area. The sleet mixed with a light freezing rain before ending, exacerbating the hazardous driving conditions across the area, and further contributing to numerous accidents. |
| **Mitchell County** | |
| 12/13/2003 | Heavy sleet began during the evening of the 13th and persisted overnight. By morning, 1 to 2 inches had accumulated, resulting in very hazardous road conditions. |
| 2/2/2004 | Sleet fell during the late evening and overnight hours, accumulating to 1 to 2 inches across portions of the mountains and foothills of North Carolina. The sleet accumulated on top of the thin layer of ice that resulted from freezing rain that fell earlier in the day. In addition, 2 to 3 inches of snow fell across portions of Avery County. |
| 1/25/2013 | Sleet developed across the northern mountains and foothills during the morning, and continued off and on through the remainder of the day. Some snow mixed in early across the higher elevations. Numerous accidents were reported across the area. Sleet continued to fall into early afternoon, accumulating to around an inch across the area. The sleet mixed with a light freezing rain before ending, exacerbating the hazardous driving conditions across the area, and further contributing to numerous accidents. |
| **Yancey County** | |
| 2/22/2001 | Cold, dry air plunged south over western North Carolina following the passage of a cold front the day before. Moisture return began almost immediately thereafter, ahead of an advancing storm system from the Gulf Coast region, and as an upper level disturbance approached the area, precipitation became widespread. Air was cold enough in the mountains to support mostly snow, while in the foothills and piedmont, the dry air in the lower levels of the atmosphere created ideal conditions for a sleet/snow mixture. In the mountains, thundersnow occurred. Snow accumulations ranged from 4 to 6 inches in a narrow swath from Newland to Bakersville, to Mount Mitchell, and southward to the high elevation foothill towns of Little Switzerland and Jonas Ridge. Elsewhere, accumulations ranged from 1 to 3 inches of snow and sleet, although as mentioned previously, snow was the predominant precipitation type across the higher terrain, with numerous traffic accidents reported. In the lower elevation foothill and piedmont, sleet was predominant, although most locations that received any wintry precipitation at all reported a sleet/snow mixture. Salisbury, Hickory and Mocksville each reported around an inch of sleet, and numerous icy roads, in addition to a light blanket of snow. This made for a horrific morning rush hour, with numerous accidents and school closures. The wintry precipitation tapered off from the west during the day. |
| 2/2/2004 | Sleet fell during the late evening and overnight hours, accumulating to 1 to 2 inches across portions of the mountains and foothills of North Carolina. The sleet accumulated on top of the thin layer of ice that resulted from freezing rain that fell earlier in the day. In addition, 2 to 3 inches of snow fell across portions of Avery County. |

## TABLE H.11: THUNDERSTORM EVENTS (2000-2019)

| Location | Date | MPH | Description |
|---|---|---|---|
| **Avery County** | | | |
| NEWLAND | 8/10/2000 | 50 | A flimsy metal porch was torn off a home and blown into power lines. |
| NEWLAND | 7/8/2001 | 55 | A tobacco farm was leveled by the wind. |
| NEWLAND | 7/8/2001 | 55 | Many trees blown down across roads in the ski areas around Beech Mountain. Torrential rain led to mudslides. |
| MINNEAPOLIS | 7/2/2002 | 50 | |
| NEWLAND | 7/9/2003 | 50 | A few trees and power lines were blown down. |
| NEWLAND | 7/9/2003 | 50 | Trees and power lines were blown down. |
| NEWLAND | 7/9/2003 | 50 | Trees and power lines were blown down. |
| NEWLAND | 5/26/2004 | 50 | Numerous trees and power lines were blown down. |
| NEWLAND | 5/26/2004 | 50 | Several large trees were blown down onto power lines. |
| NEWLAND | 5/20/2005 | 50 | Report of 2 to 3-inch diameter limbs blown down. |
| ELK PARK | 8/3/2005 | 50 | Highway dept employee reported several trees down on her property, with quite a few trees down on a neighboring property. Also, PD reported hail, almost to dime size, in Elk Park around this time. |
| BANNER ELK | 4/2/2006 | 57 | Numerous trees down across roads in the northern part of the county. |
| NEWLAND | 4/2/2006 | 50 | Trees blown down in Newland. |
| BANNER ELK | 5/26/2006 | 50 | Collapsing thunderstorms over Tennessee produced an area of damaging winds over portions of Avery County, that caused some trees to fall along Sam Eller Rd northwest of Banner Elk, as well as in other locations across the county. |
| NEWLAND | 8/23/2007 | 50 | Four-inch diameter limbs down. |
| BANNER ELK | 7/21/2008 | 50 | A couple trees were blown down. |
| NEWLAND | 6/18/2009 | 50 | A tree was blown down in Newland. |
| BANNER ELK | 6/18/2009 | 50 | Large tree limbs were blown down a little north of Banner Elk. |
| SPEAR | 8/5/2009 | 55 | Numerous trees were blown down on Long Ln. |
| MINNEAPOLIS | 6/21/2010 | 50 | A few trees were blown down. |
| MONTEZUMA | 8/5/2010 | 50 | A tree was blown down near Hospital Dr a couple miles southeast of Newland. |
| ELK PARK | 8/5/2010 | 50 | A tree was blown down on Buck Mountain Rd, about a mile northwest of Elk Park near the Tennessee line. |
| LINVILLE | 2/28/2011 | 50 | Several trees were blown down in the Grandfather Mountain area, with one tree on a building. |
| PINEOLA | 4/4/2011 | 55 | Several businesses and some homes received minor wind damage in the Pineola area. |
| ELK PARK | 5/10/2011 | 55 | Numerous trees were blown across the county, mainly from the Elk Park area to the southern part of the county. |
| BANNER ELK | 5/13/2011 | 55 | Several trees were blown down in downtown Banner Elk, one of which fell on a business. Part of a chain link fence and some signs were blown down as well. |
| THREE MILE | 5/22/2011 | 50 | Several trees were blown down on highway 194 in the Three Mile area. |
| AVERY CO ARPT | 6/8/2011 | 50 | Large tree limbs were blown down on highway 221. |
| BANNER ELK | 6/18/2011 | 50 | Trees were blown down on Beech Mountain Parkway and on Wedling Weg Rd, close to the Watauga County line. |
| LINVILLE | 9/2/2011 | 50 | Multiple trees were blown down in the Banner Elk area. |
| CROSSNORE | 6/24/2013 | 50 | Multiple trees were blown down in the Crossnore area. |
| HEATON | 7/8/2016 | 55 | EM reported at least two trees blown down between Elk Park and Banner Elk. |
| SENIA | 3/17/2018 | 50 | County comms reported trees blown down off Highway 19E near the Frank community. |
| **McDowell County** | | | |

| Location | Date | MPH | Description |
|---|---|---|---|
| GLENWOOD | 5/20/2000 | 52 | Severe thunderstorms rumbled across the northern foothills and northwest piedmont during the late afternoon. With the exception of one dime size hail report, severe weather was in the form of damaging straight-line winds. Winds were estimated to be as high as 70 mph near the Hickory Airport, Granite Falls and across Davie county. Large trees were blown down in Glenwood. Vinyl siding from a mobile home was seen blown across US Hwy 321, southeast of Granite Falls. Trees and power lines were downed in Bethlehem, north of Morganton, near Hickory, along Hwy 90 northwest of Stony Point, Turnersburg, and all over Davie county. Festival tents and a railroad crossing sign were blown down north of Hickory. Some urban flooding developed in the city of Morganton when a quick 2 inches of rain fell. |
| PLEASANT GARDENS | 6/25/2000 | 50 | Strong to severe thunderstorms developed in the mountains during the early afternoon and rumbled east across the foothills and into the western piedmont by early evening. All of the damage was produced by straight-line winds estimated almost as high as 70 mph that downed trees and power lines. In the Asheville, Biltmore, and Skyland areas 3300 people were left without power. A couple of houses were damaged by falling trees in Weaverville and Barnardsville. Fifteen to twenty trees were downed in Black Mountain - with some on cars. In Union county, sections of a church roof blew off, doors blew out, nails were pulled out the wall, and shingles were blown away. Gusty winds between 40 and 45 mph blew down one tree which landed on and flattened a car near Stony Point. |
| OLD FT | 8/10/2000 | 50 | Several trees were blown down. |
| GLENWOOD | 11/9/2000 | 50 | Severe winds downed trees and power lines along a path between Glenwood and Dysartsville. Radar signatures indicated the winds could have been produced by a weak tornado, but a storm survey team could not find any damage to substantiate the assertion. |
| MARION | 7/8/2001 | 55 | Numerous trees and power lines blown down. Some of the trees fell onto Interstate 40. |
| MARION | 7/8/2001 | 55 | Numerous trees and power lines blown down. Widespread, long-term power outages resulted. |
| OLD FT | 7/8/2001 | 50 | Trees and power lines knocked down. |
| NEBO | 7/8/2001 | 50 | Trees blown down in and around Lake James. |
| MARION | 5/2/2002 | 55 | A few power poles were blown down. |
| PLEASANT GARDENS | 5/2/2002 | 55 | Some trees were blown down. |
| DYSORTVILLE | 5/2/2002 | 55 | Some trees were blown down. |
| PLEASANT GARDENS | 6/4/2002 | 50 | A few powerlines were blown down. |
| OLD FT | 6/4/2002 | 50 | Numerous trees and powerlines were blown down. |
| MARION | 6/6/2002 | 50 | A few trees were blown down. |
| OLD FT | 6/13/2002 | 50 | Some trees and powerlines were blown down. |
| OLD FT | 5/2/2003 | 50 | A couple of trees were blown down. |
| GLENWOOD | 5/2/2003 | 70 | Numerous trees and power lines were blown down in areas from Glenwood, to Marion, to Nebo. Some houses sustained significant damage as a result of fallen trees as well as direct damage from the high winds. One house had about a quarter of its roof removed. |
| OLD FT | 6/8/2003 | 50 | A few trees were blown down. One fallen tree blocked a portion of I-40. |
| MARION | 7/5/2003 | 50 | Several trees were blown down at Buck Creek, just northwest of Lake Tahoma. |
| MARION | 7/9/2003 | 50 | Numerous trees and power lines were blown down. |
| MARION | 7/9/2003 | 50 | Trees and power lines were blown down. |
| MARION | 7/9/2003 | 50 | Trees and powerlines were blown down. |
| MARION | 11/19/2003 | 50 | Several trees were blown into power lines, resulting in some power outages. |
| MARION | 5/19/2004 | 50 | Trees were blown down in Marion and Glenwood. |

