FLOYD COUNTY
HAZARD MITIGATION PLAN 2016

Including the Cities of Cave Spring and Rome

Table of Contents

Chapter 1 – Introduction……..……4

1.1 Purpose……..…..4

1.2 Organization of the Plan…….…….…....5

1.3 Participants in Planning Process…….……6

1.4 HRV Summary/Mitigation Goals…….……10

1.5 Multi-Jurisdictional Special Considerations…….10

1.6 Adoption, Implementation, Monitoring, Evaluation…….……...….11

1.7 Review and Incorporation…….……...….11

1.8 Scope of Updates…….……...…..13

1.9 Brief County Overview…….15

Chapter 2 – Local Natural Hazard, Risk and Vulnerability Summary…….….18

2.1 Tornados…….……...…21

2.2 Severe Thunderstorms (incl. Hail and Lightning)……...…42

2.3 Flooding……..……...……45

2.4 Winter Storms……..……...……...…50

2.5 Wildfire……...……..…….55

2.6 Drought……...……..…….62

2.7 Earthquakes……...…….....……...70

2.8 Sinkholes & Caves...……...…….....81

Chapter 3 – Local Tech Hazard, Risk & Vulnerability Summary……..……83

3.1 Hazardous Materials Release……...……..……85

3.2 Dam Failure…….....88

Chapter 4 – Land Use and Development Trends……..……...….95

Chapter 5 – Hazard Mitigation Goals, Objectives, and Actions…….…..96

Chapter 6 – Executing the Plan…….…...104

6.1 Action Plan Implementation…….....…104

6.2 Evaluation…….…...…105

6.3 Multi-Jurisdictional Strategy and Considerations…….…….....…105

6.4 Plan Update and Maintenance……..…...…105

Chapter 7 – Conclusion…….…...…...108

7.1 Summary……...…….108

7.2 References……...109

Appendices

Appendix A – Critical Facilities Database

Appendix B – Hazard History Database

Appendix C – Hazard Frequency Table

Appendix D – Other Planning Documents

Appendix E – Glossary

Appendix F – Signature Pages

Chapter 1
Introduction

1.1 Purpose

The Disaster Mitigation Act of 2000 has helped to bring attention to the need for successful hazard mitigation planning throughout the United States. Section 322 of the Act emphasizes the importance of comprehensive multi-hazard planning at the local level, both natural and technological, and the necessity of effective coordination between State and local entities to promote an integrated, comprehensive approach to mitigation planning. The Hazard Mitigation Planning and Hazard Mitigation Grant Program (HMGP) interim final rule published on February 26, 2002, identifies these new local mitigation planning requirements. According to this rule, state and local governments are required to develop, submit, and obtain FEMA approval of a hazard mitigation plan (HMP). Completion of an HMP that meets the new Federal requirements will increase access to funds for local governments and allow them to remain eligible for Stafford Act assistance.

The HMP becomes part of the foundation for emergency management planning, exercises, training, preparedness and mitigation within the County. Such a plan sets the stage for long-term disaster resistance through identification of actions that will, over time, reduce the exposure of people and property to identifiable hazards. This plan provides an overview of the hazards that threaten the County, and what safeguards have been implemented, or may need to considered for implementation in the future.

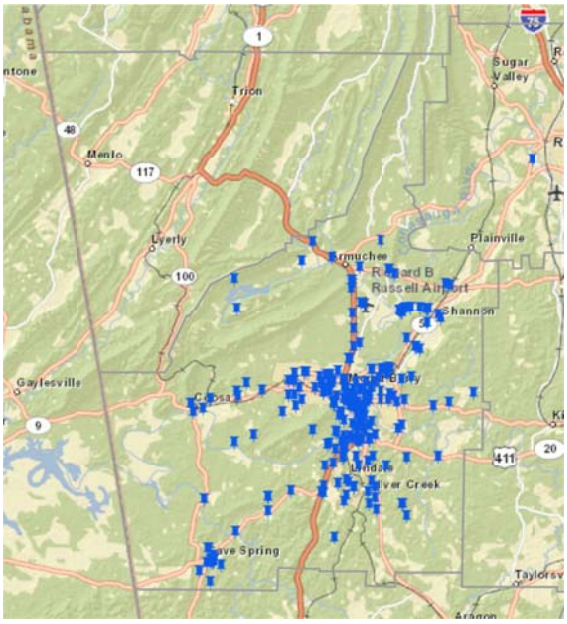
Hazards, for purposes of this plan, have been divided into two basic categories: natural and technological. Natural hazards include all hazards that are not caused either directly or indirectly by man and are frequently related to weather events, such as tornados and winter storms. Technological hazards include hazards that are directly or indirectly caused by man, including hazardous materials spills and weapons of mass destruction (WMD) events, although terrorism is not the particular focus of this Plan. This Plan also makes some recommendations that transcend this classification of natural and technological hazards. In other words, some of the recommendations contained within this Plan apply to many or all hazards. This is commonly referred to as an “all-hazards approach”. Most hazards throughout the United States could happen anytime and anywhere. However, the main focus of this plan is on those hazards that are most likely to affect Floyd County and the Cities of Cave Spring and Rome in the future.

1.2 Organization of the Plan

The Hazard Mitigation Plan (HMP) consists of four main components: 1) the narrative plan, 2) the Hazard History Database, 3) the Hazard Frequency Table, and 4) a Critical Facilities Database. The narrative plan itself is the main component of the HMP. This part of the Plan includes an overview of the planning process, a summary of the County's hazard history, hazard frequency projections, a detailed discussion of proposed mitigation measures, and a description of how future reviews and updates to the Plan will be handled. The Hazard History Database is attached as a Microsoft Excel spreadsheet and includes relevant information on past hazards within the County. The Hazard Frequency Table is derived from the hazard history and provides frequency-related statistics for each discussed hazard. This table is also attached as a Microsoft Excel spreadsheet. Finally, the Critical Facilities Database is an online tool developed in part by UGA for GEMA that contains detailed information on critical facilities within the County. Critical facilities for the purposes of this plan are those facilities that are among the most important within a specific jurisdiction with regard to the security and welfare of the persons and property within that jurisdiction. Typical critical facilities include hospitals, fire stations, police stations, critical records storage locations, etc. These facilities will be given special consideration during mitigation planning. For instance, a critical facility should not be located in a floodplain if at all possible. Using the critical facilities information, including GPS coordinates and replacement values, along with different hazard maps from GEMA, this database becomes a valuable planning tool that can be used by Counties to help estimate losses and assess vulnerabilities. This interactive Critical Facilities Database will also help to integrate mitigation planning into their other planning processes.

The following map displays the location of critical facilities within Floyd County and the Cities of Cave Spring and Rome. These facilities may be viewed in much greater detail within the Critical Facilities Database. Access to this database is limited and can only be viewed with the permission of the EMA Director due to the sensitive nature of some of the information.

<u>Floyd County Critical Facilities Map</u>



A risk assessment, which is composed of elements from each of the four main HMP components, provides the factual basis for all mitigation activities proposed within this Plan.

Inventory of Critical Facilities: Critical facilities are defined as facilities that provide essential products and services to the public. Many of these facilities are government buildings that provide a multitude of services to the public, including most public safety disciplines such as emergency management, fire, police, and EMS. Other government buildings/facilities commonly classified as critical facilities are water distribution systems, wastewater treatment facilities, public works, public schools, administrative services, and post offices. For the purposes of this Plan, critical facilities have been identified by the HMPC and important information gathered for each one. This information is located in the Critical Facilities Database (Appendix A).

Hazard Identification: During the planning process, a hazard history was created based upon available records from the past fifty years. This hazard history includes the natural and technological hazards that are most likely to affect the County. Unfortunately, record keeping was not as accurate or detailed decades ago as it is now. Therefore, the most useful information relating to these hazard events is found within the last ten to fifteen years. This fact is obvious upon review of the Hazard History Database (Appendix B), and the Hazard Frequency Table (Appendix C).

Profile of Hazard Events: Each hazard identified was analyzed to determine likely causes and characteristics, and what portions of the County's population and infrastructure were most affected. However, each of the hazards discussed in this Plan has the potential to negatively impact any given point within the County. A profile of each hazard discussed in this plan is provided in Chapter 2.

Vulnerability Assessment: This step is accomplished with the Critical Facilities Database by comparing GEMA hazard maps with the inventory of affected critical facilities, other buildings, and population exposed to each hazard (see Worksheets 3a).

Estimating Losses: Using the best available data, this step involved estimating structural and other financial losses resulting from a specific hazard. This is also accomplished to some degree using the Critical Facilities Database. Describing vulnerability in terms of dollar amounts provides the County with a rough framework in which to estimate the potential effects of hazards on the built environment.

Based on information gathered, the Plan identifies some specific mitigation goals, objectives, and actions to reduce exposure or impact from hazards that have the most impact on each community. A framework for Plan implementation and maintenance is also presented within this document.

Planning grant funds from the Federal Emergency Management Agency, administered by GEMA, funded the HMP. The HMP was developed by the HMPC, with technical assistance from GEMA and North Georgia Consulting Group.

1.3 Participants in Planning Process

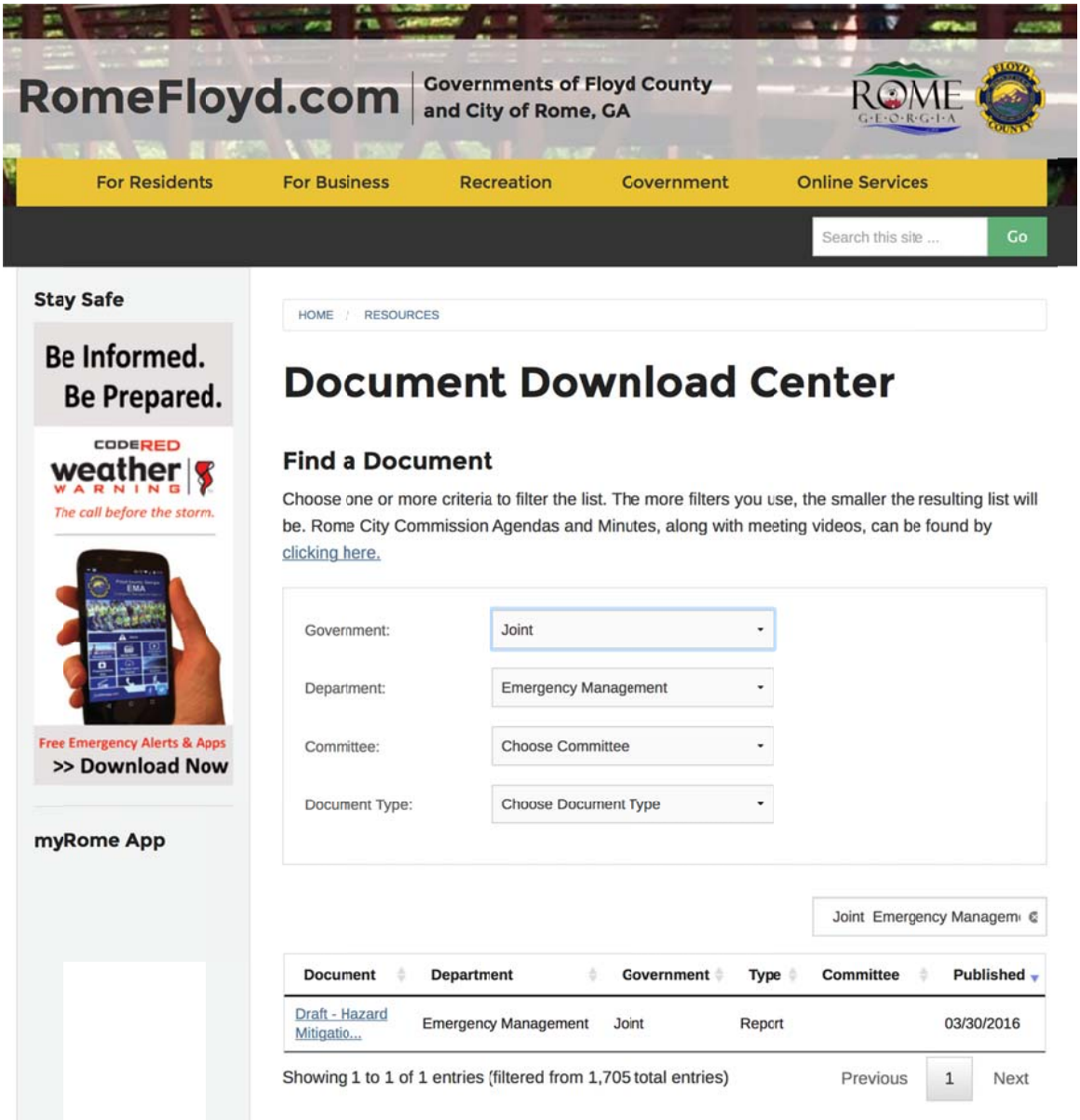
This Hazard Mitigation Plan (HMP) is designed to protect both the unincorporated areas of the County as well as the Cities. Though the County facilitated this planning process, the Cities of Cave Spring and

Rome provided critical input into the process. Without this mutual cooperation, the Plan would not exist in its present comprehensive form. Note: Please keep in mind that throughout this Plan, the term "county" typically refers to all of Floyd County, including the Cities of Cave Spring and Rome.

The process for updating Floyd County's Hazard Mitigation Plan can be found in the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Planning's "How To" Guides. According to "Getting Started: Building Support for Mitigation Planning;" the suggested process for preparing a Hazard Mitigation Plan is to 1) Organize resources and identify stakeholders and those holding technical expertise; 2) Access risks to the community; 3) Develop a Mitigation Plan and lastly; 4) Implement and Monitor that plan once it is adopted. (FEMA 386-1)

The Floyd County Hazard Mitigation Planning Committee (HMPC) is made up of a variety of members. The Chairman of the HMPC is Tim Herrington. The Chairman's responsibilities include all decisions relating to the overall direction of the Plan, retrieval of data from various departments, and serving as a central point of contact for all matters relating to the Plan. The consultant, NGCG, is responsible for facilitation of HMPC meetings, integration of updated data into the Plan, grant administration, and other administrative functions. Local government officials including County and City employees, Georgia Forestry, and Floyd Medical Center represented the HMPC. Representatives for utilities and local businesses were also extended an invitation to participate. Potential participants were invited either verbally or by email, depending upon the participant. Each jurisdiction had representatives on the HMPC who provided critical data for consideration through meetings, email, and/or site visits. This diverse group provided valuable input into the planning process including identifying hazards and developing important mitigation measures to be considered in the future. The entire HMPC met several times over the course of this planning process. These meetings occurred on January 27, 2015, April 16, 2015, May 14, 2015, July 14, 2015, and August 11, 2015. Other meetings were held throughout this planning process at various times between two or more HMPC members in order to accomplish smaller tasks. Two public meetings relating to this Plan are required by FEMA: one during the drafting stages of the Plan, and one after the final version of the Plan is completed. The first of these two meetings occurred on August 11, 2015 during the drafting stages of the Plan. Once necessary revisions were made to the Plan, a second public meeting was held on December 13th 2016 where it was adopted by Floyd County. A copy of the adoption resolution is included in the Appendices.

The public was provided opportunities at two separate public meetings to review and comment on the Plan. All public meetings were advertised in the local newspaper and the draft Plan update was posted on the county website as shown on the following page. In addition, surrounding jurisdictions were directed to the online draft Plan and provided with an opportunity to comment on the Plan prior to submittal. The final version of the Plan was then submitted to GEMA and FEMA for review and subsequent approval.



The Plan is the result of a community-wide effort put forth over the past several months utilizing FEMA's Hazard Mitigation Plan "How To" Guides to aid in laying out the planning process described above. Stakeholders and persons with technical expertise were identified early in the process. Full participation was provided by Floyd County and the Cities of Cave Spring and Rome. Each jurisdiction had representatives on the Hazard Mitigation Planning Committee and provided critical data to the HMPC for consideration.

The public involvement elements of this Plan were reviewed by the HMPC. They were determined to have remained effective and were approved for use in the current Plan update process.

HMPC members are listed alphabetically in the following table:

Name	Jurisdiction/Dept
Kenna Baker	Floyd Co. Medical Center, Preparedness Coordinator
Tom Bowen	Floyd County EMA, Communications Administrator
Shaun Brand	GA Dept of Public Health, Emergency Preparedness Coordinator
Troy Brock	City of Rome Fire Dept., Fire Chief
Stacy Cantrell	GFC, Ranger
Matt DeFoor	City of Rome, GIS Coordinator
Judy Dickerson	City of Cave Spring, Clerk
Shane Hendrix	Floyd County Environmental Health, Manager
Tim Herrington	Floyd County EMA Director
Sammy Highfield	City of Cave Spring, Maintenance Supervisor
Tracy Mobley	GFC, Ranger
Nathan Oakes	GFC, Ranger
Curt Pierson	City of Rome Fire Dept., Deputy Chief
Brad Roberson	Floyd County Fire Dept., Chief
Bryan J. Roberts	City of Rome/Floyd County Floodplain Management Coordinator
Michael Skeen	Floyd County Public Works, Director
David Thompson	City of Rome/Floyd County Planning Dept, Director
Vicki Wiles	Medical College of GA Physician Coordinator / Floyd County CERT Coordinator

Various County and Cities departments, schools, and others participated in conversations with the EMA Director that directly contributed to the development of this Plan. Due to limited resources within the County and Cities, attendance at HMPC meetings for many was not an option. Nevertheless, their direct input was utilized by the HMPC to develop this Plan.

The Plan was posted on the county's website during the planning process. This was done to allow the general public, including other nearby communities, as well as other agencies to review and comment on the Plan utilizing the contact information provided on the website.

1.4 HRV summary/Mitigation goals

Floyd County has experienced a number of hazard events throughout its history, most resulting in fairly localized damage. Flooding, tornados, winter storms, wildfire, drought, severe thunderstorms (including hail and lightning), earthquakes, landslides, dam failure and hazardous materials to varying degrees represent known threats to Floyd County. The Floyd County HMPC used information gathered throughout this planning process to identify mitigation goals and objectives as well as some recommended mitigation actions. Each potential mitigation measure identifies an organization or agency responsible for initiating the necessary action, as well as potential resources, which may include grant programs and human resources. An estimated timeline is also provided for each mitigation action.

1.5 Multi-Jurisdictional Special Considerations

The Cities of Cave Spring and Rome were active participants and equal partners in the planning process as well as the previous planning process. As an active part of the HMPC, both jurisdictions contributed significantly to the identification of mitigation goals and objectives and potential mitigation measures contained within the HMP.

Participation in Mitigation Plan

Jurisdiction	*2015 Plan*	*2011 Plan*
Floyd County	✔	✔
City of Cave Spring	✔	✔
City of Rome	✔	✔

1.6 Adoption, Implementation, Monitoring, Evaluation

Upon completion of the Plan, it will be forwarded to GEMA for initial review. GEMA will then forward the Plan to FEMA for final review and approval. Once final FEMA approval has been received, Floyd County and the Cities of Cave Spring and Rome will be responsible for initiating the appropriate courses of action related to this Plan. Actions taken may be in coordination with one another or may be pursued separately. The "Plan Update and Maintenance" section of this document details the formal process that will ensure that the Floyd County HMP remains an active and relevant document. The HMP maintenance process includes monitoring and evaluating the Plan annually, and producing a complete Plan revision every five years. Additionally, procedures will ensure public participation throughout the plan maintenance process. This Plan will be considered for integration into various existing plans and programs, including the Floyd County Comprehensive Plan at its next scheduled update. Mitigation actions within the HMP may be used by the County and Cities as one of many tools to better protect the people and property of Floyd County and the Cities of Cave Spring and Rome. Floyd County and the Cities of Cave Spring and Rome are each individually responsible for the processes necessary to formally adopt this Plan.

Adoption Status

Jurisdiction	*Date of Adoption*
Floyd County	Upon GEMA & FEMA Approval
City of Cave Spring	Upon GEMA & FEMA Approval
City of Rome	Upon GEMA & FEMA Approval

1.7 Review and Incorporation

The HMPC recognized the need to integrate other plans, codes, regulations, procedures and programs into this Hazard Mitigation Plan (HMP). Floyd County did not have the opportunity to incorporate the original HMP's strategy into other planning mechanisms, but will now ensure that during the planning process for new and updated local planning documents such as a comprehensive plan or Local Emergency Operations Plan, the EMA Director will provide a copy of the HMP to the appropriate parties, so incorporation will be considered in future updates. All goals and strategies of new and updated local planning documents should be consistent with, and support the goals of, the HMP and not contribute to increased hazards in the affected jurisdiction(s).

Record of Review

Existing planning mechanisms	Reviewed? (Yes/No)	Method of use in Hazard Mitigation Plan
Comprehensive Plan (multi-jurisdictional)	Yes	Development trends
Local Emergency Operations Plan	Yes	Identifying hazards; Assessing vulnerabilities
Storm Water Management / Flood Damage Protection Ordinance	Yes	Mitigation strategies
Building and Zoning Codes and Ordinances	Yes	Development trends; Future growth
Mutual Aid Agreements	Yes	Assessing vulnerabilities
State Hazard Mitigation Plan	Yes	Risk assessment
Land Use Maps	Yes	Assessing vulnerabilities; Development trends; Future growth
Critical Facilities Maps	Yes	Locations
Community Wildfire Protection Plan	Yes	Mitigation strategies

As set forth in the plan maintenance section of this plan (Section 6.4), the Hazard Mitigation Planning Committee will meet during the plan approval anniversary date of every year to complete a review of the Hazard Mitigation Plan. It is during this review process that the mitigation strategy and other information contained within the Hazard Mitigation Plan are considered for incorporation into other planning mechanisms as appropriate. Opportunities to integrate the requirements of this HMP into other local planning mechanisms will continue to be identified through future meetings of the HMPC on an annual basis. The primary means for integrating mitigation strategies into other local planning mechanisms will be through the revision, update and implementation of each jurisdiction's individual action plans that require specific planning and administrative tasks (e.g., plan amendments and ordinance revisions).

During the planning process for new and updated local planning documents such as a comprehensive plan or Local Emergency Operations Plan, the EMA Director will provide a copy of the HMP to the appropriate parties. It will be recommended that all goals and strategies of new and updated local planning documents be consistent with, and support the goals of, the HMP and will not contribute to increased hazards in the affected jurisdiction(s).

Although it is recognized that there are many benefits to integrating components of this plan into other local planning mechanisms, and that components are actively integrated into other planning mechanisms when appropriate, the development and maintenance of this stand-alone HMP is deemed by the committee to be the most effective method to ensure implementation of local hazard mitigation actions at this time. Therefore, the review and incorporation efforts made in this update and the last, which consisted of a simple review of the documents listed in the chart above by various members of the HMPC, are considered successful by the HMPC and will likely be utilized in future updates.

The County's EMA is committed to incorporating hazard mitigation planning into its Local Emergency Operations Plan and other public emergency management activities. As the EMA Director becomes aware of updates to other County or City plans, codes, regulations, procedures and programs, the Director will continue to look for opportunities to include hazard mitigation into these mechanisms.

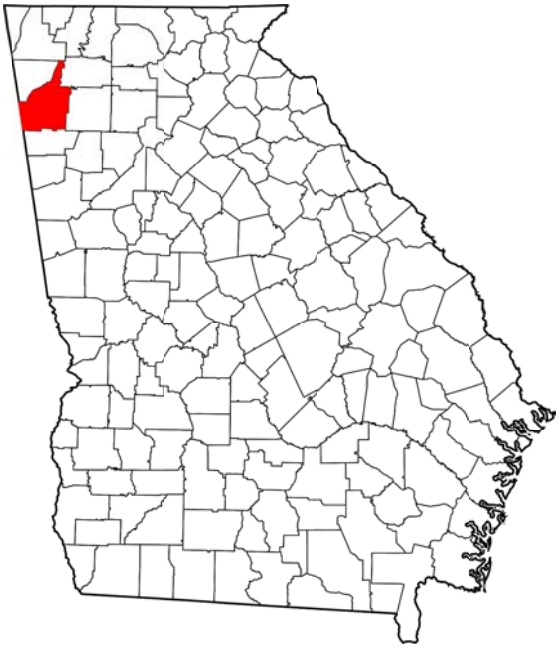
1.8 Scope of Updates

Changes have been made to the HMP in this updated version. These changes are summarized in the following table.

Chapter or Section	Chapter or Section Description	Changes this Update
1.2	Organization of the Plan	Descriptions
1.3	Participants in Planning Process	Data
1.5	Multi-Jurisdictional Special Considerations	Data
1.6	Adoption, Implementation, Monitoring, Evaluation	Descriptions, Data
1.7	Review and Incorporation	Descriptions, Data
1.8	Scope of Updates	Descriptions, Data
1.9	Brief County Overview	Descriptions, Data
2	Introduction	Descriptions, Data
2.1	Severe Thunderstorm	Descriptions, Data, Visual Aids
2.2	Winter Storm	Descriptions, Data, Visual Aids
2.3	Flooding	Descriptions, Data, Visual Aids
2.4	Tornado	Descriptions, Data, Visual Aids
2.5	Wildfire	Descriptions, Data, Visual Aids

2.6	Drought	Descriptions, Data, Visual Aids
2.7	Earthquake	Descriptions, Data, Visual Aids
2.8	Sinkholes	Descriptions, Data, Visual Aids
3.1	Hazardous Materials Rel.	Descriptions, Data, Visual Aids
3.2	Dam Failure	Descriptions, Data, Visual Aids
4	Land Use & Dev. Trends	Descriptions, Data, Visual Aids
5	HM Goals Objectives & Actions	Descriptions, Data
6.1	Action Plan Implementation	Descriptions
6.2	Evaluation	Descriptions
6.3	Multi-Jurisdictional Strategy & Considerations	Descriptions
6.4	Plan Update & Maintenance	Descriptions, Data
7.2	References	Data
App. A	Critical Facilities Database	Data, Visual Aids
App. B	Hazard History Database	Data
App. C	Hazard Frequency Table	Data
App. D	Other Planning Documents	Descriptions, Data, Visual Aids

1.9 Brief County Overview



County Formed: December 3, 1832

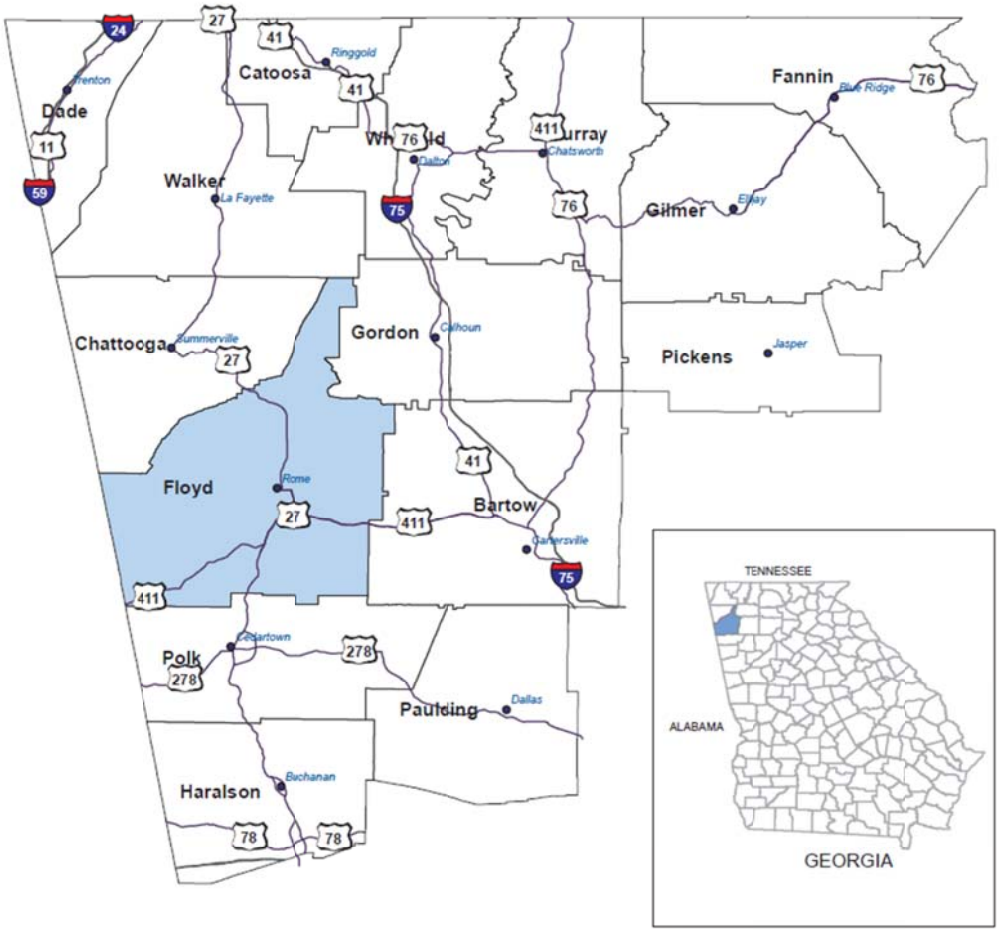
County Seat: Rome

Incorporated Cities: Cave Spring, Rome

U.S. Census Bureau Estimated Population:

Floyd County:	96,063 (2014)
City of Cave Spring:	1,200 (2010)
City of Rome:	35, 973 (2013)

Total Area: 518.5 square miles



LOCATION MAP
FLOYD COUNTY, GEORGIA

Miles
20 10 0 20

Community Information

Floyd County is located in the northwestern area of the state of Georgia on the Alabama border. Its largest city, Rome, is located in the center of the county and the City of Cave Spring is located in the southwest. Floyd County has a “ridge and valley” topography. Rome’s elevation is 605 feet and Cave Spring’s is 636 feet. Floyd County has two major rivers running throughout the county. The Etowah and Oostanaula rivers merge in downtown Rome to form the Coosa River, which then flows through the western part of the county into Alabama. This places parts of the county directly in flood areas.

Rome is the county seat of Floyd County and has a total area of 29.8 square miles. The U.S. Census Bureau estimated the city population as of 2013 was 35, 973.

Cave Spring is the smaller of the two municipalities located in Floyd County. The City of Cave Spring has a total area of 4.0 square miles. Cave Spring does not have a river running through it. Cedar Creek is the only large body of water that affects Cave Spring. The 2010 Census places the population of Cave Spring at 1,200 people.

Floyd County has a total area of 518.5 square miles, of which, 5.3 square miles is water. Sixty (60) percent of the land is forested. The U.S. Census Bureau estimated the county population as of 2014 was 96,063.

Rome is the home of four colleges and two major medical centers.

Cave Spring is known for its antique shops, old residences, and its namesake crystal clear spring. The town features Rolater Park, which includes the world's largest natural spring swimming pool. Cave Spring is also home to the Georgia School for the Deaf.

In northern Floyd County is the $800 million Rocky Mountain pumped storage power plant. Generating enough power for 290,000 households, the plant pumps water to a 550-acre lake on the mountain top, channels the water down a 570-foot vertical shaft and through a 2,500-foot horizontal tunnel to a series of turbines inside the mountain's base.

Chapter 2
Local Natural Hazard, Risk and Vulnerability (HRV) Summary

The Floyd County Hazard Mitigation Planning Committee (HMPC) identified natural hazards the County is vulnerable to based upon available data including scientific evidence, known past events, and future probability estimates. As a result of this planning process, which included an analysis of the risks associated with probable frequency and impact of each hazard, the HMPC determined that each of these natural hazards pose a threat significant enough to address within this Plan. These include tornado, severe thunderstorm (including hail & lightning), flooding, winter storms, wildfire, drought, earthquakes, and sinkholes & caves. For this plan update, the HMPC reviewed the natural hazards listed in the 2011 Georgia Hazard Mitigation Strategy Standard Plan Update to assess the applicability of these hazards to Floyd County and the Cities of Cave Spring and Rome (See Table 2.1). Each of these natural hazards is addressed in this chapter of the Plan. An explanation and results of the vulnerability assessment are found in Tables 2-1 and 2-2.

The HMPC also discussed how changes in the climate may in some ways impact the County and Cities. If this is the case, at this point there is insufficient data to calculate how and to what degree such changes may impact Floyd County in the future. However, it seems likely that the impact of any changes in climate would be manifested in the form of the same hazards currently addressed within this Plan, even though frequency, probability and severity of those hazards might change.

