APPENDIX C

OTHER PLANNING DOCUMENTS

Jefferson County Emergency Management Agency

Emergency Operations Plan

Plan Approved:
18-MAR-15

Revised:
18-MAR-15

Jefferson County
EMERGENCY OPERATIONS PLAN

Local Resolution

Record of Revisions

Distribution List

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PREFACE

This Emergency Operations Plan (EOP) describes the management and coordination of resources and personnel during periods of major emergency. This comprehensive local emergency operations plan is developed to ensure mitigation and preparedness, appropriate response and timely recovery from natural and man made hazards which may affect residents of Jefferson County.

This plan supersedes the Emergency Operations Plan dated from old eLEOP. It incorporates guidance from the Georgia Emergency Management Agency (GEMA) as well as lessons learned from disasters and emergencies that have threatened Jefferson County. The Plan will be updated at the latest, every four years. The plan:

- Defines emergency response in compliance with the State-mandated Emergency Operations Plan process.
- Establishes emergency response policies that provide Departments and Agencies with guidance for the coordination and direction of municipal plans and procedures.
- Provides a basis for unified training and response exercises.

The plan consists of the following components:

- The Basic Plan describes the structure and processes comprising a county approach to incident management designed to integrate the efforts of municipal governments, the private sector, and non-governmental organizations. The Basic Plan includes the: purpose, situation, assumptions, concept of operations, organization, assignment of responsibilities, administration, logistics, planning and operational activities.
- Appendices provide other relevant supporting information, including terms, definitions, and authorities.
- Emergency Support Function Annexes detail the missions, policies, structures, and responsibilities of County agencies for coordinating resource and programmatic support to municipalities during Incidents of Critical Significance.
- Support Annexes prescribe guidance and describe functional processes and administrative requirements necessary to ensure efficient and effective implementation of incident management objectives.
- Incident Annexes address contingency or hazard situations requiring specialized application of the EOP. The Incident Annexes describe the missions, policies, responsibilities, and coordination processes that govern the interaction of public and private entities engaged in incident management and emergency response operations across a spectrum of potential hazards. Due to security precautions and changing nature of their operational procedures, these Annexes, their supporting plans, and operational supplements are published separately.

The following is a summary of the 15 Emergency Support Functions:

1. *Transportation*: Support and assist municipal, county, private sector, and voluntary organizations requiring transportation for an actual or potential Incident of Critical Significance.

2. *Communications*: Ensures the provision of communications support to municipal, county, and private-sector response efforts during an Incident of Critical Significance.

3. *Public Works and Engineering*: Coordinates and organizes the capabilities and resources of the municipal and county governments to facilitate the delivery of services, technical assistance, engineering expertise, construction management, and other support to prevent, prepare for, respond to, and/or recover from an Incident of Critical Significance.

4. *Firefighting*: Enable the detection and suppression of wild-land, rural, and urban fires resulting from, or occurring coincidentally with an Incident of Critical Significance.

5. *Emergency Management Services*: Responsible for supporting overall activities of the County Government for County incident management.

6. *Mass Care, Housing and Human Services*: Supports County-wide, municipal, and non-governmental organization efforts to address non-medical mass care, housing, and human services needs of individuals and/or families impacted by Incidents of Critical Significance.

7. *Resource Support*: Supports volunteer services, County agencies, and municipal governments tracking, providing, and/or requiring resource support before, during, and/or after Incidents of Critical Significance.

8. *Public Health and Medical Services*: Provide the mechanism for coordinated County assistance to supplement municipal resources in response to public health and medical care needs (to include veterinary and/or animal health issues when appropriate) for potential or actual Incidents of Critical Significance and/or during a developing potential health and medical situation.

9. *Search and Rescue*: Rapidly deploy components of the National US Response System to provide specialized life-saving assistance to municipal authorities during an Incident of Critical Significance.

10. *Hazardous Materials*: Coordinate County support in response to an actual or potential discharge and/or uncontrolled release of oil or hazardous materials during Incidents of Critical Significance.

11. *Agriculture and Natural Resources*: supports County and authorities and other agency efforts to address: Provision of nutrition assistance; control and eradication of an outbreak of a highly contagious or economically devastating animal/zoonotic

disease; assurance of food safety and food security and; protection of natural and cultural resources and historic properties.

12. *Energy*: Restore damaged energy systems and components during a potential of actual Incident of Critical Significance.

13. *Public Safety and Security Services*: Integrates County public safety and security capabilities and resources to support the full range of incident management activities associated with potential or actual Incidents of Critical Significance.

14. *Long Term Recovery and Mitigation*: Provides a framework for County Government support to municipal governments, nongovernmental organizations, and the private sector designed to enable community recovery from the long-term consequences of an Incident of Critical Significance.

15. *External Affairs*: Ensures that sufficient County assets are deployed to the field during a potential or actual Incident of Critical Significance to provide accurate, coordinated, and timely information to affected audiences, including governments, media, the private sector, and the populace.

Georgia Emergency Operation Plan

2017

Approval and Implementation

The Georgia Emergency Management and Homeland Security Agency maintains the Georgia Emergency Operations Plan and presents the plan to the Governor for adoption once every four years, at a minimum.

The Georgia Emergency Operations Plan was developed by the Georgia Emergency Management and Homeland Security Agency, in coordination with other state agencies, non-governmental organizations and private sector partners and is aligned with the National Incident Management System as well as the National Response Framework and the National Disaster Recovery Framework. In addition, Georgia Emergency Management and Homeland Security Agency modified the Georgia Emergency Operations Plan, its appendices, Emergency Support Function Annexes and Support and Hazard Specific Annexes incorporate lessons learned from exercises, training, incidents and events.

This plan supersedes the Georgia Emergency Operation Plan dated January 2013.

11/13/17

Homer Bryson

Director

Georgia Emergency Management and

Homeland Security Agency

Date

Executive Summary

Georgia is vulnerable to a variety of hazards as identified in the State's Hazard Mitigation Strategy Plan. Thus the Georgia Emergency Operations Plan is written for the entire State Disaster Response Team, to include, but not limited to: all executives, state emergency management personnel, Private-Sector Partners, Non-Governmental Organization partners, local emergency managers, faith-based organizations and any other individuals or organizations expected to support disaster response efforts through emergency management functions.

This Plan is intended to clarify expectations for an effective response by state and local officials in support of responders in the field which can save lives, protect property, and more quickly restore essential services.

This document represents decades of planning and coordination between local, state, federal and non-governmental partners operating within or supporting the State of Georgia and is intended to ensure seamless integration of federal and state resources when necessary.

This Plan is consistent with the National Response Framework and supports the local emergency operations plans for all 159 counties within the State.

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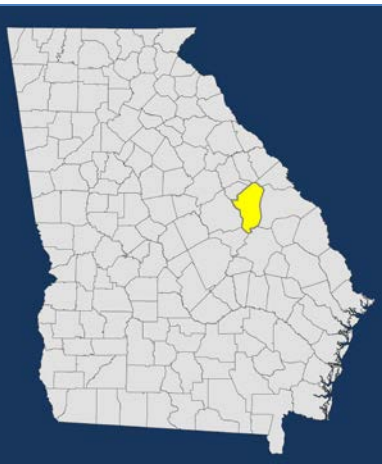

Hazard Risk Analyses
Supplement to the Jefferson County Joint Hazard Mitigation Plan

Carl Vinson
Institute of Government
UNIVERSITY OF GEORGIA

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Introduction

The Federal Disaster Mitigation Act of 2000 (DMA2K) requires state, local, and tribal governments to develop and maintain a mitigation plan to be eligible for certain federal disaster assistance and hazard mitigation funding programs.

Mitigation seeks to reduce a hazard's impacts, which may include loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation must be based on a sound risk assessment that quantifies the potential losses of a disaster by assessing the vulnerability of buildings, infrastructure, and people.

In recognition of the importance of planning in mitigation activities, FEMA Hazus-MH, a powerful disaster risk assessment tool based on geographic information systems (GIS). This tool enables communities of all sizes to predict estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses.

In 2018, the Georgia Department of Emergency Management partnered with the Carl Vinson Institute of Government at the University of Georgia to develop a detailed risk assessment focused on defining hurricane, riverine flood, and tornado risks in Jefferson County, Georgia. This assessment identifies the characteristics and potential consequences of the disaster, how much of the community could be affected by the disaster, and the impact on community assets.

Risk Assessment Process Overview

Hazus-MH Version 2.2 SP1 was used to perform the analyses for Jefferson County. The Hazus-MH application includes default data for every county in the US. This Hazus-MH data was derived from a variety of national sources and in some cases the data are also several years old. Whenever possible, using local provided data is preferred. Jefferson County provided building inventory information from the county's property tax assessment system. This section describes the changes made to the default Hazus-MH inventory and the modeling parameters used for each scenario.

