



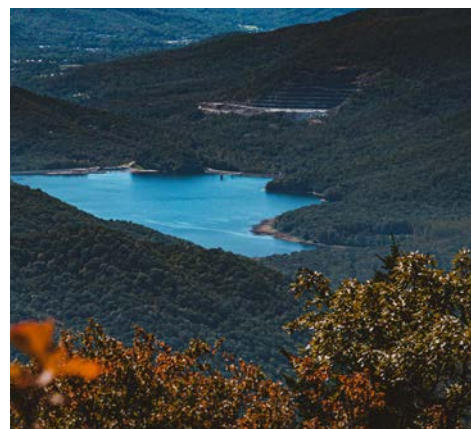
OUR RESILIENCE & HAZARD MITIGATION

What is Resilience and Hazard Mitigation?

Resilience is defined as the capacity of a community, business, or natural system to prevent, withstand, respond to, and recover from a disruption.¹ In the southeast and across the nation, many local governments are recognizing the need to build resilience against increasingly frequent and/or severe extreme weather events. Changes in climate will result in existing hazards becoming more frequent and/or severe.²

Hazard mitigation, as defined by the Federal Emergency Management Agency (FEMA), is “sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.”³

Hazard Mitigation Plans are required by FEMA in order for communities to remain eligible for certain types of federal hazard mitigation funding. Buncombe County first developed a Hazard Mitigation Plan in 2006 and has since kept the plan updated. The last update of the plan was completed in 2021. The Hazard Mitigation Plan is the blueprint for how the County intends to reduce the impact of natural and human-caused hazards on people and the built environment. The intersection of hazards with the built environment is where the Hazard Mitigation Plan overlaps with land use planning documents, such as the 2043 Comprehensive Plan currently under development.



The Land of Sky Regional Council (LOSRC) has led a multi-year effort to develop a regional resilience assessment that is also available to the County. This regional assessment identified primary climate hazards that are especially relevant to long-term planning, including flooding, landslides, drought, and wildfires.

Photo by Cody Scott on Unsplash

OVERVIEW OF TRENDS & PLANNING INFLUENCES

Hazards for Buncombe County

The following is a list of hazards that could impact the county based on the Buncombe Madison Regional Hazard Mitigation Plan. Nine out of the 16 hazards listed are climate-related and denoted with an asterisk.

1. *Cyber*
2. *Dam Failures**
3. *Drought**
4. *Earthquakes*
5. *Electromagnetic Pulse*
6. *Erosion**
7. *Flood**
8. *Geological Hazards (Landslide)**
9. *Hazardous Substances*
10. *Hurricanes and Coastal Hazards**
11. *Infectious Disease*
12. *Radiological Emergency -Fixed Nuclear Facilities*
13. *Severe Winter Weather**
14. *Terrorism*
15. *Tornadoes/Thunderstorms**
16. *Wildfire**

Hazard Risk and Vulnerability

Flooding Risks

- When analyzing building vulnerability for the 100-year floodplains, there are a total of 1,255 residential, commercial, and public buildings worth \$16,507,758 at risk.
- About 13% (589) of all commercial properties in the county are highly vulnerable to flooding.
- There are 89 commercial buildings at risk worth \$2,234,258 in damages.
- About 2% (1,432) of residential properties in the county have medium to high vulnerability and risk to flooding.
- There are 1,148 residential buildings worth \$10,783,554 at risk.
- About 17% of government-owned and critical facilities are exposed to flooding.
- There are 18 public buildings at risk worth \$3,489,946.

Roads

- Impacts to roads can prevent emergency vehicle access to residents and other critical facilities or significantly increase response times. About 5% of the roads within the county are exposed to flooding, meaning they are located within the flood hazard extent. Additionally, about 18% of all roads within the county are exposed to landslides (potential debris flow pathways).

Source: Buncombe Madison Regional Hazard Mitigation Plan, March 2020; Land of Sky Regional Resilience Assessment, November 2020

Wildfire Risks

- The hazard of wildfire is based on the Wildland Urban Interface (WUI). There are two types of WUI: intermix and interface, which vary based on the amount of wildland vegetation in proximity to homes.
- Many commercial properties (51%) are also in WUI areas. However, most of these are likely in lower risk zones with high emergency

response drive times.

- About 6% (4,581) of residential properties in the county have medium to high vulnerability and risk to wildfire. These include properties in high WUI risk areas that are in close proximity to fuels and that have relatively longer emergency response drive times in the county.
- The areas with the highest percentage of vulnerable residential properties include North Buncombe, areas outside Weaverville, Barnardsville and Dillingham, Sandymush and Newfound, Alexander, Fairview, and a few areas in South Buncombe.
- Similar to commercial properties, more than 50% of government-owned and critical facilities are within the WUI.

Landslides

- About 19% (832) of commercial properties in the county are exposed to landslides. Although many commercial corridors are located on flatter land, a significant number are also close to steep slopes.
- For the county, 60% of natural lands have potential debris flow pathways, a suitable land use for many steep slope areas.
- About 5% (3,929) of residential properties in the county have medium to high vulnerability

and risk to landslides. Most of these are properties with buildings constructed before the County enacted its steep slope ordinance.

- Areas across the county have relatively high percentages of vulnerable residential properties, including Black Mountain/Montreat, Barnardsville, Sandymush, and Southwest Buncombe.
- About 24% (599) of government-owned and critical facilities by the County are exposed to potential for debris flow pathways. However, only about 23% of these facilities have buildings within debris flow pathways, including 55 religious properties, 24 medical facilities, 15 schools, 12 utility properties, 5 transportation facilities, and 27 other government-owned properties (County, City, or Federal).



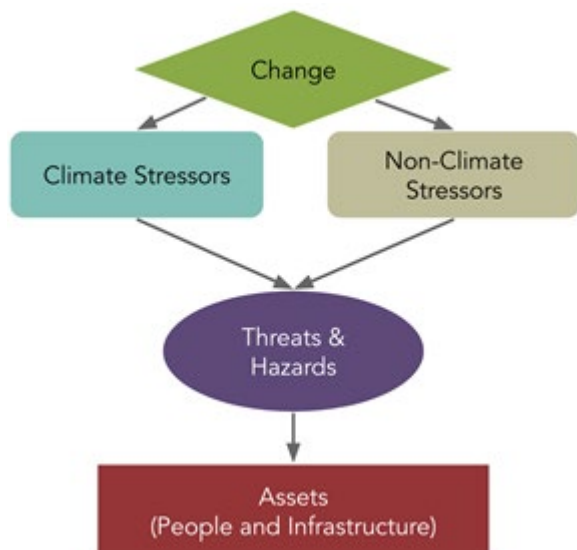
Above: Flood event in May 2018 near the Swannonoa River Road and Tunnel Road intersection in Asheville. Image courtesy of Fernleaf.

FINDINGS FROM ANALYSIS

Climate Hazards

Climate-related hazards are the result of the interaction between climate and non-climate stressors. For example, the amount of precipitation (or lack thereof) by itself is not a hazard. However, extreme precipitation is a climate stressor if enough precipitation falls in a given time, or if it occurs on land with a substantial amount of impervious surface (a non-climate stressor). Lack of precipitation also constitutes a climate stressor in the form of droughts.

The conceptual model framework (below) illustrates the relationships between climate and non-climate stressors, hazards, and people or community assets that may be affected. The arrows in the model are drawn to reflect the causal influences between these different components. This type of model can also be used to reveal strategies or actions that have the potential to reduce vulnerability to hazards and build resilience.



Another challenge that Buncombe County faces is changes in the climate and built environment. For example, future increases in heavy precipitation events (climate stressor) or an increase in the amount

of impervious surface for a given area (non-climate stressor) could result in an increased frequency or severity of flooding. The impacts from climate hazards must be evaluated and measured in a structured way for communities to make informed decisions.

To start, we ask three primary questions:

- What are the primary climate hazards and drivers of changing conditions for Buncombe County
- How do climate and non-climate stressors influence hazards for the County?
- How could hazards impact people and community assets in the County?

National tools are available to explore these questions, including the U.S. Climate Resilience Toolkit and the Climate Explorer.⁴ Also, the Land of Sky Regional Council (LOSRC) has led a multi-year effort to develop a regional resilience assessment that is also available to the County. This regional assessment identified primary climate hazards that are especially relevant to long-term planning, including flooding, landslides, drought, and wildfire. The exposure, vulnerability, and risk to community assets were assessed for each hazard in the County. The LOSRC regional assessment defined hazards for Buncombe County using trusted sources of information described in the following sections.