Table 2.1 – Hazards Terminology Differences

Hazards Identified in 2011 Georgia State Plan	Equivalent/Associated Hazards Identified in the 2015 Floyd County Plan	Difference
Tornados	Tornados	Grammatical only.
Wind	Severe Thunderstorms	HMPC views as an associated hazard.
Severe Weather	Severe Thunderstorms	Difference in terminology.
Hailstorm	Severe Thunderstorms	HMPC views as an associated hazard.
Lightning	Severe Thunderstorms	HMPC views as an associated hazard.
Tropical Cyclonic Events	Severe Thunderstorms Flooding	Due to the County's inland location, not directly viewed as a threat. Tropical weather has limited effects within the County and is generally considered in terms of Severe Thunderstorms and Flooding, associated hazards.
Inland Flooding	Flooding	Difference in terminology.
Earthquake	Earthquake	None
Severe Winter Storms	Winter Storms	Difference in terminology.
Wildfire	Wildfire	None
Drought	Drought	None

Table 2.2 – Vulnerability Assessment - Natural Hazards *(see Keys below)*

HAZARD	Floyd	Cave Spring	Rome
Severe Thunderstorms (includes lightning & hail)			
Frequency	EX	EX	EX
Severity	EX	EX	EX
Probability	EX	EX	EX
Tornados			
Frequency	H	M	H
Severity	EX	H	EX
Probability	H	M	H
Flooding			
Frequency	H	M	H
Severity	H	M	H
Probability	H	H	H
Winter Storms			
Frequency	M	M	M
Severity	H	H	H
Probability	M	M	M
Drought			
Frequency	M	M	M
Severity	H	M	H
Probability	M	M	M
Wildfire			
Frequency	L	L	VL
Severity	M	M	M
Probability	L	L	VL
Earthquake			
Frequency	M	M	M
Severity	M	M	M
Probability	H	H	H
Sinkholes & Caves			
Frequency	M	H	M
Severity	M	M	M
Probability	M	H	M
Dam Failure			
Frequency	L	VL	L
Severity	H	M	H
Probability	L	VL	L
Hazardous Materials Release			
Frequency	M	L	M
Severity	H	M	H
Probability	H	M	H

Key for Table 2.2 – Vulnerability Assessment Frequency and Probability Definitions

NA = Not applicable; not a hazard to the jurisdiction
VL = Very low risk/occurrence
L = Low risk; little damage potential (for example, minor damage to less than 5% of the jurisdiction)
M = Medium risk; moderate damage potential (for example, causing partial damage to 5-15% of the jurisdiction, infrequent occurrence)
H = High risk; significant risk/major damage potential (for example, destructive, damage to more than 15% of the jurisdiction, regular occurrence)
EX = Extensive risk/probability/impact

Key for Table 2.2 – Vulnerability Assessment Severity Definitions

	Low	**Medium**	**High**	**Extensive**
Tropical Cyclonic Events	*(See Wind & Inland Flooding)*			
ind – Wind Speed	38 MPH	39–50 MPH	50-73 MPH	73–91 MPH
Severe Thunderstorm	*(See Wind & Inland Flooding)*			
Tornado - Magnitude	< EF3	EF3	EF4	EF5
Inland Flooding - Water depth	3” or less	3 – 8”	8-12”	12”+
Severe Winter Storms – Ice/ Sleet	½” or less	½ – 4”	4-7”	7”+
Severe Winter Storms - Snow	1” or less	1-6”	6-12”	12”+
Drought – Duration	1 year	1 – 2 years	2-5 years	5+ years
Wildfire - # of Acres	<50	50-110	110-200	200+
Earthquake - Magnitude	1-2	3	4	5+

2.1 Tornados

A. Hazard Identification – A tornado is a dark, funnel-shaped cloud containing violently rotating air that develops below a heavy cumulonimbus cloud mass and extends toward the earth. The funnel twists about, rises and falls, and where it reaches the earth causes great destruction. The diameter of a tornado varies from a few feet to a mile; the rotating winds attain velocities of 200 to 300 mph, and the updraft at the center may reach 200 mph. A tornado is usually accompanied by thunder, lightning, heavy rain, and a loud "freight train" noise. In comparison with a hurricane, a tornado covers a much smaller area but can be just as violent and destructive. The atmospheric conditions required for the formation of a tornado include great thermal instability, high humidity, and the convergence of warm, moist air at low levels with cooler, drier air aloft. A tornado travels in a generally northeasterly direction with a speed of 20 to 40 mph. The length of a tornado's path along the ground varies from less than one mile to several hundred.

The Fujita Scale was the standard scale in the United States for rating the severity of a tornado as measured by the damage it causes from 1971 to 2007 (see table below).

The Fujita Scale of Tornado Intensity			
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 reinforced concrete structures badly damaged.

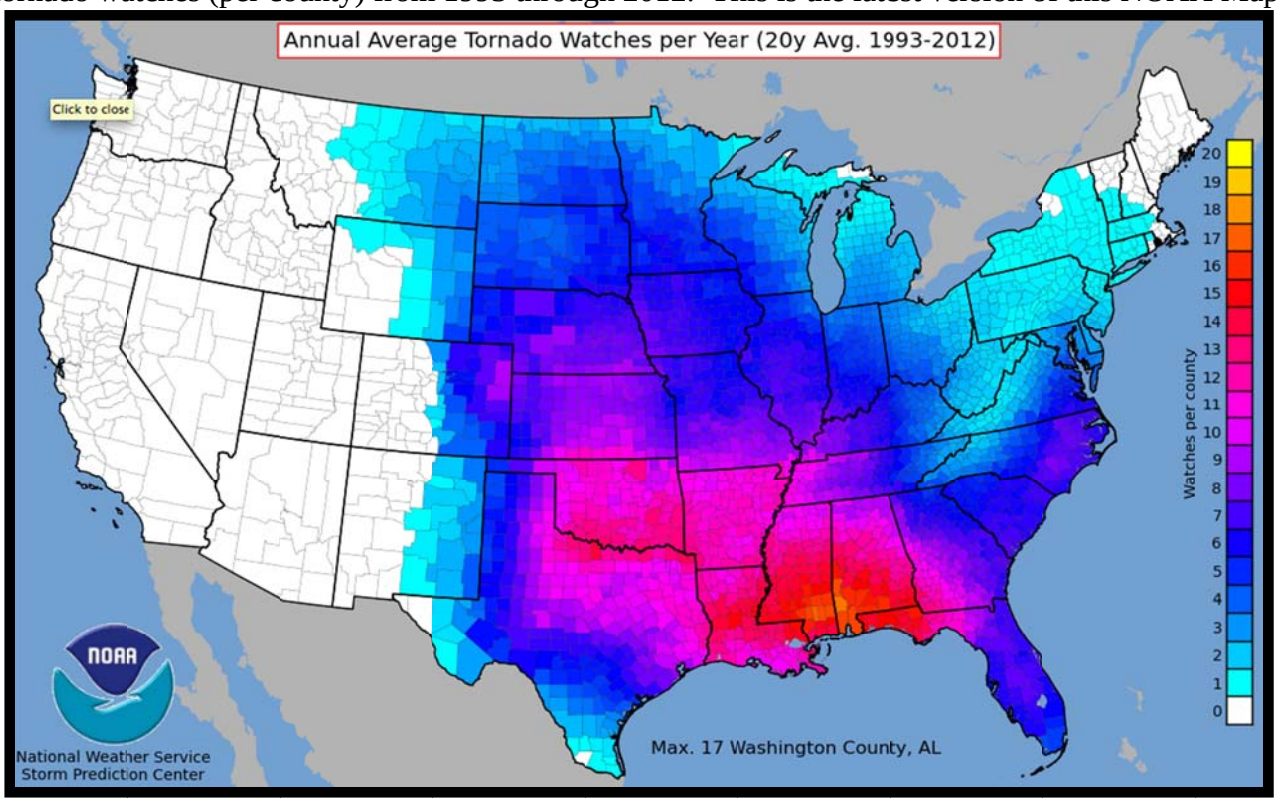
The Enhanced Fujita (EF) Scale for Tornado Damage is an update to the original Fujita Scale by a team of meteorologists and wind engineers that was implemented in the United States in 2007. The EF Scale is still a set of wind estimates (not measurements) based on damage. It uses three-second gusts estimated at the point of damage based on a judgment of 8 levels of damage to 28 indicators. These estimates vary with height and exposure. The three-second gust is not the same wind as in standard surface observations. Standard measurements are taken by weather stations in open exposures, using a directly measured, "one-minute mile" speed.

Levels of the Enhanced Fujita scale

Grade, damage and windspeeds

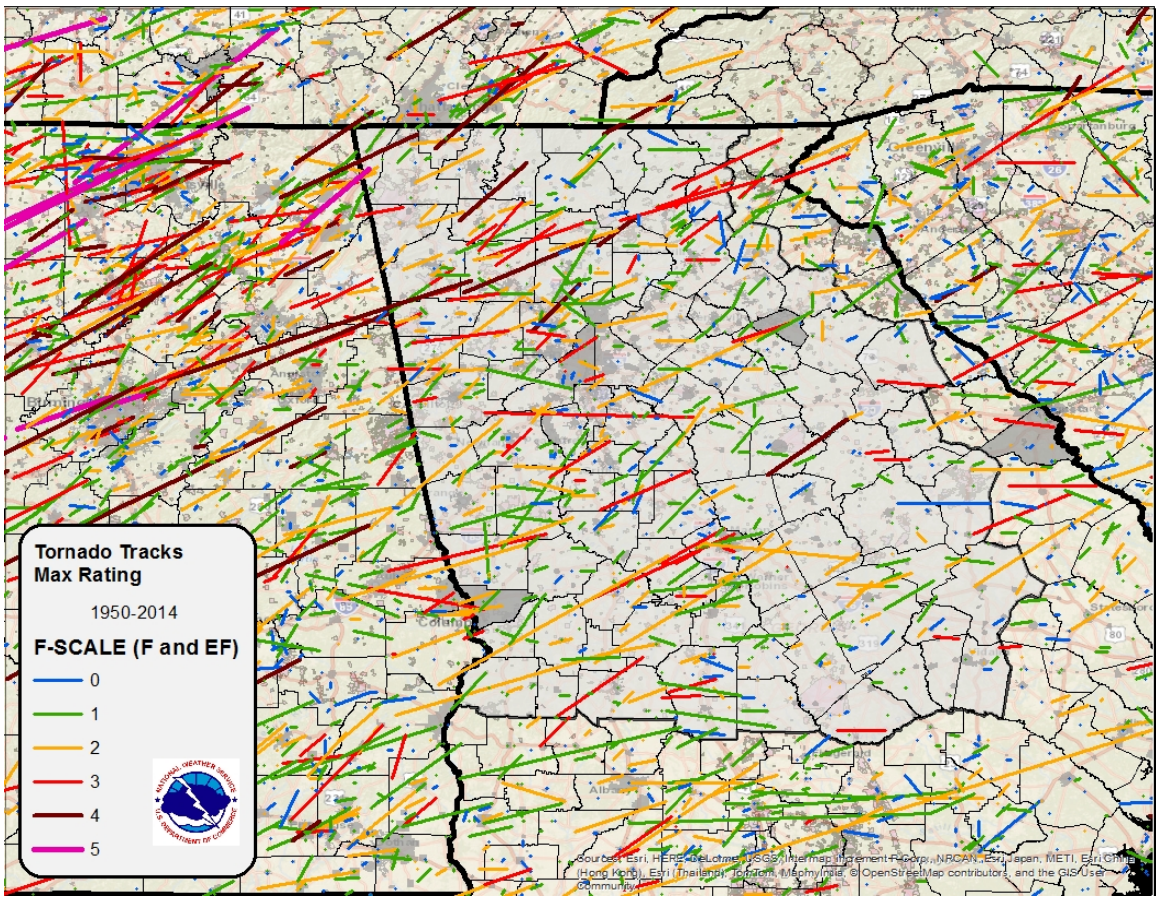
Source: Fema

The NOAA map below represents the average annual number of NOAA Storm Prediction Center tornado watches (per county) from 1993 through 2012. This is the latest version of this NOAA Map.

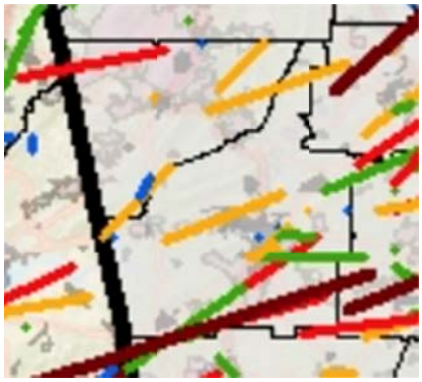


Floyd County averaged six per year during this time period. Although this 20 year time period does not match up exactly with the timelines reviewed within this Plan, the map is a valuable visual aid by providing a nationwide perspective on potential tornado activity.

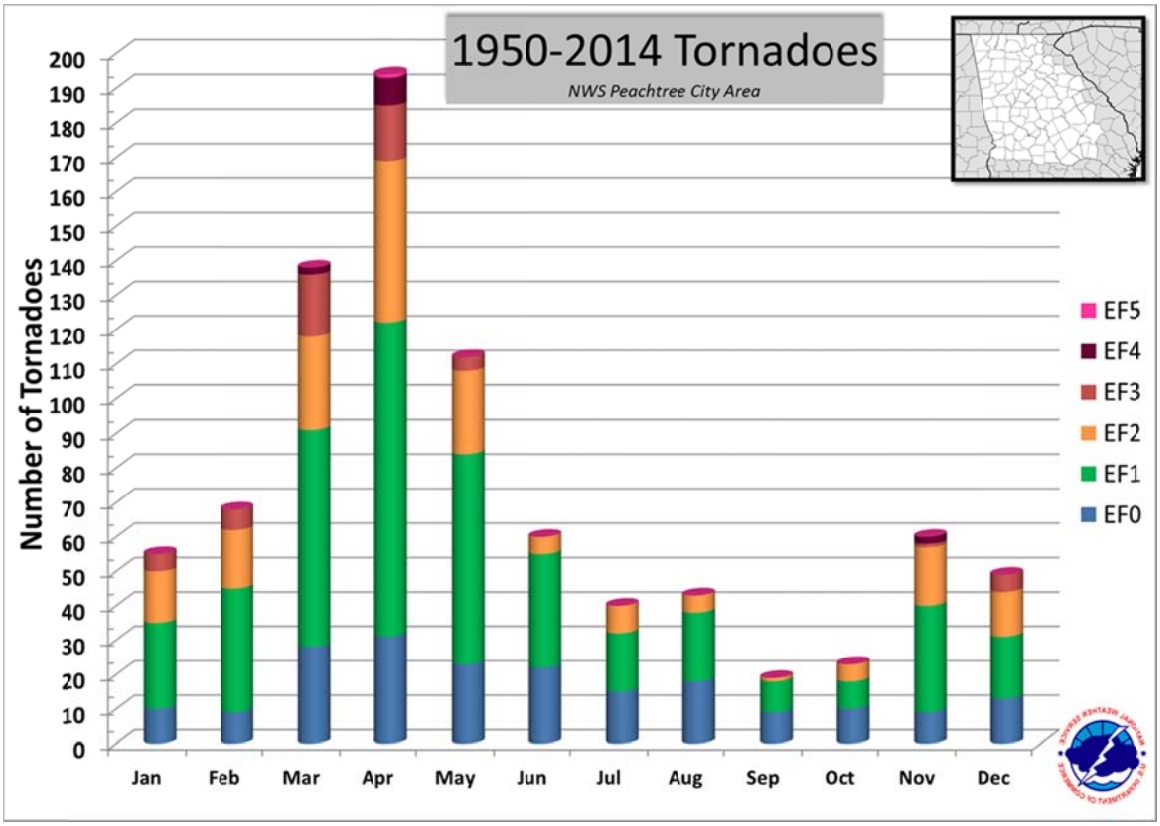
The following NOAA maps represent the United States severe report database (tornados 1950-2014) converted into shapefile (.shp) file format along with a Geographic Information System (GIS) database. In other words, these maps show the estimated paths and intensities of recorded tornados over this time period. Although this 64-year time period does not match up exactly with the 50-year timeline reviewed within this Plan, the map remains a valuable visual aid by providing a regional perspective on historical tornado activity.



Close-up of Floyd County from the map above:



Tornados are considered to be the most unpredictable and destructive of weather events in Georgia, even though they are not the most frequently occurring natural hazard within Floyd County. Tornado season in Georgia is ordinarily said to run from March through August, with the peak activity being in April. However, tornados can strike at any time of the year when certain atmospheric conditions are met, including during the coldest months of the year. See the National Weather Service graph below, which covers the NWS Peachtree City Area of Georgia.



B. Hazard Profile – All areas within Floyd County are vulnerable to the threat of a tornado. There is simply no method to determine exactly when or where a tornado will occur. The Floyd County Hazard Mitigation Planning Committee (HMPC) reviewed historical data from the Georgia Tornado Database, the National Climatic Data Center, and various online resources in researching the past effects of tornados within the County. With most of the County's recorded tornado events, only basic information was available. However, dozens of tornado watches have been recorded during this period, and certainly some tornados go undetected or unreported. Therefore, any conclusions reached based upon available information on tornados within Floyd County should be treated as the minimal possible threat.

In the Peachtree City County Warning Area (CWA), which includes Floyd County, the average number of tornado days per year is six, according to the National Weather Service. While tornados have been reported in all months of the year, most occur in the months of March, April, and May. During this "tornado season" the most likely time of occurrence is from mid-afternoon through early evening. Tornado intensities of F2 or greater are involved in 37% of the events when the data is broken down into a county-by-county basis. These strong tornados are more likely to occur during the month of April than in any other month.

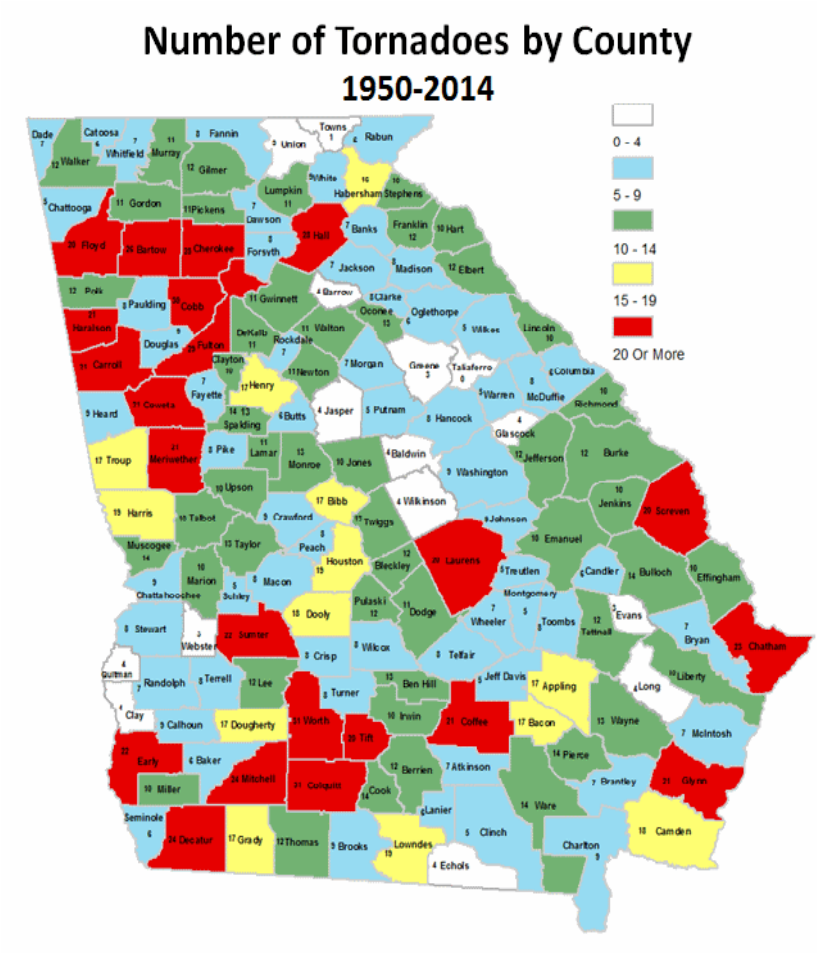
(National Climatic Data Center) NCDC and other records show that 21 tornados occurred within the County over the past fifty years, which equates to a 42% annual frequency of reported events. However, four of the tornados have occurred within the past five years, which equates to an 80% annual frequency of reported events. It would appear that tornado activity has increased significantly over time within the County. This may be the case or it may simply be that record keeping and technology have improved significantly over the course of time, reflecting the higher numbers. It may also be a combination of

these two factors. The following chart provides annual frequency of reported events over the past five, ten, twenty, and fifty-year periods. The most recent five-year period, covering the span of time since the last update to this Plan, is highlighted in gold.

Floyd County – Tornado Frequency (based on Reported Events)				
Time Period	**5yrs (2010-2015)**	**10yrs (2005-2015)**	**20yrs (1995-2015)**	**50yrs (1965-2015)**
Number of Reported Events	**4**	**8**	**9**	**21**
Frequency Average per Year	**0.80**	**0.80**	**0.45**	**0.42**
Frequency Percent per Year	**80%**	**80%**	**45%**	**42%**

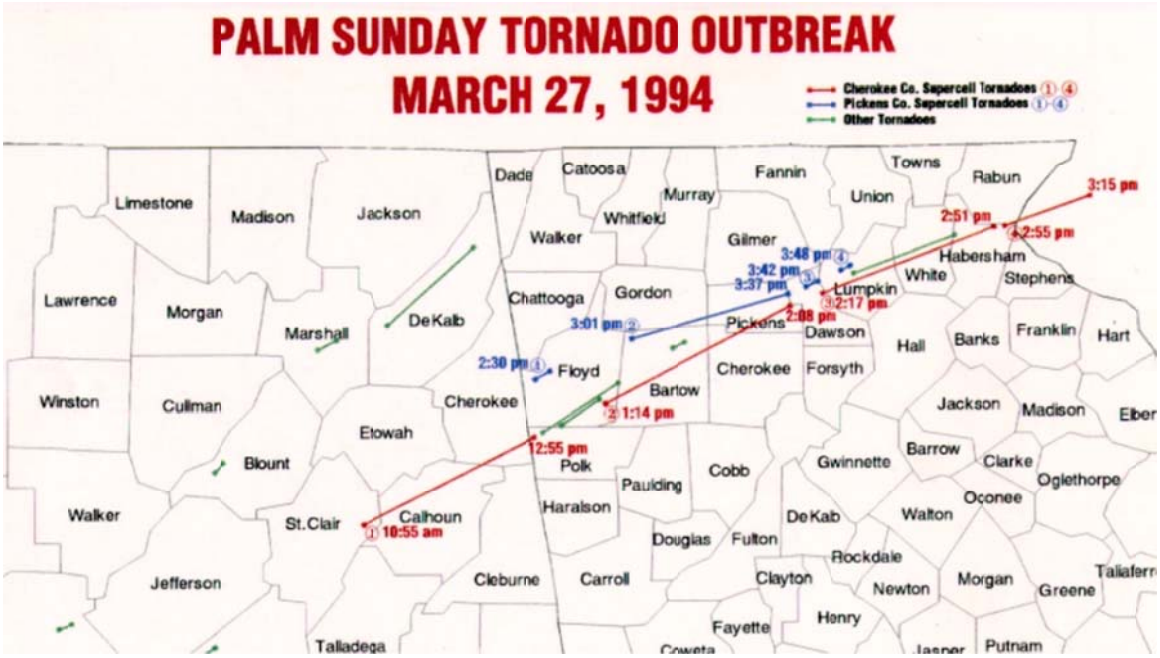
The National Weather Service statewide map on the following page shows 20 Floyd County tornados on record from the specific time period of 1950 to 2014. However, a total of 21 tornados have actually been recorded over the past fifty years (1965-2015). See the Hazard History Database (Appendix B) for information on all tornados recorded in the NCDC Database.

The most recent version of this National Weather Service map below covers the period from 1950-2014. It demonstrates historic tornado activity of the County in relationship to surrounding counties, and the entire state.



March 27, 1994 Palm Sunday Tornados

On March 27, 1994, a severe tornado outbreak occurred across four states and became known as the Palm Sunday Tornado Outbreak. It was responsible for 42 fatalities, 320 reported injuries, and hundreds of damaged or destroyed residences.



On March 27, 1994 (Palm Sunday) "supercells" of tornados moved from northern Alabama, into North Georgia and on to South and North Carolina. The 12 supercells spawned possibly 30 individual tornados, 15 in the state of Georgia alone. Of the 42 who died, 18 were within the state of Georgia. Only Alabama had more.

Saturday morning at 2:00 am, March_26, 1994 the National Weather Service (NWS) issued a bulletin that included the "possibility of isolated supercells with a threat of tornados." Later that evening tornados touched down in Cobb County, Paulding County, Hall County, Stevens County and White County, Georgia as warm, moist air from the surface was rapidly being covered by an incoming upper level cold front that extended from north central Alabama into north Georgia. The front stalled, essentially creating a path through northern Alabama and north Georgia that these storms could follow. At 9:18am the following morning a storm system the meteorologists were watching moved to the Mississippi-Alabama border and developed enough for the NWS to issue Tornado Watch No. 4, which covered northern and central Alabama. They knew this storm was serious. The rating system used by the meteorologists, incorporating factors like temperature difference and humidity, gave the storms an 8.4, and a 2.0 means tornados are likely to form.

Sunday morning, March_27, 1994, started off like many previous Palm Sundays for members of the Goshen United Methodist Church, three miles south of Piedmont, Alabama. It had traditionally been heavily-attended in this deeply religious farming community of 5,000, only 25 miles east of Cedartown,

Georgia. That morning 20 members died when a tornado struck the church at 11:35. Only the church nursery was spared. Ham radio operator Jack Blair's wife and daughter went to that morning service. After the tornado struck Jack made his way to the church, broadcasting to the world, "The roof has exploded. I see one house, the top all gone. Power lines down. Vehicles wrecked ... rescue squad on the scene." His wife lay dead, his daughter severely injured.

The storm (or mesocyclone) that spawned the Piedmont tornado moved east into Georgia. At 12:14 pm observers reported a funnel cloud -- a category F4 tornado had landed in Floyd County, Georgia. According to the NWS, supercell outbreaks of tornadic activity such as the one that was now moving into the state are "infrequent." Infrequent or not, over the next eight hours Georgia residents would be repeatedly raked by heavy rain, hail and high winds.

With a report of a funnel cloud from a credible observer, members of the Peachtree City, Georgia National Weather Service team had a lot of work to do. First, they upgraded all area tornado watches to tornado warnings and quickly sent the information out over their network. A minute after the first report, the F4 tornado was in Bartow County, moving east and tearing up infrastructure at an alarming rate.

Although most tornados have a life of a few minutes, Storm No. 5 (the NWS designation of the tornado) spent 32 minutes on the ground in Bartow County alone. Leaving a path of utter destruction, killing two people and injuring 14, this storm destroyed property in extreme northwest Cherokee County, crossing Salacoa Ridge in the rugged Cherokee Highlands and continuing into Pickens County where it added more death and destruction to its toll. Tornado #5 alone accounted for 3 deaths and 20 injuries.

As Tornado #5 moved east the funnel cloud dissipated over Pickens County, but the storm that had formed it continued moving east along the boundary of the stalled cold front. A second tornado from the same storm, designated #9 by the NWS, formed over Dawson County (east of Pickens), crossing Lumpkin County, and coming to an end in Habersham County, in Georgia's northeast corner.

The southern border of Rabun County is defined by the Tallulah River, the geological formation Tallulah Gorge, and the small town of Tallulah Falls, which spans Rabun's border with neighboring Habersham County. East of here, the Chattooga River creates the South Carolina border. A third storm from the same mesacyclone, designated Tornado #12 formed over Habersham County as Tornado #9 died, continuing the earlier storm's path of destruction by moving east into Rabun County, passing directly over Tallulah Falls about 5 minutes after 2 p.m, that Sunday, causing extensive destruction.

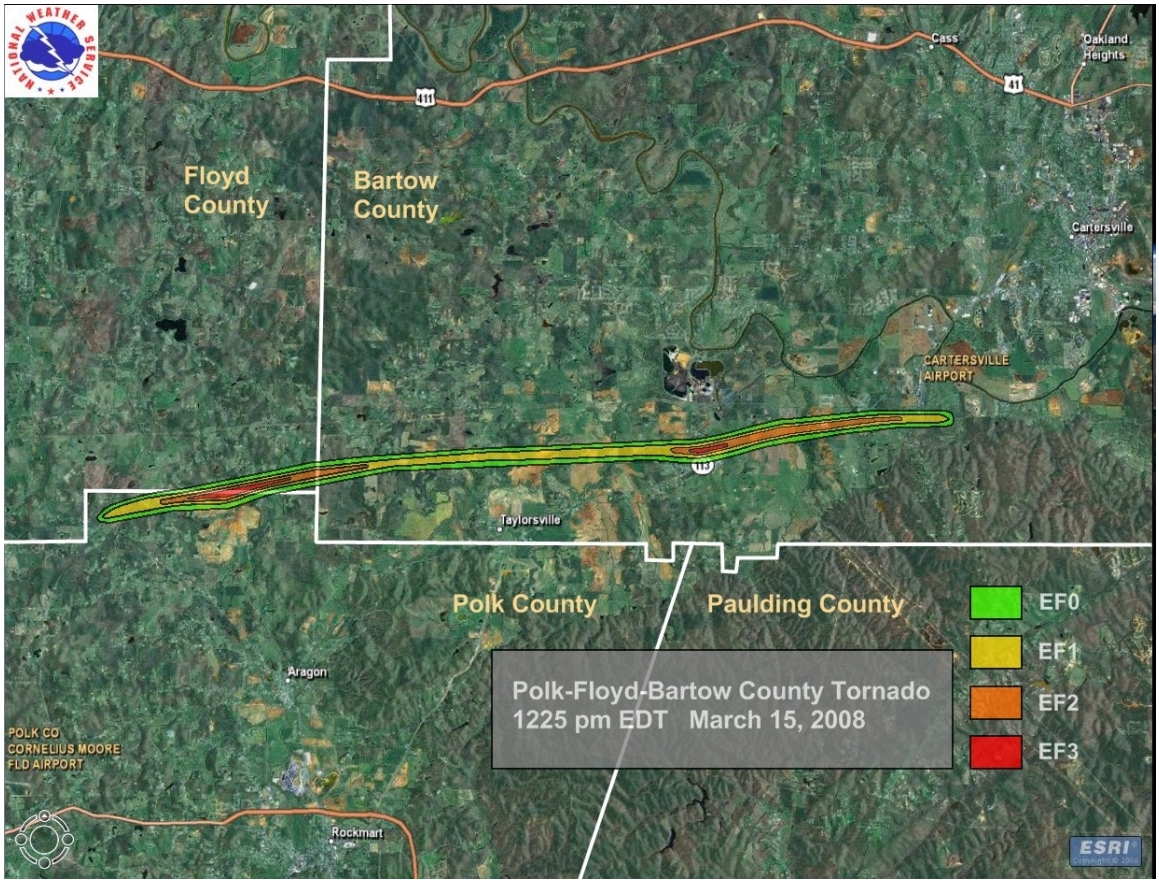
Crossing Tallulah Gorge into Rabun County, the F3 storm did extensive natural damage to the North Rim Trail. Continuing on to the Chattooga River, Storm #12 snapped trees and deposited them into the gorge. One still sits atop "Deliverance Rock." By the time the supercell moved into North and South Carolina, taking with it Storm #12 and its' mile-wide path, a second supercell had entered the state following roughly the same track as the first. Although "only" an F3, this storm killed 8 people in Pickens County, making it the most deadly tornado in Georgia that day.

As the cold front slowly pushed south F0-F3 storms struck northwest Georgia at about 6:00 pm that evening, causing some destruction, but no deaths were associated with these storms. By the end of the day these "killer tornados" left in its path a death toll of 42 people and 320 people injured. The National Oceanic and Atmospheric Administration calculated the property damage at 107 million dollars

March 15, 2008 Tornado

On March 15, 2008, just one day after the City of Atlanta was hit by a deadly tornado, severe thunderstorms and tornados returned to Georgia. These storms dealt the state another heavy blow as two people lost their lives and others were injured. Hail and high winds struck at least 40 counties. Survey teams from the National Weather Service Forecast Office in Peachtree City confirmed 3 tornados - the worst being an EF3 killer that raked portions of Floyd, Polk and Bartow counties. Maximum winds with this storm were estimated as high as 150 mph.

Path of EF3 tornado that struck Floyd and Bartow Counties.