| Location | Date | MPH | Description |
|---|---|---|---|
| MARION | 5/23/2004 | 55 | Numerous trees were blown down, one onto a house. Other downed trees blocked roads in the Toms Creek and Pleasant Gardens area. State highway 80 was also blocked near Lake Tahoma. |
| DYSORTVILLE | 6/29/2005 | 50 | |
| WOODLAWN | 7/13/2005 | 50 | Trees down near the Rutherford County line. |
| OLD FT | 5/13/2006 | 50 | Large tree limbs snapped off along with small hail. |
| OLD FT | 5/31/2006 | 55 | Quite a few trees down. One tree fell on a power line, taking down the lines and damaging a transformer. |
| MARION | 6/23/2006 | 55 | Golfball size hail and numerous trees down on the west side of Marion. |
| MARION | 8/3/2007 | 50 | Trees and power lines blown down around the city. |
| OLD FT | 8/21/2007 | 55 | Multiple trees and power lines blown down near the intersection of Old Fort Sugar Hill Rd and Bethlehem Rd. |
| DYSORTVILLE | 8/23/2007 | 50 | Several trees were blown down, with one tree on a car. |
| MARION | 8/25/2007 | 55 | Trees were blown down on camper trailers on the west side of Lake James. Twenty-two trailers were damaged. One family was briefly trapped inside of a camper. Power lines were also blown down. |
| DYSORTVILLE | 3/4/2008 | 60 | A large storage shed was lifted and destroyed by strong winds in the Dysartsville area. |
| OLD FT | 3/4/2008 | 50 | Large tree limbs blown down. |
| MARION | 6/7/2008 | 60 | Scattered severe storms affected western North Carolina during the afternoon and early evening hours. |
| MARION | 6/10/2008 | 50 | A tree was blown down on Florence Ave in Marion and another was blown down on Stacy Hill Rd, 4 miles east northeast of town. |
| CROSS MILL | 6/10/2009 | 50 | Trees and power lines were blown down. |
| SUGAR HILL | 6/11/2009 | 50 | Trees were blown down between Sugar Hill and Marion. |
| DYSORTVILLE | 6/15/2009 | 50 | Multiple trees were blown down along Vein Mountain Rd. |
| MARION | 9/9/2009 | 50 | Several trees were blown down in and around the city of Marion. |
| DYSORTVILLE | 6/22/2010 | 50 | A tree was blown down on Dairy Farm Rd about a mile east of Dysartsville. |
| DYSORTVILLE | 6/22/2010 | 50 | A tree was blown onto a mobile home on Muddy Creek Rd. |
| DYSORTVILLE | 6/23/2010 | 55 | Numerous trees were blown down in and around Dysartsville. Affected roads included Sunny Grove, Tatertown Loop, Lake Lamar Loop, Gold Mine Rd, and Fortune Rd. |
| OLD FT | 6/28/2010 | 50 | Several trees were blown down. |
| DYSORTVILLE | 7/17/2010 | 50 | Two trees were blown down near the intersection of highway 226 and Vein Mountain Rd. |
| MARION | 7/20/2010 | 50 | Multiple trees were blown down in and around the city. |
| ASHFORD | 7/26/2010 | 50 | Numerous large tree limbs were blown down in the Ashford and Linville Taverns area. |
| MARION ARPT | 7/27/2010 | 50 | A couple trees were blown down on Toms Creek Rd. |
| SUGAR HILL | 7/27/2010 | 50 | A few trees and large limbs were blown down in the Sugar Hill community. |
| DAVISTOWN | 8/4/2010 | 50 | A tree was blown down on Bartlett Hollow Rd and another was blown down in the same area on Bat Cave Rd. |
| SUNNY VALE | 8/5/2010 | 50 | A couple trees were blown down on highway 80, several miles northwest of Marion. |
| WEST MARION | 8/18/2010 | 50 | A tree was blown down near mile marker 82 along Interstate 40, about 3 miles south of Marion. |
| EAST MARION | 8/18/2010 | 50 | A tree was blown down near the intersection of Memorial Park Rd and highway 70, about 2 miles east northeast of Marion. |
| NEBO | 8/19/2010 | 50 | Several small trees were blown down about 6 miles east of Marion. |
| GLENWOOD | 2/28/2011 | 55 | Numerous trees were blown down along Mudcut Rd in the Glenwood community. Several trees fell on homes and automobiles. |
| SUNNY VALE | 4/4/2011 | 55 | Numerous trees and power lines were blown down across the county. |

| Location | Date | MPH | Description |
|---|---|---|---|
| GRAPHITE | 5/3/2011 | 60 | Numerous trees blown down in the Old Fort area, with the Mill Creek Rd area, about 4 miles west northwest of town, being the hardest hit. One tree fell on and damaged a mobile home on Middle Street in the city. |
| DAVISTOWN | 5/3/2011 | 60 | Quite a few trees were blown down in the Old Fort Sugar Hill Rd area. |
| MARION ARPT | 5/10/2011 | 55 | Multiple trees were blown down across the county. One tree fell on and caused extensive damage to a home on Holly St in the city of Marion. Another tree destroyed an outbuilding on Vein Mountain. |
| MARION | 6/9/2011 | 55 | Several trees were blown down in the Marion area, with one tree on a house on Lena St. Also, a carport was flipped over on Nix Creek Rd. |
| MARION | 6/18/2011 | 55 | Numerous trees were blown down in and around Marion. |
| CROSS MILL | 7/6/2011 | 50 | A tree was blown down on Nix Creek Rd. Additional trees were blown down in the same area. |
| OLD FT | 4/26/2012 | 50 | A power pole was blown down about 2 miles south of Old Fort. |
| OLD FT | 4/26/2012 | 50 | A tree was blown down on highway 80, about 8 miles north northeast of Old Fort. |
| NEBO | 6/13/2012 | 50 | Multiple trees and power lines were blown down in the Nebo area. |
| EAST MARION | 7/5/2012 | 50 | Large tree limbs blown down along Hankins Rd and along Lake James Rd, 3 to 5 miles north of Marion. |
| SUGAR HILL | 7/18/2012 | 50 | A tree was blown down in the Sugar Hill Community with another blown down near Glenwood. |
| MARION | 8/2/2012 | 50 | Trees were blown down on West Henderson St. |
| SUGAR HILL | 8/8/2012 | 55 | Numerous trees were blown down south of the Glenwood community. |
| WEST MARION | 8/8/2012 | 50 | Trees were blown down, blocking I-40 East about 3 miles south of Marion. Multiple trees were also blown down along Goose Creek Rd. |
| GLENWOOD | 8/10/2012 | 50 | Two trees were blown down along Goose Creek Rd. |
| MARION | 6/24/2013 | 50 | Several trees were blown down on Garden Creek Rd. |
| OLD FT | 7/12/2013 | 50 | Trees were blown down along I-40 near Old Fort. |
| GLENWOOD | 7/24/2013 | 50 | Multiple trees and power lines were blown down on White Pine Dr in the Glenwood community. |
| MARION | 7/25/2013 | 50 | About five trees were blown down in the Marion area. |
| FERO | 8/10/2013 | 50 | A few trees were blown down on Harmony Grove Rd. |
| MARION | 5/27/2014 | 50 | Media reported several trees were blown down across I-40 near Marion, causing brief closure of the interstate. |
| DYSORTVILLE | 6/10/2014 | 50 | Newspaper reported multiple trees were blow down in the Dysartsville community. |
| GREENLEE | 6/19/2014 | 50 | County comms reported trees blown down on Henry McCall road and on Jakes Branch Rd in the same area. |
| NEBO | 6/19/2014 | 50 | County comms reported trees blown down on Roland Chapel Rd (1 WSW Nebo) and on Harmony Grove Rd (3 SSE). |
| PROVIDENCE | 6/19/2014 | 50 | Media relayed county comms report of trees blown down on Wall Pool Rd and on Lytle Mountain Rd in the same area. |
| MARION | 8/20/2014 | 50 | County comms reported numerous large limbs blown down around downtown Marion, and trees down along Tunnel Rd (1.5 E) and Jacktown Rd. Also, media reported several large limbs blown down on Highway 226 (5 SE). |
| EAST MARION | 8/21/2014 | 50 | Media reported a couple of trees blown down along Baldwin Ave. |
| MARION | 9/2/2014 | 50 | Media relayed EM report of a tree down in downtown Marion, with multiple trees down along I-40 on the south side of town. |
| OLD FT | 9/2/2014 | 50 | Media relayed EM report of multiple trees blown down along I-40 near Parker Padgett Rd, with one lane of the interstate blocked. |
| GLENWOOD | 6/8/2015 | 60 | EM reported multiple trees uprooted, minor roof damage to some homes and part of the roof blown off a barn in the Dysartsville area. |