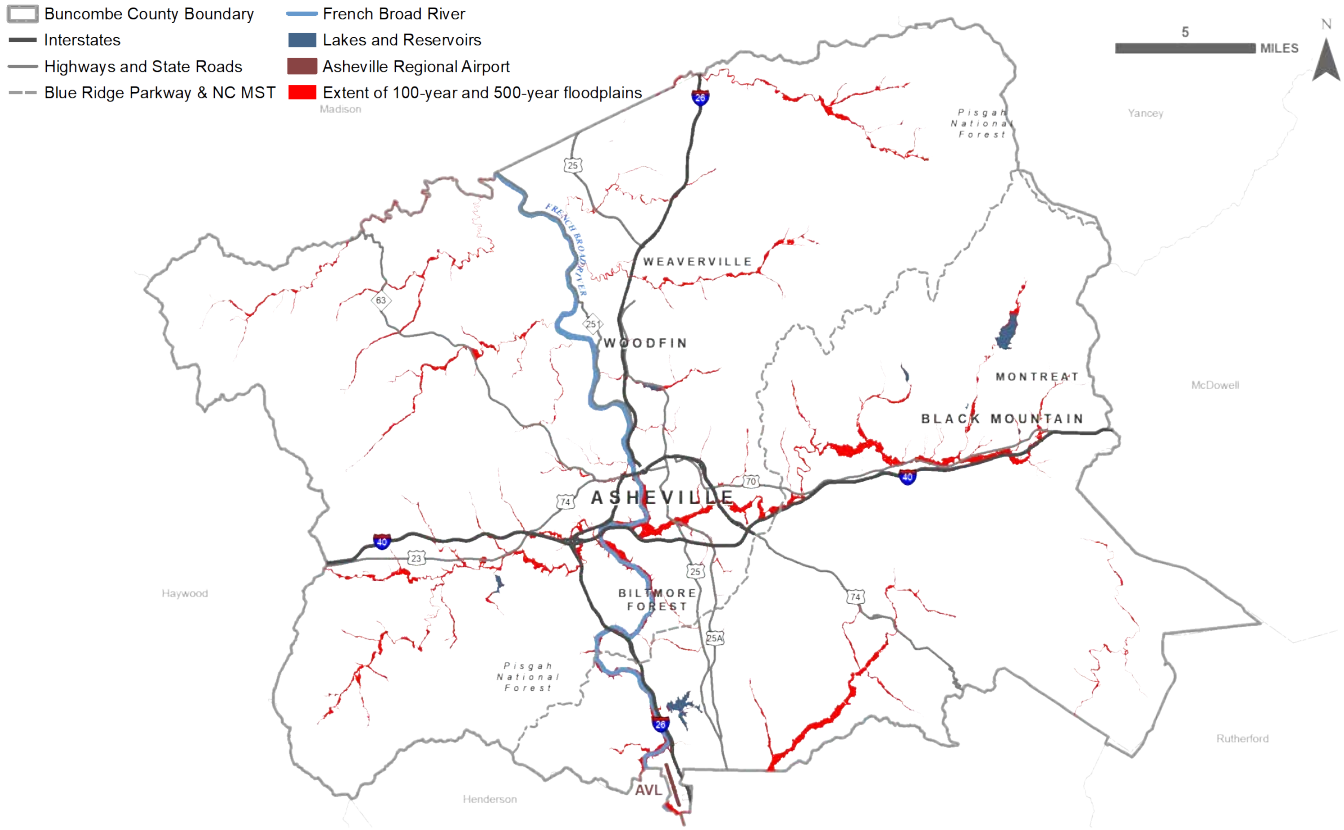
Flooding

Flood hazard areas were determined by FEMA and the North Carolina Floodplain Mapping Program (NCFMP), including both the 100-year and 500-year floodplains. The map on the next page shows these flooding extents for the County (Figure source: Fernleaf, data from FEMA and NCFMP).

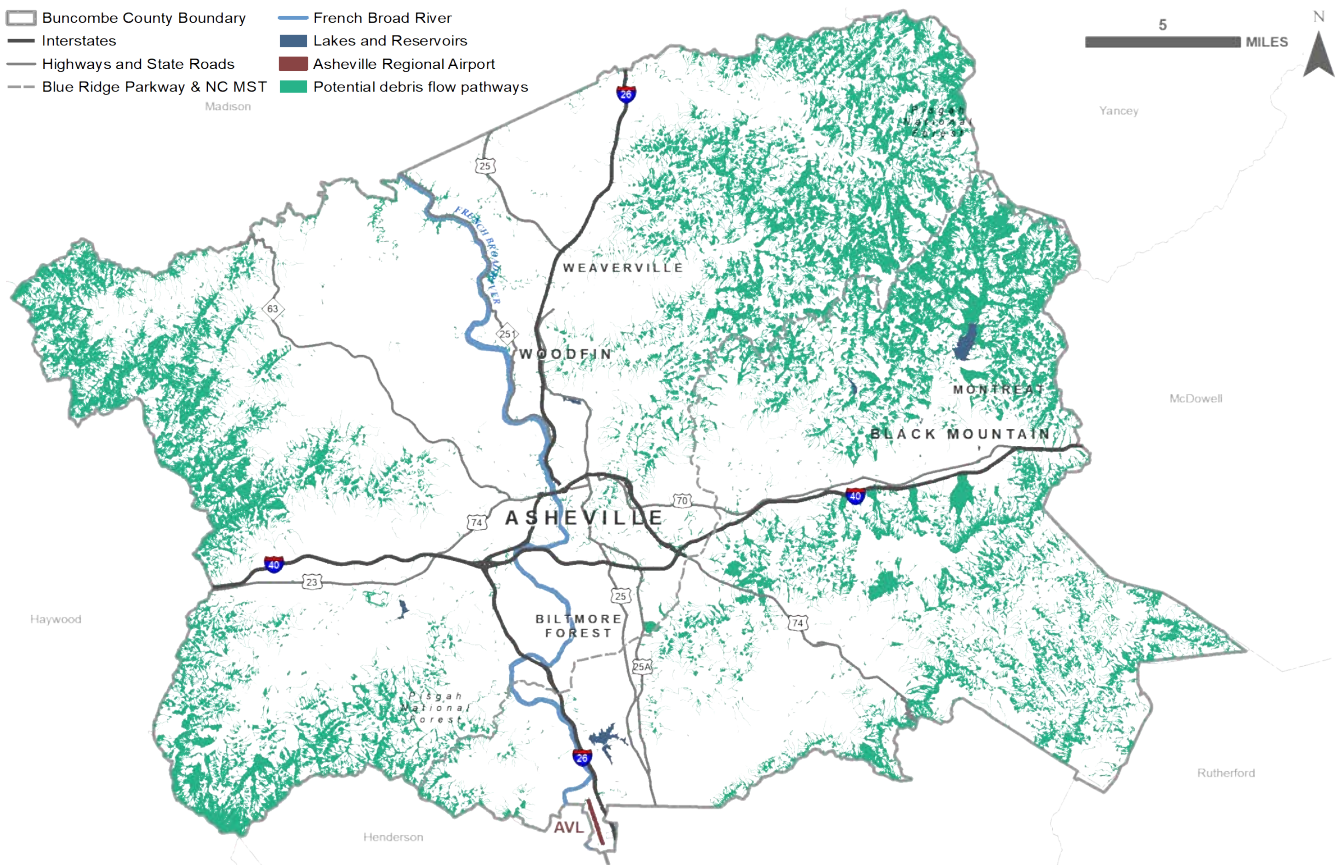
Landslides

The hazard of landslides was defined by potential debris flow areas in Buncombe and Henderson counties, as determined by the North Carolina Department of Environmental Quality (NCDEQ). The map on the next page shows extents of potential debris flow pathways (Figure source: Fernleaf, data from NCDEQ).