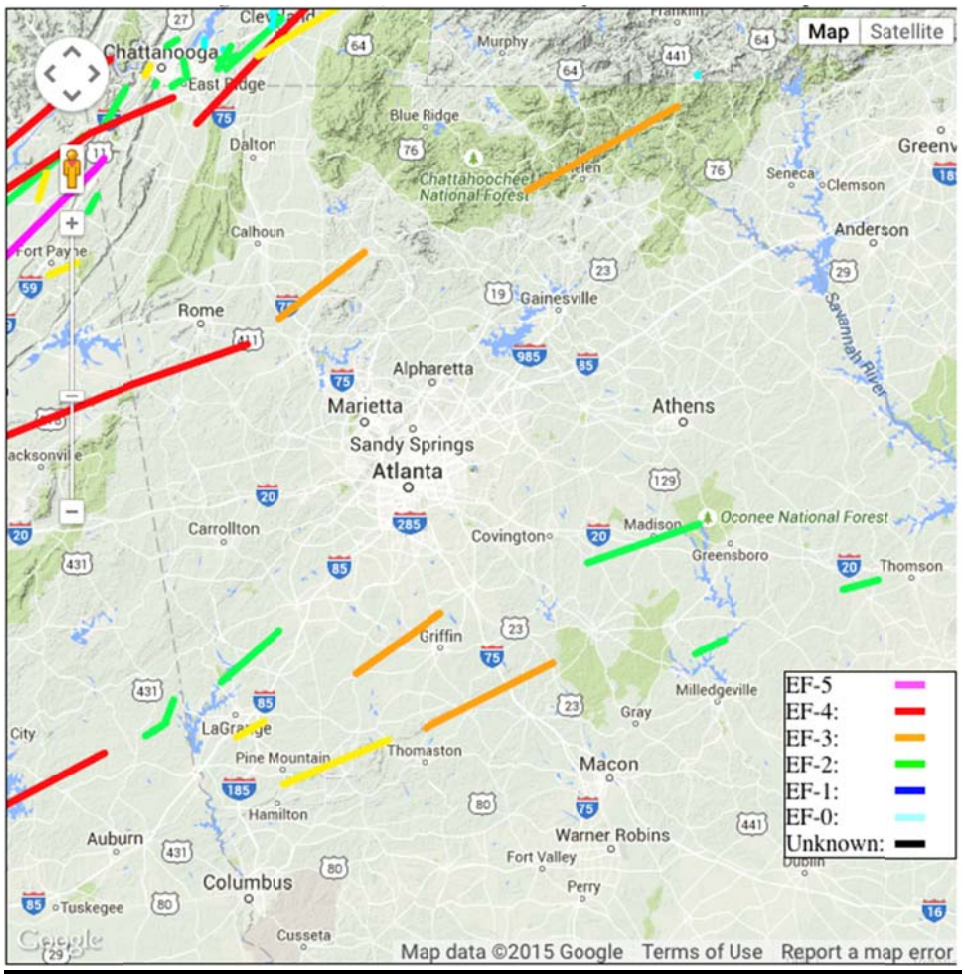


Two homes and some outbuildings destroyed along Old Wax Road in Floyd County. One fatality took place here.

Chicken houses damaged in Floyd County.

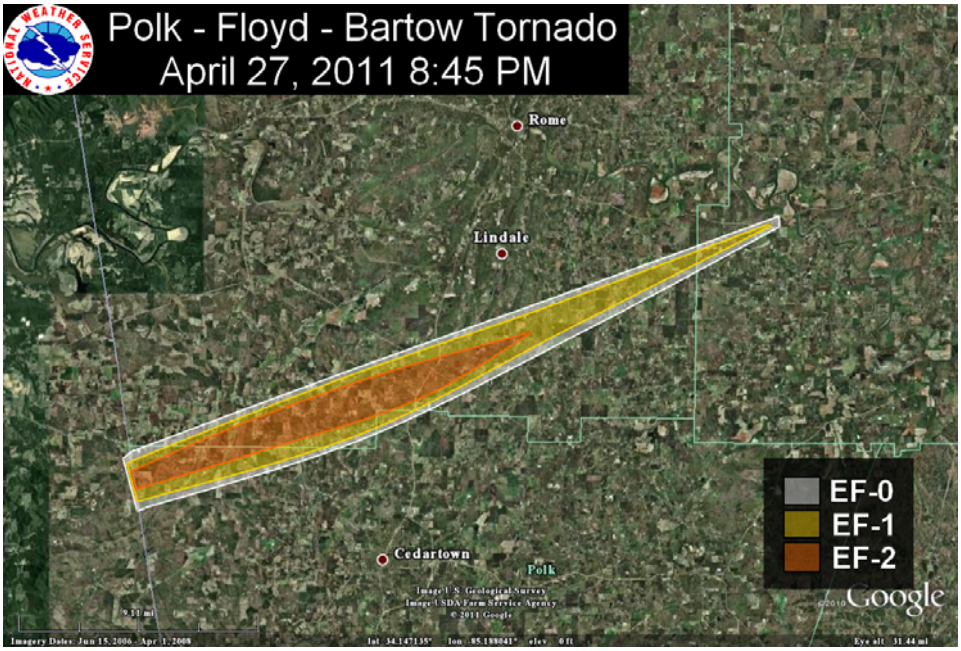
April 27-28, 2011 Tornados

A strong area of low pressure lifted through the Ohio valley allowing a cold front to sweep through the lower Mississippi valley during the evening hours of April 27th. Ahead of the front, increased moisture emanating off the Gulf of Mexico combined with a potent upper level system to produce widespread severe weather. All of north and central Georgia was placed under a moderate risk of severe thunderstorms, and northwest Georgia was covered by a rare high-risk area. As the evening progressed, a Tornado Watch was issued with the designation of PDS, or Particularly Dangerous Situation, indicating a high potential for strong and long-lived tornados. Numerous long-tracked tornados, including two EF-5 tornados, raked over much of the southeast states causing extensive damage and, unfortunately, loss of life. In total, 15 tornados tracked across the Peachtree City forecast area, which includes most of north and central Georgia.

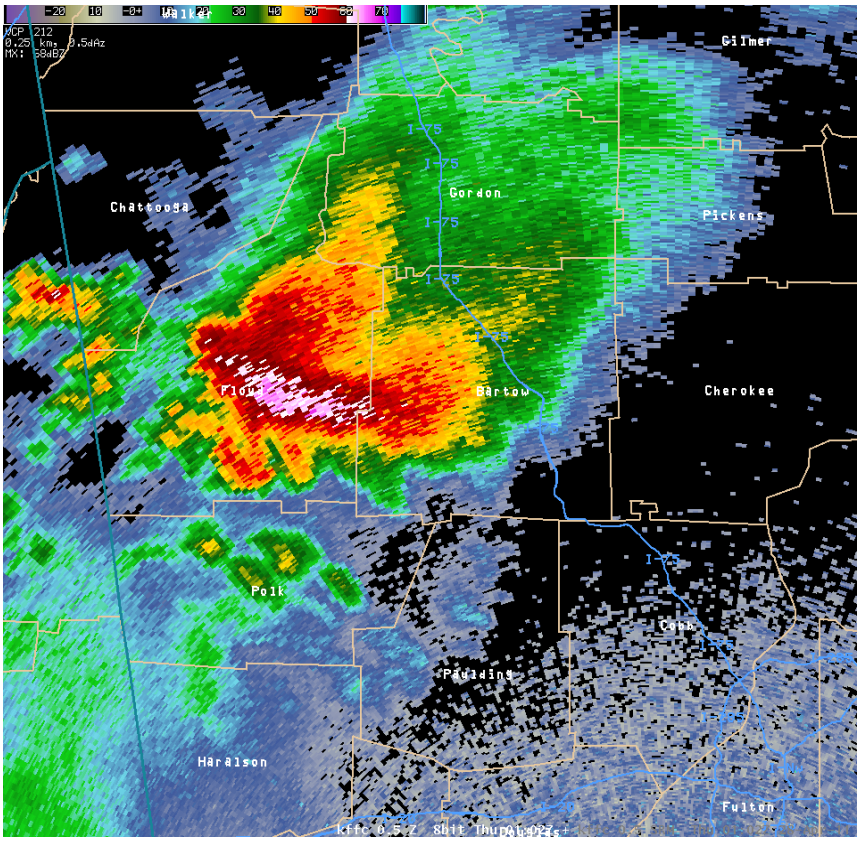


A National Weather Service survey team determined that an EF2 tornado with maximum winds of 125 MPH moved across extreme northwest Polk, south Floyd, and Bartow Counties the evening of April 27, 2011. The tornado touched down about 6 miles southwest of Cave Springs in Polk County around 8:45 pm Wednesday. It lifted about 4 miles southwest of Kingston in Bartow County around 9:25 pm. The path length was 26 miles long and had a width of a half-mile wide. More than 13 structures were destroyed and in addition about 10 chicken houses were destroyed.

Path of EF2 tornado that struck Polk, Floyd, and Bartow Counties.



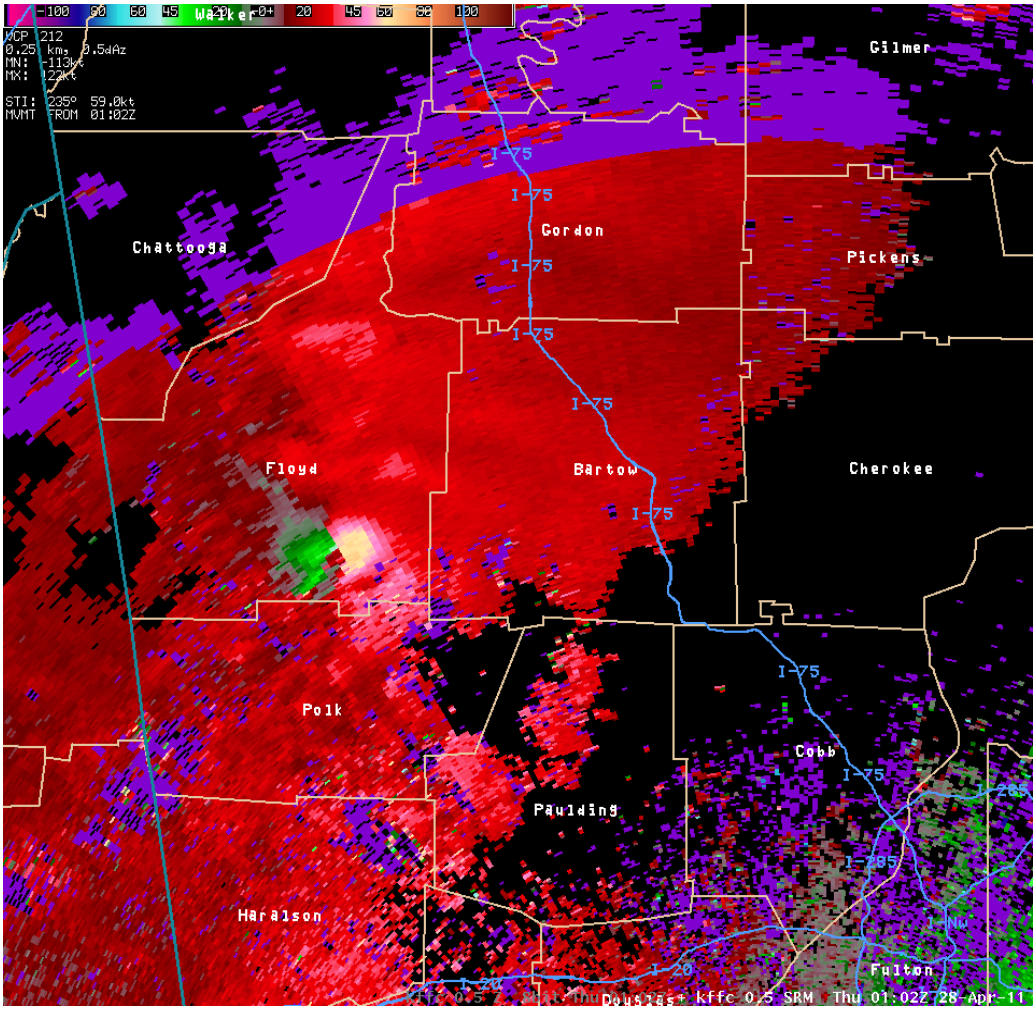
Reflectivity image of tornado in Floyd County.



Chicken houses destroyed on Mountain Home Road (Polk/Floyd County line).

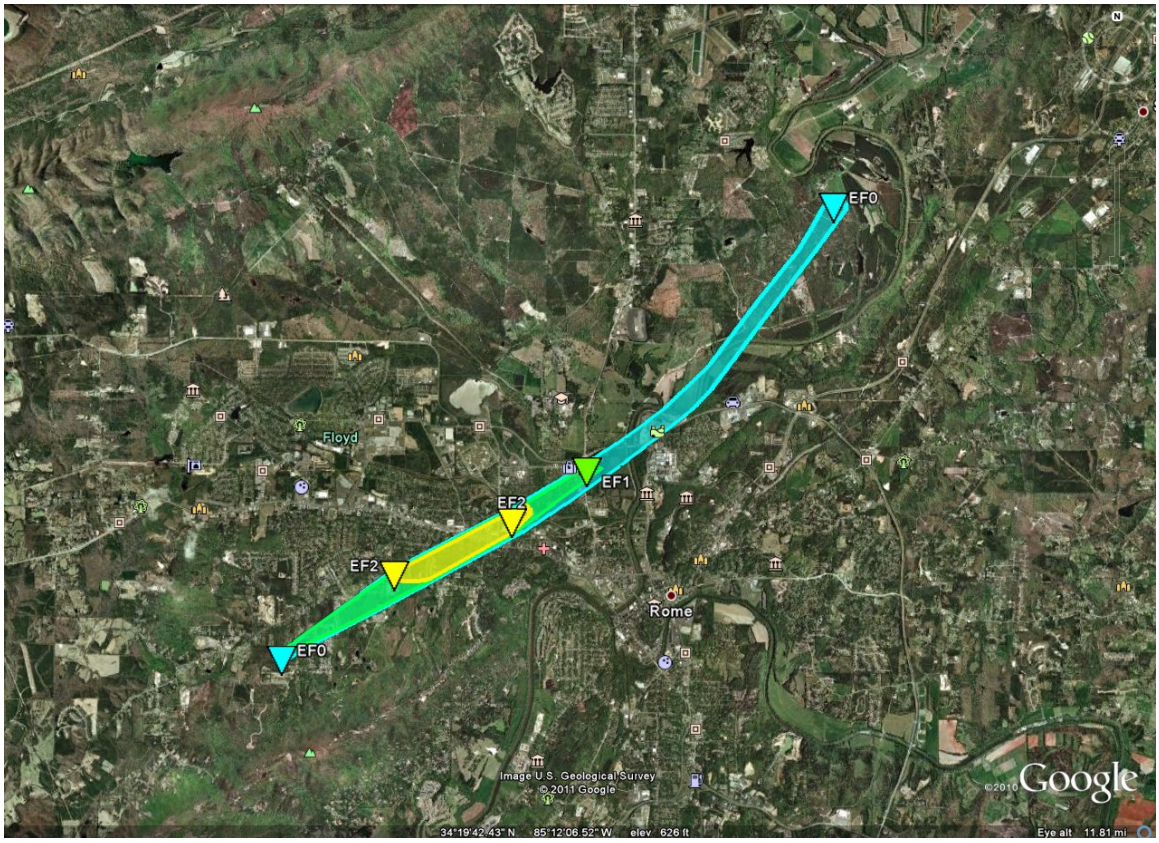
Damage to home on Old Cedartown Road just south of Lindale (Floyd County).

Storm Relative Velocity image of tornado in Floyd County.



December 22, 2011 Tornado

A National Weather Service assessment team was dispatched to Floyd County near Rome to investigate damage associated with thunderstorms that moved through the evening of December 22, 2011. It was determined that EF1 tornado touched down just west of the Rome city limits near the end of Holland Dr. The tornado strengthened to EF2 as the storm progressed northeast into the Walton Creek subdivision where several well-constructed homes lost their roofs. The EF1 to EF2 damage continued for approximately a mile and a half as it crossed Shorter Ave and North Division St, where more homes and a few businesses were damaged. A large storage facility used by Berry College was heavily damaged on John Davenport drive. The tornado eventually weakened and dissipated west of highway 53 and east of Jones Bend road.



Damage to a warehouse in Floyd County.

Damage in Rome, GA

February 22, 2012 Tornado

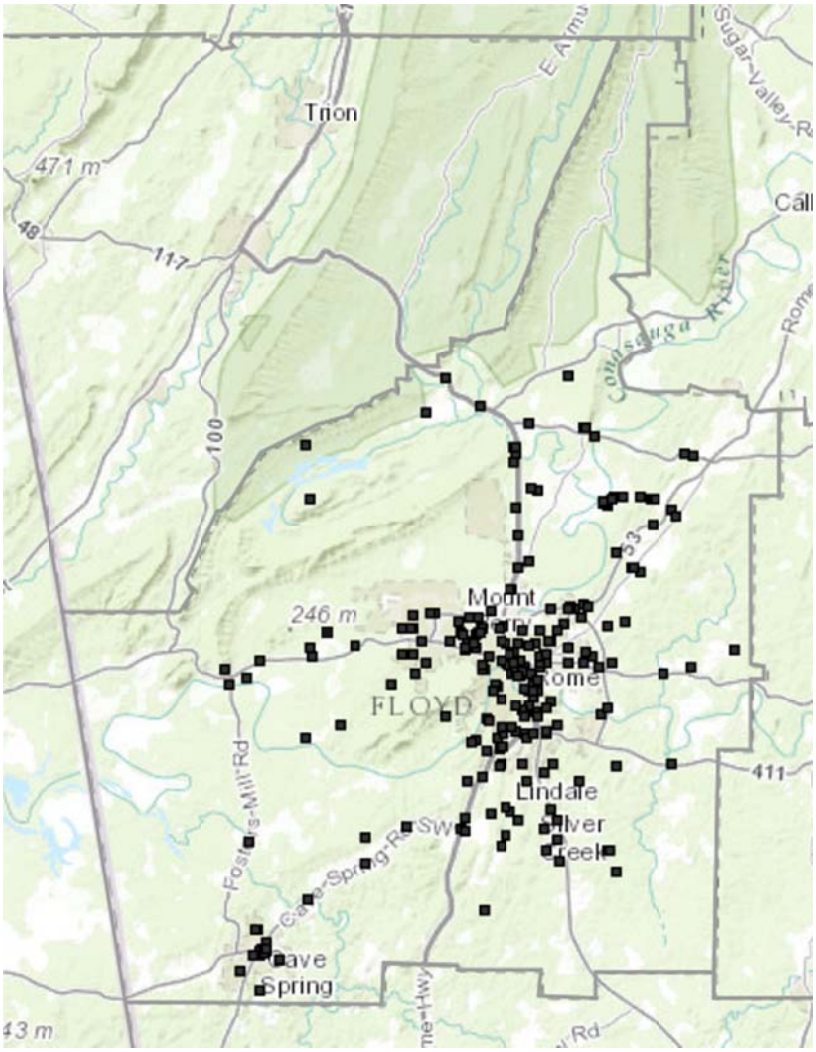
A line of storms tracked across northwest Georgia on February 22, 2012. One severe thunderstorm spawned a weak tornado in Floyd County. Details on the tornado can be found below.

- Location: Floyd County
- Rating: EF1
- Wind Speed: 95 MPH
- Path Length: 3.25 miles
- Path Width: 75 yards
- Injuries: 0
- Deaths: 0 direct, 1 indirect

Additional Information: The initial touchdown was in the city of Rome, just west of the Maplewood Subdivision. EF1 damage, consisting mostly of uprooted and snapped trees, occurred as the tornado moved in a general easterly direction. The tornado traveled east of Rome and nearly paralleled Kingston Highway, where the most significant damage was sustained near the intersection of Kingston Highway and Freeman Ferry. At this location, a small store lost a significant portion of its roof, and the entire roof was blown off a singlewide manufactured home. The one indirect fatality associated with the storm occurred at this location, when a 75-year-old woman died of a heart attack after the storm passed. The tornado continued to parallel Kingston Highway, uprooting numerous trees and damaging or destroying a couple of outbuildings. The tornado weakened to an EF0 and finally lifted just east of the intersection of Kingston Highway and Mathis Road.

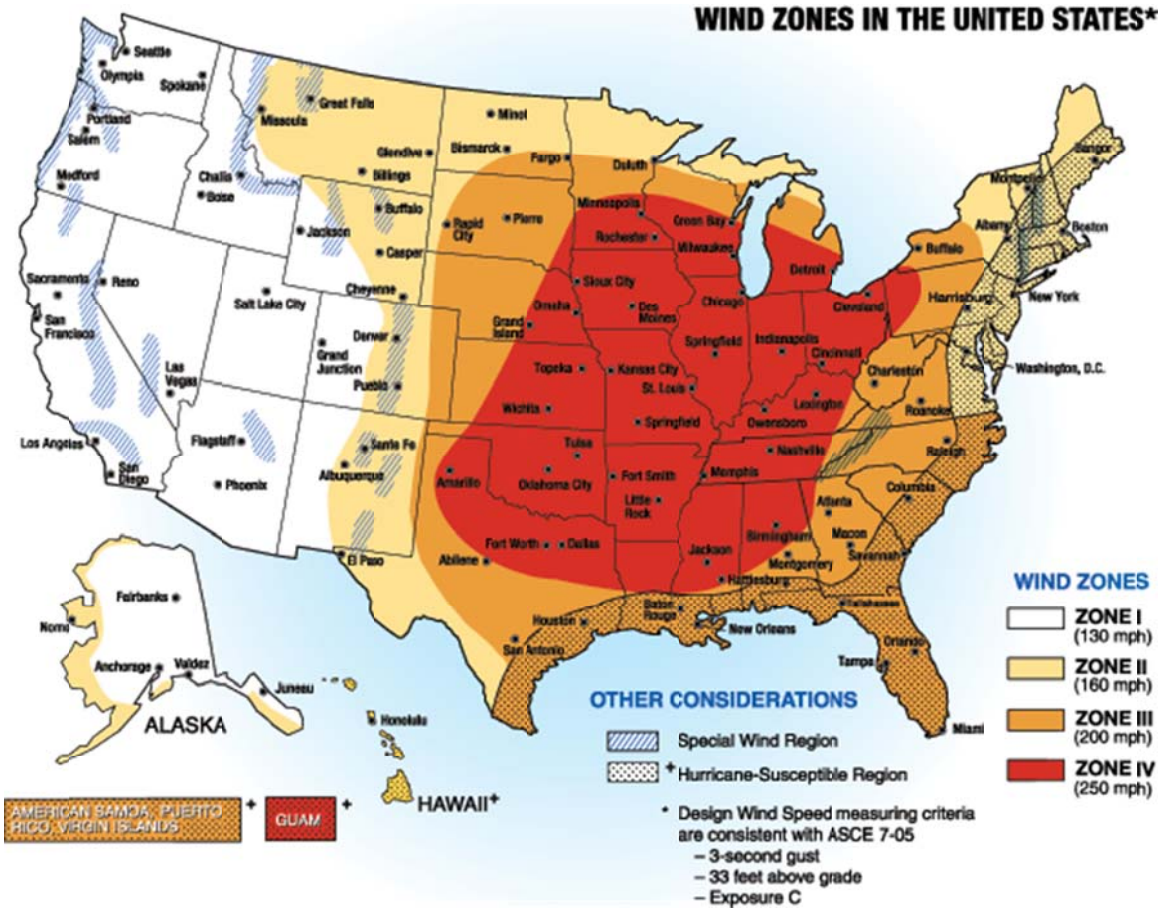
Path of EF0 tornado that struck Floyd County.

C. Assets Exposed to Hazard - Tornados are unpredictable and are indiscriminate as to when or where they strike. All public and private property including critical facilities are susceptible to tornados since this hazard is not spatially defined. The map below identifies critical facilities located within the hazard area, which in the case of tornados includes all areas within the County and Cities.

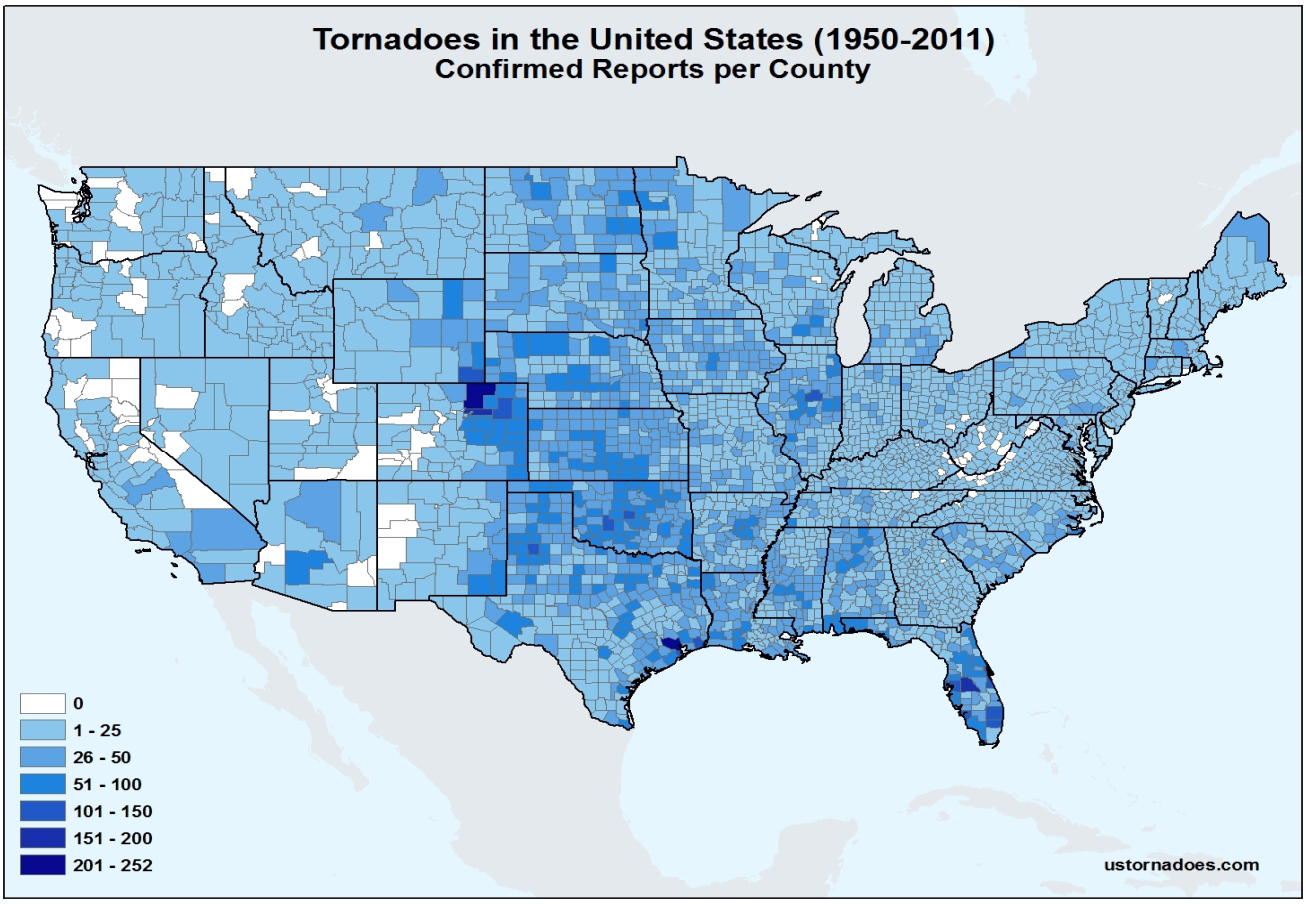


D. Estimate of Potential Losses – For loss estimate information, please refer to the Critical Facilities Database (Appendix A).

Floyd County is located in wind zone IV, which is associated with 250-mph design wind speeds as determined by the American Society of Civil Engineers (ASCE). Construction must adhere to the Georgia State Minimum Standard Codes (Uniform Codes Act). The minimum standards established by these codes provide reasonable protection from most natural hazards. See the following 2005 ASCE wind zone map.


WIND ZONES IN THE UNITED STATES*
WIND ZONES
ZONE I (130 mph)
ZONE II (160 mph)
ZONE III (200 mph)
ZONE IV (250 mph)
OTHER CONSIDERATIONS
Special Wind Region
+Hurricane-Susceptible Region
* Design Wind Speed measuring criteria are consistent with ASCE 7-05
– 3-second gust
– 33 feet above grade
– Exposure C
ALASKA
HAWAII+
AMERICAN SAMOA, PUERTO RICO, VIRGIN ISLANDS +
GUAM +
Seattle
Olympia
Spokane
Portland
Salem
Medford
Great Falls
Missoula
Minot
Bismarck
Glendive
Billings
Fargo
Duluth
Challis
Boise
Buffalo
Jackson
Rapid City
Pierre
Minneapolis
Green Bay
Rochester
Milwaukee
Casper
Sacramento
Reno
San Francisco
Salt Lake City
Cheyenne
Sioux City
Omaha
Des Moines
Chicago
Detroit
Cleveland
Buffalo
Albany
Boston
Bangor
Montpelier
Harrisburg
New York
Washington, D.C.
Grand Island
Denver
Grand Junction
Pueblo
Las Vegas
Topeka
Kansas City
St. Louis
Springfield
Indianapolis
Cincinnati
Charleston
Lexington
Owensboro
Roanoke
Wichita
Springfield
Los Angeles
San Diego
Flagstaff
Phoenix
Santa Fe
Albuquerque
Tulsa
Amarillo
Oklahoma City
Fort Smith
Little Rock
Memphis
Nashville
Raleigh
Columbia
Atlanta
Macon
Savannah
Birmingham
Montgomery
Jackson
Hattiesburg
Fort Worth
Dallas
Abilene
El Paso
Houston
San Antonio
Baton Rouge
New Orleans
Orlando
Tampa
Miami
Fairbanks
Nome
Anchorage
Valdez
Juneau
Honolulu

The following map from USTornadoes.com, created by GIS Analyst Katie Wheatley, was derived from National Weather Service data and shows county-level impacts of all U.S. tornadoes from 1950-2011. In this analysis if one tornado crosses multiple counties it was included as an individual tornado for each county hit. Almost the entire state of Georgia, including Floyd County, is within the "1-25" tornado count range for this time period.



E. Multi-Jurisdictional Concerns - Floyd County and the Cities of Cave Spring and Rome have a design wind speed of 250 mph as determined by the American Society of Civil Engineers (ASCE). Since no part of the County is immune from tornados, any mitigation steps taken related to tornados will be undertaken on a countywide basis, including the Cities of Cave Spring and Rome. See the following ASCE design wind speed map.

F. Hazard Summary – Based on its history, Floyd County has a high exposure to potential damage from tornados. Should a tornado strike residential areas or critical facilities, significant damage and loss of life could occur. Due to the destructive power of tornados it is essential that the mitigation measures identified in this plan receive full consideration. Specific mitigation recommendations related to tornados are identified in *Chapter 5*.

2.2 Severe Thunderstorms (including Hail & Lightning)

A. Hazard Identification – A Severe Thunderstorm is defined as a thunderstorm producing wind at or above 58 mph and/or hail ¾ of an inch in diameter or larger. This threshold is met by approximately 10% of all thunderstorms. These storms can strike any time of year, but similar to tornados, are most frequent in the spring and summer months. They are nature's way of providing badly needed rainfall, dispersing excessive atmospheric heat buildup and cleansing the air of harmful pollutants. Not only can severe thunderstorms produce injury and damage from violent straight-line winds, hail, and lightning, but these storms can produce tornados very rapidly and without warning. Note: For the purposes of this Plan, severe thunderstorms that result from tropical storms and hurricanes are included in this section.

The most damaging phenomena associated with thunderstorms, excluding tornado activity, are thunderstorm winds. These winds are generally short in duration involving straight-line winds and/or gusts in excess of 50 mph. However, these winds can gust to more than 100 miles an hour, overturning trailers, unroofing homes, and toppling trees and power lines. Such winds tend to affect areas of the County with significant tree stands, as well as areas with exposed property, infrastructure, and above-ground utilities. Resulting damage often includes power outages, transportation and economic disruptions, and significant property damage. Severe thunderstorms can ultimately leave a population with injuries and loss of life. Thunderstorms produce two types of wind. Tornados are characterized by rotational winds. The other more predominant winds from a thunderstorm, downbursts, are small areas of rapidly descending air beneath a thunderstorm that strike the ground producing isolated areas of significant damage. Every thunderstorm produces a downburst. The typical downburst consists of only a 25 mph gusty breeze, accompanied by a temperature drop of as much as 20 degrees within a few minutes. However, severe downburst winds can reach from 58 to 100 mph, or more, significantly increasing the potential for damage to structures. Downbursts develop quickly with little or no advance warning and come from thunderstorms whose radar signatures appear non-severe. There is no sure

method of detecting these events, but atmospheric conditions have been identified which favor the development of downbursts. Severe downburst winds have been measured in excess of 120 miles per hour, or the equivalent of an F2 tornado, on the Fujita Scale. Such winds have the potential to produce both a loud "roaring" sound and the widespread damage typical of a tornado. This is why downbursts are often mistaken for tornados.