County Inventory Changes

The default Hazus-MH site-specific point inventory was updated using data compiled from the Georgia Emergency Management Agency (GEMA). The default Hazus-MH aggregate inventory (General Building Stock) was also updated prior to running the scenarios. Reported losses reflect the updated data sets.

General Building Stock Updates

General Building Stock (GBS) is an inventory category that consists of aggregated data (grouped by census geography — tract or block). Hazus-MH generates a combination of site-specific and aggregated loss estimates based on the given analysis and user input.

The GBS records for Jefferson County were replaced with data derived from parcel and property assessment data obtained from Jefferson County. The county provided property assessment data was current as of February 2018 and the parcel data current as of February 2018. Records without improvements were deleted. The parcel boundaries were converted to parcel points located in the centroids of each parcel boundary; then, each parcel point was linked to an assessor record based upon matching parcel numbers. The parcel assessor match-rate for Jefferson County is 98.9%. The generated building inventory represents the approximate locations (within a parcel) of structures. The building inventory was aggregated by census block. Both the tract and block tables were updated. Table 1 shows the results of the changes to the GBS tables by occupancy class.

Table 1: GBS Building Exposure Updates by Occupancy Class*

General Occupancy	Default Hazus-MH Count	Updated Count	Default Hazus-MH Exposure	Updated Exposure
Agricultural	52	0	$9,802,000	$0
Commercial	396	593	$176,509,000	$437,194,000
Education	18	21	$18,564,000	$38,118,000
Government	18	6	$8,455,000	$1,594,000
Industrial	119	262	$98,037,000	$409,493,000
Religious	93	174	$54,476,000	$107,858,000
Residential	6,804	7,391	$975,872,000	$850,270,000
Total	7,500	8,447	$1,341,715,000	$1,844,527,000

*The exposure values represent the total number and replacement cost for all Jefferson County Buildings

For Jefferson County, the updated GBS was used to calculate hurricane wind losses. The flood losses and tornado losses were calculated from building inventory modeled in Hazus-MH as User-Defined Facility

(UDF)[1], or site-specific points. Figure 1 shows the distribution of buildings as points based on the county provided data.

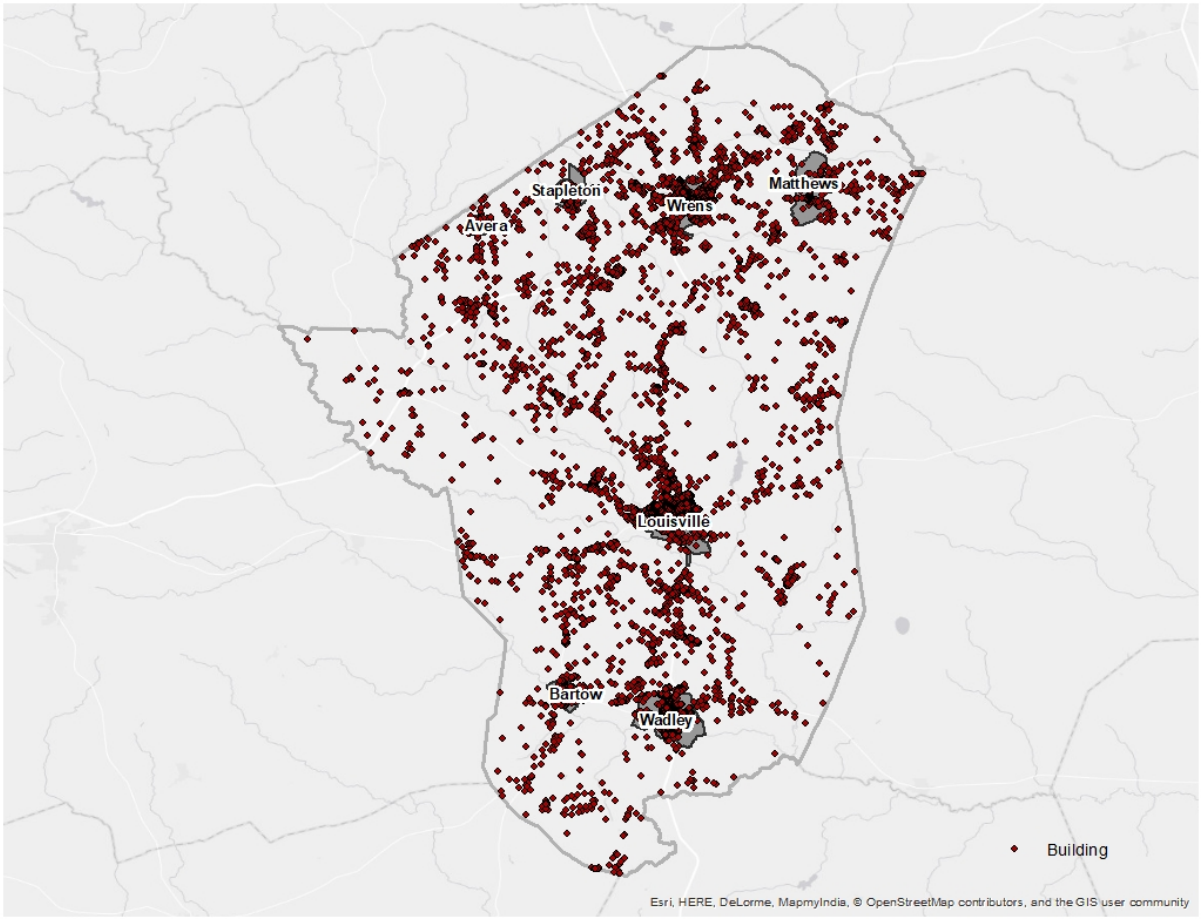


Figure 1: Jefferson County Overview

Essential Facility Updates

Essential facilities include:

- Care facilities
- EOCs
- Fire stations
- Police stations
- Schools

The default Hazus-MH essential facility data was updated to reflect improved information available in the Georgia Mitigation Information System (GMIS) as of February 2018. For these risk analyses, only GMIS data for buildings that Hazus-MH classified as Essential Facilities was integrated into Hazus-MH because the application provides specialized reports for these five facilities. Essential Facility inventory was updated for the analysis conducted for this report. The following table summarizes the counts and exposures, where available, by Essential Facility classification of the updated data.

[1] The UDF inventory category in Hazus-MH allows the user to enter site-specific data in place of GBS data.

Table 2: Updated Essential Facilities

Classification	Updated Count	Updated Exposure
Avera		
EOC	0	$0
Care	0	$0
Fire	1	$100,000
Police	0	$0
School	0	$0
Total	1	$100,000
Bartow		
EOC	0	$0
Care	0	$0
Fire	2	$347,000
Police	1	$209,000
School	0	$0
Total	3	$556,000
Louisville		
EOC	0	$0
Care	3	$64,400,000
Fire	1	$750,000
Police	2	$8,591,000
School	2	$38,750,000
Total	8	$112,491,000
Matthews		
EOC	0	$0
Care	0	$0
Fire	0	$0
Police	0	$0
School	0	$0
Total	0	$0

Classification	Updated Count	Updated Exposure
Stapleton		
EOC	0	$0
Care	0	$0
Fire	1	$394,000
Police	1	$383,000
School	0	$0
Total	2	$777,000
Wadley		
EOC	0	$0
Care	2	$2,015,000
Fire	0	$0
Police	1	$1,500,000
School	1	$12,750,000
Total	4	$16,265,000
Wrens		
EOC	0	$0
Care	2	$1,890,000
Fire	1	$1,125,000
Police	0	$0
School	2	$37,500,000
Total	5	$40,515,000
Unincorporated Areas of Jefferson County		
EOC	1	$2,380,000
Care	1	$841,000
Fire	0	$0
Police	1	$5,261,000
School	2	$56,930,000
Total	5	$65,412,000

Assumptions and Exceptions

Hazus-MH loss estimates may be impacted by certain assumptions and process variances made in this risk assessment.

- The Jefferson County analysis used Hazus-MH Version 2.2 SP1, which was released by FEMA in May 2015.
- County provided parcel and property assessment data may not fully reflect all buildings in the county. For example, some counties do not report not-for-profit buildings such as government buildings, schools and churches in their property assessment data. This data was used to update the General Building Stock as well as the User Defined Facilities applied in this risk assessment.
- Georgia statute requires that the Assessor's Office assign a code to all of the buildings on a parcel based on the buildings primary use. If there is a residential or a commercial structure on a parcel and there are also agricultural buildings on the same parcel Hazus-MH looks at the residential and commercial "primary" structures first and then combines the value of all secondary structures on that parcel with the value of the primary structure. The values and building counts are still accurate but secondary structures are accounted for under the same classification as the primary structure. Because of this workflow, the only time that a parcel would show a value for an agricultural building is when there are no residential or commercial structures on the parcel thus making the agricultural building the primary structure. This is the reason that agricultural building counts and total values seem low or are nonexistent.
- GBS updates from assessor data will skew loss calculations. The following attributes were defaulted or calculated:
  Foundation Type was set from Occupancy Class
  First Floor Height was set from Foundation Type
  Content Cost was calculated from Replacement Cost
- It is assumed that the buildings are located at the centroid of the parcel.
- The essential facilities extracted from the GMIS were only used in the portion of the analysis designated as essential facility damage. They were not used in the update of the General Building Stock or the User Defined Facility inventory.