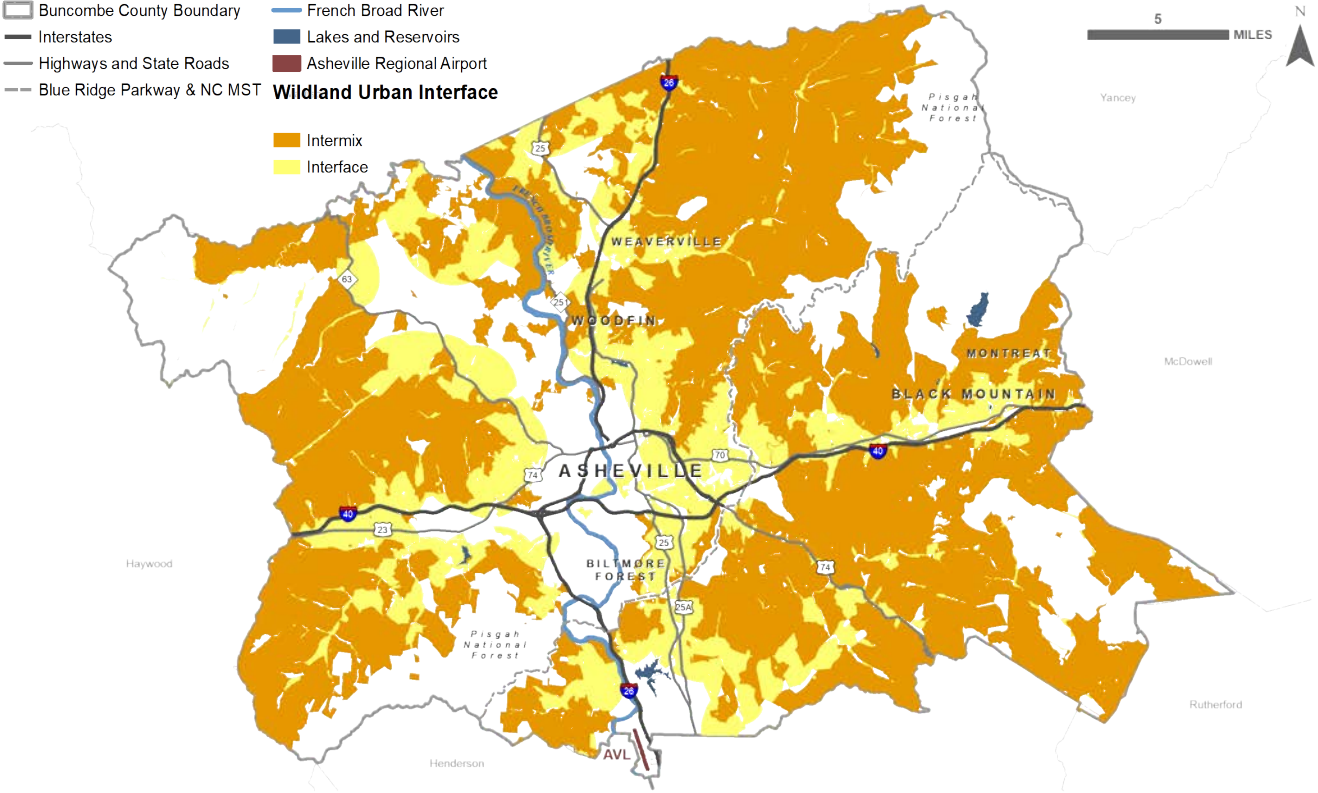
Flooding Risk: Flood Hazard Areas, 100-Year and 500-Year Flood Plains



Landslide Risk: Potential Debris Flow Pathways



Wildfire Risk: Wildland Urban Interface



Wildfire

The hazard of wildfire is based on the Wildland Urban Interface (WUI), as defined by the University of Wisconsin SILVIS Lab. There are two types of WUI: intermix and interface, which vary based on the amount of wildland vegetation in proximity to homes.⁵ Intermix (orange on the above map) includes areas where housing and vegetation intermingle. These areas have wildland vegetation over at least 50% of the land and a housing density of at least 1 house per 40 acres. Interface (yellow on map) includes areas where homes are in close proximity to wildland vegetation. These areas have wildland vegetation over less than 50% of the land but are within 1.5 miles (2.4 km) of a densely vegetated area (defined as an area of at least 5 km² with 75% wildland vegetation). Settled or urbanized areas are also excluded from this calculation.

The WUI wildfire risk areas in the county were determined using data from the Southern Group of State Foresters (SGSF). The map above shows the extent of the WUI, including the interface and intermix zones (Figure source: Fernleaf, data from University of Wisconsin SILVIS). This analysis utilizes drive times from fire stations to residential properties to understand adaptive capacity in the form of emergency response capabilities. Although the availability of static water sources for aircraft is a consideration for response to wildfires, this has not been used in the analysis.

Climate Stressors

The table below lists some of the key climate and

<i>Climate Hazard</i>	<i>Climate Stressor</i>	<i>Non-Climate Stressor</i>
Flooding	Extreme precipitation	Impervious surfaces
Landslides	Extreme precipitation	Steep slope development; vegetation removal
Wildfire	Temperature variability, drought	Fuels and vegetation, human-caused ignitions

non-climate stressors for the County’s primary climate hazards.

Heavy precipitation is an important climate stressor for Buncombe County due to the impact it has on both flooding and landslides. Also, according to the National Climate Assessment, heavy precipitation events in the Southeast have increased in frequency and intensity and will continue to increase in the future.⁶ Figure 1, below, shows the number of precipitation events per year that exceeded 1.5 inches at a weather station located in Downtown Asheville. Each blue bar represents one year.

In addition to increasing heavy precipitation, droughts are becoming more frequent and more severe. The Palmer Hydrological Drought Index for the area around the Land of Sky region displays a bar for every month representing the Monthly Palmer

Drought Severity Index (Figure 2, below). Droughts, indicated by the orange bars in the chart, have become more frequent and severe in the past decades.

Most importantly, increasing drought conditions also increase the hazard of wildfire.

Droughts, indicated by the orange bars in the chart, are becoming more frequent and severe in the past decades. This can be seen by the number of bars (1 bar = 1 month) and their length. The value associated with the length describes relative dryness using temperature and precipitation data. In recent decades, droughts are becoming more frequent and severe: the orange bars are more frequently interspersed with the green bars and, when they do occur, have a greater relative dryness compared to historic values.

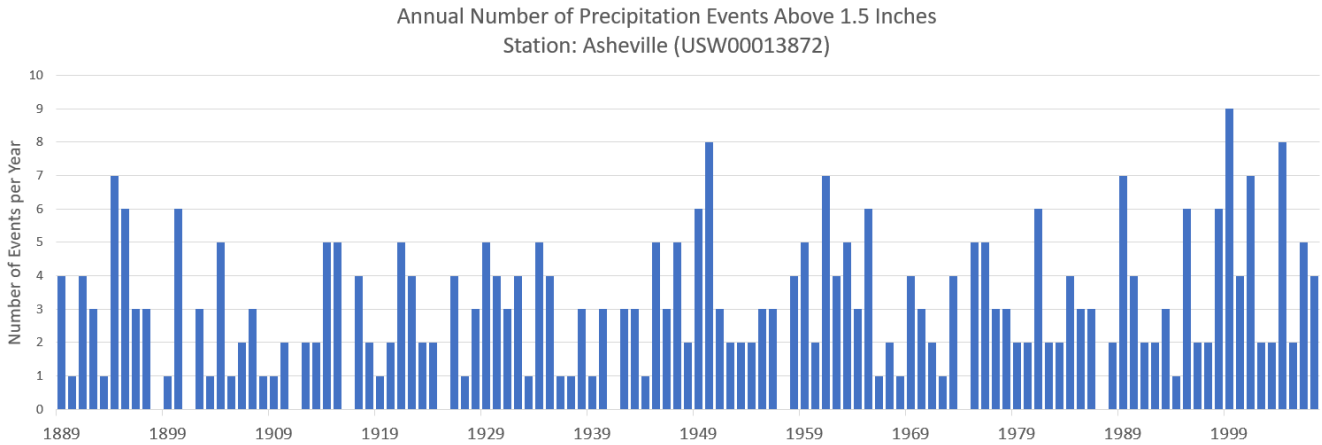


Figure 1. Number of precipitation events per year that exceeded 1.5 inches in Downtown Asheville (USW00013872)
 Figure source: Fernleaf. data from U.S. Climate Resilience Toolkit Climate Explorer and GHCN.

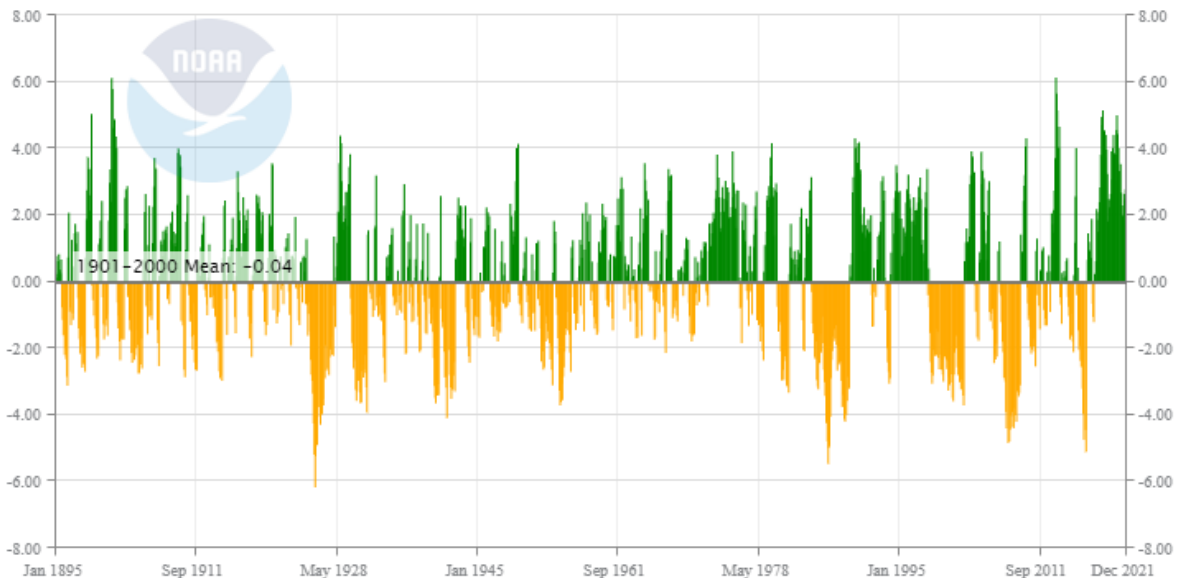


Figure 2. Land of Sky Region Palmer Hydrological Drought Index (PDSI), North Carolina Climate Division 1
 Figure source: NOAA NCEI Climate at a Glance, U.S. Time Series