Hail can also be a destructive aspect of severe thunderstorms. Hail causes more monetary loss than any other type of thunderstorm-spawned severe weather. Annually, the United States suffers about one billion dollars in crop damage from hail. Storms that produce hailstones only the size of a dime can produce dents in the tops of vehicles, damage roofs, break windows and cause significant injury or even death. Unfortunately hail is often much larger than a dime and can fall at speeds in excess of 100 mph. Hailstones are created when strong rising currents of air called updrafts carry water droplets high into the upper reaches of thunderstorms where they freeze. These frozen water droplets fall back toward the earth in downdrafts. In their descent, these frozen droplets bump into and coalesce with unfrozen water droplets and are then carried back up high within the storm where they refreeze into larger frozen drops. This cycle may repeat itself several times until the frozen water droplets become so large and heavy that the updraft can no longer support their weight. Eventually, the frozen water droplets fall back to earth as hailstones.

Finally, one of the most frightening aspects of thunderstorms is lightning. Lightning kills nearly one hundred people every year in the United States and injures hundreds of others. A possible contributing reason for this is that lightning victims frequently are struck before or just after the occurrence of precipitation at their location. Many people apparently feel safe from lightning when they are not experiencing rain. Lightning tends to travel the path of least resistance and often seeks out tall or metal objects. With lightning however, it's all relative. A 'tall' object can be an office tower, a home, or a child standing on a soccer field. Lightning can and does strike just about any object in its path. Some of the most dangerous and intense lightning may occur with severe thunderstorms during the summer months, when outdoor activities are at their peak.

B. Hazard Profile – Severe thunderstorms, hail, and lightning are serious threats to the residents of Floyd County. Over the course of a year, the County experiences dozens of thunderstorms, with about one in ten being severe. Severe thunderstorms occur more frequently than any other natural hazard event within Floyd County. Most of these storms include lightning and/or hail. There have been dozens of severe thunderstorm events within Floyd County over the past fifty years according to available documentation. It is very likely this is a low estimate due to poor record keeping in decades past. It is clear from information collected that more accurate record keeping related to severe thunderstorms developed over the past two decades, with even more detailed information available for the past ten years.

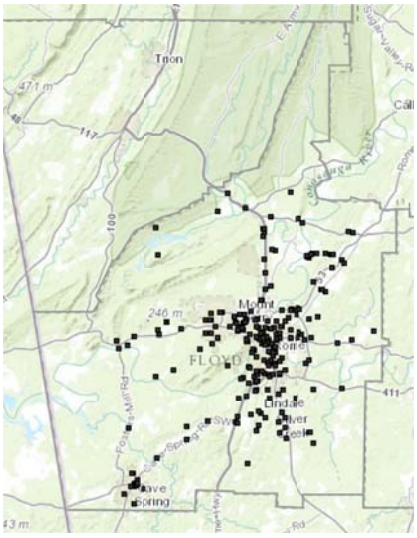
Most of the available information relating to severe thunderstorms, hail, and lightning occurrences within Floyd County fails to describe damage estimates in great detail. However, with each thunderstorm event it is likely there are unreported costs related to infrastructure and utilities repair and public safety costs, at a minimum. Severe thunderstorms have occurred in all parts of the day and night within Floyd County. They have also taken place in every single month of the year.

The Floyd County HMPC utilized data from the National Climatic Data Center, the National Weather Service, numerous weather-related news articles and various online resources, and the Floyd County Emergency Operations Plan in researching severe thunderstorms and their impact on the County. With most of the County's recorded severe thunderstorm events, only basic information was available. It is also likely that some severe thunderstorm events have gone unrecorded. Therefore, any conclusions reached based upon available information on severe thunderstorms within Floyd County should be treated as the minimal possible threat.

NCDC records show that 325 severe thunderstorms occurred within the County over the past fifty years, which equates to a 650% annual frequency based upon reported events. Over the past twenty years that frequency has more than doubled. It would appear that severe thunderstorm activity has increased over time within the County. This may be the case or it may simply be that record keeping and technology have improved significantly over the course of time, reflecting the higher numbers. It may also be a combination of these two factors. The following chart provides annual frequency of reported events over the past five, ten, twenty, and fifty-year periods. The most recent five-year period, covering the span of time since the last update to this Plan, is highlighted in gold.

Floyd County – Severe Thunderstorm Frequency including Hail & Lightning (based on Reported Events)				
Time Period	**5yrs (2010-2015)**	**10yrs (2005-2015)**	**20yrs (1995-2015)**	**50yrs (1965-2015)**
Number of Reported Events	**53**	**145**	**273**	**325**
Frequency Average per Year	**10.60**	**14.50**	**13.65**	**6.50**
Frequency Percent per Year	**1006%**	**1450%**	**1365%**	**650%**

C. Assets Exposed to Hazard – All public and private property including critical facilities are susceptible to severe thunderstorms, hail, and lightning since this hazard is not spatially defined. The map below identifies critical facilities located within the hazard area, which in the case of severe thunderstorms includes all areas within the County and Cities.



D. Estimate of Potential Losses – For loss estimate information, please refer to the Critical Facilities Database (Appendix A).

E. Multi-Jurisdictional Concerns – Any portion of Floyd County can be negatively impacted by severe thunderstorms, hail, and lightning. Therefore, any mitigation steps taken related to these weather events will be pursued on a countywide basis and include the Cities of Cave Spring and Rome.

F. Hazard Summary – Overall, severe thunderstorm, hail, and lightning events pose one of the greatest threats to Floyd County in terms of property damage, injuries and loss of life. These weather events represent the most frequently occurring natural hazard within Floyd County and have a great potential to negatively impact the County each year. Based on the frequency of this hazard, as well as its ability to negatively impact any part of the County, the HMPC recommends that the mitigation measures identified in this plan for severe thunderstorm, hail, and lightning be aggressively pursued. Specific mitigation actions related to these weather events are identified in *Chapter 5*.

2.3 Flooding

A. Hazard Identification: The vulnerability of a river or stream to flooding depends upon several variables. Among these are topography, ground saturation, rainfall intensity and duration, soil types, drainage, drainage patterns of streams, and vegetative cover. A large amount of rainfall over a short time span can result in flash flood conditions. Nationally, the total number of flash flood deaths has exceeded tornado fatalities during the last several decades. Two factors seem to be responsible for this: public apathy regarding the flash flood threat and increased urbanization. A small amount of rain can also result in floods in locations where the soil is saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, etc. Topography and ground cover are also contributing factors for floods in that water runoff is greater in areas with steep slopes and little or no vegetation.

B. Hazard Profile: Over the past fifty years, flood events on record in Floyd County have usually been associated with areas in the vicinity of the County's many creeks and lakes. The areas most affected or potentially most affected include locations in the vicinity of the Etowah River, the Oostanaula River, the Coosa River, Cedar Creek, and other tributaries that empty into the Etowah, Oostanaula, and Coosa Rivers. Relatively little information on flooding damage estimates, in terms of dollars, was available. However, with each of these events there were certainly significant costs related to road repair, infrastructure repair, and public safety, at a minimum. Most of the flood damage that has occurred historically within the County appears to be "public" flood damage. More specifically, roads and culverts washing out have been the most common flooding problem on record.

NCDC records show that 50 flood events occurred within the County over the past fifty years, which equates to a 100% annual frequency based upon reported events. Though the annual frequency seem to be higher with the ten and twenty-year periods, the annual frequency of the most recent five-year period is also 100%. The following chart provides annual frequency of reported events over the past five, ten, twenty, and fifty-year periods. The most recent five-year period, covering the span of time since the last update to this Plan, is highlighted in gold.

Floyd County – Flooding Frequency (based on Reported Events)				
Time Period	**5yrs (2010-2015)**	**10yrs (2005-2015)**	**20yrs (1995-2015)**	**50yrs (1965-2015)**
Number of Reported Events	**5**	**15**	**50**	**50**
Frequency Average per Year	**1.00**	**1.50**	**2.50**	**1.00**
Frequency Percent per Year	**100%**	**150%**	**250%**	**100%**

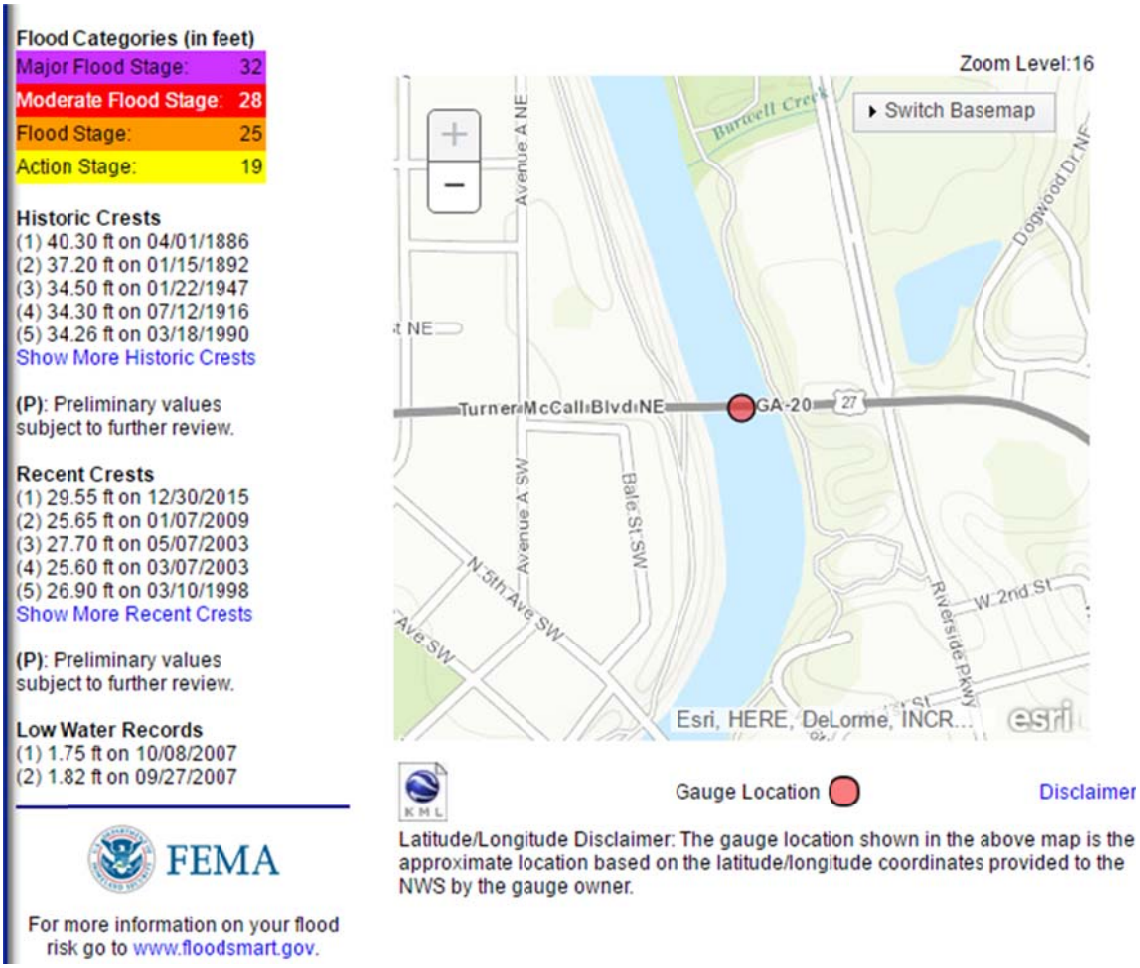
Floyd County has three major rivers: the Oostanaula, Etowah, and Coosa Rivers. The headwaters of the Oostanaula and Etowah Rivers originate in the mountains of north-central Georgia. The rivers generally flow southwesterly toward the City of Rome where they join to form the Coosa River. The Coosa River then flows westerly toward the Alabama River. Dykes, Little Cedar, Silver, Booze, Armuchee, Little Armuchee, and Little Cedar Creek are major tributaries to these rivers. Little Cedar Creek, from its headwaters on the northeastern slopes of Indian Mountain in Polk County, Georgia, flows 12 miles in a northerly direction through Cave Spring to join Big Cedar Creek, a tributary of the Coosa River, about 2.5 miles north of the city. The 23-square-mile watershed of Little Cedar Creek is approximately 9 miles long and has a maximum width of 4 miles. The channel banks of the creek are generally 4 to 8 feet in height and vary in width from 20 to 80 feet. The channel has an average slope of about 14 feet per mile. The climate of Floyd County consists of warm, humid summers, mild winters, and abundant rainfall. Summer temperatures average 84°F and winter temperatures average 55°F. On average, July is the warmest month with the highest mean monthly temperature of 78°F, while January is the coolest month with the lowest mean monthly temperature of 39°F. The average annual precipitation in Floyd County is 56 inches. The wettest month is March with an average of 6.67 inches of precipitation while October is the driest with 3.40 inches.

The headwaters of the Oostanaula and Etowah Rivers are in the mountains of north-central Georgia. These streams flow from the mountains into the wide valleys of the Valley and Ridge physiographic province. The two rivers join at Rome to form the Coosa River, which flows west into the Alabama River. According to the most recent Flood Insurance Study of Floyd County (revised in 2009), the physical characteristics of the basin are favorable to the production of high rates of runoff. The speed with which runoff concentrates in the main channel of the Etowah River is illustrated by the major flood of April 1938 and several minor floods in 1939, in which stages at Canton and Kingston, east of Rome, began to rise 3 hours after the beginning of the intense rainfall and peaked 9 to 12 hours after its end. The gradient of the Oostanaula River is not as steep as the Etowah River; therefore, the peak discharges at Rome from the Etowah River usually precede those from the Oostanaula River. This interval between peak flows tends to prolong the duration of floods. Floods usually occur in winter and spring due to frontal system movements; prior to construction of Allatoona Lake Dam, the frequency was an average of one flood per year. The largest flood on record was in 1886, when the Oostanaula River reached a level of 40.4 feet North American Vertical Datum of 1988 (NAVD88). Some of the most damaging floods occurred in 1892, 1916, 1919, 1921, 1932, 1936, 1938, 1946, 1947, and 1972. The Flood

Insurance Study concludes that recurrence intervals cannot be estimated for these floods because flood control projects have changed the flood characteristics of the area. Relatively minor floods occur frequently in Rome, usually in the late spring and summer as a result of thunderstorms. These floods usually result in flooded streets with little property damage. The physical characteristics of the Little Cedar Creek basin promote high rates of storm runoff, which can occur with little or no warning as heavy rainstorms move over the basin. Over the years, runoff has gradually increased as a result of periodic commercial and residential developments and clearing to expand agricultural production. This is a typical problem in all drainage basins with any increase in population or economic growth. Floods have occurred on Little Cedar Creek; the creek overflows its banks on average of twice a year. According to the Flood Insurance Study, the highest floods of record occurred in 1951, 1977, and 1980 and caused considerable flood damages.

No significant structural flood protection measures exist in the City of Cave Spring. However, the city carefully maintains the channels and bridge openings to avoid debris buildup, siltation, or other restrictions to the normal flow patterns of the creek. For the City of Rome, following the floods of 1886 and the early 1900s, local merchants began taking the first measures in preventing flood damage by raising portions of Broad Street as high as 15 feet. Allatoona Lake Dam is located on the Etowah River, approximately 48 miles upstream of Rome. Congress authorized construction of Allatoona Dam in August 1941, but construction did not begin until February 1946. The flood control operation of the dam, which began in December 1949, has prevented major damage to the city since that time. In addition, the flood control operation of Carters Dam, combined with Allatoona Dam in a system operation, will further reduce the probability of major flood damage in the vicinity of Rome. Carters Dam is located approximately 75 miles upstream of Rome on the Coosawattee River, a tributary of the Oostanaula River. After three floods in December 1932 and four floods within three months during 1936, Congress appropriated $330,000 for a 2-mile levee to be constructed on the north side of the Oostanaula and Coosa Rivers. The project consists of a system of earthen levees west of Wilson Avenue. The structures are located in areas from the confluence of the Oostanaula River and the Etowah River to a point approximately 2.3 miles downstream, along the left bank of the Coosa River. This levee was completed in 1939 and in the past protected the fourth ward area of Rome from flooding caused by the Coosa River. Levees provide the county with some degree of protection against flooding. However, it has been ascertained, according to the Flood Insurance Study, that some of these levees may not protect the community from rare events such as the 1-percent-annual-chance flood. The criteria used to evaluate protection against the 1-percent-annual-chance flood are 1) adequate design, including freeboard, 2) structural stability, and 3) proper operation and maintenance. Levees that do not protect against the 1-pecent-annual-chance flood are not considered in the hydraulic analysis of the 1-percent-annual-chance floodplain. The South Rome Levee System has been certified to provide protection against the 1-percent-annual-chance flood. Areas behind the levee system have two ponding areas with pumping stations to control flooding resulting from interior drainage.

Both historic crests and recent crests for Floyd County are listed in the graphic below.



Floyd County (CID No. 130079) and the Cities of Cave Spring (CID No. 130080) and Rome (CID No. 130081) each participate in the National Flood Insurance Program (NFIP) and follow the Program guidelines to ensure future development is carried out in the best interests of the public. According to NFIP guidelines, each jurisdiction has executed a Flood Damage Prevention Ordinance. The purpose of this ordinance is to minimize the loss of human life and health as well as to minimize public and private property losses due to flood conditions. The ordinance requires that potential flood damage be evaluated at the time of initial construction of structures, facilities and utilities, and that certain uses be restricted or prohibited based on this County evaluation. The ordinance also requires that potential homebuyers be notified that property is located in a flood area. In addition, all construction must adhere to the Georgia State Minimum Standard Codes (Uniform Codes Act). The minimum standards established by these codes provide reasonable protection to persons and property within structures that comply with the regulations for most natural hazards.

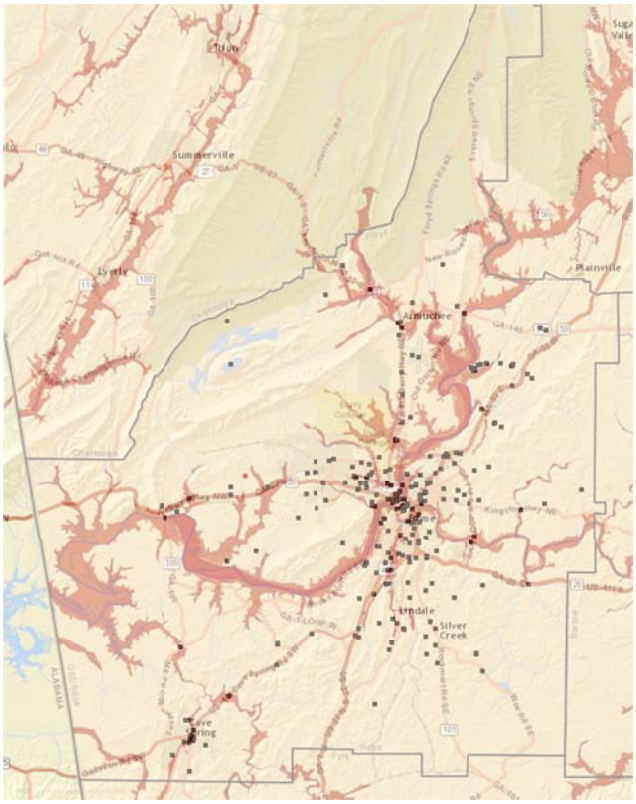
According to the National Flood Insurance Reform Act, a repetitive loss structure is defined as "…a building covered by a contract for flood insurance that has incurred flood-related damages on two occasions during a 10-year period ending on the date of the event for which a second claim is made, in which the cost of repairing the flood damage, on the average, equaled or exceeded 25 percent of the

market value of the building at the time of each such flood event." **As of September 2015, there are no official residential "repetitive loss structures" on file for Floyd County.** *Specific addresses for repetitive loss structures cannot be included in this Plan, but a current list of these structures may be viewed in GMIS by authorized individuals, as determined by the EMA Director.*

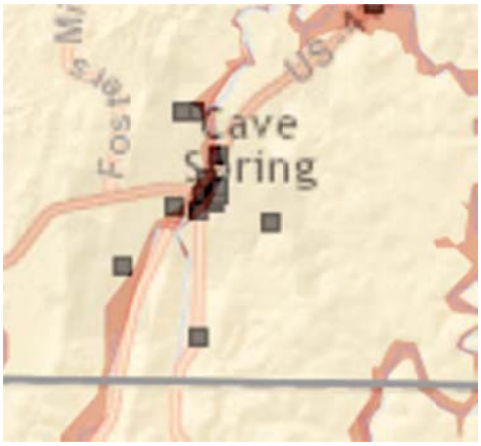
C. Assets Exposed to Hazard – In evaluating assets that may potentially be impacted by the effects of flooding, the HMPC determined that, although all critical facilities, public and private property are potentially susceptible to flooding, structures located within the vicinity of the Etowah River, the Oostanaula River, the Coosa River, Cedar Creek, and other tributaries that empty into the Etowah, Oostanaula, and Coosa Rivers are the most susceptible.

The following maps identify the locations of critical facilities in relationship to the known flooding hazard areas located within the County and Cities.

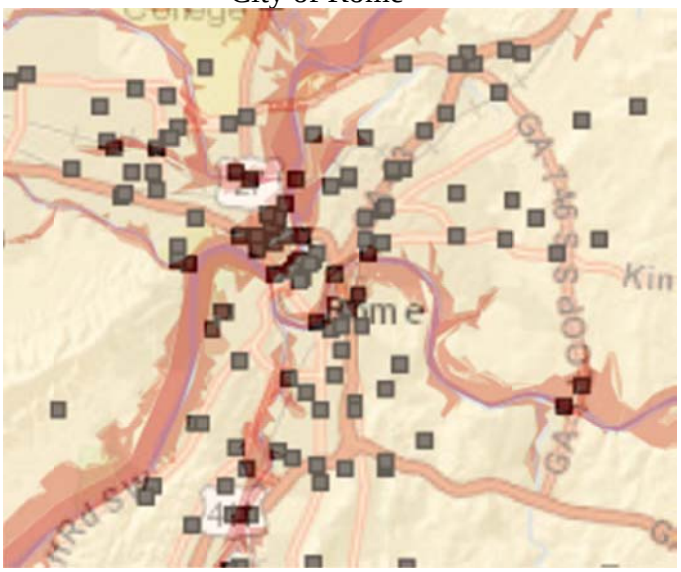
Floyd County



City of Cave Spring



City of Rome



Estimate of Potential Losses – For loss estimate information, please refer to the Critical Facilities Database (Appendix A).

E. Multi-Jurisdictional Concerns – Any portion of Floyd County can potentially be impacted by flooding, however, the areas most prone to flooding have historically been those areas located in the vicinity of the Etowah River, the Oostanaula River, the Coosa River, Cedar Creek, and other tributaries that empty into the Etowah, Oostanaula, and Coosa Rivers. Any mitigation steps taken related to flooding will be pursued on a countywide basis and include the Cities of Cave Spring and Rome. According to GMIS flood maps, the County and each of the municipalities all have significant flood-prone areas within their jurisdictions.

F. Hazard Summary – Severe flooding has the potential to inflict significant damage within Floyd County. Mitigation of flood damage requires the community to have knowledge of flood-prone areas, including roads, bridges, bodies of water, and critical facilities, as well as the location of the County's designated shelters. The Floyd County HMPC identified flooding as a hazard requiring mitigation measures and identified specific mitigation goals, objectives and action items they deemed necessary to lessen the impact of flooding. These findings are found in *Chapter 5*.

2.4 Winter Storms

A. Hazard Identification – The Floyd County HMPC researched historical data from the National Climatic Data Center, The National Weather Service, as well as information from past newspaper articles and various online resources relating to winter storms in Floyd County. Winter storms bring the threat of freezing rain, ice, sleet, snow and the associated dangers. A heavy accumulation of ice, especially when accompanied by high winds, devastates trees and power lines. Such storms make highway travel or any outdoor activity extremely hazardous due to falling trees, ice, and other debris.

B. Hazard Profile – Although winter storms occur relatively infrequently, they have the potential to wreak havoc on the community when they do strike. Winter storms within Floyd County typically cause damage to power lines, trees, buildings, structures, and bridges, to varying degrees. Portions of the County with higher elevations have highways with steep grades, resulting in very hazardous travel conditions when they are covered with frozen precipitation. Another hazard exists due to the large tree population. Trees and branches weighed down by snow and ice become very dangerous to person and property.

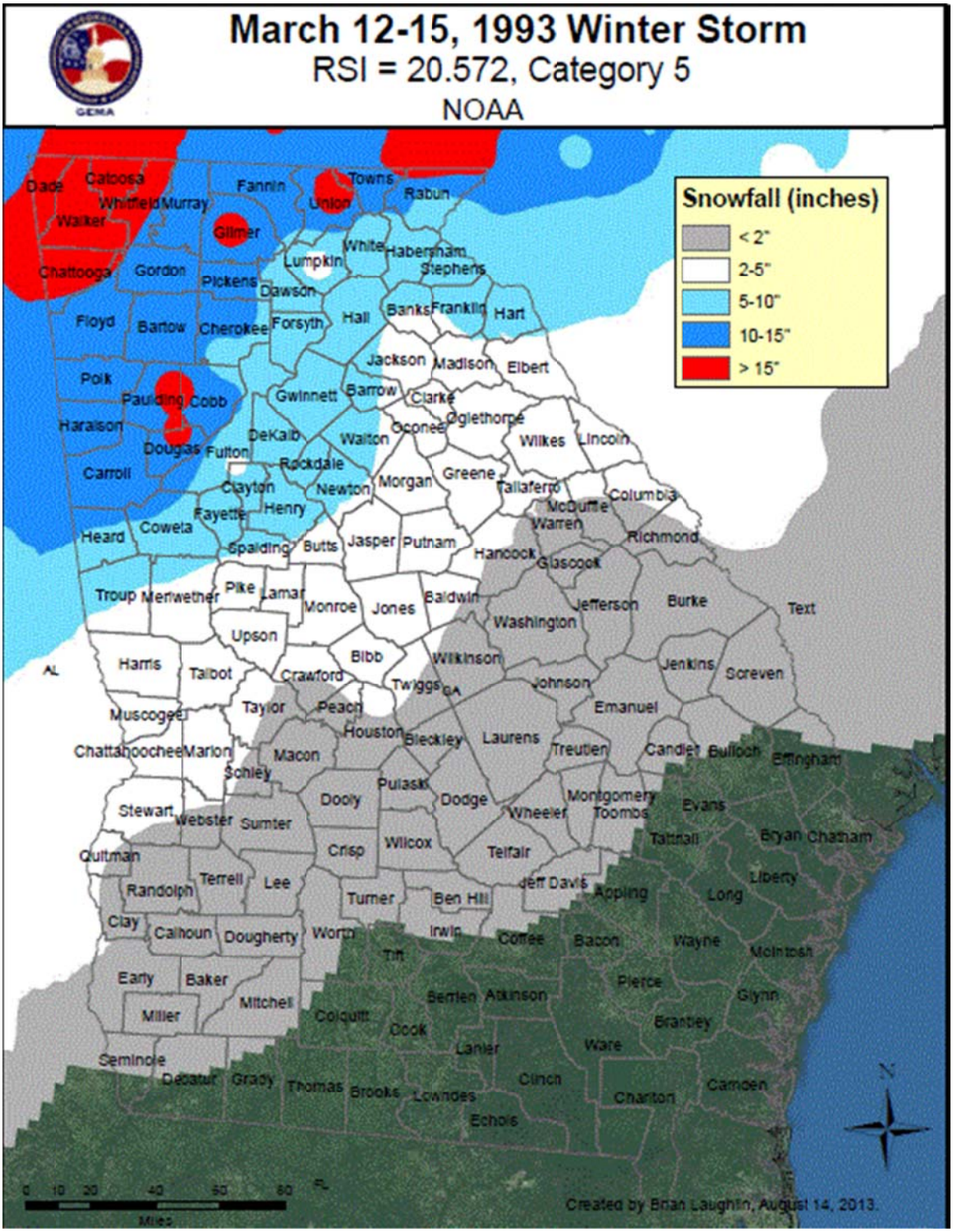
NCDC records show that 32 winter storms occurred within the County over the past fifty years, which equates to a 64% annual frequency based upon reported events. However, winter storm events were obviously underreported during the first few decades of the fifty-year history since reported events for the twenty-year history also equal 32, equating to a 160% annual frequency. It may be best to place higher consideration on the more consistent 5, 10 and 20-year histories when considering the threat that winter storm events present to the County. The following chart provides annual frequency of reported

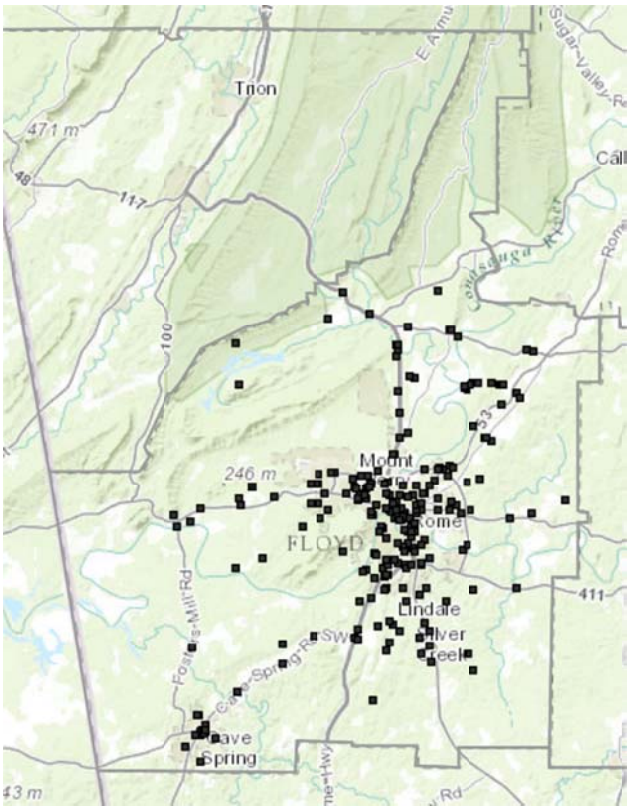
events over the past five, ten, twenty, and fifty-year periods. The most recent five-year period, covering the span of time since the last update to this Plan, is highlighted in gold.

Floyd County – Winter Storm Frequency (based on Reported Events)				
Time Period	5yrs (2010-2015)	10yrs (2005-2015)	20yrs (1995-2015)	50yrs (1965-2015)
Number of Reported Events	9	15	32	32
Frequency Average per Year	1.80	1.50	1.60	0.64
Frequency Percent per Year	180%	150%	160%	64%

March 13, 1993 "Storm of the Century"

On Wednesday, March 10, 1993, Atlanta's high was 75 degrees, while other parts of the state hit the 80s. But by Friday, forecasters at the National Weather Service were sounding ominous warnings of overnight blizzard conditions as a hurricane-like storm churned out of Florida into Georgia. The "Storm of the Century" as it became known hit metro Atlanta on Saturday, March 13, 1993. The snow began falling early that morning and by the time it had tapered off nearly three feet had fallen across parts of extreme north Georgia, with Floyd County receiving over 15 inches in some locations. Although only four inches of snow was officially recorded at Hartsfield-Jackson International Airport, a foot or more of the white stuff fell across the northern suburbs, and winds whipping to 50 mph blew the snow into nearly waist-deep drifts. Fifteen people were killed in Georgia, while the death toll across the U.S., Canada and Cuba hit 310. The storm paralyzed metro Atlanta and north Georgia for days, the heavy snowfall closing interstates from Atlanta northward. Saturday's blizzard conditions subsided somewhat by late in the day but were followed by bitter cold, with temperatures plummeting into the teens on Sunday. The following Monday, hundreds if not thousands of motorists were still stranded on snow-packed I-75 through northwest Georgia. National Guardsmen in four-wheel drive vehicles made their way up the interstate, handing out bags of fruit to stranded motorists. The weight of all that snow took its toll on the carpet industry in northwest Georgia, where the roofs of numerous large carpet mills and warehouses collapsed. Over 10 million utility customers lost power as the storm developed into a fierce Nor'easter as it skirted the Atlantic coast northward. In Georgia, more than a half-million Georgia Power customers were without electricity, some for as long as two weeks.