| Location | Date | MPH | Description |
|---|---|---|---|
| MARION | 6/17/2015 | 50 | EM reported a tree blown down in downtown Marion at Sotuh Gordon and East Court St. Media reported trees and power lines blown down near the intersection of School St and Virginia Rd. |
| PLEASANT GARDENS | 6/17/2015 | 50 | Media reported trees blown down on Highway 70. |
| PROVIDENCE | 6/17/2015 | 50 | Media reported trees blown down on Zion Hill Rd. |
| FERO | 6/19/2015 | 50 | County comms reported a few trees blown down along Polly Spout Rd. |
| GLENWOOD | 6/30/2015 | 50 | EM reported Highway 226 was closed in the Dysartsville community due to being blocked with multiple downed trees. |
| GREENLEE | 6/30/2015 | 55 | EM reported multiple trees blown down across Highway 70 and a tree on a home on Mackey Creek Rd in the Greenlee community. Spotter reported four large trees across Greenlee Rd. |
| SUGAR HILL | 6/30/2015 | 55 | EM reported numerous trees and power lines blown down in the Sugar Hill community. |
| OLD FT | 7/8/2015 | 50 | Media reported multiple trees blown down on Golf Course Rd near Old Fort, with a carport damaged in the same area. Trees and power lines were also blown down in the Sugar Hill Rd area in the Providence community. |
| SUGAR HILL | 7/13/2015 | 40 | Spotter reported a tree blown down on a house in the Sugar Hill community. |
| SUGAR HILL | 5/1/2016 | 70 | NWS Storm Survey team reported numerous trees and power lines blown down across the Sugar Hill community, with trees down on at least 5 homes. Several outbuildings were also tossed. |
| PROVIDENCE | 5/2/2016 | 50 | Media reported trees blown down on Goose Creek Rd and Ashworth Rd near Marion. |
| NEBO | 7/5/2016 | 55 | EM reported multiple trees blown down and an outbuilding heavily damaged along Gilbert Byrd Rd. |
| DAVISTOWN | 7/5/2016 | 55 | EM reported numerous trees blown down from Old Fort to Marion. Impacted roads included Old Fort Sugar Hill Rd, Bat Cave Rd, Greenlee Rd, and a couple of streets near downtown Marion. A tree fell on a home on Old Fort Sugar Hill Rd, while trees fell on 3 camping trailers and one automobile at Highway 70 and Riverside Park Dr. |
| DAVISTOWN | 7/8/2016 | 50 | EM reported multiple trees down across Bat Cave Rd, causing the road to be closed. |
| GREENLEE | 7/8/2016 | 40 | NWS Co-op observer reported a tree blown down on a house on Highway 70 west of Marion. |
| GLENWOOD | 7/16/2016 | 50 | Media reported a tree blown down along Highway 221 in the Glenwood area and additional trees blown down on Polly Spout Rd closer to the Rutherford County line. |
| OLD FT | 7/16/2016 | 50 | Media reported two trees blown down along I-40 in the Old Fort area. |
| GRAPHITE | 7/19/2016 | 50 | EM reported trees and power lines blown down near the intersection of Mill Creek Rd and Graphite Rd. |
| FERO | 7/20/2016 | 50 | Media reported a few trees and power lines blown down east of Marion. |
| GREENLEE | 7/22/2016 | 50 | FD reported one large tree and multiple tree limbs blown down northeast of Old Fort. |
| GREENLEE | 8/2/2016 | 50 | EM reported trees blown down on Parker Padgett Rd and Lytle Mountain Rd. |
| DAVISTOWN | 8/7/2016 | 50 | Em reported multiple trees blown down near old fort. |
| NORTH COVE CROSSING | 8/27/2016 | 40 | Media reported a tree blown down on a house in North Cove. |
| WEST MARION | 8/27/2016 | 50 | Media reported trees blown down on Veterans Drive. |
| DAVISTOWN | 6/13/2017 | 55 | EM reported around 10 trees blown down in the area around Salem Church Road and Silvers Welch Road. A house and outbuildings also had mostly minor roof damage. |
| OLD FT | 7/1/2017 | 50 | Em reported a few trees blown down on Bat Cave Rd, with some down on vehicles. |
| FERO | 7/5/2017 | 50 | EM reported multiple trees and power lines blown down east and southeast of Marion, from Highway 226 to Deer Park Rd. One tree fell on a home off Deer Park Rd. |
| GLENWOOD | 7/6/2017 | 50 | EM reported trees and power lines blown down across Highway 221 S, causing the highway to be shut down for a while. |

| Location | Date | MPH | Description |
|---|---|---|---|
| NEBO | 7/6/2017 | 50 | EM reported trees blown down on power lines on Wildlife Rd at Highway 126. |
| DYSORTVILLE | 7/8/2017 | 50 | Media reported trees blown down at Highways 64 and 226. |
| CLINCHCROSS | 7/13/2017 | 50 | EM reported trees blown down on power lines on Lake James Rd and additional trees down on Highway 70. |
| SEVIER | 7/14/2017 | 50 | EM reported a tree blown down on and blocking Highway 226 and additional trees down on Linville Rd. |
| PROVIDENCE | 7/14/2017 | 50 | Em reported trees blown down along Lytle Mountain Rd and other trees down along S. Main St in Marion. |
| GLENWOOD | 7/17/2017 | 50 | EM reported multiple trees blown down in the Glenwood area. |
| MARION | 7/22/2017 | 50 | EM reported multiple trees blown down across several streets in Marion. |
| NEBO | 7/23/2017 | 50 | EM reported multiple trees blown down at Stacy Hill Rd and Highway 70. |
| OLD FT | 7/23/2017 | 55 | EM reported numerous trees and large limbs blown down in the Old Fort area, including on Parker Padgett Rd, Greenlee Rd, Ebenezer Rd, Lackey Town Rd, and in the Moffitt Hill community. |
| DAVISTOWN | 8/4/2017 | 50 | Multiple sources reported multiple trees and power lines blown down from southeast of Old Fort through the Sugar Hill community, from along Old Fort Sugar Hill Rd, across Sugar Hill Rd, to almost Highway 221. Trees fell on homes on Summey Rd and at Old Fort Sugar Hill Rd and Parker Padgett Rd. |
| NORTH COVE CROSSING | 6/25/2018 | 50 | Media reported multiple trees blown down along Highway 221 in far northern McDowell County, including near Honeycutt Road. |
| PLEASANT GARDENS | 6/25/2018 | 50 | Media reported trees blown down at lake Tahoma Rd and Toms Creek Rd, on Sugar Hill rd, on Ashworth Rd, and on Luck Strike Rd. |
| MARION | 7/6/2018 | 50 | EM reported trees blown down at Clay St and State St, on I-40 at mile markers 82 and 83, and on Goose Creek Rd. |
| DYSORTVILLE | 8/8/2018 | 50 | EM reported trees blown down along Highway 226. |
| SUGAR HILL | 4/14/2019 | 50 | EM reported multiple trees blown down with at least one on a structure. |
| WEST MARION | 5/4/2019 | 40 | Emergency manager reported a tree blown down on a home on Sugar Hill Rd. |
| SEVIER | 6/22/2019 | 50 | Emergency manager reported multiple trees blown down near the intersection of Ep Boyd Rd and Stockton Rd. |
| SUGAR HILL | 7/12/2019 | 50 | Emergency manager reported trees blown down on Mud Cut Rd. |
| SUGAR HILL | 8/19/2019 | 50 | County comms reported multiple trees blown down along with a few power lines in the Sugar Hill area. |
| DAVISTOWN | 8/19/2019 | 50 | County comms reported several trees blown down along with a few power lines. |
| DYSORTVILLE | 8/21/2019 | 50 | Emergency manager reported multiple trees blown down, some on power lines along Highway 64. |
| CROSS MILL | 8/22/2019 | 55 | Emergency mngr reported numerous trees and power lines blown down in and near Marion. One tree fell on a home on Baldwin Ave. |
| MARION | 10/31/2019 | 50 | Emergency manager reported multiple trees blown down in the Marion area. |
| SUNNY VALE | 10/31/2019 | 50 | Emergency manager reported multiple trees blown down on Buck Creek Rd. |
| **Mitchell County** | | | |
| COUNTYWIDE | 7/8/2001 | 55 | Numerous trees and power lines down throughout the county. At least six houses had trees fall on them, and 12,000 homes were without power for a short time. |
| BAKERSVILLE | 7/9/2003 | 55 | Trees and power lines were blown down in several locations across the northern part of the county. |
| BULADEAN | 5/26/2004 | 50 | Some trees were blown down. |
| SPRUCE PINE | 5/30/2004 | 50 | Numerous large tree limbs and a few trees were blown down. |
| BULADEAN | 5/31/2004 | 50 | Some trees were blown down. |
| BAKERSVILLE | 5/31/2004 | 50 | Some trees were blown down. |