The hazard models included in this risk assessment included:

- Hurricane assessment which was comprised of a wind only damage assessment.
- Flood assessment based on the 1% annual chance event that includes riverine assessments.
- Tornado assessment based on GIS modeling.

Hurricane Risk Assessment

Hazard Definition

The National Hurricane Center describes a hurricane as a tropical cyclone in which the maximum sustained wind is, at minimum, 74 miles per hour (mph)[2]. The term hurricane is used for Northern Hemisphere tropical cyclones east of the International Dateline to the Greenwich Meridian. The term typhoon is used for Pacific tropical cyclones north of the Equator west of the International Dateline. Hurricanes in the Atlantic Ocean, Gulf of Mexico, and Caribbean form between June and November with the peak of hurricane season occurring in the middle of September. Hurricane intensities are measured using the Saffir-Simpson Hurricane Wind Scale (Table 3). This scale is a 1 to 5 categorization based on the hurricane's intensity at the indicated time.

Hurricanes bring a complex set of impacts. The winds from a hurricane produce a rise in the water level at landfall called storm surge. Storm surges produce coastal flooding effects that can be as damaging as the hurricane's winds. Hurricanes bring very intense inland riverine flooding. Hurricanes can also produce tornadoes that can add to the wind damages inland. In this risk assessment, only hurricane winds, and coastal storm surge are considered.

Table 3: Saffir-Simpson Hurricane Wind Scale

Category	Wind Speed (mph)	Damage
1	74 - 95	Very dangerous winds will produce some damage
2	96 - 110	Extremely dangerous winds will cause extensive damage
3	111 - 130	Devastating damage will occur
4	131 -155	Catastrophic damage will occur
5	> 155	Catastrophic damage will occur

The National Oceanic and Atmospheric Administration's National Hurricane Center created the HURDAT database, which contains all of the tracks of tropical systems since the mid-1800s. This database was used to document the number of tropical systems that have affected Jefferson County by creating a 20-mile buffer around the county to include storms that didn't make direct landfall in Jefferson County but impacted the county. Note that the storms listed contain the peak sustained winds, maximum pressure and maximum attained storm strength for the entire storm duration. Since 1851, Jefferson County has had 22 tropical systems within 20 miles of its county borders (Table 4).

Table 4: Tropical Systems affecting Jefferson County[3]

YEAR	DATE RANGE	NAME	MAX WIND(Knots)	MAX PRESSURE	MAX CAT
1851	August 16-27	UNNAMED	100	0	H2

[2] National Hurricane Center (2011). "Glossary of NHC Terms." National Oceanic and Atmospheric Administration. http://www.nhc.noaa.gov/aboutgloss.shtml#h. Retrieved 2012-23-02.

[3] Atlantic Oceanic and Meteorological Laboratory (2012). "Data Center." National Oceanic and Atmospheric Administration. http://www.aoml.noaa.gov/hrd/data_sub/re_anal.html. Retrieved 7-20-2015.

YEAR	DATE RANGE	NAME	MAX WIND(Knots)	MAX PRESSURE	MAX CAT
1852	August 19-30	UNNAMED	100	961	H2
1856	August 25 - September 03	UNNAMED	100	969	H2
1877	September 21 - October 05	UNNAMED	100	0	H2
1886	June 17-24	UNNAMED	85	0	H1
1887	October 09-22	UNNAMED	75	0	H1
1898	August 30 - September 01	UNNAMED	75	0	H1
1901	September 09-19	UNNAMED	70	0	TD
1915	July 31 - August 05	UNNAMED	65	1003	TD
1928	August 03-13	UNNAMED	90	977	H1
1933	August 31 - September 07	UNNAMED	120	948	H3
1949	August 23 - September 01	UNNAMED	115	1002	H3
1959	May 28 - June 02	ARLENE	55	1002	TD
1964	August 20 - September 05	CLEO	135	1003	H4
1965	June 11-18	UNNAMED	45	0	TD
1968	June 01-13	ABBY	65	1005	TD
1972	June 14-23	AGNES	75	1001	H1
1986	August 13-30	CHARLEY	70	1015	TD
1990	October 09-13	MARCO	55	1007	TD
2000	September 15-25	HELENE	60	1012	TD
2001	June 05-19	ALLISON	50	1012	TD
2003	July 25-27	UNNAMED	30	1022	TD

Category Definitions:

TS – Tropical storm

TD – Tropical depression

H1 – Category 1 (same format for H2, H3, and H4)

E – Extra-tropical cyclone

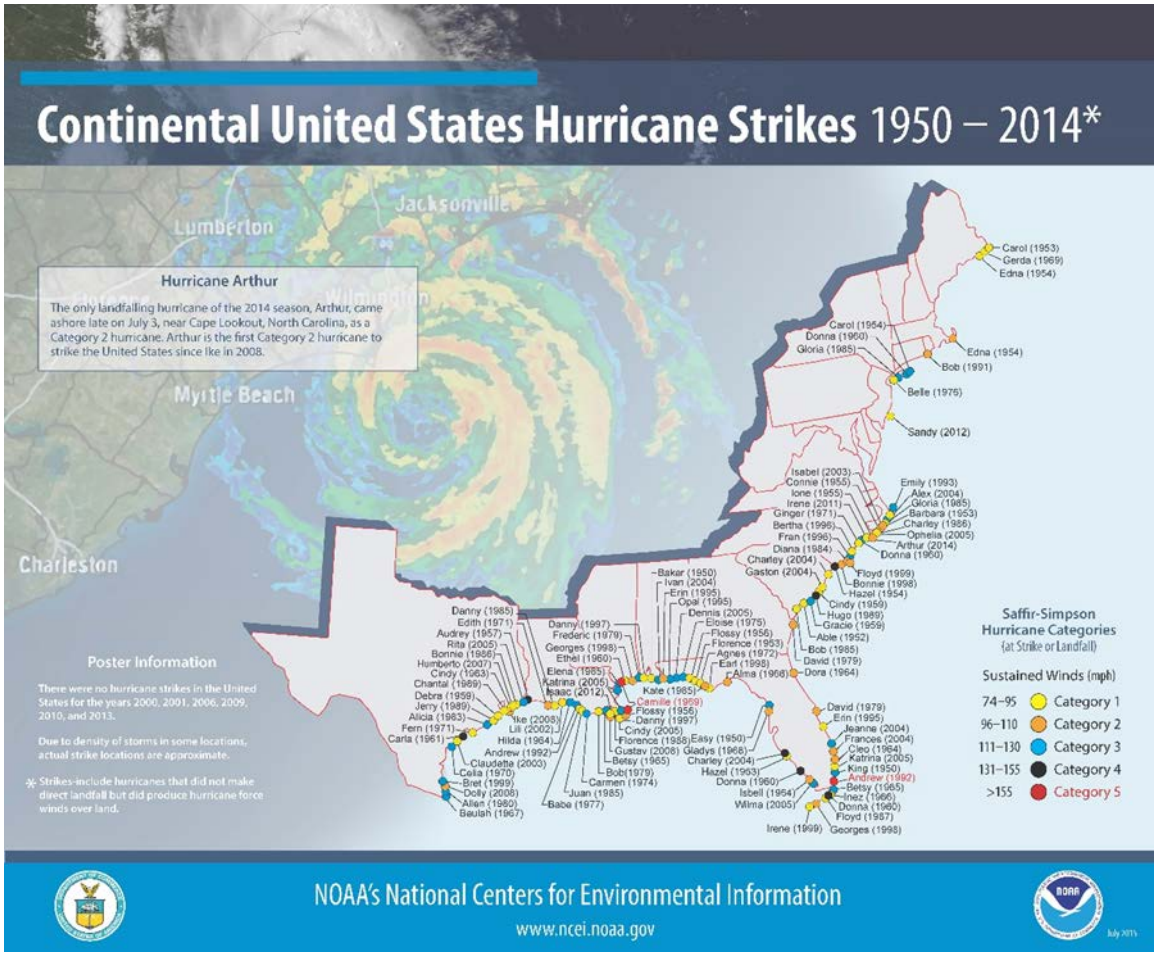


Figure 2: Continental United States Hurricane Strikes: 1950 to 2014[4]

Probabilistic Hurricane Scenario

The following probabilistic wind damage risk assessment modeled a Category 1 Hurricane with maximum winds of 76 mph.