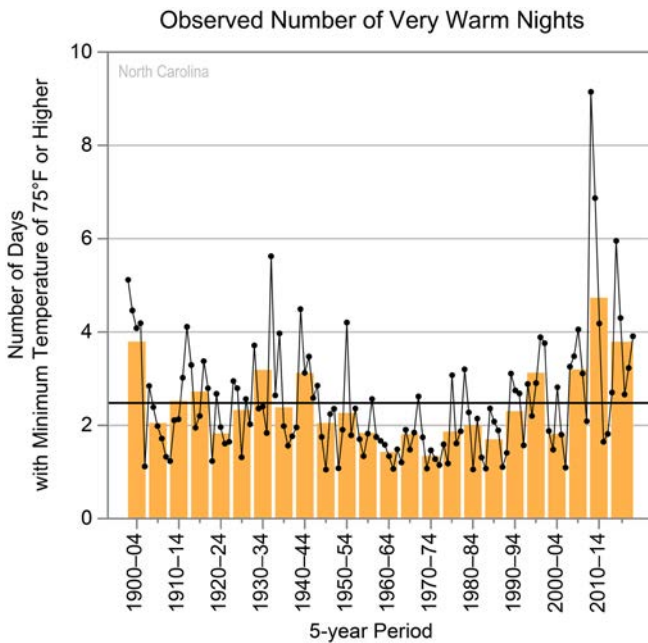


Figure 3. From the mid-1940s to the mid-1990s, the number of warm nights during each five-year period was comparatively low; however, the number of very warm nights has risen since 2005. Figure source: CISESS and NOAA NCEI Climate at a Glance, U.S. Time Series.

The number of warm nights is also increasing. From the mid-1940s to the mid-1990s, the number of warm nights during each five-year period was comparatively low; however, the number of very warm nights has risen since 2005 (Figure 3). Because of this, many air conditioning systems now run continuously during many parts of the summer. The chart shows the historical number of days where nighttime temperatures exceed 75 degrees Fahrenheit. For heat stress, the maximum temperature during the day is often not as critical as the amount of nighttime cooling which radiates out accumulated heat. There are two equity implications involved here: The warmer nighttime temperatures creates an increased need for cooling, which can pose financial challenges for some households, and not all homes (especially in the mountains and throughout Buncombe County) have access to air conditioning.

Although extreme heat has not historically been a problem in western North Carolina, the changing climate increases the potential for heat challenges in the future.

National and State-Level Resilience

Strategies and Funding

FEMA administers a group of grant programs called Hazard Mitigation Assistance (HMA). HMA grants

programs include the following, all of which can be used to implement certain types of resilience projects.

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

The State of North Carolina has also initiated the NC Resilient Communities Program,⁷ which is led by the North Carolina Office of Recovery and Resiliency (NCORR). State-level strategies with a focus on climate resilience and environmental justice were also identified as part of the 2020 North Carolina Climate Risk Assessment and Resilience Plan.⁸

Hazard Rankings

The table below is from the Buncombe Madison Regional Hazard Mitigation plan that ranks the hazards that could impact the region. Rankings were provided by scoring the hazards using a Priority Risk Index that looks at a number of factors about the hazards.⁹ The scoring was then reviewed and discussed with the Regional Hazard Mitigation Planning team and minor revisions to the rankings were made as a result of their review.

Hazard Risk	
HIGH RISK	Severe Winter Weather Tornadoes / Thunderstorms Flood Geological Hazards (Landslide) Cyber
MODERATE RISK	Drought Wildfire Hazardous Substances Hurricane /Coastal Hazards Earthquake Dam Failure Infectious Disease
LOW RISK	Terrorism Radiological Emergencies Electromagnetic Pulse

Vulnerability and Risk to Climate Hazards

The LOSRC regional resilience assessment assessed vulnerability and risk to flooding, landslides, and wildfire for Buncombe County. Part of this approach involved defining community assets. For the purposes of the assessment the following categories of community assets were assessed:

- Residential property
- Commercial and industrial property
- Government-owned and critical facilities
- Natural lands (including agricultural land)
- Roadways

Assessments were conducted for each asset category using property parcel data. The following are key terms and concepts used in the assessment:

Asset: Valuable regional resources such as infrastructure, services, and people

Exposure: The presence of assets in harm’s way

Vulnerability: The susceptibility of assets to hazard events, which is determined by their potential impact and adaptive capacity

Risk: The likelihood and negative outcome of a hazard event

Assets within hazard areas were considered to be exposed, or to be in harm’s way to each hazard. The assessment of vulnerability and risk then examines detailed characteristics of exposed assets in order

to understand how assets are more or less susceptible and likely to be impacted. For example:

- Floodplain development ordinances present at the time that buildings were constructed for assets exposed to flooding
- Steep slope ordinance requirements at the time buildings were constructed for assets exposed to landslides
- Response drive time to properties in the WUI

County Summary

The summary table (below) shows the total number of assets within the county for each asset category and the number and percentage of assets that are exposed or highly vulnerable and at risk for each hazard assessed.

The assessment also highlights that some of the areas with the most vulnerable properties in the region are also the most socially vulnerable and historically under-served. With the impact hazards can have on homes, jobs, and key services that businesses provide, it is important to recognize that people in historically under-served neighborhoods are disproportionately affected. For more information on sociodemographic data and vulnerability, please refer to the Our People chapter, pages 3-19. In the following sections are key findings and maps based on the results of the LOSRC vulnerability and risk assessments.

Assets Summary Table				
Asset Category	Asset Total	Flooding	Wildfire	Landslides
Commercial & Industrial	4,375	589* (13%)	2,223** (51%)	832** (19%)
Residential	82,917	1,432* (2%)	4,581* (6%)	3,929* (5%)
Government-Owned & Critical Facilities	2,446	416** (17%)	1,328** (54%)	599** (24%)
Natural	3,806	488** (13%)	2,503** (66%)	2,283** (60%)

*Vulnerability and risk assessment results. **Exposure assessment results.

Flooding

Commercial and Industrial Property

About 13% (589) of all commercial properties in the county are highly vulnerable to flooding. The Biltmore Village/Tunnel Road commercial corridor accounts for almost a third of the county's total commercial vulnerability and risk. The maps on the next page show the percentage of properties with medium or high vulnerability and risk.

There are also high percentages of commercial vulnerability in some of the smaller communities, such as Candler, Swannanoa, Black Mountain, and Barnardsville.

Natural Land

About 13% (488) of natural land properties are exposed to flooding. Natural areas in the floodplain are usually adapted to and often help to mitigate flooding. However, of these lands, about 70% are agricultural lands in the floodplain.

Residential Property

Flood Insurance Rate Maps (FIRM) are created by FEMA and identify locations of higher flood hazards.. Pre-FIRM refers to a property or building for which construction occurred on or before the effective date of an initial Flood Insurance Rate Map (FIRM). For most of Buncombe County this date is August 1, 1980.

About 2% (1,432) of residential properties in the county have medium to high vulnerability and risk to flooding. About 82% of these were constructed pre-FIRM or before the County adopted its floodplain development ordinances. This means that these buildings were constructed before any detailed flood hazard data and flood elevations were provided to the community and usually before the community enacted comprehensive regulations on floodplain construction, which would give the buildings higher adaptive capacity. The map on the next page shows the percentage of properties with medium or high vulnerability and risk.

The areas with the highest percentage of vulnerable residential properties include North of Downtown Asheville, Haw Creek, Swannanoa, Black Mountain, and Barnardsville.

Government-Owned and Critical Facilities

About 17% of government-owned and critical facilities are exposed to flooding, meaning any part of the property is within the flood extent.