| Location | Date | MPH | Description |
|---|---|---|---|
| BULADEAN | 4/2/2006 | 50 | Spotter reported shingles torn off his roof, estimated wind speeds at 60 mph. Also, numerous trees downed all across the county. |
| LEDGER | 5/31/2006 | 50 | Large tree limbs down and a tree down on a house. |
| SPRUCE PINE | 8/24/2007 | 50 | A tree and power lines blown down. |
| SPRUCE PINE | 8/24/2007 | 50 | A tree and power lines blown down. |
| SPRUCE PINE | 6/11/2009 | 50 | A couple trees were blown down. |
| BULADEAN | 6/18/2009 | 50 | Large tree limbs were blown down on highway 226 in the Buladean community, as well as on Cane Creek Rd about three miles east of Bakersville. |
| EWART | 6/21/2010 | 50 | Trees were blown down. |
| BAKERSVILLE | 8/19/2010 | 50 | Two trees were blown down on Baker Ln. |
| ALTAPASS | 6/7/2011 | 50 | Trees and large limbs were blown down on the Blue Ridge Parkway a few miles south of Spruce Pine. |
| BULADEAN | 6/9/2011 | 50 | Several trees were blown down in the Iron Mountain area along the Tennessee border. |
| SPRUCE PINE | 6/18/2011 | 50 | Trees were blown down in the Spruce Pine area. |
| BULADEAN | 7/3/2012 | 50 | Multiple trees and large limbs blown down a little to the north of Buladean. |
| GLEN AYRE | 7/5/2012 | 55 | Numerous trees were blown down across the northern part of the county. |
| SPRUCE PINE | 6/25/2013 | 50 | Multiple trees were blown down along highway 19 near Spruce Pine. |
| HAWK | 7/17/2013 | 50 | Multiple trees were blown down in the Cane Creek area. |
| BAKERSVILLE | 8/20/2014 | 50 | County comms reported two trees blown down just northwest of town. |
| **Yancey County** | | | |
| SIOUX | 7/14/2000 | 50 | A cluster of severe thunderstorms produced damaging wind and hail close to midnight. Numerous downed trees and power lines were reported along with the usual associated power outages. A lot of hail fell in Weaverville but the size was unknown. Lightning struck a home in Mars Hill, destroying the home and its contents. |
| COUNTYWIDE | 7/8/2001 | 55 | Hundreds of trees were blown over by the wind, with structural damage reported to a half-dozen homes. 7000 homes lost power for a brief time during the storm. |
| BURNSVILLE | 5/26/2004 | 50 | A tree and several large limbs were blown down. |
| BUSICK | 5/31/2004 | 50 | Some trees and power lines were blown down. |
| BURNSVILLE | 5/31/2004 | 50 | Trees and power lines were blown down. |
| BURNSVILLE | 4/2/2006 | 55 | Several trees blown down into roads around Burnsville. |
| DAY BOOK | 8/5/2010 | 50 | Two trees were blown down on Jacks Creek Rd, about 4 miles north of Burnsville. |
| SPIVEY GAP | 10/25/2010 | 50 | Several trees were blown down in the Flat Top Mountain area. |
| HAMRICK | 2/28/2011 | 50 | Several trees were blown down. |
| HAMRICK | 4/9/2011 | 50 | Large tree limgs were blown down near Celo. |
| BURNSVILLE | 4/9/2011 | 50 | Several large branches were blown down around the Burnsville area. |
| BANKS CREEK | 5/22/2011 | 50 | Several trees were blown down along Prices Creek Rd. |
| GREEN MTN | 6/8/2011 | 50 | A tree and large limbs were blown down in the Green Mountain community. |
| SWISS | 6/9/2011 | 50 | Trees were blown down about 7 miles west of Burnsville. |
| BURNSVILLE | 2/29/2012 | 50 | Numerous trees were blown down in and around Burnsville, possibly as a result of outflow from thunderstorms that dissipated over East Tennessee. |
| BURNSVILLE | 4/26/2012 | 55 | Numerous trees were blown down across the county, with the worst damage occurring in the western part of the county. |
| BURNSVILLE | 7/1/2012 | 50 | Several trees were blown down in the Burnsville area. |
| SIOUX | 7/5/2012 | 55 | Numerous trees were blown down across the northern half of the county. |
| SWISS | 6/13/2013 | 60 | Numerous trees were blown down across the county, with some power poles down and roof damage. |
| BURNSVILLE | 5/23/2014 | 55 | County comms reported numerous trees blown down near the high school. |
| BURNSVILLE | 7/8/2016 | 50 | Public reported (via Social Media) multiple trees blown down in the Burnsville area. |

| Location | Date | MPH | Description |
|---|---|---|---|
| SWISS | 5/27/2017 | 55 | County comms reported widespread trees blown down across Yancey County, particularly along the Highway 19 corridor. One tree clipped a home on Sam Green Rd near Arbuckle Rd (near the Mitchell County line). |
| BANKS CREEK | 8/30/2018 | 50 | County comms reported multiple trees blown down to the south of Burnsville. |
| SWISS | 6/22/2019 | 50 | County comms reported a few trees blown down across the county. |

## TABLE H.12: TORNADO EVENTS (2000-2019)

| Location | Date | Scale | Description |
|---|---|---|---|
| MARION | 5/24/2000 | F0 | A few thunderstorms crossed the mountains, then exploded and quickly became large supercells as they moved into the foothills late in the afternoon. The most damaging of the supercells developed in northern McDowell county and became severe along the Burke/McDowell county line near Lake James, dropping baseball size hail. This severe storm tracked southeast along the county border, producing golf ball to softball size hail all the way to the Rutherford county line. In addition to the very large hail, this supercell was able to generate a few weak (F0) tornadoes. The first tornado briefly touched down near Bridgewater and blew windows out of a house. It may also have been responsible for wind damage at a nearby mobile home park where 15 to 25 mobile homes sustained damage from both wind and hail. The second tornado developed in extreme eastern McDowell county and blew down trees across Interstate 40 before crossing into Burke county. Several motorists on Interstate 40 sighted the tornado and had their vehicles damaged by softball size hail. A resident in extreme southwest Burke county, near the Rutherford county line measured a 94 mph gust of wind as the parent supercell moved overhead. A damage survey team did not find any tornadic damage in the vicinity but suspected this may have been the actual mesocyclone on the ground. There was extensive hail damage to homes, vehicles and plants from softball size hail that was seen bounding" down the hillside. The third tornado developed near South Mountain State Park in northeast Rutherford county and blew down numerous trees in the vicinity of the park. This storm went on to produce nickel to baseball size hail in Cleveland county. |
| SUGAR HILL | 10/14/2014 | EF0 | NWS Storm Survey found a short path of a weak tornado that touched down just south of Wilkerson Way, just off Montford Cove Rd near the Rutherford County line. The tornado initially only snapped a few tree limbs and flattened a hedge. The tornado moved rapidly north/northeast, flattening a corn field at a farmstead near Wilkerson Way. A portion of the north facing roof of a barn was removed at this location, with material tossed upwards of a 100 yards to the north. Another small shed was moved off its foundation by about 8 feet and its roofing was blown off. The tornado continued just east of due north, destroying a carport at a business and tossing debris as much as 200 yards. Some heavy motors were also pushed over at this location and a piece of steel estimated at 70 pounds was flung about 50 feet. A small trailer was also moved and damaged by flying debris. Another open bed trailer was apparently flipped and severely damaged. The tornado proceeded north/ northeast from there, moving through the yard of a home, where numerous trees were blown down and branches snapped. A barn under construction at this location had scaffolding from inside the barn blown out in opposite directions from the north and south facing doors. The tornado continued to blow down numerous tall evergreen trees as it moved north/northeast before lifting just north of Crossings Dr. |
| ASHFORD | 4/19/2019 | EF0 | EM reported a short tornado track along Highway 221 in the Ashford area. Most of the damage consisted of uprooted trees and large limbs blown down. However, some minor structural damage was observed to a couple of buildings while some metal skirting was also torn away from the base of a mobile home. Some small outbuildings also sustained damage. |

# TABLE H.13: WINTER STORM EVENTS (2000-2019)

| Date | Description |
|---|---|
| | **Avery County** |
| 12/4/2003 | Heavy snow and sleet began during the early morning hours across the North Carolina mountains, and by late afternoon had accumulated to 3 to 4 inches across much of the area. Some slopes with an eastern exposure had up to 5 inches. |
| 1/29/2005 | Snowfall intensity increased around sunrise, and continued through much of the day across Avery County. The snow mixed with sleet and freezing rain during the afternoon, before changing back to light snow during the evening. Total snowfall accumulations of 4-7 inches were experienced. |
| 11/22/2005 | As northwest flow developed in the wake of the upper low, snow showers continued to affect the northern mountains. By early morning of the 22nd, 3 to 5 inches of snow was reported across much of Avery County, although the lower elevations near the Caldwell County line reported mostly rain. |
| 2/2/2009 | Snow showers developed during the evening of the 2nd along the Tennessee border and continued off and on through the overnight hours and through much of the 3rd. One to four inches had accumulated in many areas by the evening of the 3rd. Numerous traffic accidents were reported on I-40 through the Pigeon River gorge in Haywood County. Snow showers increased in coverage and intensity during the late evening, then continued for much of the overnight hours. Snow persisted off and on through much of the 4th. Total accumulations ranged from 1 to 4 inches in the lower valleys, to as much as 8 inches in the higher elevations along the Tennessee border. |
| 3/1/2009 | Rain changed to snow across the northern mountains during the early afternoon hours. The snow became heavy at times and quickly accumulated to 1-4 inches by late afternoon. Snow, heavy at times, continued into the evening hours across. By the time the snow tapered off, accumulations of 4-8 inches were common across the area. However, some of the higher peaks received over a foot of snow. The heavy wet snow, combined with gusty winds, caused some trees to fall and isolated power outages. |
| 12/18/2009 | A strengthening area of low pressure moved out of the Gulf of Mexico, across southern Georgia, and then up the southeast coast. As the low passed south of the region, snow became heavy across the southern and central mountains, as well as the Smokies and surrounding valleys late in the morning. Heavy snow developed a little later over the northern mountains. The heavy snow continued throughout the afternoon. Snowfall rates of 1-2 inches per hour became common across the area during the afternoon. Meanwhile, warming temperatures allowed the snow to mix with and eventually change to rain and sleet in the southwest mountain valleys. The heavy, wet snow combined with gusty winds to cause numerous trees and power lines to fall across the area during the afternoon. Widespread power outages resulted, and some customers were without power for as much as a week. Even longer outages affected parts of the northern mountains. \|\|The snow ended over the Blue Ridge and the central mountains on the evening of the 18th. However, wrap around snow showers developed along the Tennessee line, resulting in additional snow accumulations overnight and into the morning hours of the 19th.\|\|Total accumulations ranged from 12-18 inches across the lower northern mountain valleys, to 2-3 feet in the higher elevations along the Tennessee border, and in areas along the eastern escarpment. Over the southern and central mountains, total accumulations ranged from 6-10 inches in the lower elevations near the southern escarpment, to as much as 2 feet in the higher elevations. While the southwest mountain valleys generally saw only 3-5 inches, 2-3 feet of total snowfall was reported in the higher elevations of the Smokies and along the Cherohala Skyway in Graham County.\|\|Hundreds of traffic accidents were reported during the storm, and continued for several days thereafter, as continuous melting and refreezing of ice and snow resulted in treacherous road conditions during the late night and morning hours. Hospitals reported 100s of cases and slips and falls during this time as well. |
| 2/4/2010 | As low pressure moved across the deep south, snow, heavy at times, developed during the late evening over the northern mountains and northern foothills. Snow continued during the overnight, with many areas accumulating heavy snowfall across the northern mountains and northern foothills after midnight. The snow began to mix with or change to sleet by sunrise. By mid-morning, accumulations of snow and sleet ranged from 3-8 inches, with the heaviest amounts occurring along the Blue Ridge. Precipitation changed to freezing rain across much of the area by noon, with damaging accumulations of ice occurring across much of the area, particularly along the Blue Ridge. Meanwhile, locations along the Tennessee border mostly stayed above freezing throughout the event and experienced little in the way of wintry weather. |
| 12/15/2010 | Snow developed over the northern mountains late in the evening, and continued into the early morning hours of the 16th. As temperatures warmed aloft, the snow changed to freezing rain and sleet which continued through the |