Wind Damage Assessment

Separate analyses were performed to determine wind and hurricane storm surge related flood losses. This section describes the wind-based losses to Jefferson County. Wind losses were determined from probabilistic models run for the Tropical Storm which equates to the 1% chance storm event. Figure 3 shows wind speeds for the modeled Category 1 Storm.

[4] Source: NOAA National Climatic Data Center

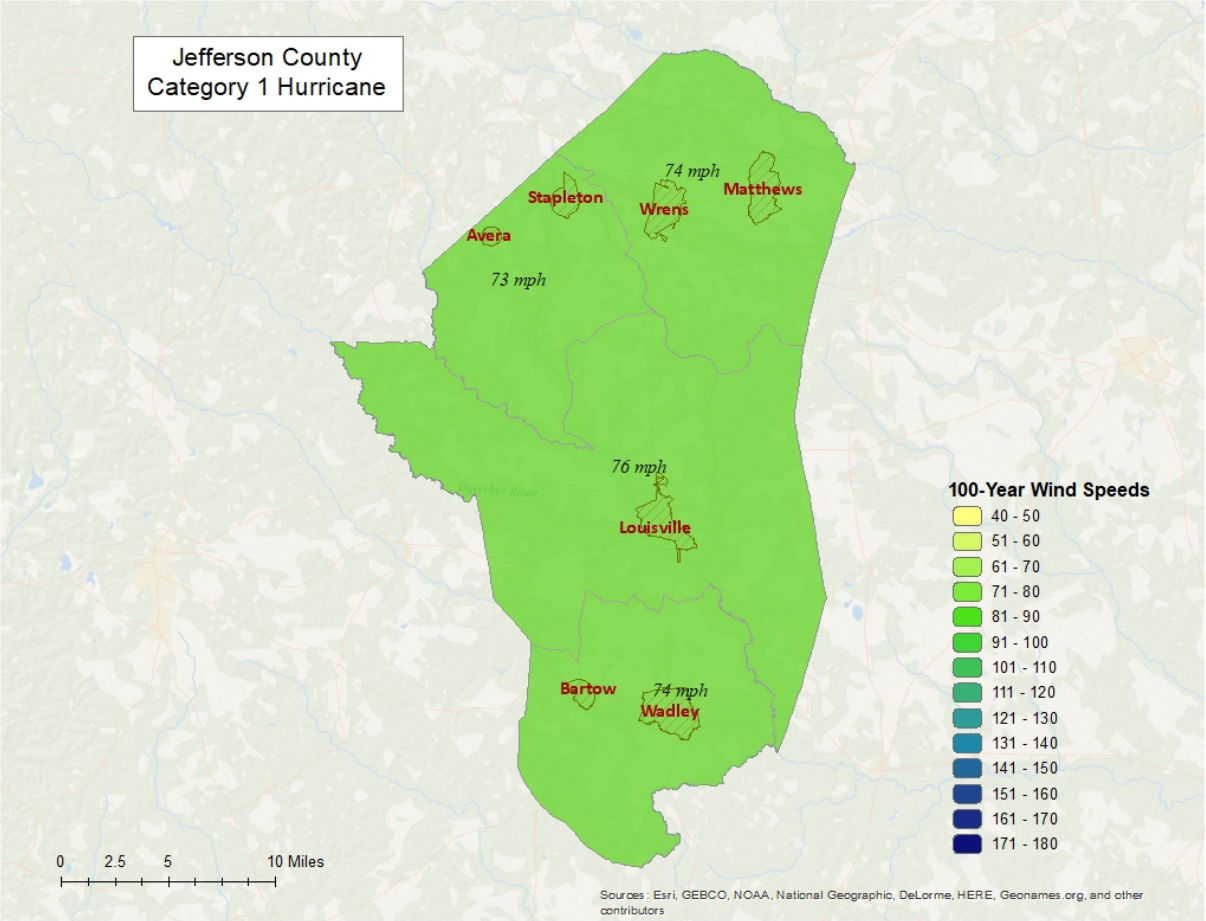


Figure 3: Wind Speeds by Storm Category

Wind-Related Building Damages

Buildings in Jefferson County are vulnerable to storm events, and the cost to rebuild may have significant consequences to the community. The following table shows a summary of the results of wind-related building damage in Jefferson County for the Category 1 (100 Year Event) hurricane. The loss ratio expresses building losses as a percentage of total building replacement cost in the county. Figure 4 illustrates the building loss ratios of the modeled Category 1 storm.

Table 5: Hurricane Wind Building Damage

Classification	Number of Buildings Damaged	Total Building Damage	Total Economic Loss[5]	Loss Ratio
Category 1	46	$2,173,330	$2,941,130	0.12%

[5] Includes property damage (infrastructure, contents, and inventory) as well as business interruption losses.

Note that wind damaged buildings are not reported by jurisdiction. This is due to the fact that census tract boundaries – upon which hurricane building losses are based – do not closely coincide with jurisdiction boundaries.

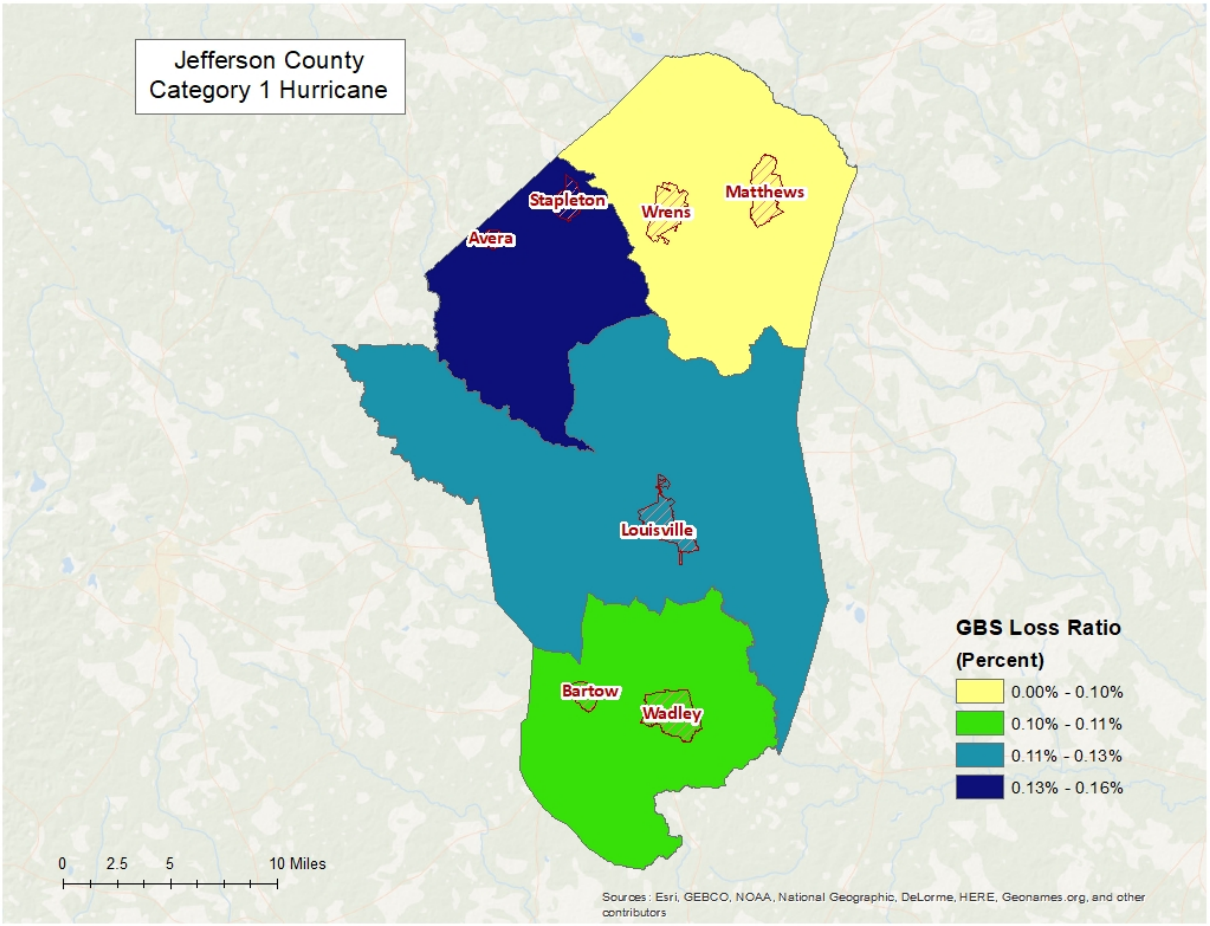


Figure 4: Hurricane Wind Building Loss Ratios

Essential Facility Losses

Essential facilities are also vulnerable to storm events, and the potential loss of functionality may have significant consequences to the community. Hazus-MH identified the essential facilities that may be moderately or severely damaged by winds. The results are compiled in Table 6.