- 76 religious properties
- 58 utility properties
- 44 schools
- 22 transportation facilities
- 12 medical facilities
- 190 other government-owned properties (County, City, or Federal)

In addition to the community asset assessments, the following pages include information from the County's Hazard Mitigation Plan and NC Emergency Management on flood losses and exposure. The hotspot map was developed by North Carolina Emergency Management (NCEM)'s Risk Management section. The map depicts areas of potential dollar losses due to the impacts of a 100-year (or 1% annual chance) flood. The darker the grid square, the more potential damage from flooding can be expected. The majority of the hotspot areas are located along the French Broad and Swannanoa Rivers and their tributaries.



Above: Flood event in May 2018 near the Swannanoa River Road and Tunnel Road intersection in Asheville. Image courtesy of Fernleaf.

Flooding Risk: Commercial Property

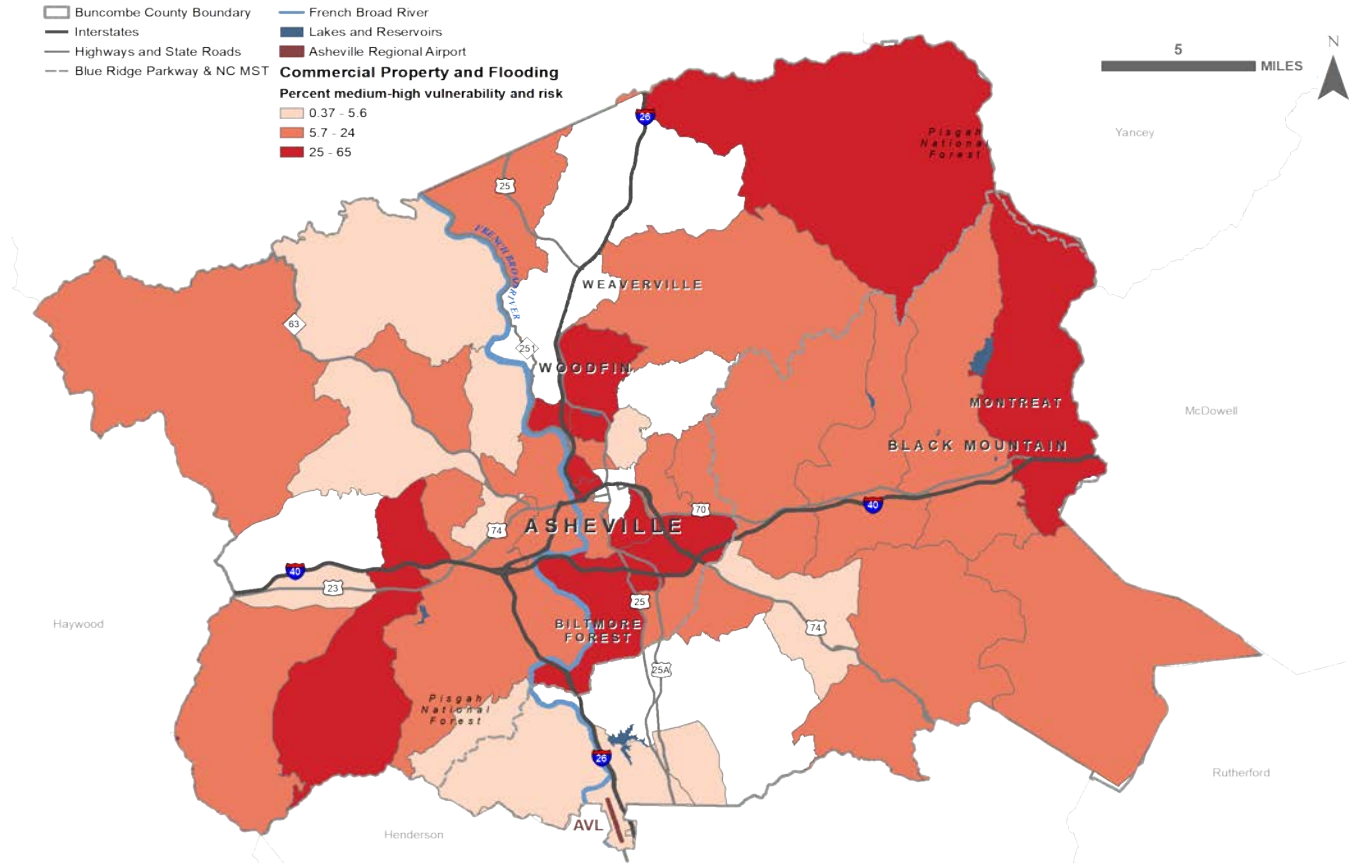


Figure source: Fernleaf.

Flooding Risk: Residential Property

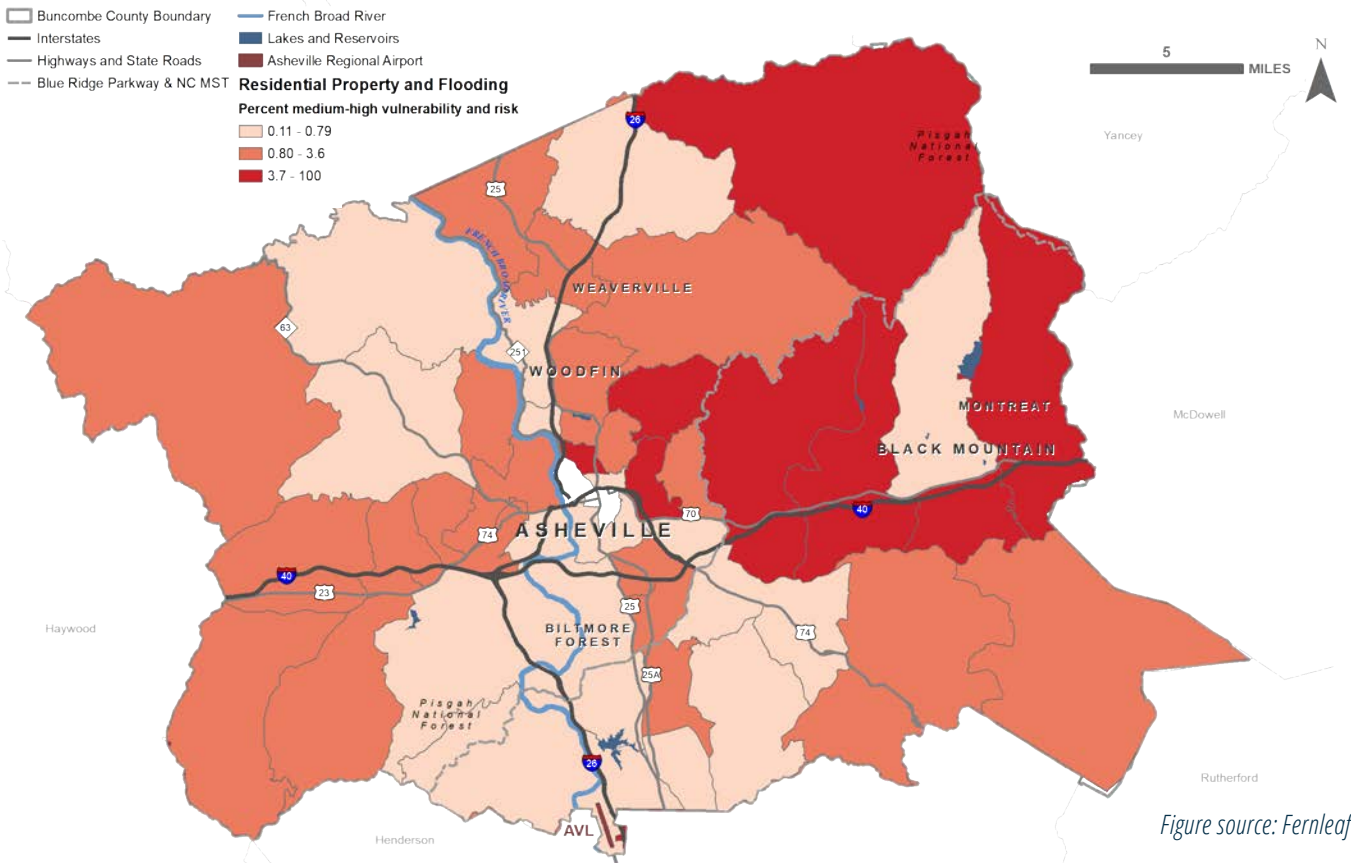
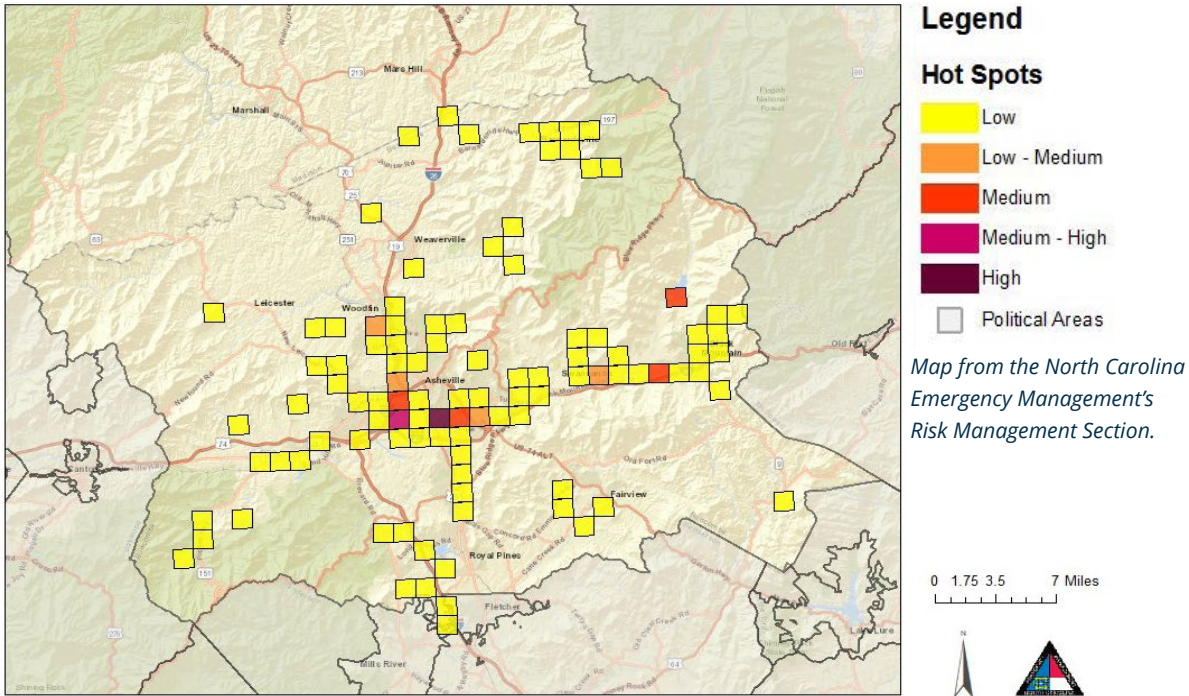