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| | morning hours before changing to rain by early afternoon. Most areas received one quarter to one half inch of a combination of ice and sleet. The sleet and ice accumulating on top of the inch of snow that fell earlier created for very hazardous driving conditions. |
| 3/25/2013 | Snow showers developed during the early morning hours of the 25th and continued off and on throughout the day. Synoptically enhanced northwest flow snow showers became heavy overnight across the western mountains, and by the afternoon hours of the 26th storm total snowfall amounts of 4 to 8 inches were common across the area. Snow showers continued through the early morning hours of the 27th across the higher elevations near the Tennessee border, where totals of a foot or more were prevalent. Heavy snowfall was mainly confined to areas above 3000 feet or so in the southern and central mountains, but was a little more widespread in the northern mountains. |
| 1/2/2014 | After a strong cold front introduced much colder air to the mountains, snow showers developed near the Tennessee border during mid-evening. The snow showers lasted through the pre-dawn hours, resulting in heavy accumulations across mainly the higher elevations of the northern and central mountains. Total accumulations were generally in the 3-5-inch range above 3500 feet near the Tennessee border. Locally higher amounts were observed on the high peaks and ridge tops, while most lower valley areas saw anywhere from a dusting to less than two inches. Very strong northwest winds resulted in considerable blowing and drifting snow. |
| 2/12/2014 | A Miller type-A low pressure system moved up along the South Carolina coast bringing widespread heavy snow to the mountains of western North Carolina. Total accumulations generally ranged from 5-9 inches across the area, although locations above 4000 feet or so saw 1-1.5 feet. |
| 2/16/2015 | Snow mixed with sleet overspread the northern mountains of North Carolina during the afternoon, and quickly began to accumulate. While locations near the Blue Ridge saw mainly snow continue into the evening, precipitation began to transition to primarily sleet for locations near the Tennessee border. Travel conditions gradually deteriorated throughout the afternoon and evening. Heavy accumulations of sleet and snow were reported across the area by late evening. Colder air trapped near the Blue Ridge escarpment resulted in mostly snow there, while locations nearer the Tennessee border saw a snow and sleet mix. Total accumulations of snow ranged from 3 to 6 inches near the Blue Ridge, with a foot or more reported in the high elevations of the Black and Craggy Mountains. Meanwhile, other areas generally saw 1-2 inches of mostly sleet. |
| 2/25/2015 | After the significant snowfall that fell across portions of the North Carolina mountains on the morning of the 24th, an area of low pressure moving along the Gulf Coast spread yet another round of snow across the southern Appalachians and adjacent foothills during the evening of the 25th. The snow was heavy at times, and quickly accumulated, with occasional mixed rain undercutting the totals a bit across the southern foothills. Many areas reported heavy accumulations by late evening. By the time the snow tapered off during the early morning of the 26th, total accumulations ranged from 4 to 6 inches, with locally higher amounts across the mountains. Across the foothills, where snow occasionally mixed with or changed to rain along the Highway 74 corridor, accumulations ranged from 2 to 5 inches. |
| 12/8/2017 | As moisture associated with developing and strengthening low pressure over the northeast Gulf of Mexico overspread western North Carolina, snow developed across the central and northern mountains around sunrise on the 8th and quickly accumulated. By noon, heavy snowfall accumulations were reported across much of the Blue Ridge area, while moderate to occasionally heavy snow continued to fall throughout the afternoon into the evening. By the time the snow tapered off to flurries and light snow showers during the early morning hours of the 9th, total accumulations ranged from 9-12 inches across the area, with locally higher amounts reported. While occasional flurries and light snow showers produced locally light additional accumulations into the early daylight hours of the 9th, the accumulating snow ended in most areas shortly after midnight. |
| 3/24/2018 | As a warm front lifted slowly north across the Tennessee Valley and the Carolinas, an area of light to moderate snow developed across Avery County around daybreak on the 24th, and continued off and on through the day, except across western portions of the county, where snow changes to rain as temperatures warmed above freezing. Temperatures warming above the surface forced a transition to sleet and freezing rain across the southern and eastern part of the county during the afternoon and early evening, but not before 2-4 inches of snow had accumulated. Sleet and freezing rain continued across much of the southern and eastern part of the county through the evening. Ice accretion of around a quarter inch was reported across much of these areas by the time |

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| | the precipitation tapered off during the early morning hours of the 25th. The weight of the ice downed trees and power lines, with scattered outages reported. |
| | **McDowell County** |
| 3/1/2009 | Rain changed to snow across the northern mountains during the early afternoon hours. The snow became heavy at times and quickly accumulated to 1-4 inches by late afternoon. Snow, heavy at times, continued into the evening hours across. By the time the snow tapered off, accumulations of 4-8 inches were common across the area. However, some of the higher peaks received over a foot of snow. The heavy wet snow, combined with gusty winds, caused some trees to fall and isolated power outages. |
| 12/18/2009 | A strengthening area of low pressure moved out of the Gulf of Mexico, across southern Georgia, and then up the southeast coast. As the low passed south of the region, snow became heavy across the foothills and piedmont during the afternoon, and continued to fall heavily throughout the afternoon and evening. Snowfall rates of 1-2 inches per hour became common over the foothills. The heavy, wet snow combined with gusty winds to cause a few trees and power lines to fall. Scattered power outages were reported. \|\|Total accumulations over the foothills ranged from 4-6 inches in the lower elevations near the piedmont to as much as 14 inches closer to the Blue Ridge. Over the piedmont, the snow mixed with rain and sleet at times, which cut down on the amount of accumulation, especially in areas closer to the I-85 corridor. Total accumulations ranged from 2 inches near the I-85 corridor, to 6 or 7 inches in areas along and north of I-40. After the storm ended, continuous melting and refreezing of ice and snow resulted in several mornings of treacherous driving across the area, with numerous accidents reported. |
| 12/18/2009 | A strengthening area of low pressure moved out of the Gulf of Mexico, across southern Georgia, and then up the southeast coast. As the low passed south of the region, snow became heavy across the southern and central mountains, as well as the Smokies and surrounding valleys late in the morning. Heavy snow developed a little later over the northern mountains. The heavy snow continued throughout the afternoon. Snowfall rates of 1-2 inches per hour became common across the area during the afternoon. Meanwhile, warming temperatures allowed the snow to mix with and eventually change to rain and sleet in the southwest mountain valleys. The heavy, wet snow combined with gusty winds to cause numerous trees and power lines to fall across the area during the afternoon. Widespread power outages resulted, and some customers were without power for as much as a week. Even longer outages affected parts of the northern mountains. \|\|The snow ended over the Blue Ridge and the central mountains on the evening of the 18th. However, wrap around snow showers developed along the Tennessee line, resulting in additional snow accumulations overnight and into the morning hours of the 19th.\|\|Total accumulations ranged from 12-18 inches across the lower northern mountain valleys, to 2-3 feet in the higher elevations along the Tennessee border, and in areas along the eastern escarpment. Over the southern and central mountains, total accumulations ranged from 6-10 inches in the lower elevations near the southern escarpment, to as much as 2 feet in the higher elevations. While the southwest mountain valleys generally saw only 3-5 inches, 2-3 feet of total snowfall was reported in the higher elevations of the Smokies and along the Cherohala Skyway in Graham County.\|\|Hundreds of traffic accidents were reported during the storm, and continued for several days thereafter, as continuous melting and refreezing of ice and snow resulted in treacherous road conditions during the late night and morning hours. Hospitals reported 100s of cases and slips and falls during this time as well. |
| 2/4/2010 | As low pressure moved across the deep south, snow, heavy at times, developed during the late evening over the northern mountains and northern foothills. Snow continued during the overnight, with many areas accumulating heavy snowfall across the northern mountains and northern foothills after midnight. The snow began to mix with or change to sleet by sunrise. By mid-morning, accumulations of snow and sleet ranged from 3-8 inches, with the heaviest amounts occurring along the Blue Ridge. Precipitation changed to freezing rain across much of the area by noon, with damaging accumulations of ice occurring across much of the area, particularly along the Blue Ridge. Meanwhile, locations along the Tennessee border mostly stayed above freezing throughout the event and experienced little in the way of wintry weather. |
| 2/4/2010 | As low pressure moved across the deep south, snow, heavy at times, developed during the late evening over the northern mountains and northern foothills. Snow continued during the overnight, with many areas accumulating heavy snowfall across the northern mountains and northern foothills after midnight. The snow began to mix with or change to sleet by sunrise. By mid-morning, accumulations of snow and sleet ranged from 3-8 inches, with the heaviest amounts occurring along the Blue Ridge. Precipitation changed to freezing rain across much of the area by noon, with damaging accumulations of ice occurring across much of the area, particularly along the Blue Ridge. |