March 12-15, 1993 Winter Storm
RSI = 20.572, Category 5
NOAA
GEMA
Snowfall (inches)
< 2"
2-5"
5-10"
10-15"
> 15"
Dade
Catoosa
Whitfield
Murray
Walker
Fannin
Towns
Union
Rabun
Gilmer
Chattooga
Gordon
Pickens
Lumpkin
White
Habersham
Stephens
Dawson
Floyd
Bartow
Cherokee
Forsyth
Hall
Banks
Franklin
Hart
Jackson
Madison
Elbert
Polk
Paulding
Cobb
Gwinnett
Barrow
Clarke
Oglethorpe
Haralson
Douglas
Fulton
DeKalb
Walton
Oconee
Wilkes
Lincoln
Carroll
Rockdale
Clayton
Newton
Morgan
Greene
Taliaferro
Columbia
McDuffie
Warren
Fayette
Henry
Coweta
Heard
Spalding
Butts
Jasper
Putnam
Hancock
Richmond
Glascock
Troup
Meriwether
Pike
Lamar
Monroe
Jones
Baldwin
Jefferson
Burke
Text
Washington
Upson
Bibb
Wilkinson
Jenkins
Screven
AL
Harris
Talbot
Crawford
Twiggs
GA
Johnson
Emanuel
Muscogee
Taylor
Peach
Houston
Bleckley
Laurens
Treutlen
Candler
Bulloch
Effingham
Chattahoochee
Marion
Macon
Schley
Pulaski
Dodge
Montgomery
Toombs
Evans
Stewart
Webster
Sumter
Dooly
Wheeler
Tattnall
Bryan
Chatham
Quitman
Crisp
Wilcox
Telfair
Liberty
Randolph
Terrell
Lee
Turner
Ben Hill
Jeff Davis
Appling
Long
Clay
Calhoun
Dougherty
Worth
Irwin
Coffee
Bacon
Wayne
McIntosh
Tift
Early
Baker
Berrien
Atkinson
Pierce
Glynn
Mitchell
Miller
Colquitt
Cook
Brantley
Lanier
Ware
Seminole
Decatur
Grady
Thomas
Brooks
Lowndes
Clinch
Charlton
Camden
Echols
FL
0 10 20 40 60 80
Miles
Created by Brian Laughlin, August 14, 2013.



C. Assets Exposed to Hazard - All public and private property including critical facilities are susceptible to winter storms since this hazard is not spatially defined. The map below identifies critical facilities located within the hazard area, which in the case of winter storms includes all areas within the County and Cities.

D. Estimate of Potential Losses - For loss estimate information, please refer to the Critical Facilities Database (Appendix A).

E. Multi-Jurisdictional Concerns – Any portion of Floyd County can be negatively impacted by winter storms. Therefore, any mitigation steps taken related to winter storms will be pursued on a countywide basis and include the Cities of Cave Spring and Rome.

G. Hazard Summary – Winter storms, unlike other natural hazards, typically afford communities some advance warning. The National Weather Service issues winter storm warnings and advisories as these storms approach. Unfortunately, even with advance warning, some of the most destructive winter storms have occurred in the Southern United States, where buildings, infrastructure, crops, and livestock are not well-equipped for severe winter conditions. Motorists, not accustomed to driving in snow and icy conditions, pose an additional danger on roads and highways. The Floyd County HMPC recognized the potential threats of winter storms and identified specific mitigation actions. These can be found in *Chapter 5*.

2.5 Wildfire

A. Hazard Identification – The Floyd County HMPC utilized data from Georgia Forestry Commission (GFC) and the Community Wildfire Protection Plan (CWPP) in researching wildfires and their impact on the County.

A wildfire is defined as an uncontrolled fire occurring in any natural vegetation. For a wildfire to occur, there must be available oxygen, a supply of fuel, and enough heat to kindle the fuel. Often, these fires are begun by combustion and heat from surface and ground fires and can quickly develop into a major conflagration. A large wildfire may crown, which means it may spread rapidly through the topmost branches of the trees before involving undergrowth or the forest floor. As a result, violent blowups are common in forest fires, and on rare occasion they may assume the characteristics of a firestorm. A firestorm is a violent convection caused by a continuous area of intense fire and characterized by destructively violent surface indrafts. Sometimes it is accompanied by tornado-like whirls that develop as hot air from the burning fuel rises. Such a fire is beyond human intervention and subsides only upon the consumption of everything combustible in the locality. No records were found of such an event ever occurring within Floyd County, but this potential danger will be considered when planning mitigation efforts.

The threat of wildfire varies with weather conditions: drought, heat, and wind participate in drying out the timber or other fuel, making it easier to ignite. Once a fire is burning, drought, heat, and wind all increase its intensity. Topography also affects wildfire, which spreads quickly uphill and slowly downhill. Dried grass, leaves, and light branches are considered flash fuels; they ignite readily, and fire spreads quickly in them, often generating enough heat to ignite heavier fuels such as tree trunks, heavy limbs, and the matted duff of the forest floor. Such fuels, ordinarily slow to kindle, are difficult to

extinguish. Green fuels (growing vegetation) are not considered flammable, but an intense fire can dry out leaves and needles quickly enough to allow ready ignition. Green fuels sometimes carry a special danger: evergreens, such as pine, cedar, fir, and spruce, contain flammable oils that burst into flames when heated sufficiently by the searing drafts of a wildfire.

Tools for fighting wildfires range from the standard equipment of fire departments to portable pumps, tank trucks, and earth-moving equipment. Firefighting forces specially trained to deal with wildfire are maintained by local, state and federal entities including the Floyd County Fire Department, Georgia Forestry, and U.S. Forest Service. These trained firefighters may attack a fire directly by spraying water, beating out flames, and removing vegetation at the edge of the fire to contain it behind a fire line. When the very edge is too hot to approach, a fire line is built at a safe distance, sometimes using strip burning or backfire to eliminate fuel in the path of the uncontrolled fire or to change the fire's direction or slow its progress. Backfiring is used only as a last resort.

The control of wildfires has developed into an independent and complex science costing approximately $100 million annually in the United States. Because of the extremely rapid spreading and customary inaccessibility of fires once started, the chief aim of this work is prevention. However, despite the use of modern techniques (e.g., radio communications, rapid helicopter transport, and new types of chemical firefighting apparatus) more than 10 million acres of forest are still burned annually. Of these fires, about two thirds are started accidentally by people, almost one quarter are of incendiary origin, and more than 10% are due to lightning.

B. Hazard Profile – Wildfires are a serious threat to Floyd County.

GFC records show that 5,087 wildfires occurred within the County over the past fifty years, which equates to a 10,170% annual frequency based upon reported events. Over the course of the entire 50-year period it would appear that wildfire activity has decreased significantly within the County. The following chart provides annual frequency of reported events over the past five, ten, twenty, and fifty-year periods. The most recent five-year period, covering the span of time since the last update to this Plan, is highlighted in gold.

Floyd County – Wildfire (based on Reported Events)				
Time Period	**5yrs (2010-2015)**	**10yrs (2005-2015)**	**20yrs (1995-2015)**	**50yrs (1965-2015)**
Number of Reported Events	**247**	**680**	**1561**	**5087**
Frequency Average per Year	**49.4**	**68**	**78**	**101.7**
Frequency Percent per Year	**4940%**	**6800%**	**7800%**	**10170%**

Wildfire in Floyd County over recent years has not typically been catastrophic in nature. Three more recent examples of wildfire are summarized below.

<u>August 9, 2009 wildfire</u>

On August 9, 2009, the Rome Fire Department responded to an isolated wildfire in the woods off Flowery Branch Road, a dirt road, about one mile from Wayside Road in the northeast part of the county. The fire grew to the size of three to five acres before firefighters arrived at the scene. The fire

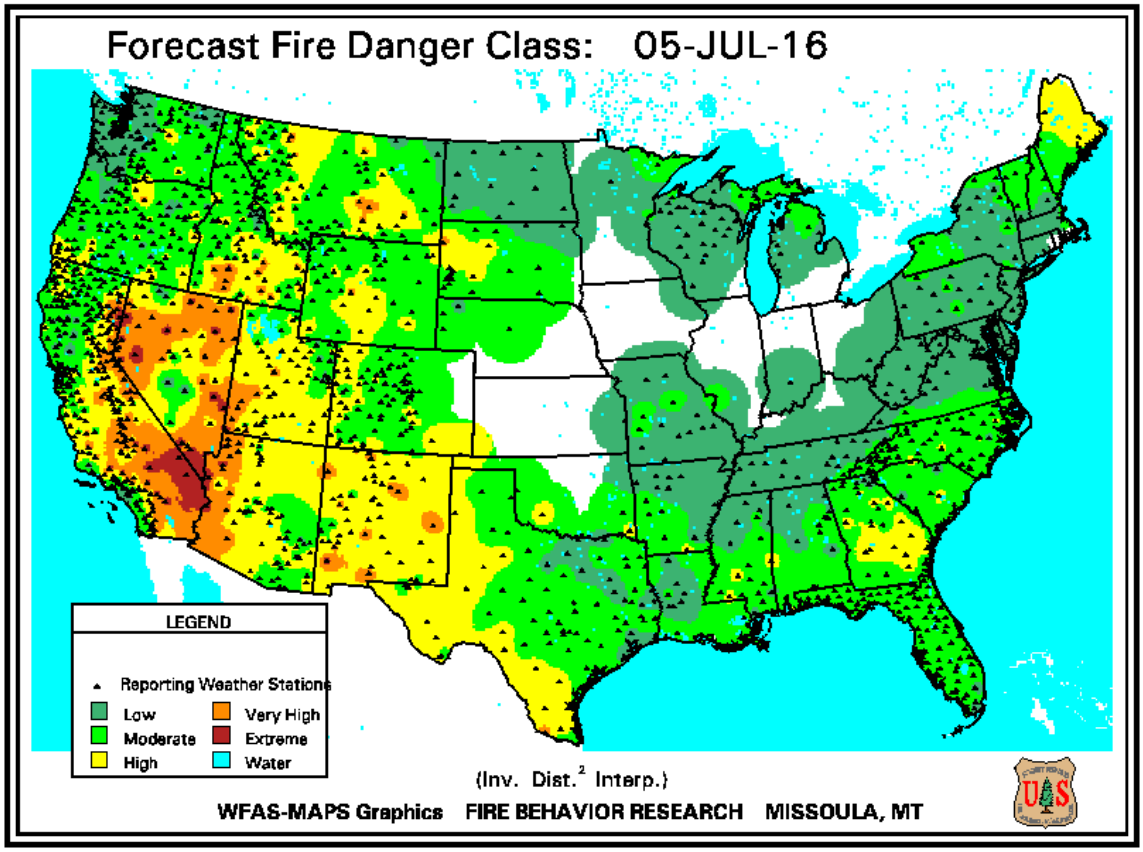
was approximately one-half mile from any structures, but was in a heavily wooded pine forest with considerable underbrush. The suspected cause was a tossed lit cigarette. The wildfire resulted in approximately $2,000 in property damages and no reported injuries or deaths.

December 3, 2012 wildfire

With the exception of early morning fog, above-normal temperatures and mainly dry conditions prevailed on December 3, 2012. The National Forest Service reported that a human-caused wildfire labeled "Girl Scout" burned 16.64 acres and resulted in $4,000 in damages. There were no reported injuries or deaths.

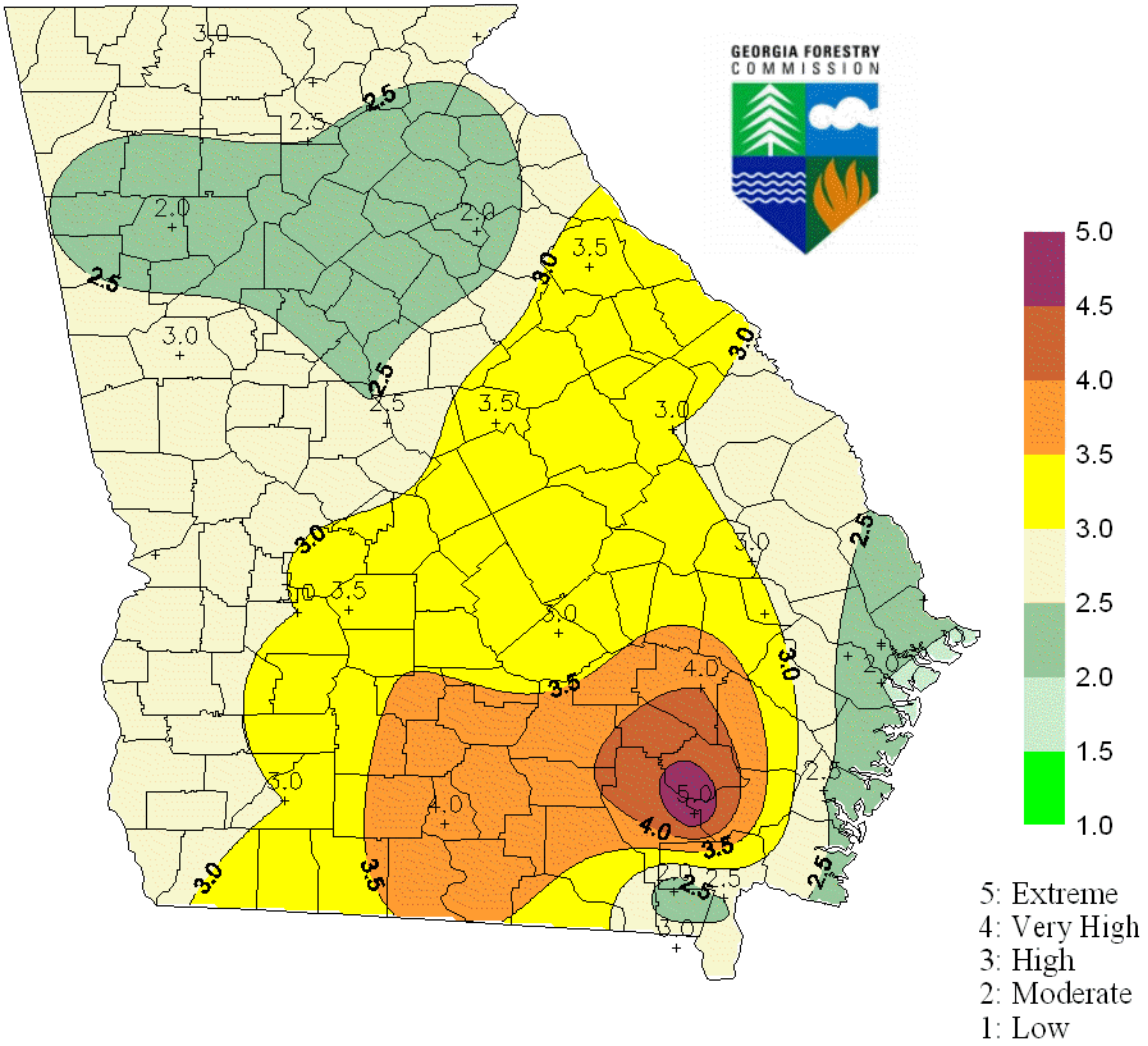
April 1, 2014 wildfire

Dangerous fire weather conditions were in place across north Georgia for the first couple of days in April due to dry low level conditions and low fuel moisture values. A few wildfires developed, including a significant one in Floyd County with over 100 acres burned. The National Forest Service reported that a wildfire of unknown origin labeled Crackerneck burned 117 acres and resulted in $11,000 in damages. There were no reported injuries or deaths.
As of July 5, 2016, Floyd County's threat of wildfire was classified as "moderate" by the U.S. Forest Service. However, this status can change from week to week. See the following map.



Another resource utilized during the planning process comes from the Georgia Forestry Commission. GFC forecasts a “moderate” to “high” level of fire danger for Floyd County for July 4, 2016. These results change daily. See map below.

Forecast Fire Danger for Tomorrow
Produced at July 4, 2016 130pm EST

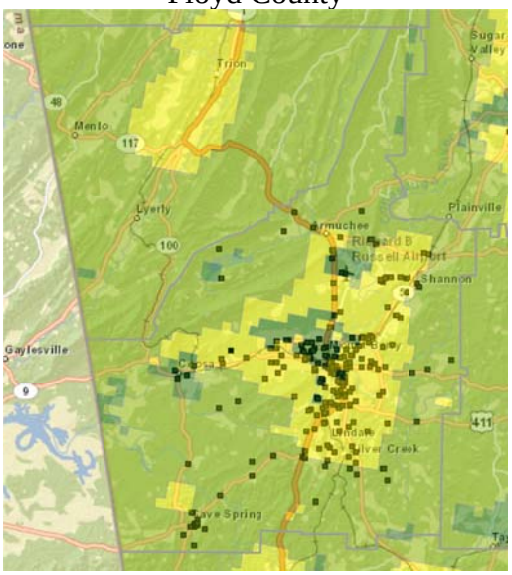


C. Assets Exposed to Hazard – In evaluating assets that are susceptible to wildfire, the committee determined that all public and private property is susceptible to wildfire, including all critical facilities. The maps on the following pages display the wildfire risk potential for Floyd County and each of the municipalities, including locations of critical facilities within the hazard areas. The following key applies to each of the maps.

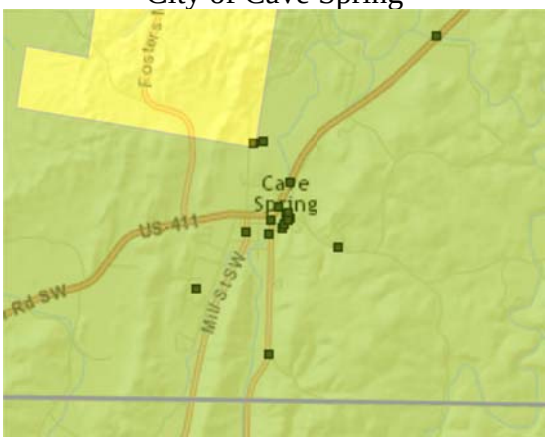
	Wildfire Threat Category	Description
	0	LOWEST THREAT: includes areas with no houses, areas with bodies of water, agricultural areas, and/or cities
	1	VERY LOW THREAT
	2	LOW THREAT
	3	MODERATE THREAT
	4	HIGH THREAT
	*****	ALL OTHER VALUES

The Wildfire Risk Layer was based on the USDA Forest Service, RMRS Fire Sciences Laboratory "Wildland Fire Risk to Flammable Structures, V 1.0" map. Although this data was not intended for use at a detail greater than state-wide analysis, it has been included as the best available data on wildfire risk. The scores are based on the risk value from the original layer. The horizontal positional accuracy is unknown for this layer.

Floyd County



City of Cave Spring



City of Rome

All portions of the County and Cities have been classified under Wildfire Threat Categories 0 (Lowest Threat), 1 (Very Low Threat) or 2 (Low Threat), among the lowest threats on a scale of 0 to 4. Nothing within the County or Cities have been classified under Wildfire Threat Category 3 (Moderate Threat) or Category 4 (High Threat). Nevertheless, the threat of wildfire certainly exists for all jurisdictions.

D. Estimate of Potential Losses – In most of the documented cases of wildfire within Floyd County, relatively little information on damages, in terms of dollars, was available. The potential commercial value of the land lost to wildfire cannot be accurately calculated, other than replacement costs of structures and infrastructure. With regard to the land itself, aside from the loss of timber and recreation, the damage is inestimable in terms of land rendered useless by ensuing soil erosion, elimination of wildlife cover and forage, and the loss of water reserves collected by a healthy forest. For available loss estimate information, please refer to the Critical Facilities Database (Appendix A).

E. Multi-Jurisdictional Concerns – Despite low countywide wildfire threat classifications, any portion of Floyd County has to potential to be impacted by wildfire. One reason for this is the common interface between urban developments and the forest. Any steps taken to mitigate the effects of wildfire should be undertaken on a countywide basis and include the Cities of Cave Spring and Rome.

F. Hazard Summary – Wildfires pose a serious threat to Floyd County in terms of property damage, as well as injuries and loss of life. Wildfires are one of the most frequently occurring natural hazards within the County each year. Based on the frequency of this hazard, as well as its ability to inflict devastation most anywhere in the County, the mitigation measures identified in this plan will be thoroughly pursued. Specific mitigation actions related to wildfire are identified in *Chapter 5*.

2.6 Drought

A. Hazard Identification –The term "drought" has various meanings, depending upon context. To a farmer, a drought is a period of moisture deficiency that affects the crops under cultivation (even two weeks without rainfall can stress many crops during certain periods of the growing cycle). To a water manager, a drought is a deficiency in water supply that affects water availability and water quality. To a meteorologist, a drought is a prolonged period when precipitation is less than normal. To a hydrologist, a drought is an extended period of decreased precipitation and streamflow.

Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. Droughts in Georgia historically have severely affected municipal and industrial water supplies, agriculture (including both livestock and crops), stream water quality, recreation at major reservoirs, hydropower generation, navigation, and forest resources. Drought is also a key factor in wildfire development by making natural fuels (grass, brush, trees, dead vegetation) more fire prone.

In Georgia, droughts have been documented at U.S. Geological Survey (USGS) streamflow gaging stations since the 1890's. From 1910 to 1940, about 20 streamflow gaging stations were in operation. Since the early 1950's through the late 1980's, about 100 streamflow gaging stations were in operation. Currently, the USGS streamflow gaging network consists of more than 135 continuous-recording gages. Groundwater levels are currently monitored at 165 wells equipped with continuous recorders.

B. Hazard Profile – The Floyd County HMPC reviewed historical data from the National Oceanic and Atmospheric Administration (NOAA), the National Climatic Data Center (NCDC), the U.S. Geological

Survey (USGS), the Georgia Department of Natural Resources (GA DNR) and the Georgia Forestry Commission (GFC) in researching drought events of the County and the State. Most historical information related to drought within this Plan has been derived from USGS streamflow data and NOAA precipitation data. Due to the nature of drought to affect large areas of the State simultaneously and the availability of only very limited County-specific drought information, the threat of drought is looked at within this Plan from a statewide perspective. Similarly, due to limited month-by-month information on drought, this hazard will be quantified on an annual basis (either there was a drought or there was not for any given year within the State). These guidelines are also used in Appendix B and Appendix C with regard to historical hazard information.

In the State of Georgia significant drought events, as identified by USGS, NOAA and other sources, have occurred in 22 of the last 50 years. Floyd County was affected to varying degrees in each of those years. Some of the most extreme droughts to affect the State include the following:

Note: When researching drought, one term that is frequently used is "recurrence interval". The recurrence interval is the average time between droughts of a given severity. For instance, in a drought with a 25-year recurrence interval the low streamflows occur, on average, once every 25 years.

1903-1905: According to the USGS, the 1903 to 1905 drought is "the earliest recorded severe drought in Georgia." In 1904, the U.S. Weather Bureau (today's National Weather Service) reported, "Levels in streams and wells were the lowest in several years. Many localities had to conserve water for stock and machinery and many factories were forced to close or operate at half capacity." When the 1903 drought struck, farm jobs dried up as quickly as the fields. The cities attracted many of these workers who migrated to Atlanta.

1924-1927: The drought that struck from 1924 to 1927 affected a wider area than simply north Georgia, affecting the Coosa River and Altamaha Basin as well at the Chattahoochee River. The U.S. Weather Bureau reported the lowest stream levels ever recorded in north Georgia in July-September of 1925, stating that the drought not only affected agricultural operations, but industrial operations as well. The scarcity of water had a profound influence on industrial and agricultural conditions in Georgia. This may have been the first time Georgia media used the term "Drought of the Century". Combined with the ongoing devastation from the boll weevil and technological advances in agriculture that increased efficiency and thereby reduced the number of farm jobs, migration from rural Georgia to urban Georgia increased significantly. The impact of this drought, plus other natural events, helped send the Georgia economy into a depression well before the rest of the United States.

1930-1935: Although the drought of 1930-1935 had little long term impact on north Georgia, it contributed to the ongoing economic problems throughout the state and the United States as a whole. The USGS reports that the severity of this drought "exceeded a 25-year recurrence interval" in central and southwestern Georgia and affected much of the Country. In extreme northern and southeastern Georgia, the recurrence interval was 10–25 years. This period was also referred to as the "Drought of the Century."

Central Georgia - 1936

1938-1944: Many of the same areas that suffered during the 1930 to 1935 drought endured severe drought again from 1938 to 1944. The drought of 1938-1944 struck the upper Coosa River basin and the Chattahoochee River basin. According to USGS the recurrence interval exceeded 50 years in those areas. In extreme northern and southwestern Georgia, the drought had recurrence intervals of 10–25 years. It was this drought that convinced politicians to move towards massive hydroelectric projects that would supply power and keep water available to constituents throughout long dry spells. One of the key supporters of hydroelectric power in the United States was Senator Richard B. Russell, member of the Senate Appropriations Committee. The first such dam in the State, Allatoona, was begun in 1941 and completed after World War II.

1950-1957: A large statewide drought lasted from 1950 to 1957. Most streamflows had recurrence intervals exceeding 25 years according to USGS. The catastrophic drought devastated crops by 1954. This event also earned the title as "Drought of the Century." This drought was most severe in southern Georgia, with most streamflows having recurrence intervals exceeding 25 years. In northeastern Georgia, the drought severity also exceeded the 25-year recurrence interval. The low rainfall affected the length of time it took to fill Lake Lanier for the first time since its creation in 1950 and completion in 1956. In northwestern Georgia, the recurrence interval of the drought was between 10 and 25 years.

1976-1978: According to USGS, beginning in 1976, the weather over southwest Georgia turned towards a persistent pattern of late-summer drought including parts of the Chattahoochee Valley.

1980-1982: The 1980 to 1982 drought resulted in the lowest streamflows since 1954 in most areas, and the lowest streamflows since 1925 in others. Recurrence intervals of 10–25 years were common in most of Georgia. Pool levels at four major reservoirs receded to the lowest levels since first filling. Groundwater levels in many observation wells were lower than previously observed. Nearly continuous declines were recorded in some wells for as long as 20 consecutive months, and water levels remained below previous record lows for as long as nine consecutive months.

1985-1989: Many North Georgia residents remember the drought of 1985 to 1989 that saw Lake Lanier reach its lowest levels since it was filled in 1950. Streamflows touched the lows reached during the 1925 drought. Water-supply shortages occurred in Georgia in 1986. Shortages first occurred in a few Atlanta metropolitan systems, primarily because of large demand and small reservoir storage. As the drought continued, other systems in the southern part of the metropolitan area also had water-supply problems, as did several municipalities in northern and central Georgia. During 1986, the U.S. Army Corps of Engineers significantly decreased the release of water from Lake Lanier, but reservoir levels continued to recede to about 2 feet above the record minimum lake level. Ground-water levels in northern Georgia were significantly less than normal during the 1985 to 1989 drought, and shortages in ground-water supplies from domestic wells occurred in the northern one-third of the State.

1998-2003: From 1998 until 2003, with a brief respite in 2000-2001, North Georgia suffered through a historic drought. The term "historic," in this instance, is used by weathermen to describe a drought of unusually long duration, one of the three measures of a drought. While the regional impact of a long-term drought is massive, in North Georgia's case, the drought's effect was mitigated, simply because of technology, mostly the dams built by the Corps of Engineers and others. Earlier droughts, however, did not have the benefit of these dams and had a "historic" impact on North Georgia. Shortages of surface-water supplies similar to those during 1986 occurred in the 1998 to 2003 drought. Water shortages during the summer of 2000 prompted the Georgia Department of Natural Resources to institute statewide restrictions on outdoor water use.

2006-2009: Beginning in late 2006 another drought struck north Georgia, on the heels of the earlier 5-year drought. River levels plummeted, causing lakes to fill up more slowly when water was released. Georgia politicians battled against the Army Corps of Engineers' continuous flow requirement for Lake Lanier due to the looming water shortages. The Georgia Environmental Protection Division (EPD) declared a level four drought response across the northern third of Georgia, including Floyd County, which prohibits most types of outdoor residential water use effective immediately.

Lake Lanier and Lake Allatoona 2007 (L to R)

Lake Hartwell 2008

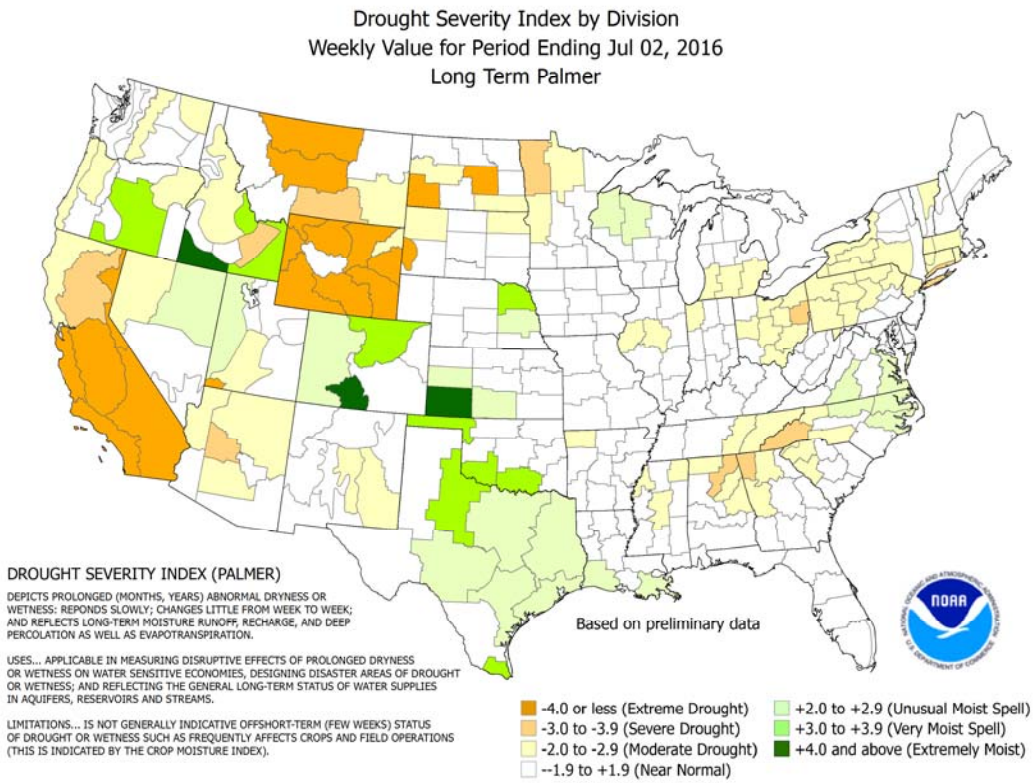
2011-2012: For two years beginning in 2011, the County was impacted once again by a relatively short, but severe drought.

2016: The most recent drought began in 2016 and had not ended at the time this Plan was updated. It has proven to be significant.

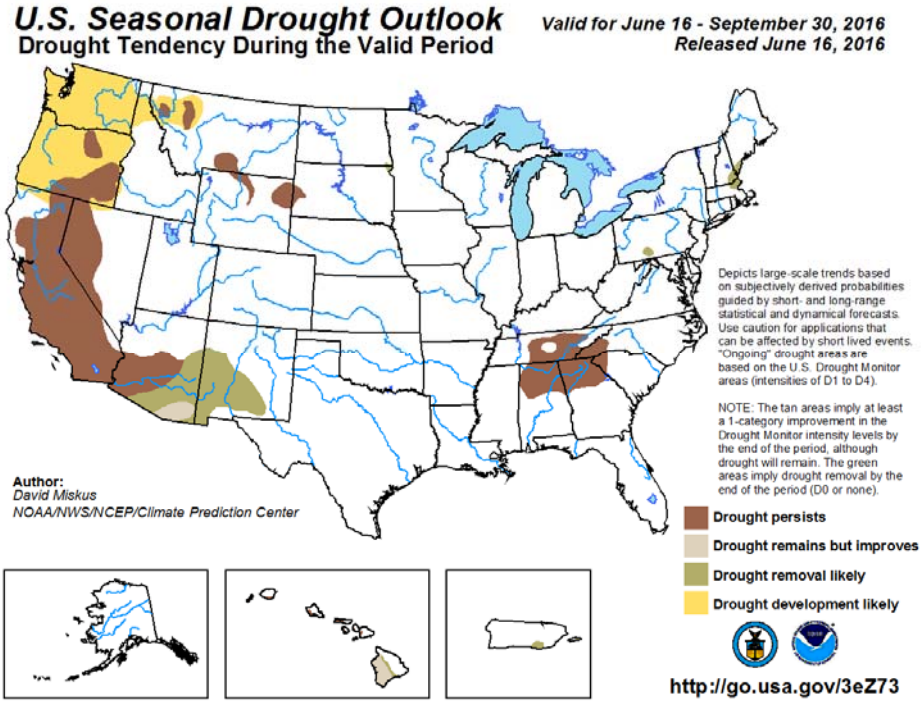
Agricultural crop damage during periods of drought is difficult to estimate. Water supplies, industries, power generation, agriculture, forests, wetlands, stream water quality, navigation, and recreation for the State of Georgia have been severely impacted over time. Because of the extremely unpredictable nature of drought (to include duration), reliably calculating a recurrence interval is difficult. The Hazard Frequency Table in Appendix C analyzes historical data from the past fifty years to provide a general idea of the frequency of drought within the State.