There are 28 essential facilities in Jefferson County.

Classification	Number
EOCs	1
Fire Stations	6
Care Facilities	8
Police Stations	6
Schools	7

Table 6: Wind-Damaged Essential Facility Losses

Classification	Facilities At Least Moderately Damaged > 50%	Facilities Completely Damaged > 50%	Facilities with Expected Loss of Use (< 1 day)
Category 1	0	0	28

Shelter Requirements

Hazus-MH estimates the number of households evacuated from buildings with severe damage from high velocity winds as well as the number of people who will require short-term sheltering. Since the 1% chance storm event for Jefferson County is a Category 1 storm, the resulting damage is not enough to displace Households or require temporary shelters as shown in the results listed in Table 7.

Table 7: Displaced Households and People

Classification	# of Displaced Households	# of People Needing Short-Term Shelter
Category 1	0	0

Debris Generated from Hurricane Wind

Hazus-MH estimates the amount of debris that will be generated by high velocity hurricane winds and quantifies it into three broad categories to determine the material handling equipment needed:

- Reinforced Concrete and Steel Debris
- Brick and Wood and Other Building Debris
- Tree Debris

Different material handling equipment is required for each category of debris. The estimates of debris for this scenario are listed in Table 8. The amount of hurricane wind related tree debris that is estimated to require pick up at the public's expense is listed in the eligible tree debris column.

Table 8: Wind-Related Debris Weight (Tons)

Classification	Brick, Wood, and Other	Reinforced Concrete and Steel	Eligible Tree Debris	Other Tree Debris	Total
Category 1	222	0	2,286	55,576	58,084

Figure 5 shows the distribution of all wind related debris resulting from a Category 1 Hurricane. Each dot represents 20 tons of debris within the census tract in which it is located. The dots are randomly distributed within each census tract and therefore do not represent the specific location of debris sites.

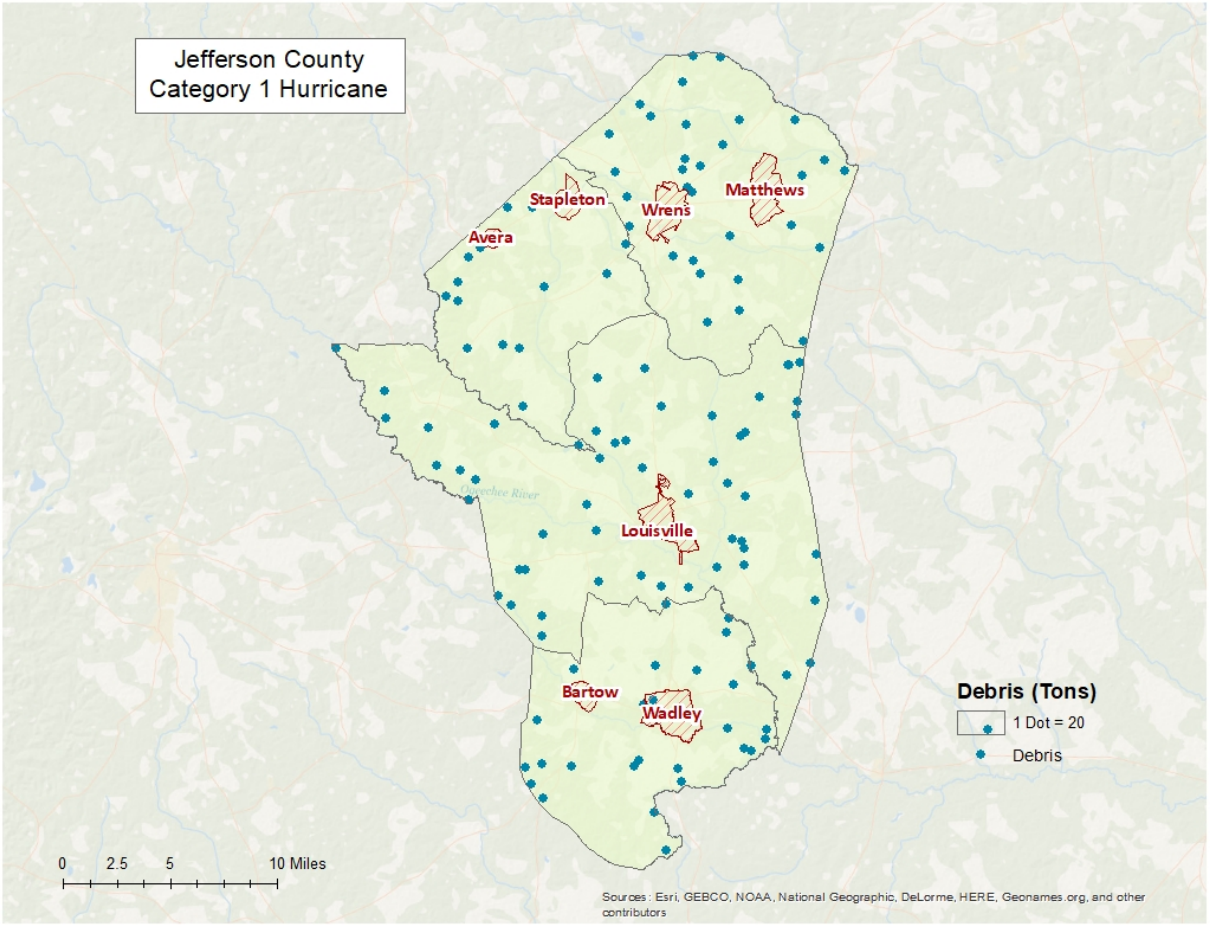


Figure 5: Wind-Related Debris Weight (Tons)

Flood Risk Assessment

Hazard Definition

Flooding is a significant natural hazard throughout the United States. The type, magnitude, and severity of flooding are functions of the amount and distribution of precipitation over a given area, the rate at which precipitation infiltrates the ground, the geometry and hydrology of the catchment, and flow dynamics and conditions in and along the river channel. Floods can be classified as one of three types: upstream floods, downstream floods, or coastal floods.

Upstream floods, also called flash floods, occur in the upper parts of drainage basins and are generally characterized by periods of intense rainfall over a short duration. These floods arise with very little warning and often result in locally intense damage, and sometimes loss of life, due to the high energy of the flowing water. Flood waters can snap trees, topple buildings, and easily move large boulders or other structures. Six inches of rushing water can upend a person; another 18 inches might carry off a car. Generally, upstream floods cause damage over relatively localized areas, but they can be quite severe in the local areas in which they occur. Urban flooding is a type of upstream flood. Urban flooding involves the overflow of storm drain systems and can be the result of inadequate drainage combined with heavy rainfall or rapid snowmelt. Upstream or flash floods can occur at any time of the year in Georgia, but they are most common in the spring and summer months.

Downstream floods, also called riverine floods, refer to floods on large rivers at locations with large upstream catchments. Downstream floods are typically associated with precipitation events that are of relatively long duration and occur over large areas. Flooding on small tributary streams may be limited, but the contribution of increased runoff may result in a large flood downstream. The lag time between precipitation and time of the flood peak is much longer for downstream floods than for upstream floods, generally providing ample warning for people to move to safe locations and, to some extent, secure some property against damage.

Coastal floods occurring on the Atlantic and Gulf coasts may be related to hurricanes or other combined offshore, nearshore, and shoreline processes. The effects of these complex interrelationships vary significantly across coastal settings, leading to challenges in the determination of the base (1-percent-annual-chance) flood for hazard mapping purposes. Land area covered by floodwaters of the base flood is identified as a Special Flood Hazard Area (SFHA). The Jefferson County flood risk assessment analyzed at risk structures in the SFHA.

> The SFHA is the area where the National Flood Insurance Program's (NFIP) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies. The owner of a structure in a high-risk area must carry flood insurance, if the owner carries a mortgage from a federally regulated or insured lender or servicer.

The following probabilistic risk assessment involves an analysis of a 1% annual chance riverine flood event (100-Year Flood) and a 1% annual chance coastal flood.

Riverine 1% Flood Scenario

Riverine losses were determined from the 1% flood boundaries downloaded from the FEMA Flood Map Service Center in March 2018. The flood boundaries were overlaid with the USGS 10 meter DEM using

the Hazus-MH Enhanced Quick Look tool to generate riverine depth grids. The riverine flood depth grid was then imported into Hazus-MH to calculate the riverine flood loss estimates. Figure 6 illustrates the riverine inundation boundary associated with the 1% annual chance.