Figure source: Fernleaf.

Potential Dollar Losses for River Flooding



INSURED FLOOD LOSSES

\$3,586,462

Claims Payments

389

Number of Policies

144

Number of Flood Losses

Flood loss numbers represent the time period since the County first joined the NFIP on August 1, 1980 through March 2020. Source: FEMA, National Flood Insurance Program

Estimated Exposure of Parcels to the Flooding Hazard					
1% Annual Chance of Flooding (100-year)			0.2% Annual Chance of Flooding (500-year)		
Approx. # of Parcels	Approx. # of Improved Buildings	Approx. Improved Value of Buildings	Approx. # of Parcels	Approx. # of Improved Buildings	Approx. Improved Value of Buildings
5,010	3,348	\$1,221,324,700	364	272	\$49,205,300

Source: FEMA NFIP

Building Vulnerability to the 100-Year Floodplains								
Pre-Firm Buildings at Risk	Residential Buildings at Risk		Commercial Buildings at Risk		Public Buildings at Risk		Total Buildings at Risk	
	#	Damages	#	Damages	#	Damages	#	Damages
961	1,148	\$10,783,554	89	\$2,234,258	18	\$3,489,946	1,255	\$16,507,758

Source: NCEM Risk Management Tool

The first table summarizes parcel exposure whereas the second table breaks down building vulnerability by type in the 100-yr floodplain. Data from the Regional Hazard Mitigation Plan, pulled in March 2020.

Landslides

Commercial and Industrial Property

About 19% (832) of commercial properties in the county are exposed to landslides. Although many commercial corridors are located on relatively flat land, many of these areas are also in proximity to steep slopes.

Natural Land

As expected, many natural lands include areas with steep slopes and potential debris flow pathways. For the county, 60% of natural lands have potential debris flow pathways, a suitable land use for many steep slope areas. Steep terrain can also contribute to the spread of wildfire.

Residential Property

About 5% (3,929) of residential properties in the county have medium to high vulnerability and risk to landslides. Most of these are properties with buildings constructed before the steep slope ordinance was in place for the County. The map

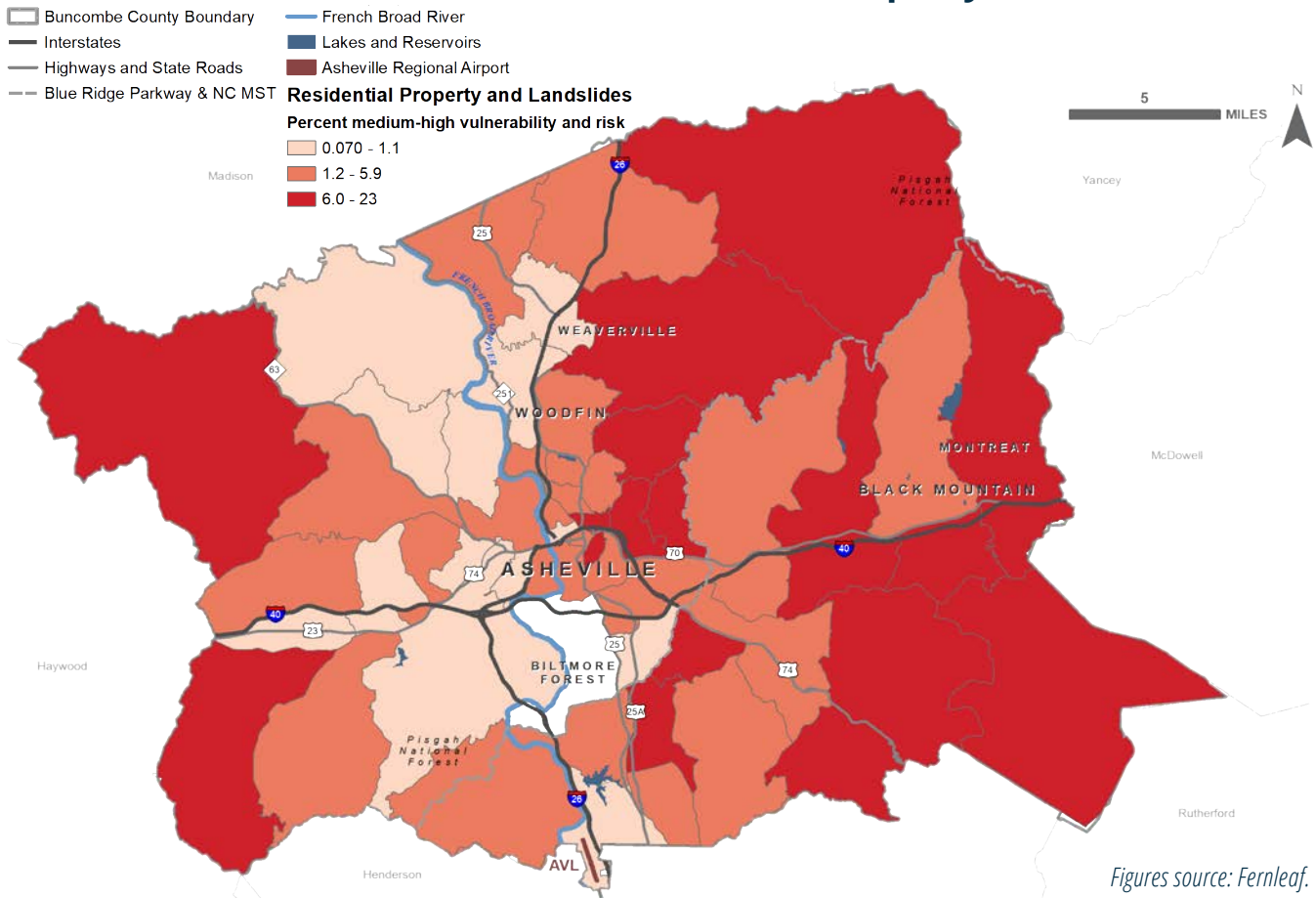
below shows the percentage of properties with medium or high vulnerability and risk. Areas across the county have relatively high percentages of vulnerable residential properties, including Black Mountain/Montreat, Barnardsville, Sandymush, and Southwest Buncombe.

Government-Owned and Critical Facilities

About 24% (599) of government-owned and critical facilities by the County are exposed to potential for debris flow pathways. However, only about 23% of these have building within debris flow pathways, including the following:

- 55 religious properties
- 24 medical facilities
- 15 schools
- 12 utility properties
- 5 transportation facilities
- 27 other government-owned properties (County, City, or Federal)

Landslide Risk: Residential Property



Figures source: Fernleaf.