The following maps represent current and forecasted drought conditions. Each of these maps is updated on a regular basis. Drought conditions can change very rapidly and must be continuously monitored.

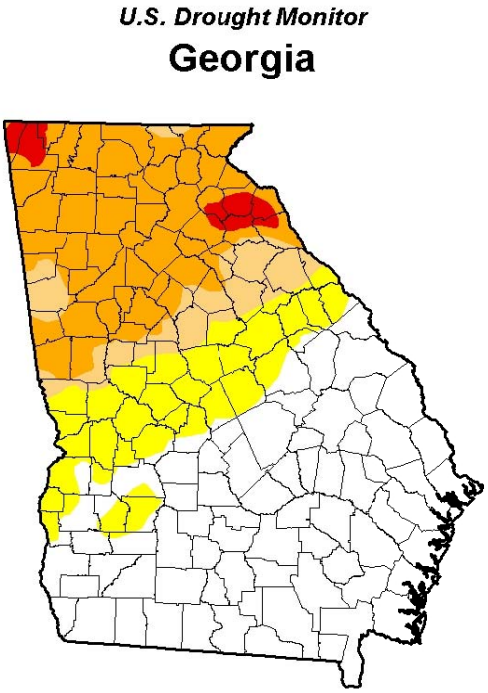
The Palmer Drought Severity Index map shows current drought conditions nationwide and is updated weekly. According to the map, the County's current drought status, as of July 2, 2016, is "severe drought".



The U.S. Seasonal Drought Outlook map, forecasts likely drought conditions through September 30, 2016, which indicates that drought conditions are likely to persist in Floyd County within this time period.



The U.S. Drought Monitor indicates that as of June 28, 2016, Floyd County is experiencing severe drought conditions at this time.



June 28, 2016
(Released Thursday, Jun. 30, 2016)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	51.72	48.28	32.69	25.21	1.96	0.00
Last Week 6/21/2016	52.37	47.63	31.61	14.55	0.00	0.00
3 Months Ago 3/29/2016	68.57	31.43	0.00	0.00	0.00	0.00
Start of Calendar Year 12/29/2015	87.36	12.64	0.00	0.00	0.00	0.00
Start of Water Year 9/29/2015	63.46	36.54	17.71	1.20	0.00	0.00
One Year Ago 6/30/2015	52.93	47.07	13.56	2.46	0.00	0.00

Intensity:

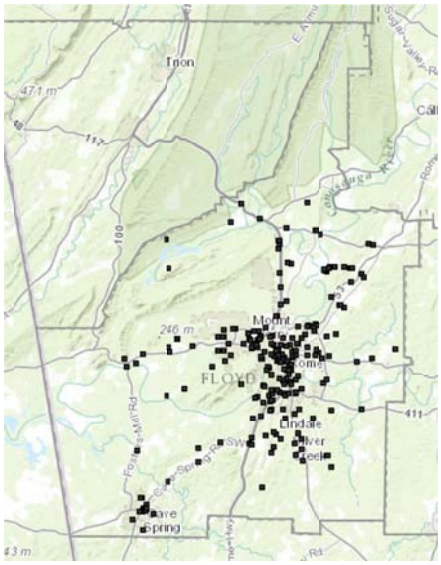
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Eric Luebehusen
U.S. Department of Agriculture

http://droughtmonitor.unl.edu/

C. Assets Exposed to Hazard – All public and private property including critical facilities are susceptible to drought since this hazard is not spatially defined. The danger of drought is compounded due to the fact that drought conditions create a heightened risk for wildfire. The map below identifies critical facilities located within the hazard area, which in the case of drought includes all areas within the County and Cities.

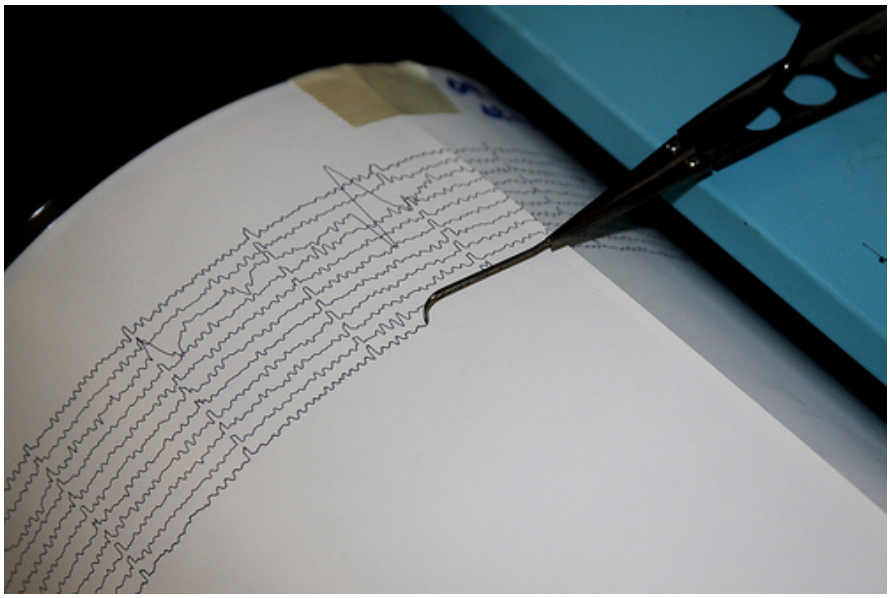


D. Estimate of Potential Losses – No damage to facilities is anticipated as a result of drought conditions, aside from the threat of wildfire. Crop damage cannot be accurately quantified due to several unknown variables: duration of the drought, temperatures during the drought, severity of the drought, rainfall requirements for specific crops and livestock, and the different growing seasons. There may also be financial losses related to water system shortages. For loss estimate information, please refer to Appendix A, the Critical Facilities Database, and Appendix D, Worksheet 3a, for each jurisdiction.

E. Multi-Jurisdictional Concerns – Agricultural losses associated with drought are more likely to occur in the rural, less concentrated areas of the County. Although the Cities of Cave Spring and Rome may be slightly less likely to experience agricultural-related drought losses than the County, they can be financially impacted by water resource-related drought losses.

F. Hazard Summary – Unlike other hazard events, drought causes damage slowly. A sustained drought can cause severe economic stress to the agricultural interests of the County and even the entire State or Region. The potential negative effects of sustained drought are numerous. In addition to an increased threat of wildfires, drought can affect water supplies, stream-water quality, water recreation facilities, hydropower generation, as well as agricultural and forest resources. The HMPC realized the limitations associated with mitigation actions for drought, but did identify some basic mitigation measures in *Chapter 5*.

2.7 Earthquakes



A. Hazard Identification – One of the most frightening and destructive natural hazards is a severe earthquake. An earthquake is a sudden movement of the Earth, caused by the abrupt release of strain that has accumulated over a long time. The forces of plate tectonics shape the Earth as the huge plates that form the Earth's surface slowly move over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free. If the earthquake occurs in a populated area, it may cause many deaths, injuries and extensive property damage.

The goal of earthquake prediction is to give warning of potentially damaging earthquakes early enough to allow appropriate response to the disaster, enabling people to minimize loss of life and property. The U.S. Geological Survey conducts and supports research on the likelihood of future earthquakes. This research includes field, laboratory, and theoretical investigations of earthquake mechanisms and fault zones. A primary goal of earthquake research is to increase the reliability of earthquake probability estimates. Ultimately, scientists would like to be able to specify a high probability for a specific earthquake on a particular fault within a particular year. Scientists estimate earthquake probabilities in two ways: by studying the history of large earthquakes in a specific area and the rate at which strain accumulates in the rock.

Scientists study the past frequency of large earthquakes in order to determine the future likelihood of similar large shocks. For example, if a region has experienced four magnitude 7 or larger earthquakes during 200 years of recorded history, and if these shocks occurred randomly in time, then scientists would assign a 50 percent probability (that is, just as likely to happen as not to happen) to the occurrence of another magnitude 7 or larger quake in the region during the next 50 years. But in many places, the assumption of random occurrence with time may not be true, because when strain is released along one part of the fault system, it may actually increase on another part.

Another way to estimate the likelihood of future earthquakes is to study how fast strain accumulates. When plate movements build the strain in rocks to a critical level, like pulling a rubber band too tight, the rocks will suddenly break and slip to a new position. Scientists measure how much strain accumulates along a fault segment each year, how much time has passed since the last earthquake along the segment, and how much strain was released in the last earthquake. This information is then used to calculate the time required for the accumulating strain to build to the levels that result in an earthquake. This simple model is complicated by the fact that such detailed information about faults is rare. In the United States, only the San Andreas Fault system has adequate records for using this prediction method.

Magnitude and intensity measure different characteristics of earthquakes. Magnitude measures the energy released at the source of the earthquake and is determined from measurements on seismographs. Intensity measures the strength of shaking produced by the earthquake at a certain location and is determined from effects on people, human structures, and the natural environment. The following two tables describe the Abbreviated Modified Mercalli Intensity Scale, and show intensities that are typically observed at locations near the epicenter of earthquakes of different magnitudes.

Magnitude / Intensity Comparison

Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 - 3.0	**I**
3.0 - 3.9	**II - III**
4.0 - 4.9	**IV - V**
5.0 - 5.9	**VI - VII**
6.0 - 6.9	**VII - IX**
7.0 and higher	**VIII** or higher

Abbreviated Modified Mercalli Intensity Scale

I. Not felt except by a very few under especially favorable conditions.

II. Felt only by a few persons at rest, especially on upper floors of buildings.

III. 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. 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. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.

VI. Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

VII. 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.

VIII. Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.

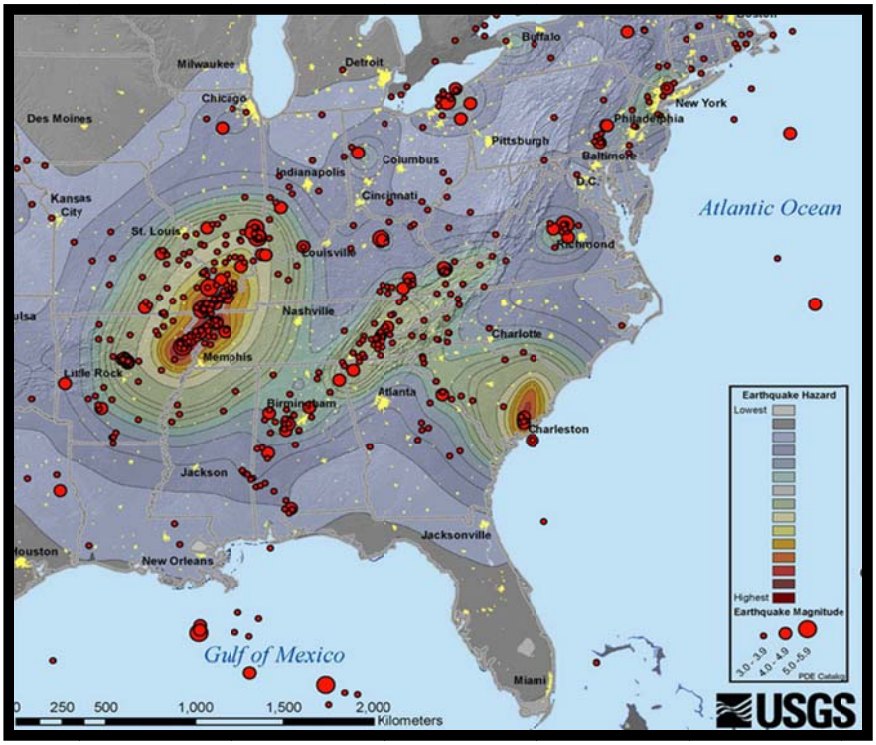
IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

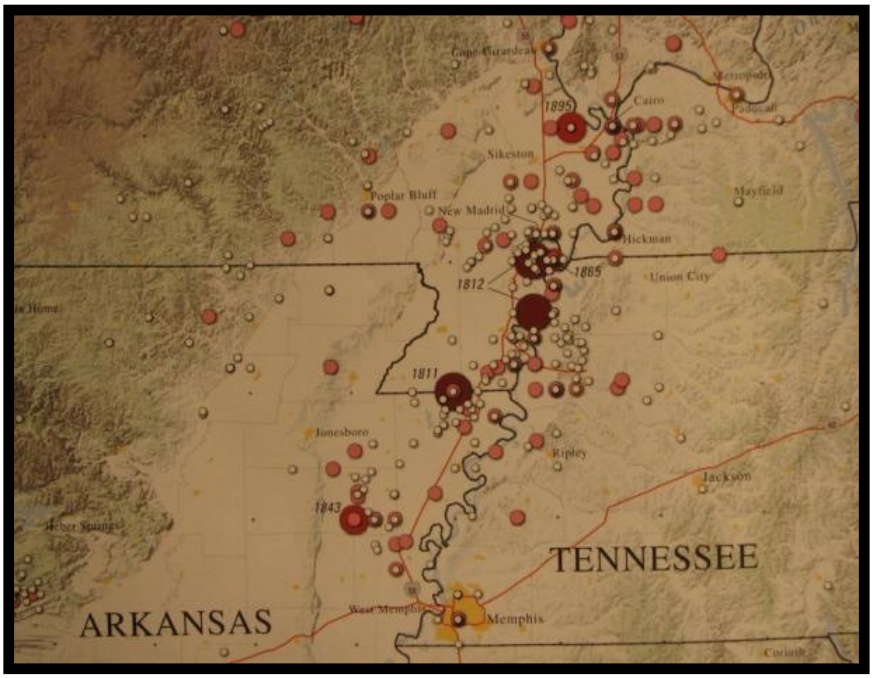
XI. Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly.

XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

The following USGS map provides a historical view of earthquakes in the Eastern United States.



B. Hazard Profile – The first earthquakes recorded as being felt in Georgia were the great New Madrid earthquakes of 1811-1812 (also known as the Mississippi River Valley earthquakes) centered in northeast Arkansas and New Madrid, Missouri. There were hundreds of earthquakes during the two month period between December 16, 1811 and February 7, 1812. On the basis of the large area of damage (600,000 square kilometers), the widespread area of perceptibility (5,000,000 square kilometers), and the complex physiographic changes that occurred, this series of earthquakes rank as some of the largest in the United States since its settlement by Europeans. The area of strong shaking associated with these shocks is two to three times larger than that of the 1964 Alaska earthquake and 10 times larger than that of the 1906 San Francisco earthquake. The first three major earthquakes occurred in northeast Arkansas on December 16, 1811 (three shocks - Mfa 7.2/MSn 8.5; Mfa 7.0/MSn 8.0; and MSn 8.0). There were six aftershocks on December 16th and 17th alone in the range of M5.5 to M6.3 (Note: aftershocks actually *are* earthquakes). The fourth earthquake occurred in Missouri on January 23, 1812 (Mfa 7.1/MSn 8.4). The fifth earthquake occurred in New Madrid, Missouri on February 7, 1812 (Mfa 7.4/ MSn 8.8). This is the earthquake that created Reelfoot Lake, located in northwest Tennessee. It was reported to have been formed as the Mississippi River flowed backward for 10–24 hours to fill the lake. As a result of this earthquake, the original town of New Madrid now lies under the Mississippi River.



This accounted for a total of five earthquakes of magnitude MSn 8.0 or higher occurring in a period of 54 days. The first earthquake caused only slight damage to man-made structures, mainly because the region was so sparsely populated. However, as the earthquakes continued, they began to open deep cracks in the ground, created landslides on the steeper bluffs and hillsides, large areas of land were uplifted, and sizable sink areas were created. These five main earthquakes, and several aftershocks, were felt over almost all of the eastern United States including the State of Georgia. In Georgia this series of earthquakes was strong enough to have shaken bricks from chimneys and other minor damage.

The great Charleston, South Carolina, earthquake of 1886 killed approximately 60 people. The magnitude 7.3 earthquake is the most damaging earthquake to occur in the Southeast United States and one of the largest historic shocks in Eastern North America. It damaged or destroyed many buildings in the old city of Charleston. Property damage was estimated at $5-$6 million. Structural damage was reported several hundred kilometers from Charleston including in the State of Georgia. On August 31, 1886 at 9:25 pm, preceded by a low rumble, the shock waves reached Savannah. People had difficulty remaining standing. One woman died of fright as the shaking cracked walls, felled chimneys, and broke windows. Panic at a revival service left two injured and two more were injured in leaping from upper story windows. Several more were injured by falling bricks. Ten buildings in Savannah were damaged beyond repair and at least 240 chimneys damaged. People spent the night outside. At Tybee Island light station the 134 foot lighthouse was cracked near the middle where the walls were six feet thick, and the one-ton lens moved an inch and a half to the northeast. In Augusta the shaking was the most severe (VIII on the Modified Mercalli scale) in the State. An estimated 1000 chimneys and many buildings were damaged. The business and social life was paralyzed for two days. Brunswick and Darien were affected as well.

June 17, 1872: An earthquake on June 17, 1872 in Milledgeville, GA and had an intensity of at least V on the Modified Mercalli scale, the lowest intensity in which some damage may occur. It was reported as a sharp shock, jarring brick buildings and rattling windows.

November 1, 1875: On November 1, 1875, at 9:55 in the evening, an intensity VI earthquake occurred near the South Carolina border. It was felt from Spartanburg and Columbia, South Carolina, to Atlanta and Macon, Georgia, from Gainesville to Augusta, and generally over an area of 25,000 square miles.

October 18, 1902: A more local event occurred on October 18, 1902, with a sharp shock felt along the east face of Rocky Face Mountain, just west of Dalton, GA with intensity VI and at LaFayette, GA with intensity V. The earthquake was felt over an area of about 1500 square miles including Chattanooga, Tennessee.

January 23, 1903: The Savannah, GA area was shaken with an intensity VI earthquake on January 23, 1903. Centering near Tybee Island, it was felt over an area of 10,000 square miles including Savannah (intensity VI), Augusta (intensity III), Charleston (intensity IV-V), and Columbia (intensity III-IV). Houses were strongly shaken.

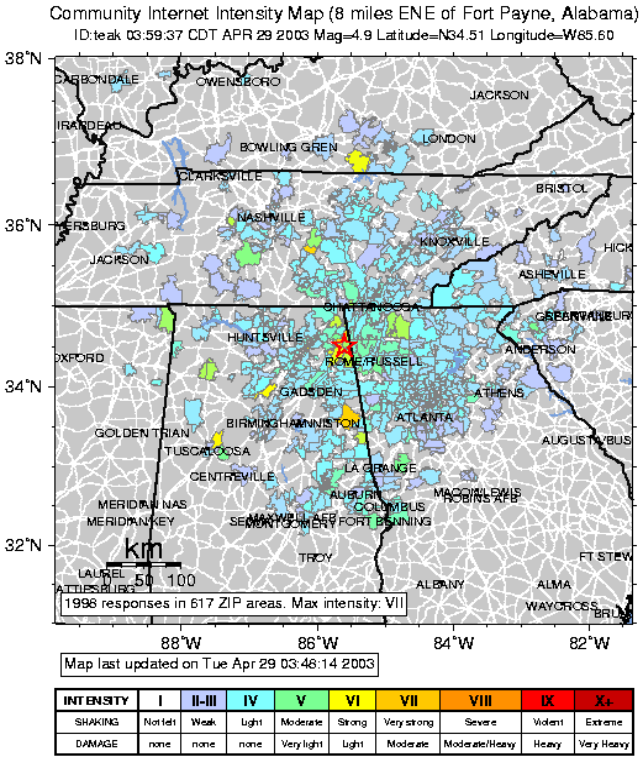
June 20, 1912: Another shock was felt on June 20, 1912, at Savannah with intensity V.

March 5, 1914: According to USGS, Georgia experienced another earthquake on March 5, 1914. Magnitude 4.5.

March 5, 1916: On March 5, 1916, an earthquake centered 30 miles southeast of Atlanta was felt over an area of 50,000 square miles, as far as Cherokee County, North Carolina, by several people in Raleigh, and in parts of Alabama and Tennessee.

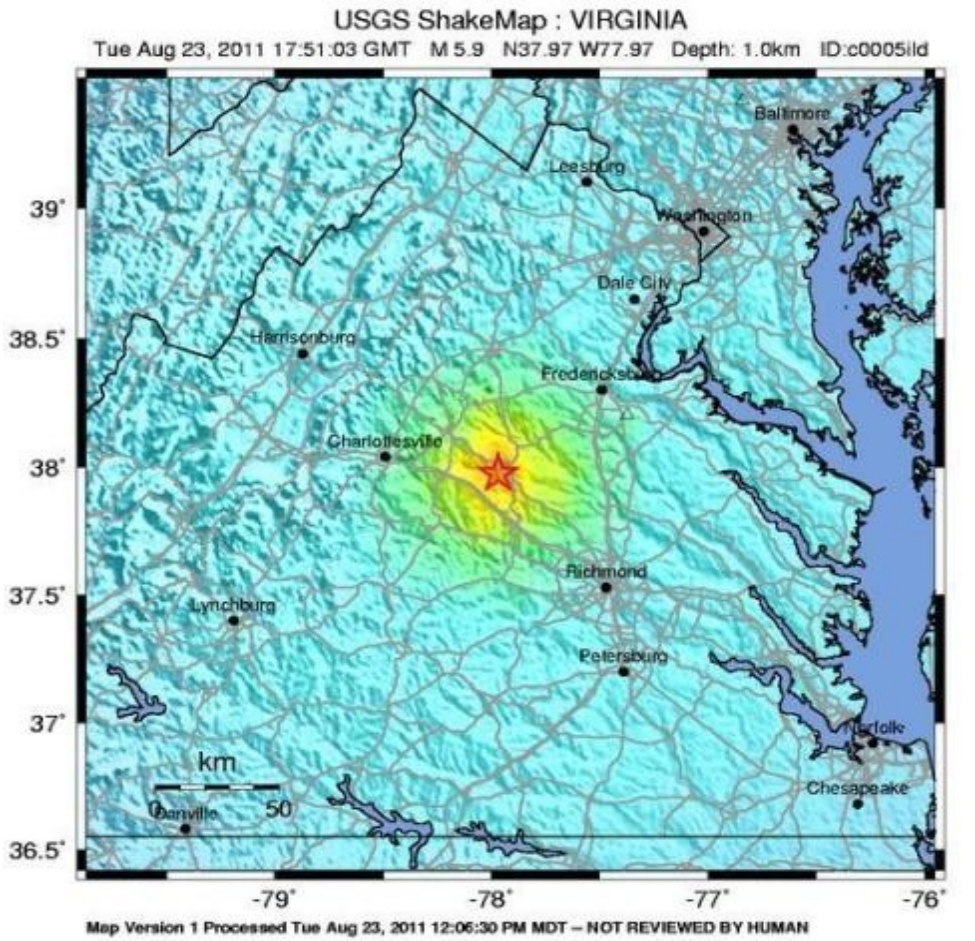
March 12, 1964: An earthquake of intensity V or over occurred on March 12, 1964, centered near Haddock, GA less than 20 miles northeast of Macon. Intensity V was recorded at Haddock while shaking was felt in four counties over a 400-square-mile area.

April 29, 2003: On April 29, 2003 just before 5:00 a.m. a moderate earthquake, rated 4.9 on the Richter Scale, shook most of the northwest corner of Georgia, south to Atlanta. The epicenter was located in Menlo, GA, about 37 miles south of Chattanooga. See map to right.



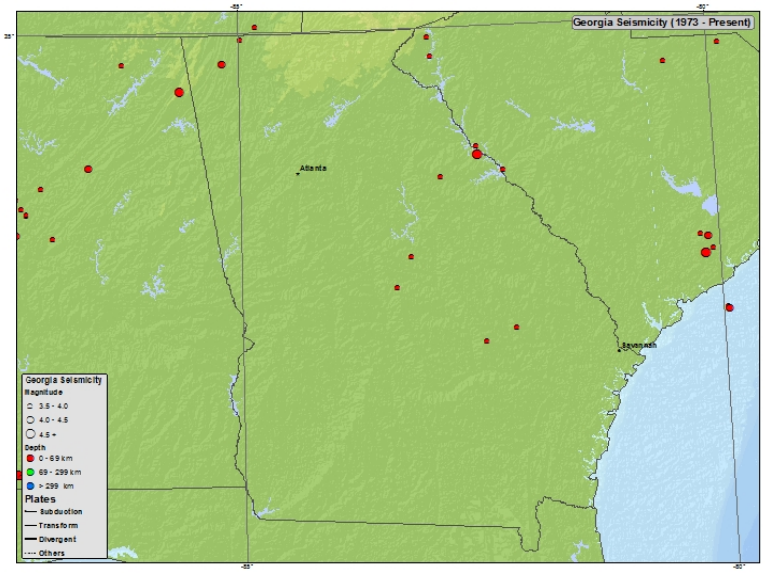
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy

August 23, 2011: On August 23, 2011 at 1:51pm, a 5.8 magnitude earthquake originated near Louisa and Mineral, Virginia. It struck Washington DC (about 100 miles away from epicenter) causing moderate shaking and potentially significant damage. The earthquake was recorded all along the Appalachians, from Georgia to New England. The earthquake was felt so widely because it was a shallow earthquake, and geologic conditions in the eastern U.S. allow the effects of earthquakes to propagate and spread much more efficiently than in the western United States. Only mild movement was felt in Floyd County. See map below.

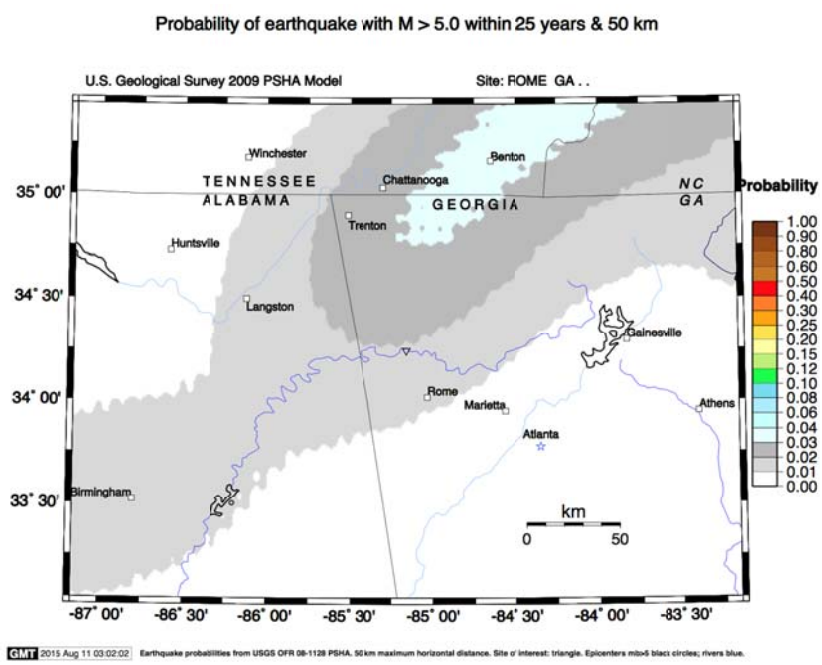


PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

To a large extent, the HMPC was unable to determine which of these earthquakes affected Floyd County and, if so, to what degree. Nevertheless, the HMPC has determined that most of the earthquakes documented above, which is not an all-inclusive list, would have been strong enough or would have occurred close enough to the County to merit consideration. Two of these earthquakes occurred within the 50-year study period and are included in the hazard history of this Plan. The threat of earthquakes in Floyd County may be more significant than the documented earthquake history would seem to indicate. Seismic activity for the State of Georgia is shown on the following USGS map for the period 1973 to 2012 which is the latest version of this map.



Based on U.S. Geological Survey estimations using the earthquake frequency method described in the section above, the probability of an earthquake of a magnitude over 5.0 within Floyd County over the next 25 years is between 0% and 3% (see map below). As discussed above, such predictions are based on limited information, and cannot necessarily be relied upon for their precision. However, they do help demonstrate that the threat of earthquakes cannot be overlooked especially in the northwestern portions of Georgia.

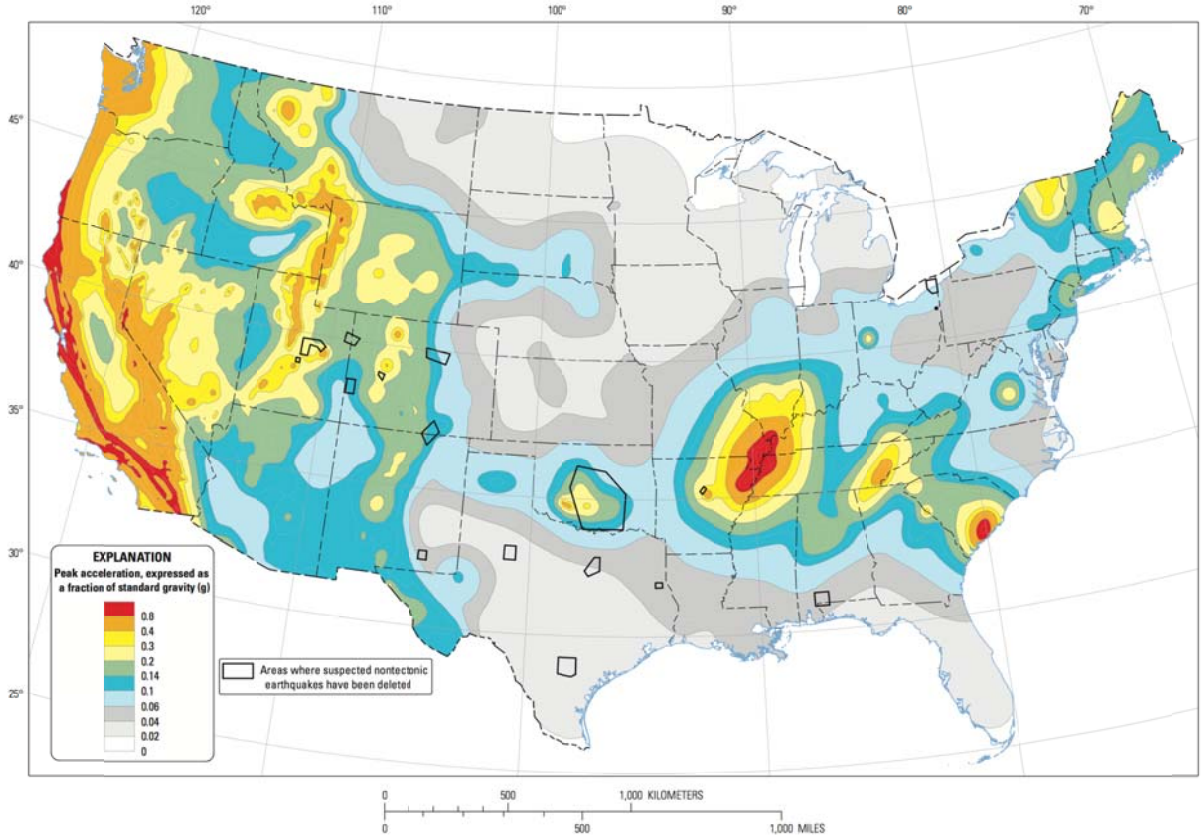


The 2014 U.S. Geological Survey (USGS) National Seismic Hazard Maps, including the one on the following page, display earthquake ground motions for various probability levels across the United States and are applied in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. The updated maps represent an assessment of the best

available science in earthquake hazards and incorporate new findings on earthquake ground shaking, faults, seismicity, and geodesy. The USGS National Seismic Hazard Mapping Project developed these maps by incorporating information on potential earthquakes and associated ground shaking obtained from interaction in science and engineering workshops involving hundreds of participants, review by several science organizations and State surveys, and advice from expert panels and a Steering Committee. The new probabilistic hazard maps represent an update of the seismic hazard maps; previous versions were developed by Petersen and others (2008) and Frankel and others (2002), using the methodology developed Frankel and others (1996). Algermissen and Perkins (1976) published the first probabilistic seismic hazard map of the United States which was updated in Algermissen and others (1990).