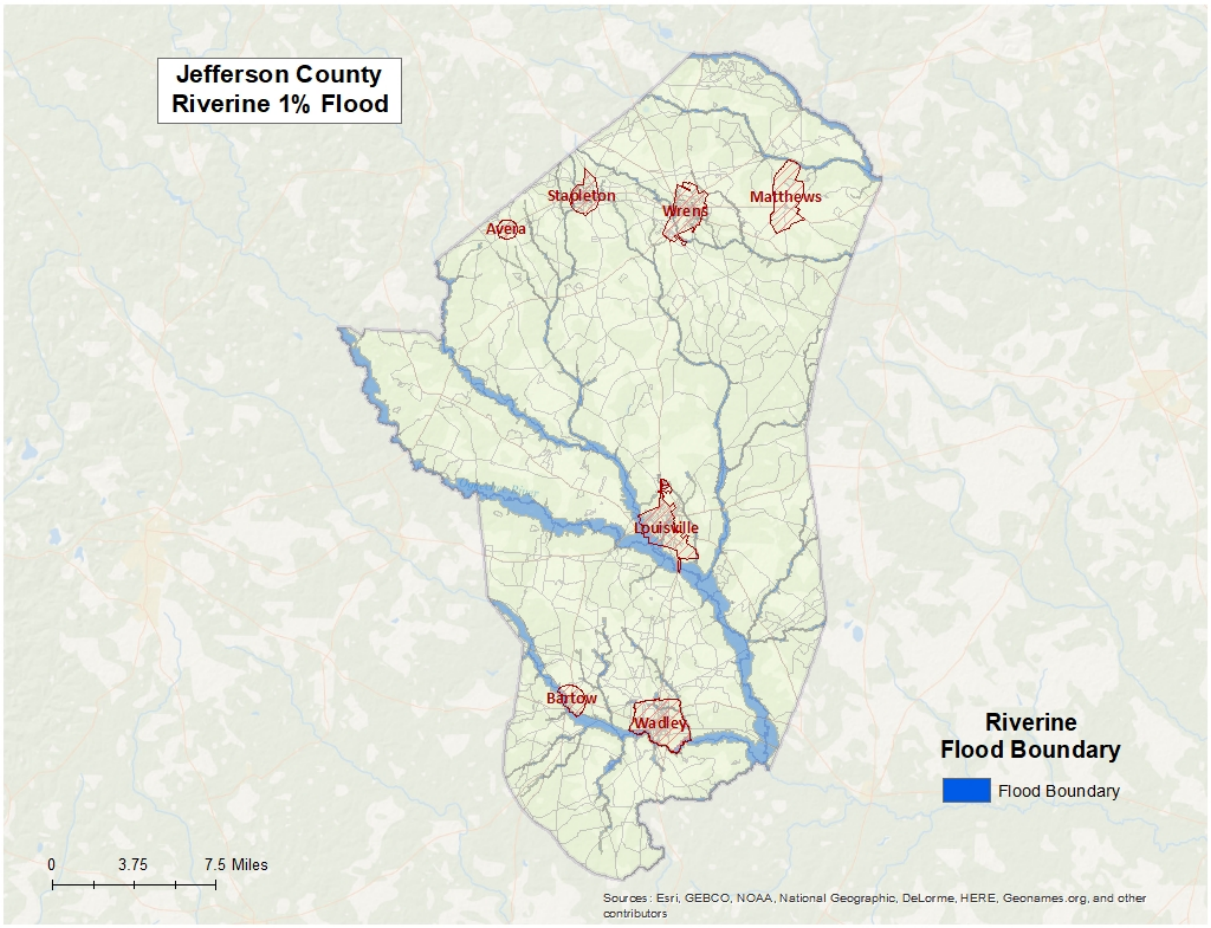


Figure 6: Riverine 1% Flood Inundation

Riverine 1% Flood Building Damages

Buildings in Jefferson County are vulnerable to flooding from events equivalent to the 1% riverine flood. The economic and social impacts from a flood of this magnitude can be significant. Table 9 provides a summary of the potential flood-related building damage in Jefferson County by jurisdiction that might be experienced from the 1% flood. Figure 7 maps the potential loss ratios of total building exposure to losses sustained to buildings from the 1% flood by 2010 census block and Figure 8 illustrates the relationship of building locations to the 1% flood inundation boundary.

Table 9: Jefferson County Riverine 1% Building Losses

Occupancy	Total Buildings in the Jurisdiction	Total Buildings Damaged in the Jurisdiction	Total Building Exposure in the Jurisdiction	Total Losses to Buildings in the Jurisdiction	Loss Ratio of Exposed Buildings to Damaged Buildings in the Jurisdiction
Bartow					
Residential	126	1	$15,871,916	$35,078	0.22%
Louisville					
Residential	932	2	$132,191,948	$56,993	0.04%
Stapleton					
Residential	189	2	$22,643,895	$69,179	0.31%
Commercial	16	1	$5,151,357	$67,850	1.32%
Wadley					
Residential	842	7	$103,784,578	$158,064	0.15%
Wrens					
Industrial	46	1	$79,633,061	$33,703	0.04%
Commercial	158	1	$106,495,257	$5,027	0.00%
Residential	839	19	$125,817,948	$465,130	0.37%

Occupancy	Total Buildings in the Jurisdiction	Total Buildings Damaged in the Jurisdiction	Total Building Exposure in the Jurisdiction	Total Losses to Buildings in the Jurisdiction	Loss Ratio of Exposed Buildings to Damaged Buildings in the Jurisdiction
Unincorporated					
Residential	4,247	66	$429,749,450	$1,642,053	0.38%
Industrial	80	1	$159,353,531	$51,743	0.03%
Commercial	115	2	$179,426,755	$107,443	0.06%
County Total					
	7,590	**103**	**$1,360,119,696**	**$2,692,263**	

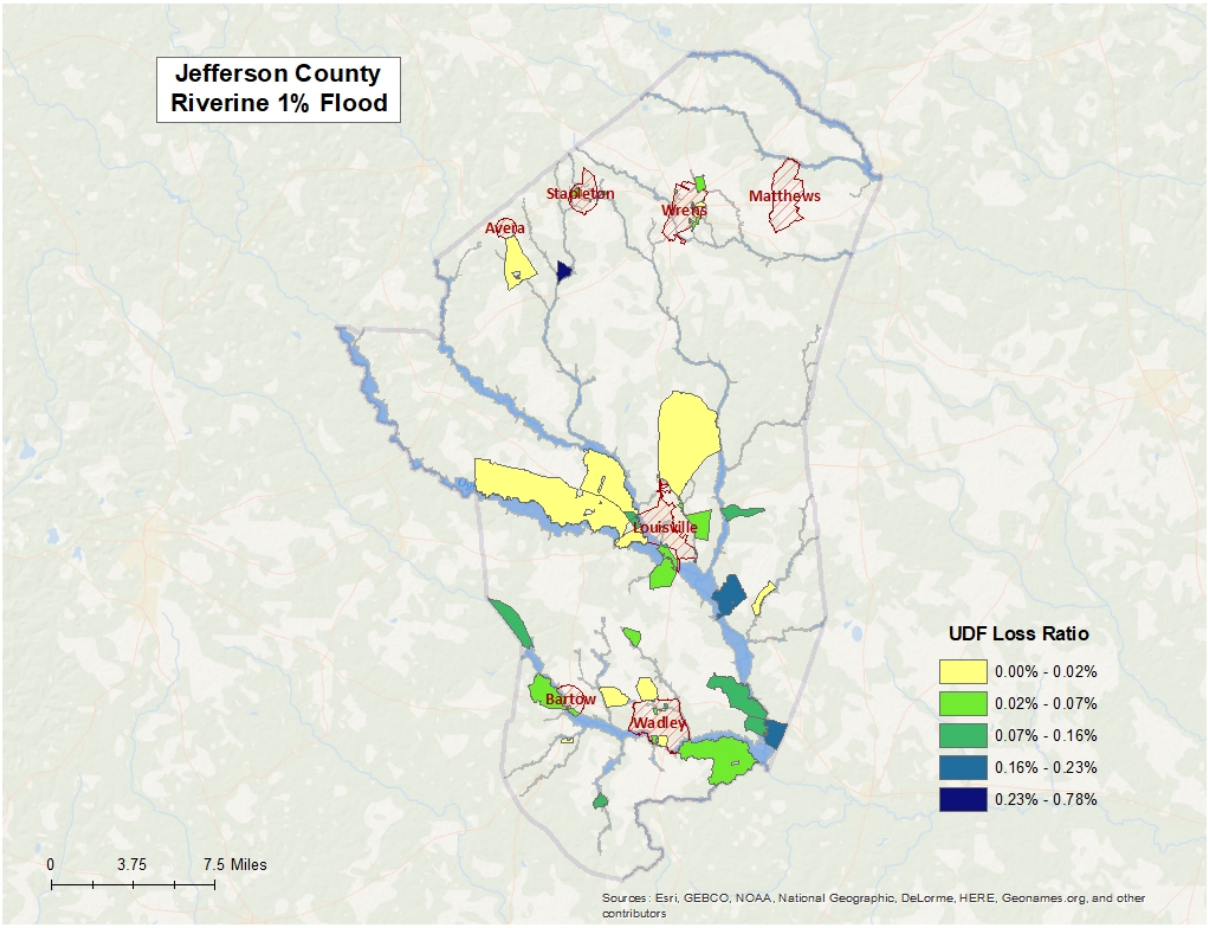


Figure 7: Jefferson County Potential Loss Ratios of Total Building Exposure to Losses Sustained to Buildings from the 1% Riverine Flood by 2010 Census Block