Wildfire

Commercial and Industrial Property

In addition to flooding and wildfire, many commercial properties (51%) are also in WUI areas. However, most of these are likely in lower risk zones with high emergency response drive times.

Natural Land

As expected over 60% of natural lands (including agricultural lands) are in WUI areas and are in relative proximity to wildfire risk areas. Any loss of vegetation associated with wildfire, combined with heavy precipitation events, can also increase the potential for landslides on steep slopes.

Residential Property

About 6% (4,581) of residential properties in the county have medium to high vulnerability and risk to wildfire. These include properties in high WUI risk areas that are in close proximity to fuels and that have relatively longer emergency response drive times in the county. The figure below shows the proportion of properties with a 5-minute, within an 8-minute, and outside 8-minute drive time from the nearest fire station. Interestingly, it shows that about 92% of all residential properties in the county are

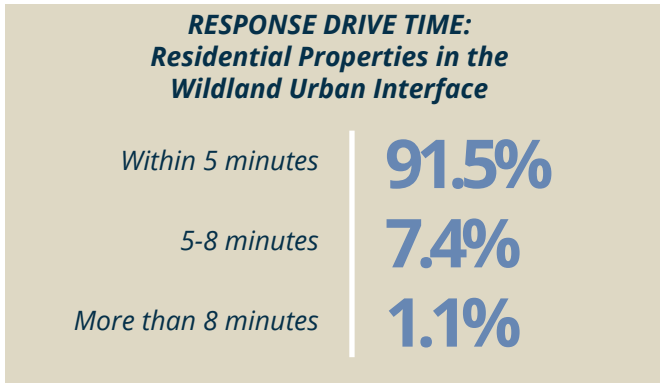
within a 5-minute emergency response drive time.

The map on the next page shows the percentage of residential properties with medium or high vulnerability and risk to wildfire. (Figure source: Fernleaf)

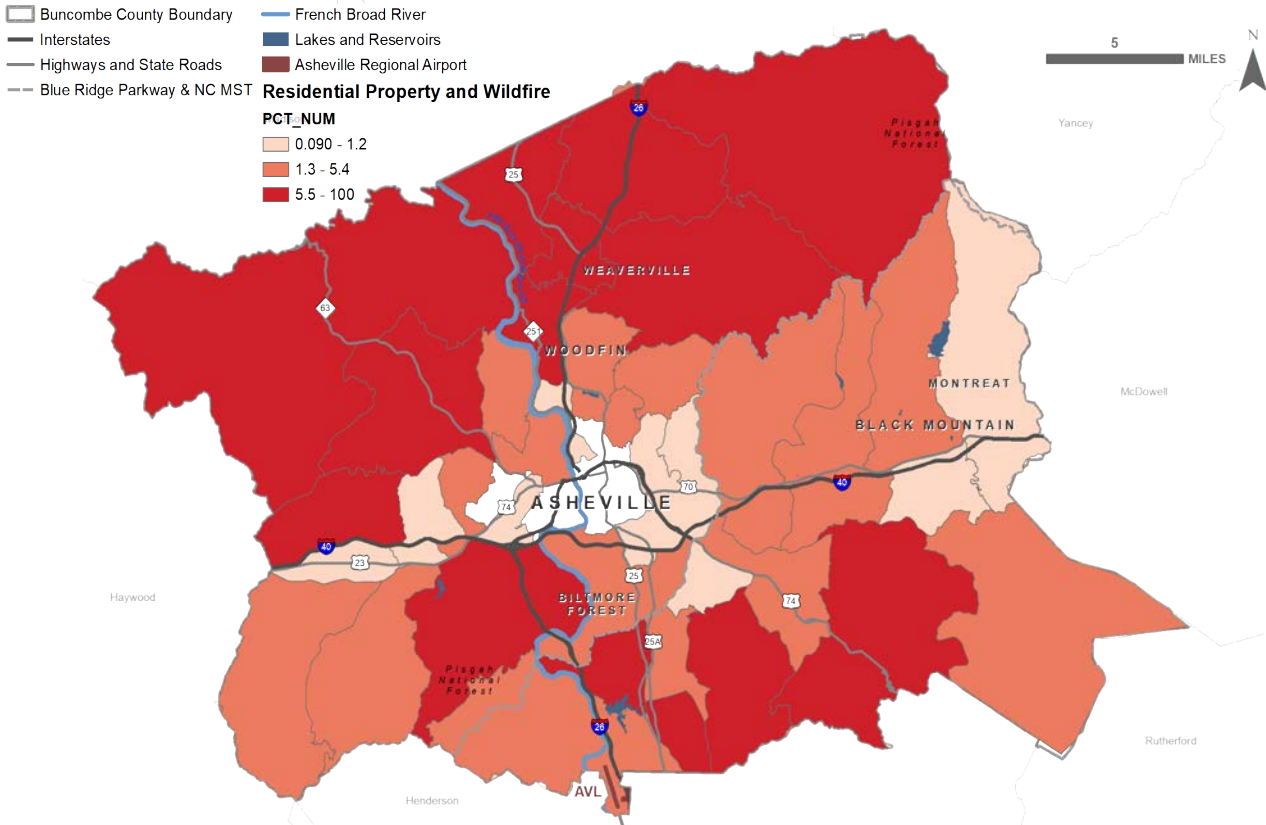
The areas with the highest percentage of vulnerable residential properties include North Buncombe, areas outside Weaverville, Barnardsville and Dillingham, Sandymush and Newfound, Alexander, Fairview and a few areas in South Buncombe.

Government-Owned and Critical Facilities

More than 50% of government-owned and critical facilities are within the WUI.



Wildfire Risk: Residential Property





Above: Flood event in May 2018, Biltmore Village in Asheville. Image courtesy of Fernleaf.



Left: House in Buncombe County with debris from a landslide after an embankment failure, July 2013. Right: Landslide on the Blue Ridge Parkway, 2004. Image courtesy of NC Geological Survey

CONSIDERATIONS FOR THE FUTURE

Below is a list of mitigation actions that Buncombe County staff have identified in the County Hazard Mitigation Plan. The County continues to work to implement these actions to reduce vulnerability to hazards. It is important to note that several of these actions are tied to long-term policy and planning, specifically referencing the comprehensive plan and other planning and policy-related activities. By integrating these actions into the County's new Comprehensive Plan, Buncombe County can help ensure that these actions become institutionalized into day-to-day and long-term planning actions.

Support Implementation of Hazard Mitigation Plan:

Prevention Actions

- Action P-1: Incorporate hazard mitigation into the planning process of each jurisdiction, including Buncombe County.
- Action P-2: Continue to carry out the hazard mitigation planning process and seek funding for emerging needs.
- Action P-3: Evaluate participation in the National Flood Insurance Program Community Rating System (CRS).
- Action P-4: Adopt new standards to limit the loss of life and damage to property in flood-prone areas.
- Action P-5: Improve access to large land development projects.
- Action P-6: Retain and improve Buncombe County's regulations that guide development on steep slopes.
- Action P-7: Consider adopting higher standards for the FDPO.

Property Protection Actions

- Action PP-2: Consider strengthening the requirements for road construction for special subdivisions through the Subdivision Ordinance.
- Action PP-3: Continue to implement the recommendations of the Comprehensive Land Use Plan (Note that the Comprehensive Land Use Plan will be replaced by the 2043 Comprehensive Plan).
- Action PP-5: Continue to evaluate and revise the stormwater management ordinance in accordance with changes as mandated by state law.
- Action PP-6: Ensure enforcement of ordinances.
- Action PP-7: Address the issues of storm water management and impervious surfaces.
- Action PP-8: Continue participation in the National Flood Insurance Program and investigate participation in the NFIP's Community Ratings System.

Emergency Services Actions

- Action ES-1: E-911 addressing reform is needed.

Public Education and Awareness Actions

- Action PEA-1: Educate the public regarding hazard mitigation.

Advance Resilience Strategies:

Data and information about the vulnerability and risk to community assets can help to inform County strategies for building long-term resilience. Actions in the following strategic areas can target current vulnerability and limit increasing risk in the future.

Natural Infrastructure

Natural infrastructure is focused on actions that use natural systems and processes for advancing adaptation.

Built Infrastructure

Built infrastructure actions are those that create new infrastructure or modify how it's built. Building codes and standards are also considered built infrastructure strategies, defined as actions to improve building codes, standards, and engineering for building physical infrastructure.

Land Use

Actions include practice, planning, and policy related to land use. Land use practice action types include modifying or implementing new land use management practices; actions related to land use planning are those that integrate climate into land use plans and planning processes.