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| | Meanwhile, locations along the Tennessee border mostly stayed above freezing throughout the event and experienced little in the way of wintry weather. |
| 2/12/2014 | A Miller type-A low pressure system moved up along the South Carolina coast bringing widespread heavy snow to the northern NC Piedmont, NC Foothills, and southern NC Mountains. Most areas saw 5-9 inches of snow with up to a foot in the higher elevations near the Blue Ridge Mountains. |
| 2/12/2014 | A Miller type-A low pressure system moved up along the South Carolina coast bringing widespread heavy snow to the northern NC Piedmont, NC Foothills, and southern NC Mountains. Most areas saw 5-9 inches of snow with up to a foot in the higher elevations near the Blue Ridge Mountains. |
| 2/16/2015 | Sleet and snow overspread the mountains and foothills of North Carolina during the afternoon and began to accumulate. Precipitation changed quickly to sleet in most areas, before mixing with freezing rain from southwest to northeast during the late afternoon and early evening. Sleet and freezing caused deteriorating road conditions by early evening, when heavy accumulations of sleet and/or freezing rain were reported across much of the area. Most locations saw around a half inch to an inch of sleet, along with around a tenth of an inch of ice accretion. The valleys of southwest North Carolina saw more freezing rain than sleet, with about one quarter inch of ice reported. Scattered power outages were therefore more concentrated there. Meanwhile, the northern foothills saw mostly sleet, with many areas reporting 2 to 3 inches of accumulation. Roads became very treacherous and impassable in many areas until melting began on the afternoon of the 17th. |
| 2/16/2015 | Sleet and snow overspread the mountains and foothills of North Carolina during the afternoon and began to accumulate. Precipitation changed quickly to sleet in most areas, before mixing with freezing rain from southwest to northeast during the late afternoon and early evening. Sleet and freezing caused deteriorating road conditions by early evening, when heavy accumulations of sleet and/or freezing rain were reported across much of the area. Most locations saw around a half inch to an inch of sleet, along with around a tenth of an inch of ice accretion. The valleys of southwest North Carolina saw more freezing rain than sleet, with about one quarter inch of ice reported. Scattered power outages were therefore more concentrated there. Meanwhile, the northern foothills saw mostly sleet, with many areas reporting 2 to 3 inches of accumulation. Roads became very treacherous and impassable in many areas until melting began on the afternoon of the 17th. |
| 2/25/2015 | After the significant snowfall that fell across portions of the North Carolina mountains on the morning of the 24th, an area of low pressure moving along the Gulf Coast spread yet another round of snow across the southern Appalachians and adjacent foothills during the evening of the 25th. The snow was heavy at times, and quickly accumulated, with occasional mixed rain undercutting the totals a bit across the southern foothills. Many areas reported heavy accumulations by late evening. By the time the snow tapered off during the early morning of the 26th, total accumulations ranged from 4 to 6 inches, with locally higher amounts across the mountains. Across the foothills, where snow occasionally mixed with or changed to rain along the Highway 74 corridor, accumulations ranged from 2 to 5 inches. |
| 2/25/2015 | After the significant snowfall that fell across portions of the North Carolina mountains on the morning of the 24th, an area of low pressure moving along the Gulf Coast spread yet another round of snow across the southern Appalachians and adjacent foothills during the evening of the 25th. The snow was heavy at times, and quickly accumulated, with occasional mixed rain undercutting the totals a bit across the southern foothills. Many areas reported heavy accumulations by late evening. By the time the snow tapered off during the early morning of the 26th, total accumulations ranged from 4 to 6 inches, with locally higher amounts across the mountains. Across the foothills, where snow occasionally mixed with or changed to rain along the Highway 74 corridor, accumulations ranged from 2 to 5 inches. |
| 12/8/2017 | As moisture associated with developing and strengthening low pressure over the northeast Gulf of Mexico overspread the western Carolinas, rain and snow developed over the northern North Carolina foothills through the morning, becoming all snow by late morning. As moderate to heavy snow continued through the afternoon, heavy accumulations were reported across area by mid-afternoon. Some sleet began mixing in with the snow during the evening along and south of I-40, which may have undercut total accumulations, but totals of 5-8 inches were reported by the time the snow tapered off to flurries and light snow showers around midnight. While occasional flurries and light snow showers produced locally light additional accumulations into the overnight and early daylight hours of the 9th, the accumulating snow ended in most areas by late evening on the 8th. |

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| 12/8/2017 | As moisture associated with developing and strengthening low pressure over the northeast Gulf of Mexico overspread western North Carolina, snow developed across the central and northern mountains around sunrise on the 8th and quickly accumulated. By noon, heavy snowfall accumulations were reported across much of the Blue Ridge area, while moderate to occasionally heavy snow continued to fall throughout the afternoon into the evening. By the time the snow tapered off to flurries and light snow showers during the early morning hours of the 9th, total accumulations ranged from 9-12 inches across the area, with locally higher amounts reported. While occasional flurries and light snow showers produced locally light additional accumulations into the early daylight hours of the 9th, the accumulating snow ended in most areas shortly after midnight. |
| **Mitchell County** | |
| 12/4/2003 | Heavy snow and sleet began during the early morning hours across the North Carolina mountains, and by late afternoon had accumulated to 3 to 4 inches across much of the area. Some slopes with an eastern exposure had up to 5 inches. |
| 1/29/2005 | After light precipitation fell for much of the overnight hours, snowfall intensity increased around sunrise, and continued through the morning, before changing to a mixture during the afternoon. Total snowfall across the area ranged from 2 to 4 inches. A trace of sleet and freezing rain fell on top of that during the afternoon and evening hours. |
| 2/2/2009 | Snow showers developed during the evening of the 2nd along the Tennessee border and continued off and on through the overnight hours and through much of the 3rd. One to four inches had accumulated in many areas by the evening of the 3rd. Numerous traffic accidents were reported on I-40 through the Pigeon River gorge in Haywood County. Snow showers increased in coverage and intensity during the late evening, then continued for much of the overnight hours. Snow persisted off and on through much of the 4th. Total accumulations ranged from 1 to 4 inches in the lower valleys, to as much as 8 inches in the higher elevations along the Tennessee border. |
| 3/1/2009 | Rain changed to snow across the northern mountains during the early afternoon hours. The snow became heavy at times and quickly accumulated to 1-4 inches by late afternoon. Snow, heavy at times, continued into the evening hours across. By the time the snow tapered off, accumulations of 4-8 inches were common across the area. However, some of the higher peaks received over a foot of snow. The heavy wet snow, combined with gusty winds, caused some trees to fall and isolated power outages. |
| 12/18/2009 | A strengthening area of low pressure moved out of the Gulf of Mexico, across southern Georgia, and then up the southeast coast. As the low passed south of the region, snow became heavy across the southern and central mountains, as well as the Smokies and surrounding valleys late in the morning. Heavy snow developed a little later over the northern mountains. The heavy snow continued throughout the afternoon. Snowfall rates of 1-2 inches per hour became common across the area during the afternoon. Meanwhile, warming temperatures allowed the snow to mix with and eventually change to rain and sleet in the southwest mountain valleys. The heavy, wet snow combined with gusty winds to cause numerous trees and power lines to fall across the area during the afternoon. Widespread power outages resulted, and some customers were without power for as much as a week. Even longer outages affected parts of the northern mountains. \|\|The snow ended over the Blue Ridge and the central mountains on the evening of the 18th. However, wrap around snow showers developed along the Tennessee line, resulting in additional snow accumulations overnight and into the morning hours of the 19th.\|\|Total accumulations ranged from 12-18 inches across the lower northern mountain valleys, to 2-3 feet in the higher elevations along the Tennessee border, and in areas along the eastern escarpment. Over the southern and central mountains, total accumulations ranged from 6-10 inches in the lower elevations near the southern escarpment, to as much as 2 feet in the higher elevations. While the southwest mountain valleys generally saw only 3-5 inches, 2-3 feet of total snowfall was reported in the higher elevations of the Smokies and along the Cherohala Skyway in Graham County.\|\|Hundreds of traffic accidents were reported during the storm, and continued for several days thereafter, as continuous melting and refreezing of ice and snow resulted in treacherous road conditions during the late night and morning hours. Hospitals reported 100s of cases and slips and falls during this time as well. |
| 2/4/2010 | As low pressure moved across the deep south, snow, heavy at times, developed during the late evening over the northern mountains and northern foothills. Snow continued during the overnight, with many areas accumulating heavy snowfall across the northern mountains and northern foothills after midnight. The snow began to mix with or change to sleet by sunrise. By mid-morning, accumulations of snow and sleet ranged from 3-8 inches, with the heaviest amounts occurring along the Blue Ridge. Precipitation changed to freezing rain across much of the area by |