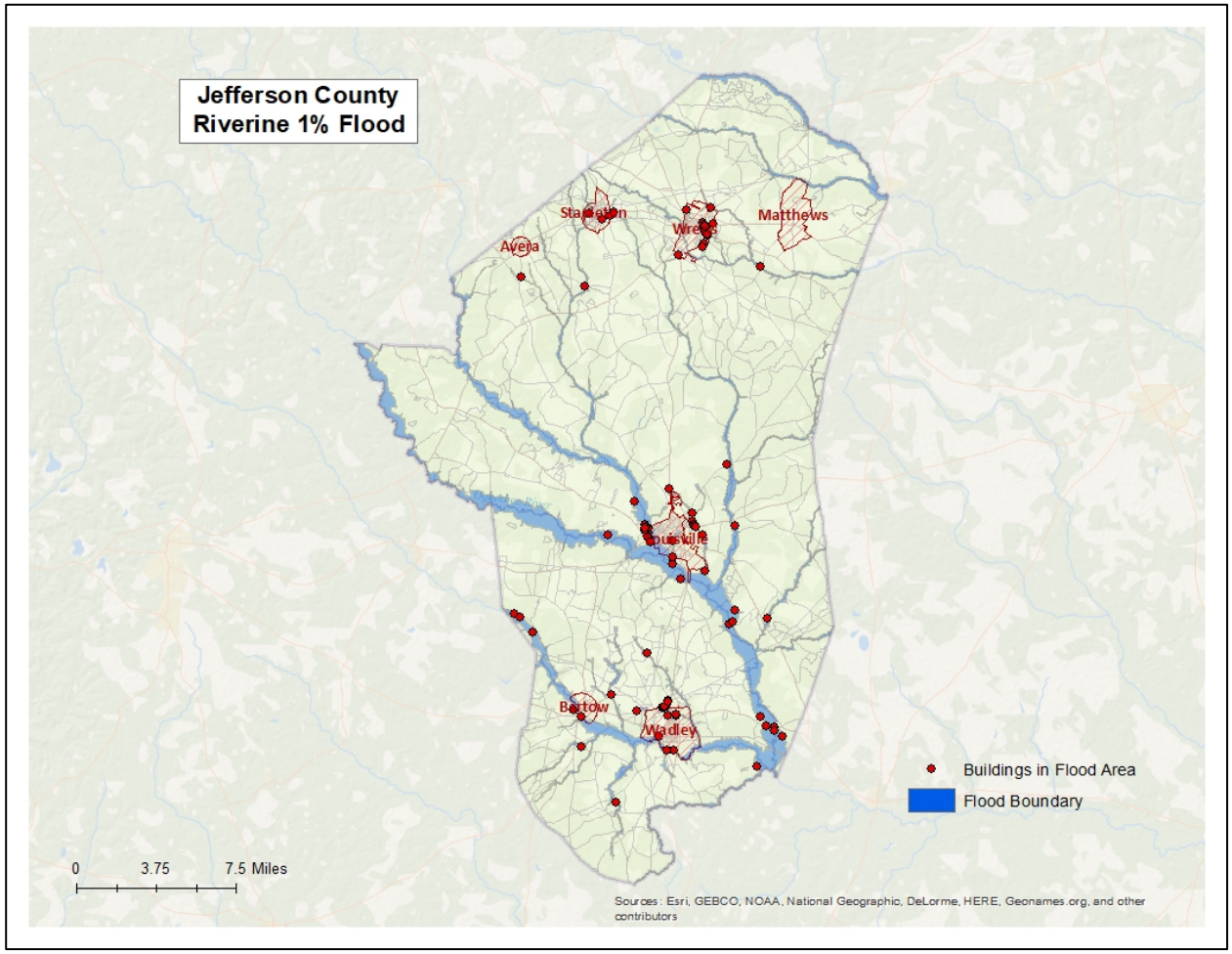


Figure 8: Jefferson County Damaged Buildings in Riverine Floodplain (1% Flood)

Riverine 1% Flood Essential Facility Losses

An essential facility may encounter many of the same impacts as other buildings within the flood boundary. These impacts can include structural failure, extensive water damage to the facility and loss of facility functionality (e.g. a damaged police station will no longer be able to serve the community). The analysis identified no essential facility that were subject to damage in the Jefferson County riverine 1% probability floodplain.

Riverine 1% Flood Shelter Requirements

Hazus-MH estimates that the number of households that are expected to be displaced from their homes due to riverine flooding and the associated potential evacuation. The model estimates 255 households might be displaced due to the flood. Displacement includes households evacuated within or very near to the inundated area. Displaced households represent 764 individuals, of which 207 may require short term publicly provided shelter. The results are mapped in Figure 9.

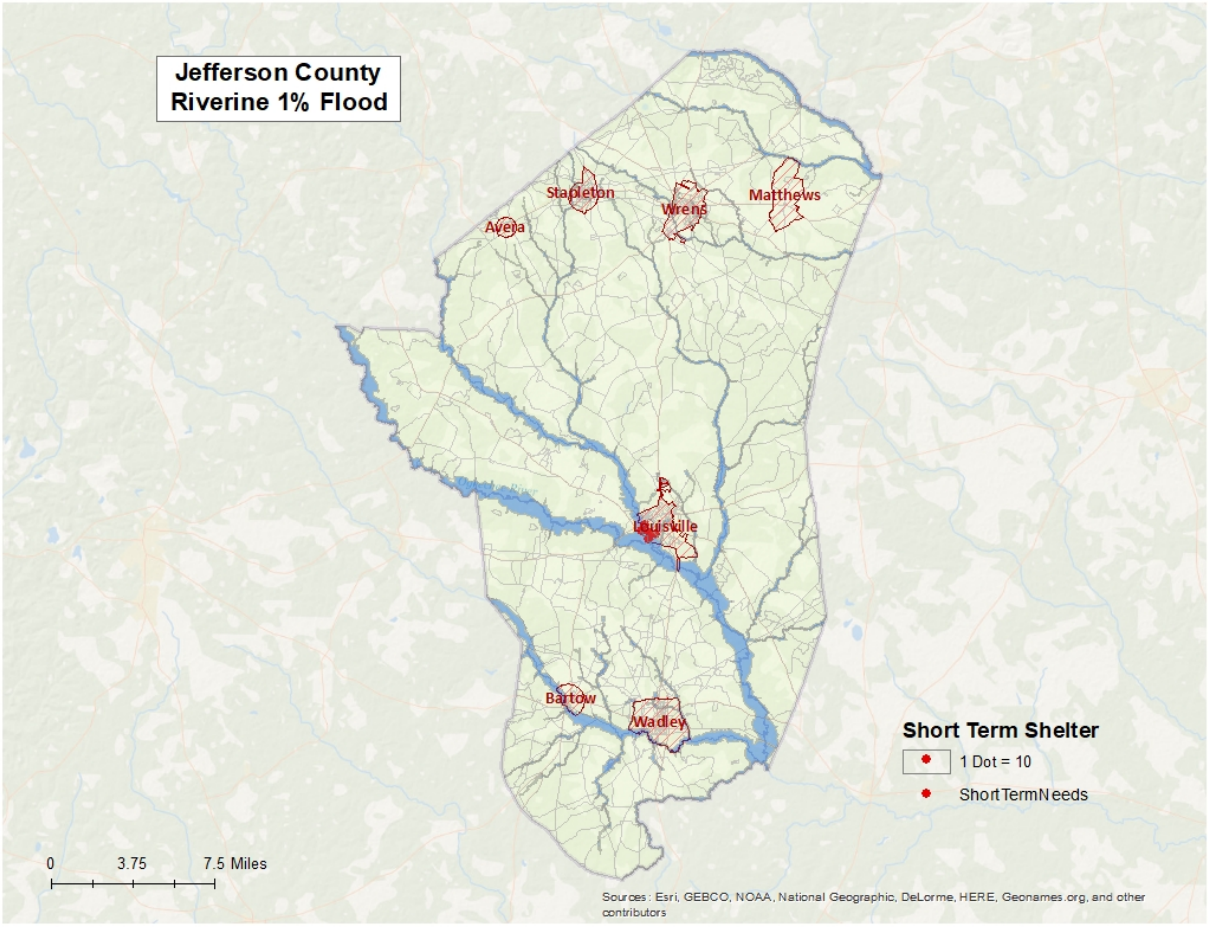


Figure 9: Riverine 1% Estimated Flood Shelter Requirements

Riverine 1% Flood Debris

Hazus-MH estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories:

- Finishes (dry wall, insulation, etc.)
- Structural (wood, brick, etc.)
- Foundations (concrete slab, concrete block, rebar, etc.)