Planning, Policy, and Management

Strategies in this category are those not related to land use, but still fall into the categories of planning, policy, and management. Planning actions are those that integrate climate into existing planning processes or are climate-specific planning actions. Policy actions are focused on creating new or revising existing regulations and legislations. Operations and practice actions modify on-the-ground operations, management, and programs.

Governance Capacity Building

Actions that build and sustain capacity of local/regional government staff and decision makers to identify, assess, and implement actions for adaptation and building resilience. These actions can take the form of building partnerships with other government, private, or non-profit entities to share expertise and align resources; analysis and research investments; capacity to monitor climate impacts as well as outcomes of taking action.

Community Engagement and Capacity Building

These are actions and investments that provide direct resources to community organizations, groups and individuals needed to cope, adapt and thrive in a changing climate. Public outreach strategies may be crucial to informing other types of strategies that could be implemented or should be prioritized as well as public support for projects. These include both public communication and community engagement. Public communication actions aim to increase public awareness, as well as engage the public or community organizations in climate decision making.

Funding & Financing

Funding and financing strategies include external funding and financing. External funding includes obtaining funding from future federal, state, or non-profit sources and can include funding from grants. Financing can also include loans that need to be repaid.

Achieve Resiliency through Land Use Planning:

A key consideration for communities like Buncombe County is “how do we balance growth with our responsibility to keep residents safe and not increase our vulnerability to hazards?” This is a critical component of building resilience.

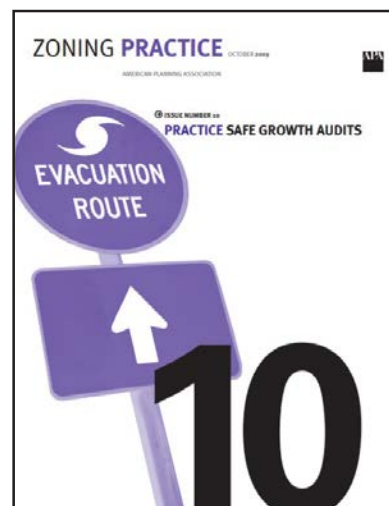
The following tools can be used to help the County as they think through resilience and hazard mitigation as part of the development of the Comprehensive Plan.

Safe Growth Audit

In 2009, the American Planning Association published the Safe Growth Audit as part of its Zoning Practice publication series.¹⁰

The Safe Growth Audit is a technique or tool that a community can use to “evaluate the extent to which a jurisdiction is growing safely relative to the natural hazards it faces.” It poses a series of questions (see following page) for local officials to consider regarding “the impacts of current policies, ordinances, and plans on community safety from hazard risk due to growth.”

It is recommended that the County consider some, if not all, of these questions as they work to update the Comprehensive Plan. Doing so will help ensure



COMPREHENSIVE PLAN**Land Use**

- Does the future land-use map clearly identify natural hazard areas?
- Do the land-use policies discourage development or redevelopment within natural hazard areas?
- Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas?

Transportation

- Does the transportation plan limit access to hazard areas?
- Is transportation policy used to guide growth to safe locations?
- Are movement systems designed to function under disaster conditions (e.g., evacuation)?

Environmental Management

- Are environmental systems that protect development from hazards identified and mapped?
- Do environmental policies maintain and restore protective ecosystems?
- Do environmental policies provide incentives to development that is located outside protective ecosystems?

Public Safety

- Are the goals and policies of the comprehensive plan related to those of the FEMA Local Hazard Mitigation Plan?
- Is safety explicitly included in the plan's growth and development policies?
- Does the monitoring and implementation section of the plan cover safe growth objectives?

ZONING ORDINANCE

- Does the zoning ordinance conform to the comprehensive plan in terms of discouraging development or redevelopment within natural hazard areas?
- Does the ordinance contain natural hazard overlay zones that set conditions for land use within such zones?
- Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?
- Does the ordinance prohibit development within, or filling of, wetlands, floodways, and floodplains?

SUBDIVISION REGULATIONS

- Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?
- Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources?
- Do the regulations allow density transfers where hazard areas exist?

CAPITAL IMPROVEMENT PROGRAM AND INFRASTRUCTURE POLICIES

- Does the capital improvement program limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?
- Do infrastructure policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards?
- Does the capital improvement program provide funding for hazard mitigation projects identified in the FEMA Mitigation Plan?

OTHER

- Do small area or corridor plans recognize the need to avoid or mitigate natural hazards?
- Does the building code contain provisions to strengthen or elevate construction to withstand hazard forces?
- Do economic development or redevelopment strategies include provisions for mitigating natural hazards?
- Is there an adopted evacuation and shelter plan to deal with emergencies from natural hazards?

that they are growing safely and building community resilience along the way.

Hazard Mitigation Capability Assessment

An important question for the County to consider during development of the 2043 Comprehensive Plan is “What is the capacity for the County to implement resilience and/or mitigation techniques?”

According to the Capability Assessment section of the Regional Hazard Mitigation Plan, the capability, or capacity of Buncombe County to implement a mitigation strategy is “High.” Specific information for how this determination was made can be found in that plan.

Having “high” capability means that Buncombe County has the means (administratively, technically, fiscally and politically) to implement a

comprehensive hazard mitigation and resilience strategy. That can be done by identifying potential opportunities for establishing or enhancing specific mitigation or resilience policies, programs or projects.

Equitable Resilience

The Comprehensive Plan is an opportunity for the County to address social equity in all resilience actions. Social equity goals can be informed by community input and background information collected on existing social stressors, such as food insecurity, lack of affordable housing, and legacy environmental injustice. The following multidimensional approach can be considered to ensure that efforts and outcomes are equitable.¹¹

<i>Equitable Resilience</i>	
Procedural equity	<ul style="list-style-type: none"> • Create processes that are transparent, fair, and inclusive in developing and implementing any program, plan, or policy • Ensure that all people are treated openly and fairly • Increase the civic engagement opportunities of communities that are disproportionately impacted by climate change
Distributional equity	<ul style="list-style-type: none"> • Fairly distribute resources, benefits, and burdens • Prioritize resources for communities that experience the greatest inequities, disproportionate impacts, and have the greatest unmet needs
Structural equity	<ul style="list-style-type: none"> • Make a commitment to correct past harms and prevent future unintended consequences • Address the underlying structural and institutional systems that are the root causes of social and racial inequities
<p><i>Source: the Urban Sustainability Directors Network Guide to Equitable, Community-Driven Climate Preparedness Planning</i></p>	

Endnotes

- 1 *Climate Change Impacts in the United States: The Third National Climate Assessment (U.S. Global Change Research Program. <http://nca2014.globalchange.gov/> Intergovernmental Panel on Climate Change. "Summary for Policymakers."*
 - 2 "Assessment of adaptation practices, options, constraints and capacity." In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* Burton, I. "Vulnerability and Adaptive Response in the Context of Climate and Climate Change."
 - 3 *Local Mitigation Planning Handbook (fema.gov)*
 - 4 *U.S. Climate Resilience Toolkit: <https://toolkit.climate.gov/>*
- The Climate Explorer: <https://crt-climate-explorer.nemac.org/>*
- 5 Radeloff, V. C., D. P. Helmers, H. A. Kramer, M. H. Mockrin, P. M. Alexandre, A. Bar-Massada, V. Butsic, T. J. Hawbaker, S. Martinuzzi, A. D. Syphard, and S. I. Stewart. 2018. Rapid growth of the U.S. Wildland Urban Interface raises wildfire risk. *Proceedings of the National Academy of Sciences*, 115(13): 3314-3319.
 - 6 Carter, L., A. Terando, K. Dow, K. Hiers, K.E. Kunkel, A. Lascurain, D. Marcy, M. Osland, and P. Schramm, 2018: Southeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 743–808. doi: 10.7930/NCA4.2018.CH19 <https://nca2018.globalchange.gov/chapter/19/>
 - 7 *The State of North Carolina, NC Resilient Communities Program, <https://www.rebuild.nc.gov/resiliency/resilient-communities>*
 - 8 *2020 North Carolina Climate Risk Assessment and Resilience Plan (June 2020), <https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council/climate-change-clean-energy-plans-and-progress/nc-climate-risk-assessment-and-resilience-plan>*
 - 9 *More information about the Priority Risk Index can be found in the Buncombe Madison Regional Hazard Mitigation Plan.*
 - 10 *Safe Growth Audits (planning.org)*
 - 11 *A few references that discuss different dimensions of equity in the context of resilience: Foster et al. 2019 NYC Panel on Climate Change 2019 Report Chapter 6, USDN Guide to Equitable Community-driven Climate Preparedness (2017); Meerow et al. Social Equity in Urban Resilience Planning (2019); Georgetown Climate Center Equitable Adaptation Legal and Policy Toolkit*