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| | noon, with damaging accumulations of ice occurring across much of the area, particularly along the Blue Ridge. Meanwhile, locations along the Tennessee border mostly stayed above freezing throughout the event and experienced little in the way of wintry weather. |
| 12/15/2010 | Snow developed over the northern mountains late in the evening, and continued into the early morning hours of the 16th. As temperatures warmed aloft, the snow changed to freezing rain and sleet which continued through the morning hours before changing to rain by early afternoon. Most areas received one quarter to one half inch of a combination of ice and sleet. The sleet and ice accumulating on top of the inch of snow that fell earlier created for very hazardous driving conditions. |
| 3/25/2013 | Snow showers developed during the early morning hours of the 25th and continued off and on throughout the day. Synoptically enhanced northwest flow snow showers became heavy overnight across the western mountains, and by the afternoon hours of the 26th storm total snowfall amounts of 4 to 8 inches were common across the area. Snow showers continued through the early morning hours of the 27th across the higher elevations near the Tennessee border, where totals of a foot or more were prevalent. Heavy snowfall was mainly confined to areas above 3000 feet or so in the southern and central mountains, but was a little more widespread in the northern mountains. |
| 1/2/2014 | After a strong cold front introduced much colder air to the mountains, snow showers developed near the Tennessee border during mid-evening. The snow showers lasted through the pre-dawn hours, resulting in heavy accumulations across mainly the higher elevations of the northern and central mountains. Total accumulations were generally in the 3-5-inch range above 3500 feet near the Tennessee border. Locally higher amounts were observed on the high peaks and ridge tops, while most lower valley areas saw anywhere from a dusting to less than two inches. Very strong northwest winds resulted in considerable blowing and drifting snow. |
| 2/12/2014 | A Miller type-A low pressure system moved up along the South Carolina coast bringing widespread heavy snow to the mountains of western North Carolina. Total accumulations generally ranged from 5-9 inches across the area, although locations above 4000 feet or so saw 1-1.5 feet. |
| 2/16/2015 | Snow mixed with sleet overspread the northern mountains of North Carolina during the afternoon, and quickly began to accumulate. While locations near the Blue Ridge saw mainly snow continue into the evening, precipitation began to transition to primarily sleet for locations near the Tennessee border. Travel conditions gradually deteriorated throughout the afternoon and evening. Heavy accumulations of sleet and snow were reported across the area by late evening. Colder air trapped near the Blue Ridge escarpment resulted in mostly snow there, while locations nearer the Tennessee border saw a snow and sleet mix. Total accumulations of snow ranged from 3 to 6 inches near the Blue Ridge, with a foot or more reported in the high elevations of the Black and Craggy Mountains. Meanwhile, other areas generally saw 1-2 inches of mostly sleet. |
| 2/25/2015 | After the significant snowfall that fell across portions of the North Carolina mountains on the morning of the 24th, an area of low pressure moving along the Gulf Coast spread yet another round of snow across the southern Appalachians and adjacent foothills during the evening of the 25th. The snow was heavy at times, and quickly accumulated, with occasional mixed rain undercutting the totals a bit across the southern foothills. Many areas reported heavy accumulations by late evening. By the time the snow tapered off during the early morning of the 26th, total accumulations ranged from 4 to 6 inches, with locally higher amounts across the mountains. Across the foothills, where snow occasionally mixed with or changed to rain along the Highway 74 corridor, accumulations ranged from 2 to 5 inches. |
| 12/8/2017 | As moisture associated with developing and strengthening low pressure over the northeast Gulf of Mexico overspread western North Carolina, snow developed across the central and northern mountains around sunrise on the 8th and quickly accumulated. By noon, heavy snowfall accumulations were reported across much of the Blue Ridge area, while moderate to occasionally heavy snow continued to fall throughout the afternoon into the evening. By the time the snow tapered off to flurries and light snow showers during the early morning hours of the 9th, total accumulations ranged from 9-12 inches across the area, with locally higher amounts reported. While occasional flurries and light snow showers produced locally light additional accumulations into the early daylight hours of the 9th, the accumulating snow ended in most areas shortly after midnight. |
| **Yancey County** | |

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| 12/4/2003 | Heavy snow and sleet began during the early morning hours across the North Carolina mountains, and by late afternoon had accumulated to 3 to 4 inches across much of the area. Some slopes with an eastern exposure had up to 5 inches. |
| 1/29/2005 | After light precipitation fell for much of the overnight hours, snowfall intensity increased around sunrise, and continued through the morning, before changing to a mixture during the afternoon. Total snowfall across the area ranged from 2 to 4 inches. A trace of sleet and freezing rain fell on top of that during the afternoon and evening hours. |
| 2/2/2009 | Snow showers developed during the evening of the 2nd along the Tennessee border and continued off and on through the overnight hours and through much of the 3rd. One to four inches had accumulated in many areas by the evening of the 3rd. Numerous traffic accidents were reported on I-40 through the Pigeon River gorge in Haywood County. Snow showers increased in coverage and intensity during the late evening, then continued for much of the overnight hours. Snow persisted off and on through much of the 4th. Total accumulations ranged from 1 to 4 inches in the lower valleys, to as much as 8 inches in the higher elevations along the Tennessee border. |
| 3/1/2009 | Rain changed to snow across the northern mountains during the early afternoon hours. The snow became heavy at times and quickly accumulated to 1-4 inches by late afternoon. Snow, heavy at times, continued into the evening hours across. By the time the snow tapered off, accumulations of 4-8 inches were common across the area. However, some of the higher peaks received over a foot of snow. The heavy wet snow, combined with gusty winds, caused some trees to fall and isolated power outages. |
| 12/18/2009 | A strengthening area of low pressure moved out of the Gulf of Mexico, across southern Georgia, and then up the southeast coast. As the low passed south of the region, snow became heavy across the southern and central mountains, as well as the Smokies and surrounding valleys late in the morning. Heavy snow developed a little later over the northern mountains. The heavy snow continued throughout the afternoon. Snowfall rates of 1-2 inches per hour became common across the area during the afternoon. Meanwhile, warming temperatures allowed the snow to mix with and eventually change to rain and sleet in the southwest mountain valleys. The heavy, wet snow combined with gusty winds to cause numerous trees and power lines to fall across the area during the afternoon. Widespread power outages resulted, and some customers were without power for as much as a week. Even longer outages affected parts of the northern mountains. \|\|The snow ended over the Blue Ridge and the central mountains on the evening of the 18th. However, wrap around snow showers developed along the Tennessee line, resulting in additional snow accumulations overnight and into the morning hours of the 19th.\|\|Total accumulations ranged from 12-18 inches across the lower northern mountain valleys, to 2-3 feet in the higher elevations along the Tennessee border, and in areas along the eastern escarpment. Over the southern and central mountains, total accumulations ranged from 6-10 inches in the lower elevations near the southern escarpment, to as much as 2 feet in the higher elevations. While the southwest mountain valleys generally saw only 3-5 inches, 2-3 feet of total snowfall was reported in the higher elevations of the Smokies and along the Cherohala Skyway in Graham County.\|\|Hundreds of traffic accidents were reported during the storm, and continued for several days thereafter, as continuous melting and refreezing of ice and snow resulted in treacherous road conditions during the late night and morning hours. Hospitals reported 100s of cases and slips and falls during this time as well. |
| 2/4/2010 | As low pressure moved across the deep south, snow, heavy at times, developed during the late evening over the northern mountains and northern foothills. Snow continued during the overnight, with many areas accumulating heavy snowfall across the northern mountains and northern foothills after midnight. The snow began to mix with or change to sleet by sunrise. By mid-morning, accumulations of snow and sleet ranged from 3-8 inches, with the heaviest amounts occurring along the Blue Ridge. Precipitation changed to freezing rain across much of the area by noon, with damaging accumulations of ice occurring across much of the area, particularly along the Blue Ridge. Meanwhile, locations along the Tennessee border mostly stayed above freezing throughout the event and experienced little in the way of wintry weather. |
| 3/5/2013 | Snow showers developed across the mountains during the evening of the 5th and continued through the morning of the 6th. By the time the snow tapered off during early evening, total snowfall ranged from an inch or two in southern Madison County to as much as 8 inches in the higher elevations along the Tennessee border. Very gusty winds also resulted in considerable blowing and drifting of the snow. |
| 3/25/2013 | Snow showers developed during the early morning hours of the 25th and continued off and on throughout the day. Synoptically enhanced northwest flow snow showers became heavy overnight across the western mountains, and |

| Date | Description |
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| | by the afternoon hours of the 26th storm total snowfall amounts of 4 to 8 inches were common across the area. Snow showers continued through the early morning hours of the 27th across the higher elevations near the Tennessee border, where totals of a foot or more were prevalent. Heavy snowfall was mainly confined to areas above 3000 feet or so in the southern and central mountains, but was a little more widespread in the northern mountains. |
| 1/2/2014 | After a strong cold front introduced much colder air to the mountains, snow showers developed near the Tennessee border during mid-evening. The snow showers lasted through the pre-dawn hours, resulting in heavy accumulations across mainly the higher elevations of the northern and central mountains. Total accumulations were generally in the 3-5-inch range above 3500 feet near the Tennessee border. Locally higher amounts were observed on the high peaks and ridge tops, while most lower valley areas saw anywhere from a dusting to less than two inches. Very strong northwest winds resulted in considerable blowing and drifting snow. |
| 2/12/2014 | A Miller type-A low pressure system moved up along the South Carolina coast bringing widespread heavy snow to the mountains of western North Carolina. Total accumulations generally ranged from 5-9 inches across the area, although locations above 4000 feet or so saw 1-1.5 feet. |
| 2/16/2015 | Snow mixed with sleet overspread the northern mountains of North Carolina during the afternoon, and quickly began to accumulate. While locations near the Blue Ridge saw mainly snow continue into the evening, precipitation began to transition to primarily sleet for locations near the Tennessee border. Travel conditions gradually deteriorated throughout the afternoon and evening. Heavy accumulations of sleet and snow were reported across the area by late evening. Colder air trapped near the Blue Ridge escarpment resulted in mostly snow there, while locations nearer the Tennessee border saw a snow and sleet mix. Total accumulations of snow ranged from 3 to 6 inches near the Blue Ridge, with a foot or more reported in the high elevations of the Black and Craggy Mountains. Meanwhile, other areas generally saw 1-2 inches of mostly sleet. |
| 2/25/2015 | After the significant snowfall that fell across portions of the North Carolina mountains on the morning of the 24th, an area of low pressure moving along the Gulf Coast spread yet another round of snow across the southern Appalachians and adjacent foothills during the evening of the 25th. The snow was heavy at times, and quickly accumulated, with occasional mixed rain undercutting the totals a bit across the southern foothills. Many areas reported heavy accumulations by late evening. By the time the snow tapered off during the early morning of the 26th, total accumulations ranged from 4 to 6 inches, with locally higher amounts across the mountains. Across the foothills, where snow occasionally mixed with or changed to rain along the Highway 74 corridor, accumulations ranged from 2 to 5 inches. |
| 12/8/2017 | As moisture associated with developing and strengthening low pressure over the northeast Gulf of Mexico overspread western North Carolina, snow developed across the central and northern mountains around sunrise on the 8th and quickly accumulated. By noon, heavy snowfall accumulations were reported across much of the Blue Ridge area, while moderate to occasionally heavy snow continued to fall throughout the afternoon into the evening. By the time the snow tapered off to flurries and light snow showers during the early morning hours of the 9th, total accumulations ranged from 9-12 inches across the area, with locally higher amounts reported. While occasional flurries and light snow showers produced locally light additional accumulations into the early daylight hours of the 9th, the accumulating snow ended in most areas shortly after midnight. |

# Appendix I: Marion Dam Failure Amendment for Future Updates

This section of the Plan includes information relevant for the City of Marion relevant for the dam failure hazard.  Revisions will be incorporated into the 2026 update of this plan.