The National Seismic Hazard Maps are derived from seismic hazard curves calculated on a grid of sites across the United States that describe the annual frequency of exceeding a set of ground motions. Data and maps from the 2014 U.S. Geological Survey National Seismic Hazard Mapping Project are available for download below. Maps for available periods (0.2 s, 1 s, PGA) and specified annual frequencies of exceedance can be calculated from the hazard curves. Figures depict probabilistic ground motions with a 2 percent probability of exceedance. Spectral accelerations are calculated for 5 percent damped linear elastic oscillators. All ground motions are calculated for site conditions with Vs30=760 m/s, corresponding to NEHRP B/C site class boundary.

Simplified 2014 Hazard Map (PGA, 2% in 50 years)



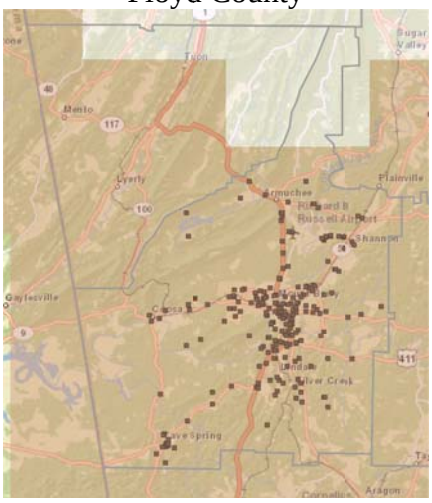
Two-percent probability of exceedance in 50 years map of peak ground acceleration

C. Assets Exposed to Hazard - All structures and facilities within Floyd County are susceptible to earthquake damage since they can occur in any portion of the County or City. The likelihood of an earthquake in Floyd County and the Cities of Cave Spring and Rome ranges from "moderate to high threat" to "highest threat". Most of the County and all of the Cities of Cave Spring and Rome are located within Seismic Threat Category 3, "moderate to high threat." Only the most northern portion of the County is located within Seismic Threat Category 4, "highest threat".

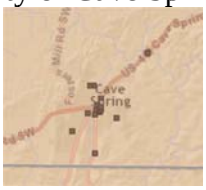
The seismic hazard layer used in the maps that follow is based on the USGS Probabilistic Seismic Hazard Map, showing the percentage of gravity that the area has a 2 percent probability of exceedance in 50 years. The score classification reflects that used by the IRC Seismic Design Categories. The horizontal positional accuracy is unknown for this layer.

	Seismic Threat Category	Original Value	Description
	1	A	0-17% gravity (lowest threat)
	2	B	17-33% gravity (low to moderate threat)
	3	C	33-50% gravity (moderate to high threat)
	4	D1	50-83% gravity (highest threat)
	*****	Not applicable	All other values

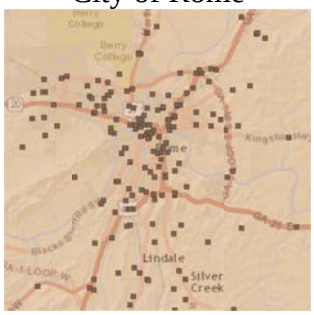
Floyd County



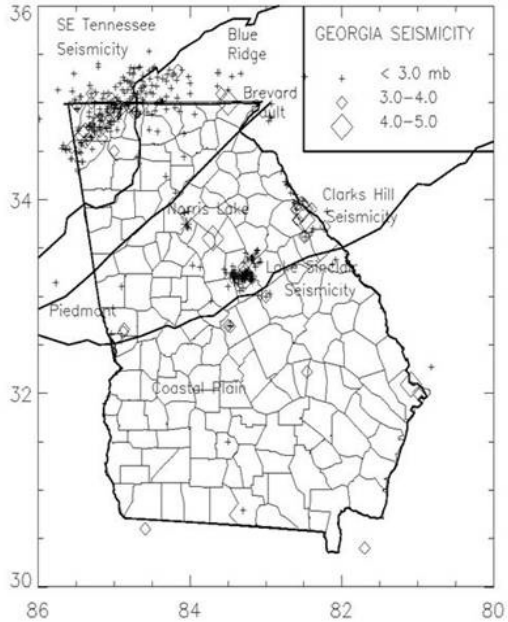
City of Cave Spring



City of Rome



Georgia has a few large faults. The Blue Ridge fault extends from Alabama through Georgia and into Tennessee. The Brevard Fault extends from Alabama through Georgia and into South Carolina. Floyd County is located between these two faults.



D. Estimate of Potential Losses – For loss estimate information, please refer to Appendix A, the Critical Facilities Database, and Appendix D, Worksheet 3a, for each jurisdiction.

E. Multi-Jurisdictional Concerns – All of Floyd County has the potential to be affected by earthquakes. The threat appears to be moderate and fairly uniform throughout the County and Cities. Any steps taken to mitigate the effects of earthquake will be undertaken on a countywide basis and include the Cities of Cave Spring and Rome.

F. Hazard Summary – Scientific understanding of earthquakes is of vital importance to the Nation. As the population increases, expanding urban development and construction works encroach upon areas susceptible to earthquakes. With a greater understanding of the causes and effects of earthquakes, we may be able to reduce damage and loss of life from this destructive phenomenon. The HMPC was limited in its ability to develop mitigation measures associated with earthquakes, but did provide some guidance in *Chapter 5*.

2.8 Sinkholes and Caves

A. Hazard Identification – Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that can naturally be dissolved by groundwater circulating through them. As the rock dissolves, spaces and caverns develop underground. Sinkholes are dramatic because the land usually stays intact for a while until the underground spaces just get too big. If there is not enough support for the land above the spaces then a sudden collapse of the land surface can occur. These collapses can be small or they can be huge and can occur where a house or road is on top. The most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania, though they are obviously not limited to these states.

Most caves form through the dissolution of limestone by acidic groundwater. Limestones of the Paleozoic age are a common bedrock in the Appalachian Plateau and Valley and Ridge provinces of northwest Georgia, and those limestones are riddled with caves and other features formed by solution processes. Georgia's two northwesternmost counties, Dade and Walker, host 164 and 149 caves respectively. Bartow County and the eight counties to the north and west (Catoosa, Chattooga, Dade, Floyd, Gordon, Murray, Walker, and Whitfield) combine to host 448 of Georgia's 513 known caves.

B. Hazard Profile – Sinkholes and caves are not the most well-known hazards within Floyd County, but they do pose a serious hazard and therefore merit mention within the Hazard Mitigation Plan.

Sinkholes generally form through the natural process of underground streams causing erosion to surface layers. Once the erosion occurs and the water dissipates, the layers above the erosion can

collapse into the voids causing a hole. However, these layers can also hold in place for years, and even after properties are constructed upon them. Unfortunately though, once the layers fail and a sinkhole occurs, property constructed upon the void will be damaged. And, in the worst cases, lives will be lost.

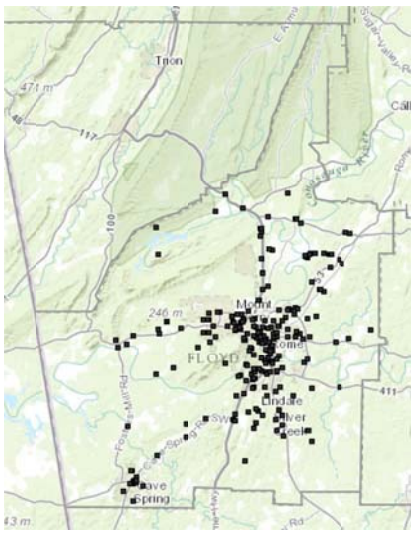
Caves, although they may seem similar in many regards to sinkholes, generally pose a different kind of threat. The main threat with caves is that people, often inexperienced, voluntarily enter them for the recreational purpose of exploring or "caving". Common hazards associated with caving include physical injury due to an inability to see well, getting lost which can lead to hypothermia and dehydration, rockfalls, and even a total or partial collapse of a cave.

A local example is Victory Lake on the campus of Berry College. The 25-acre lake at the center of the campus was created in the 1920s to honor students from the Berry Schools who fought in World War I. Since 1985, it has disappeared on different occasions because of the water draining into sinkholes that formed under the lake bed.

In 2013 large sinkhole under a Park Street apartment in Cave Spring was discovered. The top of the sinkhole was approximately 6 feet wide and 3 feet deep and was found in the crawlspace of one of the townhomes in a rental quadruplex at 10 Park St. The sinkhole continued back up under the building towards the creek behind the home. Cave Spring is actually known to have numerous caves and sinkholes and was named after the cave and water spring located in Rolater Park.

Unfortunately there is no comprehensive source of information on sinkholes. Information available is limited, but the HMPC thought it was important to include these occurrences in the Plan.

C. Assets Exposed to Hazard – In evaluating assets that are susceptible to sinkholes, the HMPC determined that any public and private property located in Floyd County can be affected.



D. Estimate of Potential Losses – Sinkhole damage estimates are difficult to estimate due to their unpredictable nature and the fact that they can be catastrophic. Caves are primarily associated with bodily injury and not property damage. For available loss estimate information, please refer to the Critical Facilities Database (Appendix A).

E. Multi-Jurisdictional Concerns – Any mitigation steps taken related to sinkholes and caves will be pursued on a countywide basis and include Floyd County and the Cities of Rome and Cave Spring.

F. Hazard Summary – Though not very common, sinkholes and caves can be devastating and do pose a serious threat to Floyd County in terms of property damage, injuries and loss of life. Specific mitigation actions related to these weather events are identified in *Chapter 5*.

Chapter 3
Local Technological Hazard, Risk and Vulnerability (HRV) Summary

In accordance with FEMA guidelines, the Floyd County Hazard Mitigation Planning Committee (HMPC) also included information relating to technological or "human-caused" hazards into this plan. The term, "technological hazard" refers to incidents resulting from human activities such as the manufacture, transportation, storage, and use of hazardous materials. This plan assumes that hazards resulting from technological sources are accidental, and that their consequences are unintended. Unfortunately, the information relating to technological hazards is much more limited, due largely to the very limited historical data available. This causes a greater level of uncertainty with regard to mitigation measures. However, enough information has been gathered to provide a basic look at technological hazards within Floyd County.

The Floyd County Hazard Mitigation Planning Committee (HMPC) identified two technological hazards the County is vulnerable to based upon available data including scientific evidence, known past events, and future probability estimates. As a result of this planning process, which included an analysis of the risks associated with probable frequency and impact of each hazard, the HMPC determined that each of these technological hazards pose a threat significant enough to address within this Plan. These include hazardous materials release and dam failure. Each of these technological hazards is addressed in this chapter of the Plan. An explanation and results of the vulnerability assessment are found in Tables 3-1 and 3-2.

Table 3.1 – Hazards Terminology Differences

Hazards Identified in 2008 Georgia State Plan	Equivalent/Associated Hazards Identified in the 2011 Floyd County Plan	Difference
Dam Failure	Dam Failure	None

Table 3.2 – Vulnerability Assessment - Technological Hazards *(see Keys below)*

HAZARD	Floyd	Cave Spring	Rome
Dam Failure			
Frequency	L	VL	L
Severity	H	M	H
Probability	L	VL	L
Hazardous Materials Release			
Frequency	M	L	M
Severity	H	M	H
Probability	H	M	H

Key for Table 3.2 – Vulnerability Assessment Frequency and Probability Definitions

NA = Not applicable; not a hazard to the jurisdiction
VL = Very low risk/occurrence
L = Low risk; little damage potential (for example, minor damage to less than 5% of the jurisdiction)
M = Medium risk; moderate damage potential (for example, causing partial damage to 5-15% of the jurisdiction, infrequent occurrence)
H = High risk; significant risk/major damage potential (for example, destructive, damage to more than 15% of the jurisdiction, regular occurrence)
EX = Extensive risk/probability/impact

3.1 Hazardous Materials Release

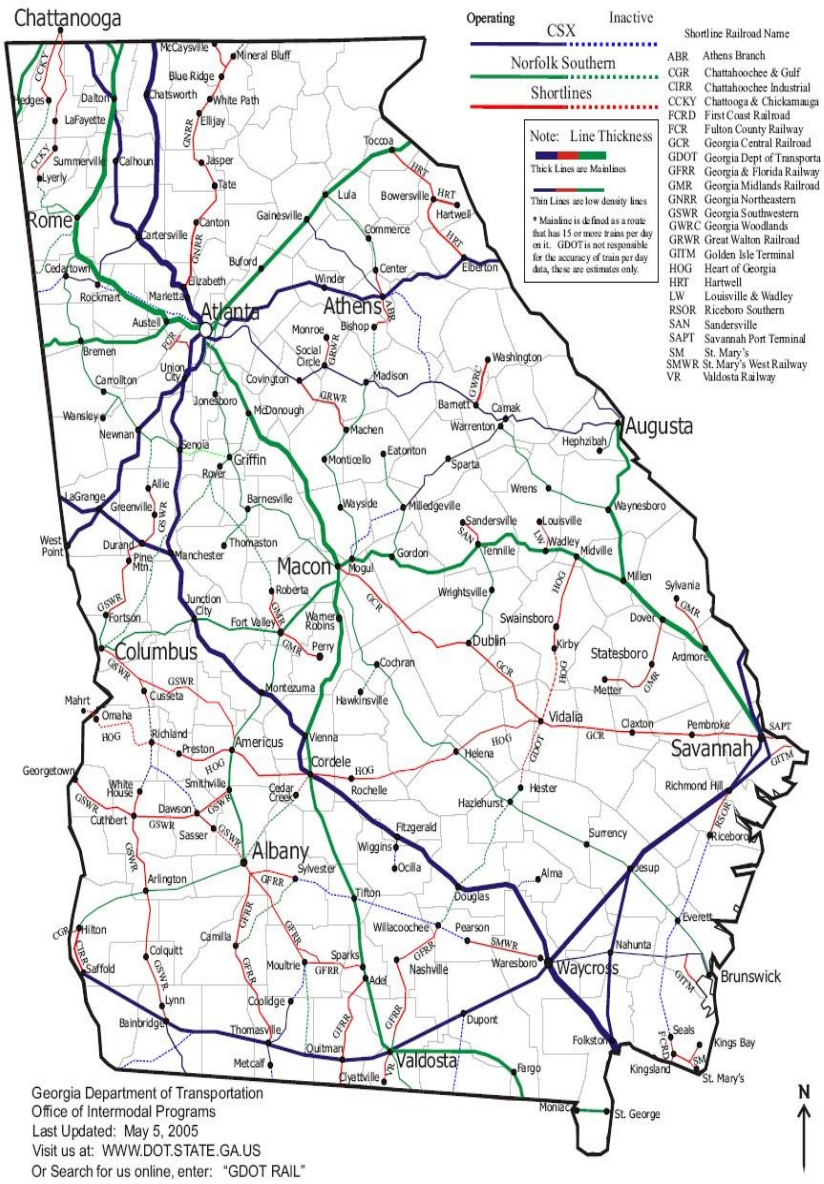
A. Hazard Identification – Hazardous materials (hazmat) refers to any material that, because of its quantity, concentration, or physical or chemical characteristics, may pose a real hazard to human health or the environment if it is released. Hazmat includes flammable and combustible materials, toxic materials, corrosive materials, oxidizers, aerosols, and compressed gases. Specific examples of hazmat are gasoline, bulk fuels, propane, propellants, mercury, asbestos, ammunition, medical waste, sewage, and chemical, biological, radiological, nuclear, and explosive (CBRNE) threat agents. Specific federal and state guidelines exist on transport and shipping hazardous materials. Research institutes, industrial plants, individual households, and government agencies all generate chemical waste. Approximately one percent is classified as hazardous.

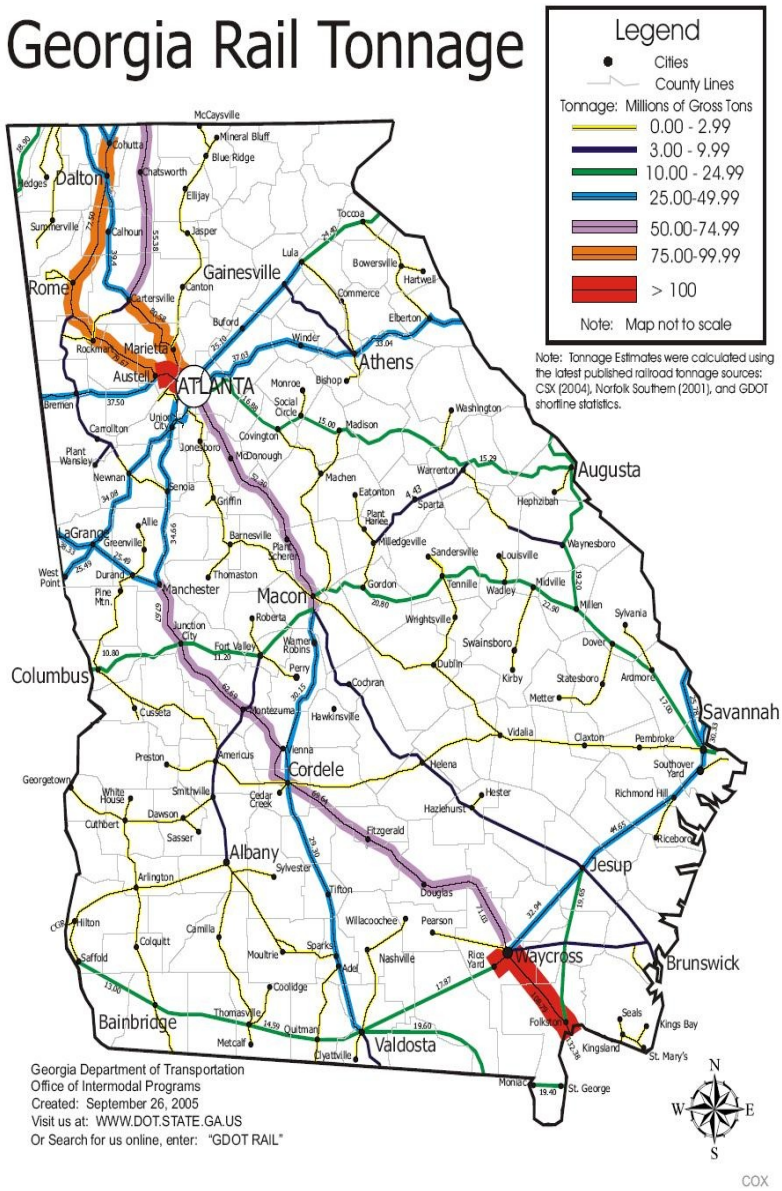
A hazmat spill or release occurs when hazardous material or waste gets into the environment in an uncontrolled fashion. Many manufacturing processes use hazardous materials or generate hazardous waste, but a hazardous spill doesn't always come from a chemical plant or a factory. Any substance in the wrong place at the wrong time in too large an amount can cause harm to the environment. The response to a spill depends on the situation. When the emergency response team is notified of a spill, it must quickly decide what sort of danger is likely. Members of the team collect appropriate clothing and equipment and travel to the scene. There they try to contain the spill, sometimes testing a sample to identify it. If necessary, they decontaminate themselves before leaving the area. Once material has been identified, other personnel arrive to remove it.

B. Hazard Profile – Hazmat spills are usually categorized as either fixed releases, which occur when hazmat is released on the site of a facility or industry that stores or manufactures hazmat, or transportation-related releases, which occur when hazmat is released during transport from one place to another.

Both fixed and transportation-related hazmat spills represent tremendous threats to Floyd County. The County's numerous industries are one of the main threats with regard to fixed hazmat spills. Another serious concern comes from transportation-related hazmat spills. US Routes 27 and 411, State Routes 1, 20, 53, 100, 101, 140, 156, 293 and major Norfolk Southern railroad lines run directly through the County and the City of Rome. The Georgia Department of Transportation (GDOT) rail maps on the following two pages provide locations of the rail lines running through Floyd County, as well as the information relating to tonnage. According to these maps, Norfolk Southern rail lines carry up to 100 million tons of materials through Floyd County and the City of Rome each year.

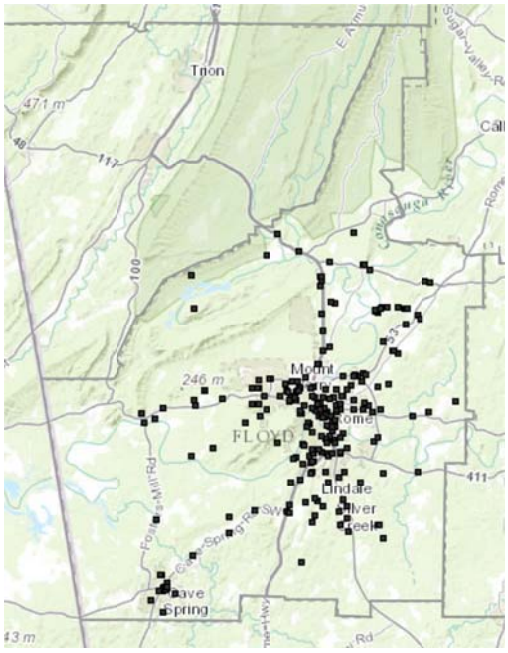
Georgia Rail System





C. Assets Exposed to Hazard – The environment is especially vulnerable to hazardous materials releases, with waterways being at greatest risk of contamination. Georgia EPD tracks information on waterways within Floyd County that have been contaminated to varying degrees due to hazmat spills. These incidents include contamination to creeks, lakes, storm sewers, wells, and drainage ditches. Such releases are also a potential threat to all property and persons within any primary highway corridors or railroad corridors of Floyd County since certain hazmat releases can create several square miles of contamination. The same holds true of property and persons located in the vicinity of facilities or industries that produce or handle large amounts of hazardous materials. The most common hazmat releases have generally included diesel, gasoline, oil, and sewage. Unfortunately, Georgia EPD no longer makes specific hazmat spill information available to the public as they once did. If at some point this changes, that data will be considered at the next Plan update.

All public and private property including critical facilities are susceptible to hazardous materials release since this hazard is not spatially defined. The map below identifies critical facilities located within the hazard area.



D. Estimate of Potential Losses - It is difficult to determine potential damage to the environment caused by hazardous materials releases. What can be calculated are the significant response costs incurred once a hazmat release does occur including emergency response, road closings, evacuations, watershed protection, expended man-hours, and cleanup materials and equipment. Corridors for US Routes 27 and 411, State Routes 1, 20, 53, 100, 101, 140, 156, 293 and major Norfolk Southern railroad lines are most vulnerable to transportation-related releases. However, such releases can occur in virtually any part of the County accessible by road. Fixed location releases are not as likely to affect the more rural areas of the County. For additional loss estimate information, please refer to the Critical Facilities Database (Appendix A).

E. Multi-Jurisdictional Concerns – All of Floyd County, including the Cities of Cave Spring and Rome, is vulnerable to both fixed and transportation-related hazardous materials releases.

F. Hazard Summary – Hazardous materials releases are a significant threat to Floyd County. Unknown quantities and types of hazmat are transported through the County by truck and railroad on a daily basis. The main corridors of concern are US Routes 27 and 411, State Routes 1, 20, 53, 100, 101, 140, 156, 293 and major Norfolk Southern railroad lines. These hazmat shipments pose a great potential threat to all of Floyd County. The fact that the County is unable to track these shipments seriously limits the mitigation measures that can be put into place. Fixed hazmat releases are also considered to be a major threat to Floyd County due to the industries located therein. Therefore, the Floyd County HMPC has identified specific mitigation actions for hazardous materials releases in *Chapter 5*.

3.2 Dam Failure

A. Hazard Identification – Georgia law defines a dam as any artificial barrier which impounds or diverts water, is 25 feet or more in height from the natural bed of the stream, or has an impounding capacity at maximum water storage evaluation of 100 acre-feet (equivalent to 100 acres one foot deep) or more. Dams are usually constructed to provide a ready supply of water for drinking, irrigation, recreation and other purposes. They can be made of rock, earth, masonry, or concrete or of combinations of these materials.

Dam failure is a term used to describe the major breach of a dam and subsequent loss of contained water. Dam failure can result in loss of life and damage to structures, roads, utilities, crops, and livestock. Economic losses can also result from a lowered tax base, lack of utility profits, disruption of commerce and governmental services, and extraordinary public expenditures for food relief and protection. National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for one third of all U.S. dam failures. Foundation defects, including settlement and slope instability, account for another third of all failures. Piping and seepage, and other problems cause the remaining third of national dam failures. This includes internal erosion caused by seepage, seepage and erosion along hydraulic structures, leakage through animal burrows, and cracks in the dam. The increasing age of dams nationwide is a contributing factor to each of the problems above.

B. Hazard Profile – Congress first authorized the US Army Corps of Engineers to inventory dams in the United States with the National Dam Inspection Act (Public Law 92-367) of 1972. The Water Resources Development Act of 1986 (P.L. 99-662) authorized the Corps to maintain and periodically publish an updated National Inventory of Dams (NID), with re-authorization and a dedicated funding source provided under the Water Resources Development Act of 1996 (P.L. 104-3). The Corps also began close collaboration with the Federal Emergency Management Agency (FEMA) and state regulatory offices to obtain more accurate and complete

information. The National Dam Safety and Security Act of 2002 (P.L. 107-310) reauthorized the National Dam Safety Program and included the maintenance and update of the NID by the Corps of Engineers.

The most recent Dam Safety Act of 2006 reauthorized the maintenance and update of the NID.

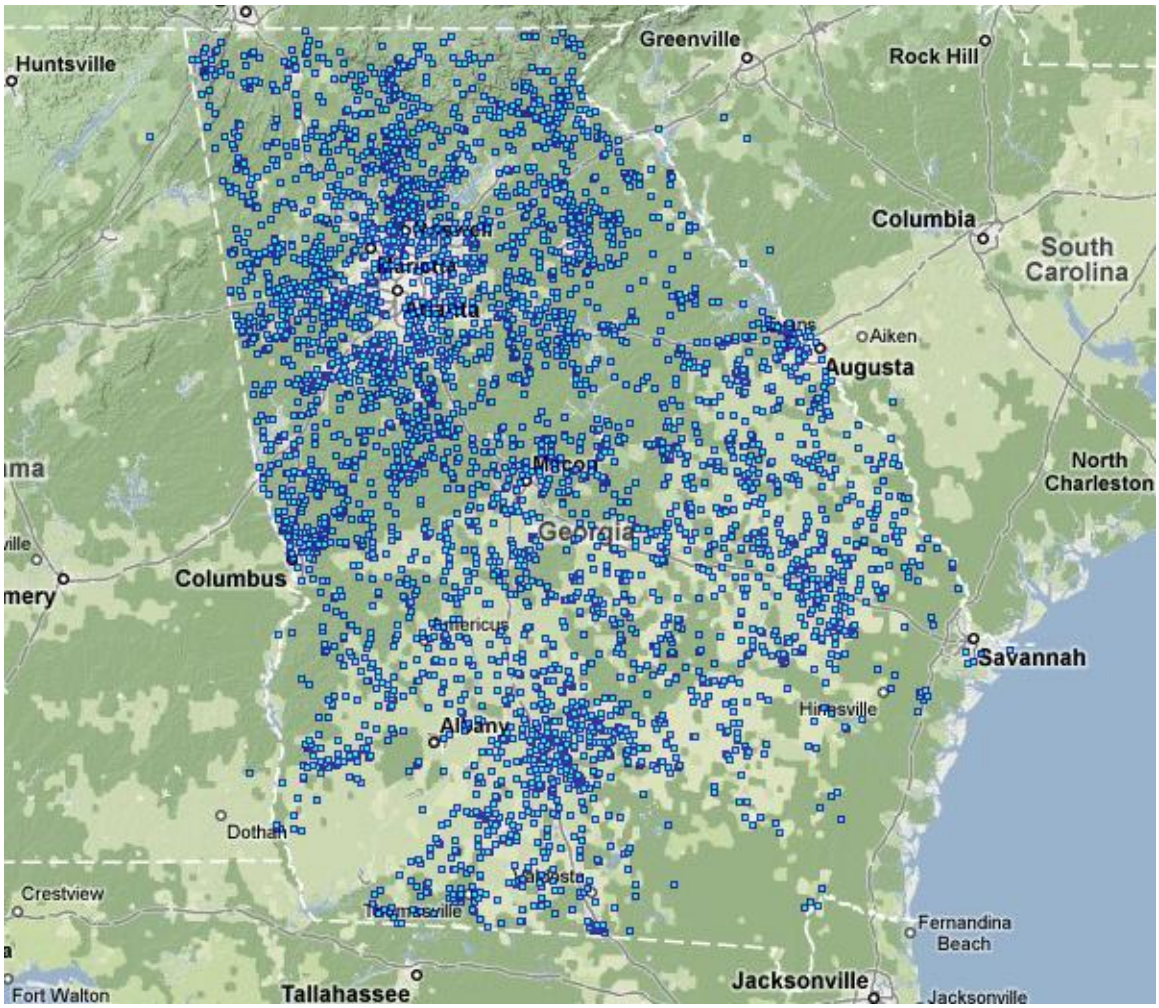
The NID consists of dams meeting at least one of the following criteria:

1) High hazard classification - loss of one human life is likely if the dam fails,
2) Significant hazard classification - possible loss of human life and likely significant property or environmental destruction,
3) Equal or exceed 25 feet in height and exceed 15 acre-feet in storage,
4) Equal or exceed 50 acre-feet storage and exceed 6 feet in height.

The goal of the NID is to include all dams in the U.S. that meet these criteria, yet in reality, is limited to information that can be gathered and properly interpreted with the given funding. The inventory initially consisted of approximately 45,000 dams, which were gathered from extensive record searches and some feature extraction from aerial imagery. Since continued and methodical updates have been conducted, data collection has been focused on the most reliable data sources, which are the various federal and state government dam construction and regulation offices. In most cases, dams within the NID criteria are regulated (construction permit, inspection, and/or enforcement) by federal or state agencies, who have basic information on the dams within their jurisdiction. Therein lies the biggest challenge, and most of the effort to maintain the NID; periodic collection of dam characteristics from states, territories, and 18 federal offices. Database management software is used by most state agencies to compile and export update information for the NID. With source agencies using such software, the Corps of Engineers receives data that can be parsed and has the proper NID codes. The Corps can then resolve duplicative and conflicting data from the many data sources, which helps obtain the more complete, accurate, and updated NID.

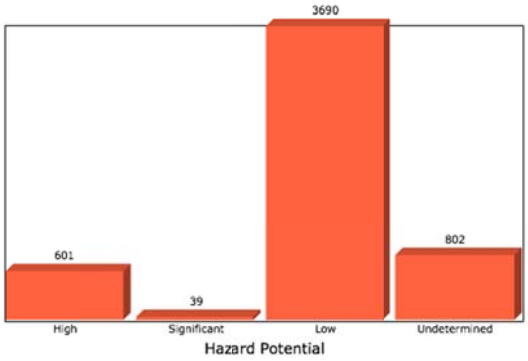
The National Inventory of Dams Map for the State of Georgia is located below and displays the State's current inventory of 5,132 dams.

U.S Army Corps of Engineers National Inventory of Dams

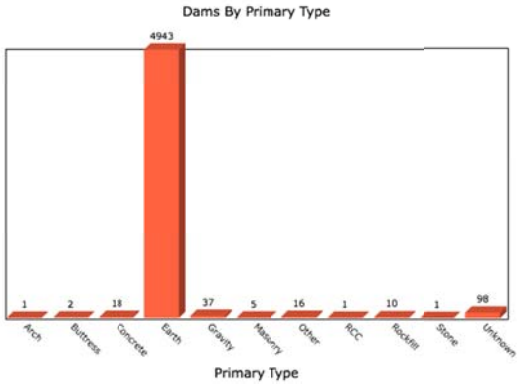


The following US Army Corps of Engineers charts are derived from NID information and present information related to number, hazard potential, type, height, ownership, purpose, and age of Georgia dams.

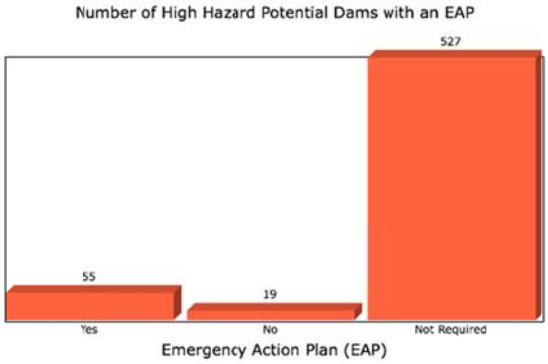
Dams by Hazard Potential



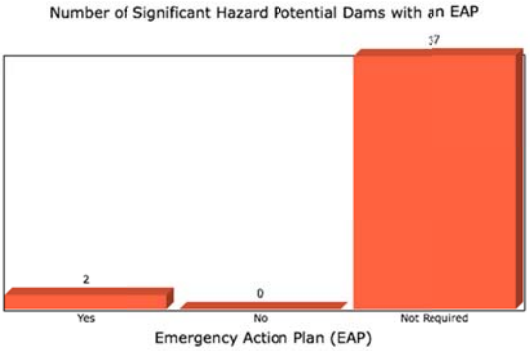
Dams By Primary Type



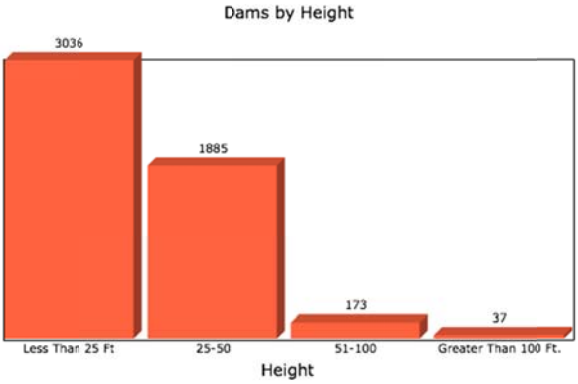
Number of High Hazard Potential Dams with an Emergency Action Plan (EAP)



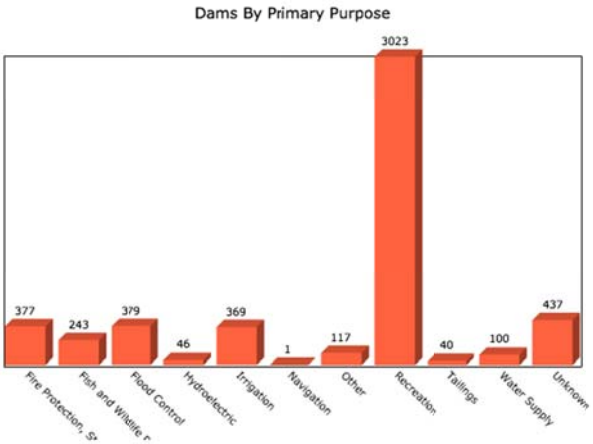
Number of Significant Hazard Potential Dams with an Emergency Action Plan (EAP)



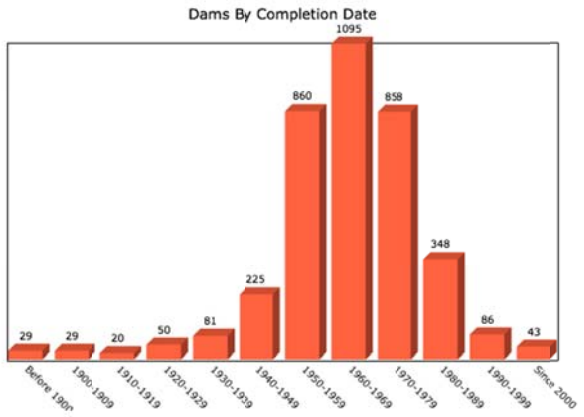
Dams by Height



Dams By Primary Purpose



Dams By Completion Date



As you can see in the last chart above, most Georgia dams were built during the 1950's through the 1970's. This puts the average age of Georgia dams at close to 50 years old.

The Floyd County HMPC reviewed data from the US Army Corps of Engineers National Inventory of Dams, the Environmental Protection Division (EPD) within the Georgia Department of Natural Resources (DNR), as well as County records in their research involving dam failure within Floyd County. Fortunately, Floyd County has never experienced a total dam failure with a Category I dam. It is also possible that some small private dams have been breached at some point in the past, but no records have been found to indicate any type of emergency response related to such a failure, or even that such a failure has taken place. However, the potential for such a disaster does exist, and the appropriate steps must be taken to minimize such risks. The Georgia Safe Dams Program helps to accomplish that.

The Georgia Safe Dams Act of 1978 established Georgia's Safe Dams Program following the November 6, 1977 failure of the Kelly Barnes Dam in Toccoa, GA, in which 39 people lost their lives when the breached dam, which held back a 45-acre lake, sent a 30-foot-high wall of water sweeping through Toccoa Falls College. The Environmental Protection Division (EPD) within the Georgia Department of Natural Resources (DNR) is responsible for administering the Program. The purpose of the Program is to *provide for the inspection and permitting of certain dams in order to protect the health, safety, and welfare of all citizens of the state by reducing the risk of failure of such dams.* The Program has two main functions: (1) to inventory and classify dams and (2) to regulate and permit high hazard dams. Although a total Category I dam failure has never been recorded in Floyd County, a partial failure of Lookout Lake Dam did occur in 2004. Mitigation actions are not yet completed for the Dam.

Structures below the State minimum height and impoundment requirements (25 feet or more in height or an impounding capacity of 100 acre-feet or more) are exempt from regulation by the Georgia Safe Dams Program. The Program checks the flood plain of the dam to determine its hazard classification. Specialized software is used to build a computer model to simulate a dam breach and establish the height of the flood wave in the downstream plain. If the results of the

dam breach analysis, also called a flood routing, indicate that a breach of the dam would result in a probable loss of human life, the dam is classified as Category I (high-hazard).

The Safe Dams Program approves plans and specifications for construction and repair of all Category I dams. In addition, Category I dams are continuously monitored for safety by Georgia EPD.

To date, the Safe Dam Program has identified three Category I dams within Floyd County. These include Berry Reservoir Dam, Conasauga Lake Dam, and Stonebridge Lake Dam. The additional classified dams within the County are Category II dams (18) or exempt dams (19). Two of the exempt dams, Camps Lake Dam and Storey Lake Dam are classified as "exempt high hazard". There are also two dams, Todd Lake Dam and Victory Lake Dam, listed as "breached". There may be a number of unclassified dams within the County as well. The Program requires all Category II dams to be inventoried at least every five years.

C. Assets Exposed to Hazard – Areas most vulnerable to the physical damages associated with dam failure within Floyd County, though such a risk appears to be relatively low, are the low-lying and downstream areas associated with Berry Reservoir Dam, Conasauga Lake Dam, and Stonebridge Lake Dam. Physical damages associated with dam failure could be significant, and the damage to the local economy and problems associated with delivery of water and other utilities could be felt Countywide and include all areas of the County and Cities.

D. Estimate of Potential Losses - Loss estimation due to dam failure is an approximate effort, at best. Direct loss to infrastructure, critical facilities and businesses in terms of repair and replacement can be roughly estimated. For additional loss estimate information, please refer to the Critical Facilities Database (Appendix A).

E. Multi-Jurisdictional Concerns – All of Floyd County, including the Cities of Cave Spring and Rome, is vulnerable to the negative impact of dam failure.

F. Hazard Summary – Due to the numerous dams located within the County, the Floyd County HMPC has identified some specific mitigation actions for dam failure in Chapter 5.

Chapter 4
Land Use and Development Trends

After review by the HMPC, it was determined that current and future development does not appear to significantly impact the vulnerabilities of Floyd County or the Cities of Cave Spring and Rome. Nevertheless, the most current development information available is outlined below.

Floyd County has seen new home building in 2014 and 2015. For 2014, 38 new homes were built. By mid-2015, an additional 26 new homes were built. These were 1 to 2 family homes, some of which were new homes in subdivisions that were created during the housing boom but stopped construction due to the recession. Other reasons for new home construction include homeowners splitting lots for family members. Second homes were added to existing lots to accommodate family members that are in assisted living or other personal reasons.

The Planning Commission for the City of Rome and Floyd County has seen over sixty cases from 2014 to present. Of those ultimately approved, five requests were for new construction of single-family or multi-family housing. A community housing project will be built off of SR 293, a multi-family apartment complex is to be located at the end of Woodrow Wilson Way and adjacent to the GA-1 Loop, and a permit for multi-family housing on a large tract of land at the corner of the East Rome Bypass SE and SR 411 was approved.

The City of Rome Clerk's Office has issued 3040 licenses since December 1, 2014 of which approximately 1900 to 2000 were business licenses. The number of licenses sold has remained consistent year to year for the past decade.

K. Local Capabilities

Local mitigation capabilities are existing authorities, policies, programs and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. The HMPC reviewed local capabilities and the available information is included in the Local Capabilities Assessment Chart below.

Local Capabilities Assessment Chart

Plan, Code/Ordinance, Tool or Funding Method	In place to address hazard mitigation by following jurisdictions (F=Floyd, R=Rome, C=Cave Spring)	Adequately utilized or enforced to address hazard mitigation	Updated regularly or as required by law	Notes
Comprehensive Plan	F, R, C	Y	Y	adopted 2008
Local Emergency Operations Plan (LEOP)	F	Y	Y	updated regularly
Transportation Plan	R, F, C	NA	NA	since 1983 has participated in the 3C planning process of the Federal Aid Highway Act of 1962
Community Wildfire Protection Plan (CWPP)	F, R, C	Y	Y	updated every 5 years
Building Code	F, R, C	Y	Y	2015 International Building Code
Site Plan Review	F, R	Y	Y	process continuously updated
ISO Rating	F, R	Y	Y	R=ISO 2, F=ISO 2X
Zoning Ordinance	F, R	Y	Y	Unified Land Development Code
Subdivision Ordinance	F, R, C	Y	Y	
Floodplain Ordinance	F, R, C	Y	Y	as required by NFIP participation
Planning Commission	F, R	Y	Y	
Plan, Code/Ordinance, Tool or Funding Method	In place to address hazard mitigation by following jurisdictions (F=Floyd, R=Rome, C=Cave Spring)	Adequately utilized or enforced to address hazard mitigation	Updated regularly or as required by law	Notes
Hazard Mitigation Planning Committee (HMPC)	F, R, C	Y	Y	2016 HMP update in progress
Mutual Aid Agreements	F, R, C	Y	Y	State and local jurisdictions

Mass Notification System	F	Y	Y	Code Red
Grant Writing	F, R, C	Y	NA	staff grant writers
CERT Team	F	Y	Y	
Public outreach & education programs	F, R	Y	Y	see mitigation actions chart
GEMA School Safety Plan	F, R, C	Y	Y	updated annually & submitted to local EMA and GEMA
Storm Ready Certification	F	Y	Y	including Berry College separately
Capital improvement projects	F, R, C	Y	NA	comprehensive plan and hazard mitigation plan
Impact fees	None	NA	NA	
Bonds, taxes, utility fees	F, R, C	Y	Y	ongoing

Chapter 5
Hazard Mitigation Goals, Objectives, & Actions

When Floyd County and the Cities of Cave Spring and Rome begin any large-scale planning effort, it is imperative that the planning process is driven by a clear set of goals and objectives. Goals and objectives are the foundation of an effective Hazard Mitigation Plan. They address the key problems and opportunities to help establish a framework for identifying risks and developing strategies to mitigate those risks. Floyd County's multi-jurisdictional Hazard Mitigation Planning Committee (HMPC) reviewed and re-evaluated the four major goals and numerous objectives for the purposes of this Plan and determined that they all remain valid and effective. No changes were recommended.

In order to fully understand the hazard mitigation goals, objectives, and actions, it is necessary to clearly define the terms **"goal"**, **"objective"**, and **"action"**:

A **goal** is a broad-based statement of intent that establishes the direction for the Floyd County Hazard Mitigation Plan. Goals can essentially be thought of as the desired "outcomes" of successful implementation of the Plan.
An **objective** is the stated "means" of achieving each goal, or the tasks to be executed in the process of achieving goals.
An **action** is a project-specific strategy to mitigate a particular hazard event within the context of the overarching goals and objectives.

While specific mitigation actions are listed later in this chapter, it is important to note that the actions were selected and evaluated in relation to the overarching hazard mitigation goals and objectives of this plan, which are as follows:

Goal #1. Protect life and minimize loss of property damage.

Objective 1-1. Implement mitigation actions that will assist in protecting lives and property by making homes, businesses, public facilities, and infrastructure more resistant to vulnerable hazards.
Objective 1-2. Review existing ordinances, building codes, and safety inspection procedures to help ensure that they employ the most recent and generally acceptable standards for the protection of buildings.
Objective 1-3. Ensure that public and private facilities and infrastructure meet established building codes and enforce the codes to address any deficiencies.
Objective 1-4. Implement mitigation actions that encourage the protection of the environment.
Objective 1-5. Integrate the recommendations of this plan into existing land use plans and capital improvement programs.
Objective 1-6. Build upon past databases to ensure that vulnerable hazards' risks are accurate.

Goal #2. Increase Public Awareness.

Objective 2-1. Develop and implement additional education and outreach programs to increase public awareness of the risks associated with hazards and on specific preparedness activities available.
Objective 2-2. Encourage homeowners and businesses to take preventative actions and purchase hazard insurance.

Goal #3. Encourage Partnerships.

Objective 3-1. Strengthen inter-jurisdictional and inter-agency communication, coordination, and partnerships to foster hazard mitigation actions designed to benefit multiple jurisdictions.
Objective 3-2. Identify and implement ways to engage public agencies with individual citizens, nonprofit organizations, business, and industry to implement mitigation activities more effectively.

Goal #4. Provide for Emergency Services.

Objective 4-1. Where appropriate, coordinate and integrate hazard mitigation actions with existing emergency operations plans.
Objective 4-2. Identify the need for, and acquire, any special emergency services and equipment to enhance response capabilities for specific hazards.
Objective 4-3. Encourage the establishment of policies to help ensure the prioritization and implementation of mitigation actions designed to benefit critical facilities, critical services, and emergency traffic routes.

Format Utilized to Develop Mitigation Actions

The HMPC reviewed each jurisdiction's annual budget, multiyear work programs, and comprehensive plans to determine existing mitigation actions that met the goals and objectives of this Plan. The committee then developed a list of tentative mitigation actions based on committee members' personal knowledge, interviews with other officials of each jurisdiction, and knowledge of successful actions implemented in other communities.

The committee members developed a prioritized list of mitigation actions utilizing the GEMA recommended STAPLEE prioritization methodology, with special emphasis on the following:

1. Cost effectiveness (and when potential federal projects are anticipated, cost-benefit reviews will be conducted prior to application);
2. Comprehensiveness, i.e. addresses a specific goal and objective;
3. Addresses reducing effects of hazards on new and existing buildings and infrastructure;
4. Addresses reducing effects of hazards on critical facilities where necessary; and,
5. Identification of future public buildings and infrastructure (Note: recognizing that the Plan may be modified and evaluated during the monitoring and evaluation period, and will definitely be completely updated within the federally mandated five year approval cycle, future development including future buildings will only include the five year period from Plan completion).

Each individual HMPC member, or non-member participant, was provided with information on the STAPLEE method and asked to prioritize the list of mitigation actions according to the criteria, with special emphasis on what they would consider most beneficial to the community. Once this information was received from participating individuals, these individual prioritization rankings of mitigation actions were composited to represent the consensus of the HMPC.

Through this prioritization process, several projects emerged as being a greater priority than others. Some of the projects involved expending considerable amounts of funds to initiate the required actions. Most projects allowed the community to pursue completion of the project using potential grant funding. Still others required no significant financial commitment by the community. All proposed mitigation actions were evaluated to determine the degree to which the County would benefit in relation to the project costs. After a final review by the HMPC, the composited prioritization list of mitigation measures, as presented within this Plan, was determined.

This same method of prioritization was utilized for the prior update to this Plan. Additionally, it was reviewed by the HMPC during the current plan update process and approved for continued use due to its effectiveness. No changes were recommended.

Mitigation Actions

Each mitigation action is presented by jurisdiction, or in the case of joint actions by multiple jurisdictions, or by independent public bodies (such as School System), or by private nonprofits (such as the Medical Center), in priority order (objective), by best estimate of cost, if applicable, by potential funding source if other than operating budgets, by department or agency that will administer the action, and by timeframe. Timeframes do not begin until funding is obtained for any particular project unless otherwise indicated.

Each mitigation action that follows may be supported by one or more jurisdictions below, as indicated by the corresponding letters as follows:

F = Floyd County (unincorporated)
C = City of Cave Spring
R = City of Rome
A = All of the above jurisdictions

Due to limited financial and human resources, much support with regard to public safety is provided by Floyd County on behalf of the Cities of Cave Spring and Rome. This includes assistance with emergency management, fire protection, and law enforcement. The Cities do have some capabilities, but they are augmented by the County. Therefore, many mitigation actions included on behalf of the County in the Plan are likely to have an indirect benefit for the Cities of Cave Spring and Rome.

Each mitigation action that follows is designed to mitigate one or more hazards discussed in this Plan. Those specific hazards are listed for each mitigation action at the end of each mitigation action description. The term "All" as used in the mitigation action section below refers to all hazards discussed in this Plan (severe thunderstorm, winter storm, flooding, tornado, wildfire, drought, earthquake, hazardous materials release, and dam failure).

Each mitigation action that follows mitigates the effects of hazards on existing structures/infrastructure, future structures/infrastructure, or both, as indicated.

In addition, the status of each mitigation action that follows is indicated by one of the following three terms:

PRELIMINARY – unfunded projects or projects in planning stages.
IN PROGRESS – funded projects that have begun but aren't completed.
ONGOING – continuous projects that are never truly completed; may be funded or unfunded at any given time but are expected to continue unless removed from Plan.

**Note: fully completed or deleted projects are not found below, but in Appendix D.*

Priority	Mitigation Action	Hazard(s) Addressed	Jurisdictional Participants	Project Status	Cost Estimate	Project Length	Goals and Objectives	Structures & Infrastructure Impacted
1	Replacement of supplies and equipment on Rome Fire's hazardous materials truck	Hazmat Release	A	Ongoing	$2,805 per year	1 year	1-1, 1-4, 4-2	Existing and Future
2	Winter weather equipment (2 brine trucks w/scrapes & 2 salt trucks w/scrapes	Winter Storms	F, R	Preliminary	$275K	3 years	1-1, 1-4, 4-2	Existing and Future
3	Load testing of all emergency generators	All	A	Preliminary	$50K	1 year	1-3, 4-2, 4-3	Existing and Future
4	Lightning protection for critical facilities	Severe Thunderstorm	A	Preliminary	$500K	3 years	1-3, 4-2, 4-3	Existing and Future
5	Dual use shelters throughout community	All	A	Preliminary	$1 million	5 years	1-1, 1-3, 4-1, 4-3	Existing and Future
6	Install additional fire hydrants	All	A	Ongoing	$5K per hydrant	5 years	1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 4-3	Existing and Future
7	Solicit State Legislature to require generators in nursing homes	All	A	Ongoing	Staff time (General funds)	5 years	3-1, 3-2, 4-2	Existing and Future
8	Backup generators for critical facilities	All	A	Ongoing	Average of $50K per generator	5 years	1-3, 4-2, 4-3	Existing and Future
9	Inspect Critical Facilities for vulnerabilities using custom inspection form	All	A	Preliminary	Staff time (General funds)	2 years	1-1, 1-2, 1-3, 4-3	Existing
10	Portable three electronic info signs	All	F	Preliminary	$47,319	6 months	2-1, 4-2	Existing and Future
11	Improvements to roadside	Flooding	F	Ongoing	$185K per	5 years	1-1, 1-3, 1-4, 1-5,	Existing and Future

Priority	Mitigation Action	Hazard(s) Addressed	Jurisdictional Participants	Project Status	Cost Estimate	Project Length	Goals and Objectives	Structures & Infrastructure Impacted
	ditches to divert water to culverts				year		4-3	
12	Minimum of four gas monitors to be placed on hazmat vehicle trailers for hazmat response	Hazmat Release	F	Preliminary	$8K	1 year	1-1, 1-4, 4-2	Existing and Future
13	Increase citizen enrollment in hazard mass alert system from current 18K subscribers	All	A	Ongoing	General funds	5 years	3-2	Existing and Future
14	Outdoor warning sirens at 14 recreation centers	Tornado	A	Preliminary	$500K	2 years	1-1, 2-1, 3-1, 3-2, 4-1, 4-2, 4-3	Existing and Future
15	Additional river monitor gauges installed by USGS (see addendum for existing USGS stream gauges)	Flooding	A	Preliminary	$30K per year	1 year	1-1, 1-4, 1-6, 3-1, 4-1, 4-2	Existing and Future
16	Media Campaign for all hazards (including printed and electronic media and including info on caves and sinkholes)	All	A	Ongoing	$24K per year	5 years	2-1, 2-2, 3-1, 3-2	Existing
17	Storm shutters for Rome/Floyd Law Enforcement Building due to large windows	Tornado, Severe Thunderstorm	F, R	Preliminary	$500K	1 year	1-2, 1-3	Existing
18	Debris removal equipment	All	F	Preliminary	$150K	1 year	4-2	Existing and Future
19	Build one brush truck for Cave Spring	Wildfire	CS	In progress	$75K	2 years	1-1, 1-4, 4-2	Existing and Future
20	Purchase one Type 3 brush truck	Wildfire	F	Preliminary	$150K	1 year	1-1, 1-4, 4-2	Existing and Future
21	Execute flood damage prevention ordinance	Flooding	A	Preliminary	Staff time (General funds)	1 year	1-1, 1-3, 1-4, 1-5, 4-3	Existing and Future

Chapter 6
Executing the Plan

6.1 – Action Plan Implementation

The hazard mitigation planning process was overseen by the Floyd County Emergency Management Agency. Facilitation of the planning process was conducted by North Georgia Consulting Group, LLC. Once GEMA completes its initial review of this Plan, it will be presented to the Floyd County Board of Commissioners for consideration. Once adopted, the Floyd County EMA Director shall assume responsibility for the maintenance of the Plan. It shall be the responsibility of the EMA Director to ensure that this Plan is utilized as a guide for initiating the identified mitigation measures within the community. The EMA Director shall be authorized to convene a committee to review and update this Plan annually. The Plan will also have to be updated and resubmitted once every five years. Through this Plan updating process, the EMA Director shall identify projects that have been successfully undertaken in initiating mitigation measures within the community. These projects shall be noted within the planning document to indicate their completion. Additionally, the committee called together by the EMA Director shall help to identify any new mitigation projects that can be undertaken in the community.

Members of the HMPC prioritized the potential mitigation measures identified in this Plan. A list of mitigation goals, objectives and related action items was compiled from the inputs of the HMPC, as well as from others within the community. The subcommittee prioritized the potential mitigation measures based on what they considered most beneficial to the community. Several criteria were established to assist HMPC members in the prioritization of these suggested mitigation actions. Criteria included perceived cost benefit or cost effectiveness, availability of potential funding sources, overall feasibility, measurable milestones, multiple objectives, and both public and political support for the proposed actions. Through this prioritization process, several projects emerged as being a greater priority than others. Some of the projects involved expending considerable amounts of funds to initiate the required actions. Most projects allowed the community to pursue completion of the project using potential grant funding. Still others required no significant financial commitment by the community. All proposed mitigation actions were evaluated to determine the degree to which the County will benefit in relation to the project costs. After review by the HMPC, the prioritized list of mitigation measures, as presented within this Plan, was determined.

6.2 – Evaluation

As previously stated, the Floyd County EMA Director will be charged with ensuring that this plan is monitored and updated at least annually or more often if deemed necessary. The method of evaluation will consist of utilizing a checklist to determine what mitigation actions were undertaken, the completion date of these actions, the cost associated with each completed action, and whether actions were deemed to be successful. A committee, perhaps with much of the same membership as the existing HMPC, will convene in order to accomplish the annual plan evaluation. Additionally, the EMA Director is encouraged to maintain a schedule of regular meetings, either quarterly or semiannually to preserve continuity throughout the continuing process. These meetings will provide an opportunity to discuss the progress of the action items and maintain the partnerships that are essential for the sustainability of the HMP. The EMA Director will ensure the results of the evaluation(s) are reported to the Floyd County Board of Commissioners, as well as to any agencies or organizations having an interest in the hazard mitigation activities identified in the plan.

6.3 – Multi-Jurisdictional Strategy and Considerations

As set forth by Georgia House Bill 489, the Emergency Management Agency is the overall implementing agency for projects such as hazard mitigation. Floyd County will work in the best interests of the County as well as the Cities of Cave Spring and Rome. Each of these municipalities played an active role in the planning process. Participation from each jurisdiction was solicited and received by Floyd County EMA. As a result, a truly multi-jurisdictional plan was created for Floyd County and the Cities of Cave Spring and Rome, with ideas and viewpoints of all participants included.

6.4 – Plan Update and Maintenance

According to the requirements set forth in the Disaster Mitigation Act of 2000, Floyd County is required to update and revise the Hazard Mitigation Plan every five years. However, the Hazard Mitigation Planning Committee will meet on the plan approval anniversary date of every year, or within 30 days of said date as determined and scheduled by the EMA Director, to complete a review of the Hazard Mitigation Plan. At each such meeting, the HMPC will review the main facets of the HMP including the vulnerability assessment, critical facilities inventory, and mitigation goals, objectives, and actions. All revisions will be posted to the County website for public review and comment. Further revisions may take place based upon public comments received.

It is during this review process that the mitigation strategies and other information contained within the Hazard Mitigation Plan are considered for incorporation into other planning mechanisms as appropriate. Opportunities to integrate the requirements of this HMP into other local planning mechanisms will continue to be identified through future meetings of the HMPC on an annual basis.

The HMPC recognizes the need to integrate other plans, codes, regulations, procedures and programs into future Hazard Mitigation Plan (HMP) updates. This plan is multi-jurisdictional; therefore the mechanism for implementation of various mitigation plan items may vary by jurisdiction. This includes reviewing other local planning documents, processes or mechanisms for possible integration with the HMP.

To Be Reviewed in Future Update

Existing planning mechanisms	Method of use in Hazard Mitigation Plan
Comprehensive Plan (multi-jurisdictional)	Development trends
Local Emergency Operations Plan	Identifying hazards; Assessing vulnerabilities
Storm Water Management / Flood Damage Protection Ordinance	Mitigation strategies
Building and Zoning Codes and Ordinances	Development trends; Future growth
Mutual Aid Agreements	Assessing vulnerabilities
State Hazard Mitigation Plan	Risk assessment
Land Use Maps	Assessing vulnerabilities; Development trends; Future growth
Critical Facilities Maps	Locations
Community Wildfire Protection Plan	Mitigation strategies

It will be the responsibility of each participating jurisdiction to determine additional implementation procedures when appropriate.

During the planning process for new and updated local planning documents such as a comprehensive plan or Local Emergency Operations Plan, the EMA Director will provide a copy of the HMP to the appropriate parties. It will be recommended that all goals and strategies of new and updated local planning documents be consistent with, and support the goals of, the HMP and will not contribute to increased hazards in the affected jurisdiction(s).

Although it is recognized that there are many benefits to integrating components of this plan into other local planning mechanisms, and that components are actively integrated into other planning mechanisms when appropriate, the development and maintenance of this stand-alone HMP is deemed by the committee to be the most effective method to ensure implementation of local hazard mitigation actions at this time. Therefore, the review and incorporation efforts made in this update and the last, which consisted of a simple review of the documents listed in the chart above by various members of the HMPC, are considered successful by the HMPC and will likely be utilized in future updates.

The County's EMA is committed to incorporating hazard mitigation planning into its Local Emergency Operations Plan and other public emergency management activities. As the EMA Director becomes

aware of updates to other County or City plans, codes, regulations, procedures and programs, the Director will continue to look for opportunities to include hazard mitigation into these mechanisms.

The Floyd County HMPC will reconvene not later than the fourth anniversary of the plan approval anniversary date, as determined and scheduled by the EMA Director, to begin planning for the formal Hazard Mitigation Plan revision process. The revision process will include a clear schedule and timeline, and identify any agencies or organizations participating in the plan revision. The committee will review the mitigation goals, objectives and actions to determine their relevance to changing situations within the different jurisdictions, as well as changes in State or Federal policy, and to ensure current and expected conditions are being addressed. The HMPC will also review the prior vulnerability assessments to determine if this information should be updated or modified, given any new available data.

Floyd County is dedicated to involving the public directly in reviews and updates of the HMP. During the plan revision process, the committee will conduct, at a minimum, two public hearings during the revision process. These public hearings will provide the public a forum for which they can express their concerns, opinions, or ideas about the Plan. Additionally, if persons from the community express interest in participation in the planning process, they will be provided the opportunity, via meetings, the County website, social media, and/or public forums, to suggest possible mitigation measures for the community. Documentation will be maintained to indicate all efforts at continued public involvement. All relevant information will be forwarded to GEMA and FEMA as a product of the proposed plan revision. Public involvement activities will continue throughout the 5-year planning cycle and will be evaluated for effectiveness by the HMPC next planning cycle.

The EMA Director will ensure the revised plan is presented to the governing body of each jurisdiction for formal adoption. In addition, all holders of the HMP will be notified of affected changes. The EMA Director shall submit a revised Hazard Mitigation Plan not later than the five-year anniversary of the most recently updated HMP to the Georgia Emergency Management Agency for review and subsequent submittal to the Federal Emergency Management Agency for ultimate approval.

Once approved by FEMA, copies of the Floyd County Hazard Mitigation Plan will be provided by the EMA Director to the appropriate governmental jurisdictions, agencies, and/or departments for review and possible inclusion into plans and programs. The HMP will be distributed by the EMA Director to the appropriate officials to allow them to review the Plan and determine to what extent the Plan should be integrated into, or referenced by, other plans and programs. Limitations may be placed on certain sensitive information by the EMA Director.

Chapter 7
Conclusion

7.1 – Summary

Floyd County has gained a great deal of knowledge relating to the County's disaster history and future potential for disaster as a result of the hazard mitigation planning process. This includes an extensive hazard history of recorded hazard events from the past fifty years, a detailed critical facilities database with valuable information on some of most critical County and Cities structures, as well as some valuable ideas from the community abroad concerning measures that should be considered for future hazard mitigation. Community involvement has been at the heart of this effort. Not only did the planning process include the creation of a Hazard Mitigation Planning Committee with representatives from all walks of life, but two public hearings were conducted to provide all Floyd County citizens with the opportunity to comment on, and offer suggestions concerning potential hazard mitigation measures within the community. Floyd County, the Cities of Cave Spring and Rome all worked in concert to ensure a broad range of citizens were represented. Elected officials, local government employees, public safety officials, Red Cross representatives, GA Forestry representatives, businesspersons, media, and other volunteers and interested parties provided important varying viewpoints to create a workable Plan. GEMA and NGCG provided valuable assistance as well. These efforts have all had the effect of better protecting our Community from the threats of nature and technology. While it would be naïve to believe this Plan provides complete protection to Floyd County and its residents, it is the hope of all parties involved in this planning process that the recommended mitigation measures contained within the Plan will provide some level of increased preparedness as well as spur further discussion and planning related to the important subject of Hazard Mitigation.

7.2 – References

Numerous sources were utilized to ensure the most complete planning document could be assembled:

Publications/Documents:

The Disaster Mitigation Act of 2000
Robert T. Stafford Disaster Relief and Emergency Assistance Act
FEMA Pre-Disaster Mitigation *How-to Guides #1, 2, 3, 7*
GEMA Supplements to FEMA Pre-Disaster Mitigation How-to Guides
Georgia Tornado Database 1808 – 2002 (Westbrook)
Earthquake Information Bulletin, Volume 3, Number 6, November-December 1971
Floyd County Hazard Mitigation Plan

Web Sites:

www.fema.gov (FEMA)
www.usfa.fema.gov (USFA)
www.fs.fed.us (USFS Fire Danger Class)
www.cpc.ncep-noaa.gov (Drought Severity Index)
www.ncdc.noaa.gov (National Climatic Data Center)
http://eqint.cr.usgs.gov (USGS Earthquake Probability Maps)
www.tornadoproject.com (Tornado Project Online)
www.disastercenter.com (The Disaster Center)
www.gema.state.ga.us (GEMA)
www.gfc.state.ga.us (GFC)
www.georgiadrought.org (Drought in Georgia)
www.weather.com (The Weather Channel)
www.accuweather.com (AccuWeather)

Other Sources:

American Red Cross
American Society of Civil Engineers
Floyd County
City of Cave Spring
City of Rome
Federal Emergency Management Agency
Georgia Department of Natural Resources
Georgia Emergency Management Agency
Georgia Forestry Commission
Georgia Safe Dams Program
National Climatic Data Center
National Oceanic & Atmospheric Administration
National Weather Service
New Georgia Encyclopedia (www.georgiaencyclopedia.org)
U.S. Army Corps of Engineers
U.S. Census Bureau
U.S. Fire Administration
U.S. Forest Service
U.S. Geological Survey

Appendices

Appendix A – Critical Facilities Database

Appendix B – Hazard History Database

Appendix C – Hazard Frequency Table

Appendix D – Other Planning Documents

Appendix E - Glossary

Appendix F - Signatures