**RESOLUTION TO AMEND THE**
**CITY OF MARION ANNEX TO**
**THE TOE RIVER REGIONAL HAZARD MITIGATION PLAN**

**WHEREAS**, the City of Marion is vulnerable to an array of natural hazards that can cause loss of life and damages to public and private property; and

**WHEREAS**, the City desires to seek ways to mitigate situations that may aggravate such circumstances; and

**WHEREAS**, the City desires to participate in the Department of Homeland Security FY 2020 Rehabilitation of High Hazard Potential Dams Program (HHPD); and

**WHEREAS**, North Carolina Emergency Management's Hazard Mitigation Section and The Region IV Office of the Federal Emergency Management Agency have reviewed the currently adopted Toe River Regional Hazard Mitigation Plan for compliance with HHPD program requirements and recommended amendments to the plan;

**NOW, THEREFORE, BE IT RESOLVED** that the City Council of Marion, North Carolina hereby:

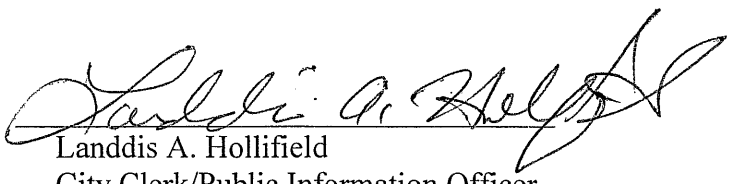
1. Adopts Amendments One, Two and Three to the City of Marion Annex to the Toe River Regional Hazard Mitigation Plan.

2. Agrees to take such other official action as may be reasonably required to carry out the proposed dam risk analysis and identified program of repairs to the extent that such are eligible under the FY 2020 HHPD.

3. Agrees to incorporate the salient points of this amendment into the next update of the City of Marion Annex to the Toe River Regional Hazard Mitigation Plan

**Adopted** this the 30th day of June 2020.

Stephen R. Little
Mayor

ATTEST: 

Landdis A. Hollifield
City Clerk/Public Information Officer

**Resolution Number: R-20-06-30-1**

Amendment to Toe River Regional Hazard Mitigation Plan (City of Marion, NC) Dated April 10, 2016

Amended as of (DATE OF ADOPTION)

Section 4 Hazard Identification, Table 4.4; Section 5 Dam Failure; Section 5 Hazard Profile; Section 8 Mitigation Goals, 8.1 Participate in Programs, 8.3 property protection and structure protection; 8.5 identify and mitigate infrastructure, 8.6 education and outreach; Section 9 Mitigation Action Plan

Following adoption by the City of Marion on (date) the following is an amendment to the above referenced hazard mitigation plan to meet the planning requirements of the FEMA High Hazard Dam Repair Program.

**Background**

Dam and Levee Failure is identified as a hazard in section 4, Table 4.4 page 1:8 Hydrologic Hazards, Dam and Levee Failure in the April 10, 2016 Toe River Regional Hazard Mitigation Plan. The hazard evaluation process is identified in Table 4.4. Section 5.10, pg 5:43 begins a hazard profile for dam and levee failure including location and spatial extent. 47 high hazard dams in the planning area are identified in Table 5.17 p5:45, with 11 in McDowell County including the Lady Marion Dam. A priority Risk Index is not found in the existing plan, but will be added circa page 5:43 describes how an index rating is calculated; PRI VALUE= [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (DURATION x .10)] With the exception of the (date) failure of the Lady Marion Dam, there have been no recorded incidents of catastrophic dam failure in Marion, An account of the Lady Marion failure will be added ca page 5.43 There is a description of Location and Spatial Extent in Section 5.10.2, pg 5:43.

The Dam Safety Program at NCDEQ has identified 11 dams in McDowell County as high hazard. The PAR (Population At Risk) analysis completed in the spring of 2020 indicates that the Lady Marion Dam meets the High Hazard Definition due to the risk of loss of life and property damage in the event of failure.

The City of Marion has in place an Emergency Action Plan for the Lady Marion Dam.

The PAR assessment looks at the following factors in classifying risk:

Dam Hazards Classification

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.

**Amendment 1,** Section Five of the Toe River Regional Hazard Mitigation Plan identifies high hazard dams in planning area, including Lady Marion Dam. The Hazard History section is hereby amended at 5.10.3 to include a description of the failure history of the Lady Marion Dam

**Attachment A: Dam failure hazard history**

**Settling resulting in foundation cracks in the dam and structures on the top of the dam were first observed in July 2018.**

**Catawba Valley Engineering and Testing did a study completed in October, 2018 which identified excessive settlement and voids in the dam.**

**Due to the potential for failure, residential structures were evacuated on January 8th, 2019.**

**A visual inspection of the box culvert on January 14th, 2020 confirmed that the box culvert spillway was failing and was the principle source of the problem.**

**The State issued a Dam Safety Order on January 25th and the lake was pumped down and remains drained until it can be repaired or breached.**

**Amendment 2,** Add attachment B-1, concerning prioritization of project proposals to section 5.10.2 below Table 5.26; Add Attachment B-2 to Section 6.3 Explanation of Data Sources p 6.5

**Attachment B-1:**

Funding of mitigation actions and measures will be pursued as available. Specific actions or projects will be prioritized as follows:

NCDEQ Dam Safety developed a risk-based selection and prioritization process for addressing high hazard dams as funding becomes available. This process will be employed by NCEM and by communities that wish to participate in the HHDR program. The analysis complies with the latest practices in dam safety risk management and are compliant with FEMA's Federal Guidelines for Dam Safety Risk Management, FEMA publication P-1025. Initial screening steps include securing buy-in and support from the local government/dam owner(s) and assurance that cost-matching requirements can be met by the local government. The second level of screening involves confirming that a particular dam is identified as a High Hazard Dam and has of updated Emergency Action Plan.

Following initial screening, a relative risk evaluation will be conducted to compare dam-specific conditions and risks. Where failure modes are driven by hydrologic concerns (under-sized spillways, poor design or other features/factors that might suggest a higher risk of catastrophic failure) are ranked ahead of dams that exhibit more static problems such as seepage or scouring. Although such conditions are cause for concern, they do not necessarily suggest that a catastrophic failure could be imminent.

To complete the assessment, subject dams are plotted on a matrix comparing approximate/relative *likelihood* of failure to approximate/relative *consequence* of failure.

Attachment B-2

Dam/Levee Failure Data including and inventory of High Hazard Dams in North Carolina is provided by the NC Department of Environmental Quality, Division of Energy, Mineral and Land Resources. Information provided by DEQ includes an annually updated list of high and moderate hazard dams in North Carolina. Dams are rated for safety based on a Population At Risk (PAR) survey that analyses the impact on people and property of the failure of specific dams. As of 2020, 47 dams in the planning area are identified as potential high hazard dams.

**Amendment 3,** High Hazard Dam Mitigation goals are identified in Section 8, Strategies of the Toe River Regional Hazard Mitigation Plan. This amendment Attachment C identifies 11 dam and levee safety-specific mitigation measures that are hereby appended to the plan in Section 9, Town of Marion Mitigation Actions.

**Mitigation Strategies** are identified in Section 8 of the plan. The following four actions are consistent with Dam and Levee Failure strategies:

8.3.2 Property Protection including retrofitting existing building or structures to help them better withstand the forces of natural hazards

8.3.3 Natural Resource Protection

8.3.4 Structural Projects intended to lessen the impact of hazards by modifying the progression of an event through construction including, dams/levees; diversion/detention/retention; channel modification

8.3.6 Public Outreach and Education

**Mitigation Actions** are described in Section 9, p 9:24 of the plan; Attachment B-1 identifies 11 mitigation techniques or actions associated with Dam and Levee Failure and will be inserted as City of Marion Mitigation Action 7

Dam failure mitigation measures and plan amendments were developed in cooperation with NCEM, NCDEQ and local government agents. The following measures are hereby adopted as additional mitigation actions

**Attachment C:**

Add the following mitigation measure to the action plan as Action 7, p 9:25:

Hazards Addressed: Dam and Levee Failure

Category: Prevention, Property Protection, Natural Resource Protection, Structural Projects, Public Outreach and Education

Priority: High

Lead Agency: City Manager's Office, Planning Department, Emergency Management

Estimated Cost: High

Potential Funding: Federal, State, Local

Implementation Schedule: 2020-2025

2021 Implementation Status: Town working with NCDEQ and NCEM on developing application for FEMA High Hazard Dam Repair Program 2020.

Following are 11 specific measures that will be contemplated for dam/levee failure mitigation actions:

1) Geotechnical investigation to establish data for risk analysis and development of engineering designs/solutions
2) Build upstream dam to reduce load on existing dam
3) Property Acquisition in inundation area(s) below dam
4) Raise crest of dam to increase storage capacity
5) Add additional spillways, widen or lower existing spillways to increase discharge capacity
6) Warning systems to alert downstream areas of potential dam failure
7) Improve flow path below dam to increase conveyance capacity
8) Encourage conservation or re-forestation of upstream land to reduce runoff
9) Development of community Stormwater Management Plans for upstream communities

10) Complete an Emergency Action Plan in conjunction with NCDEQ for all High Hazard Dams in the county
11) Permanently breach hazardous dams, or modify risers such that dam can no longer impound water, but may still provide attenuation of peak flooding by acting as a stormwater retention feature