Different types of material handling equipment will be required for each category. Debris definitions applied in Hazus-MH are unique to the Hazus-MH model and so do not necessarily conform to other definitions that may be employed in other models or guidelines.

The analysis estimates that an approximate total of 3,633 tons of debris might be generated: 1) Finishes- 1,498 tons; 2) Structural – 759 tons; and 3) Foundations- 1,376 tons. The results are mapped in Figure 10.

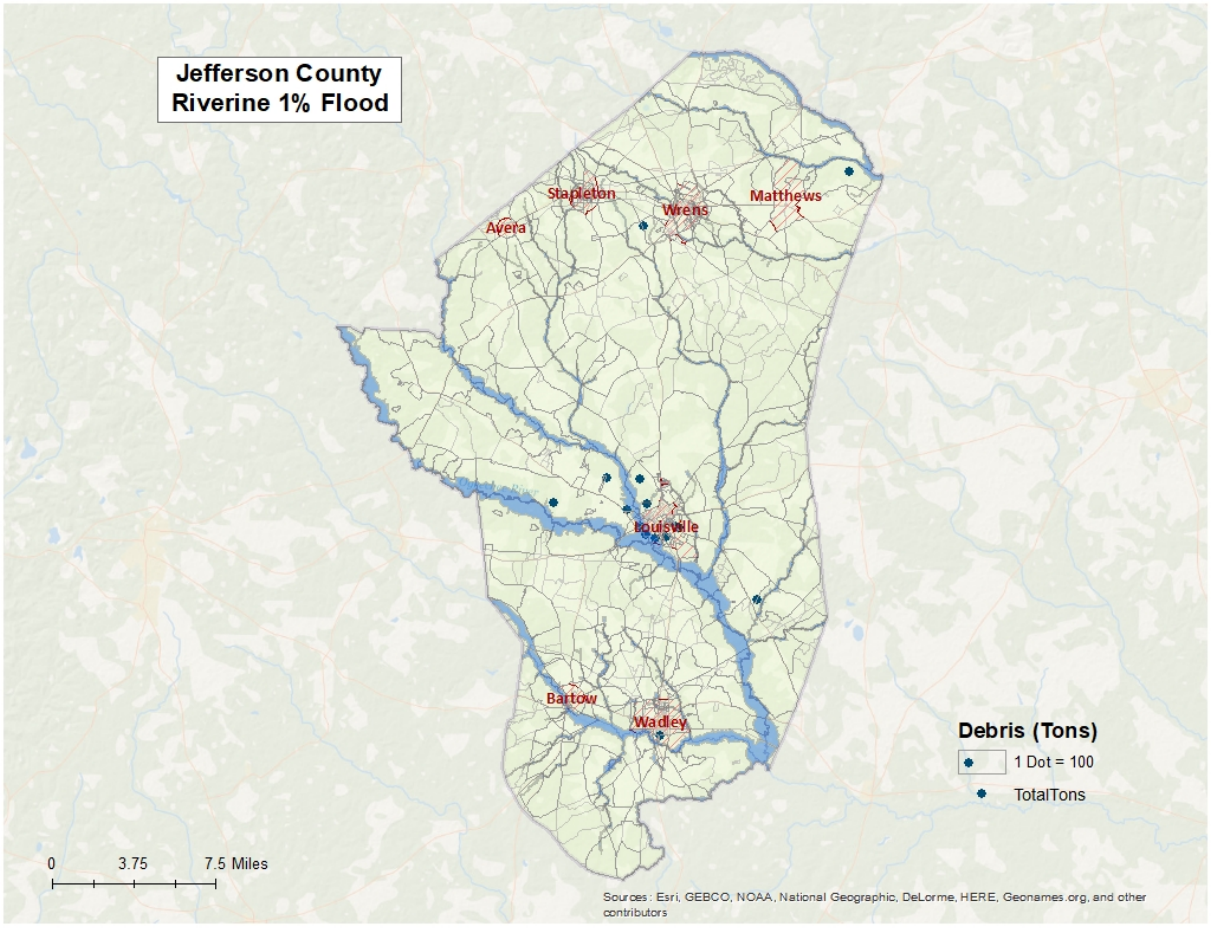


Figure 10: Riverine 1% Flood Debris Weight (Tons)

Tornado Risk Assessment

Hazard Definition

Tornadoes pose a great risk to the state of Georgia and its citizens. Tornadoes can occur at any time during the day or night. They can also happen during any month of the year. The unpredictability of tornadoes makes them one of Georgia's most dangerous hazards. Their extreme winds are violently destructive when they touch down in the region's developed and populated areas. Current estimates place the maximum velocity at about 300 miles per hour, but higher and lower values can occur. A wind velocity of 200 miles per hour will result in a wind pressure of 102.4 pounds per square foot of surface area—a load that exceeds the tolerance limits of most buildings. Considering these factors, it is easy to understand why tornadoes can be so devastating for the communities they hit.

Tornadoes are defined as violently-rotating columns of air extending from thunderstorms and cyclonic events. Funnel clouds are rotating columns of air not in contact with the ground; however, the violently-rotating column of air can reach the ground very quickly and become a tornado. If the funnel cloud picks up and blows debris, it has reached the ground and is a tornado.

Tornadoes are classified according to the Fujita tornado intensity scale. Originally introduced in 1971, the scale was modified in 2006 to better define the damage and estimated wind scale. The Enhanced Fujita Scale ranges from low intensity EF0 with effective wind speeds of 65 to 85 miles per hour, to EF5 tornadoes with effective wind speeds of over 200 miles per hour. The Enhanced Fujita intensity scale is included in Table 10.

Table 10: Enhanced Fujita Tornado Rating

Fujita Number	Estimated Wind Speed	Path Width	Path Length	Description of Destruction
EF0 *Gale*	65-85 mph	6-17 yards	0.3-0.9 miles	Light damage, some damage to chimneys, branches broken, sign boards damaged, shallow-rooted trees blown over.
EF1 Moderate	86-110 mph	18-55 yards	1.0-3.1 miles	Moderate damage, roof surfaces peeled off, mobile homes pushed off foundations, attached garages damaged.
EF2 Significant	111-135 mph	56-175 yards	3.2-9.9 miles	Considerable damage, entire roofs torn from frame houses, mobile homes demolished, boxcars pushed over, large trees snapped or uprooted.
EF3 Severe	136-165 mph	176-566 yards	10-31 miles	Severe damage, walls torn from well-constructed houses, trains overturned, most trees in forests uprooted, heavy cars thrown about.
EF4 Devastating	166-200 mph	0.3-0.9 miles	32-99 miles	Complete damage, well-constructed houses leveled, structures with weak foundations blown off for some distance, large missiles generated.
EF5 Incredible	> 200 mph	1.0-3.1 miles	100-315 miles	Foundations swept clean, automobiles become missiles and thrown for 100 yards or more, steel-reinforced concrete structures badly damaged.

Source: http://www.srh.noaa.gov

Hypothetical Tornado Scenario

For this report, an EF3 tornado was modeled to illustrate the potential impacts of tornadoes of this magnitude in the county. The analysis used a hypothetical path based upon an EF3 tornado event running along the predominant direction of historical tornados (southeast to northwest). The tornado path was placed to travel through Louisville. The selected widths were modeled after a re-creation of the Fujita-Scale guidelines based on conceptual wind speeds, path widths, and path lengths. There is no guarantee that every tornado will fit exactly into one of these categories. Table 11 depicts tornado path widths and expected damage.

Table 11: Tornado Path Widths and Damage Curves

Fujita Scale	Path Width (feet)	Maximum Expected Damage
EF-5	2,400	100%
EF-4	1,800	100%
EF-3	1,200	80%
EF-2	600	50%
EF-1	300	10%
EF-0	300	0%

Within any given tornado path there are degrees of damage. The most intense damage occurs within the center of the damage path, with decreasing amounts of damage away from the center. After the hypothetical path is digitized on a map, the process is modeled in GIS by adding buffers (damage zones) around the tornado path. Figure 11 describes the zone analysis.

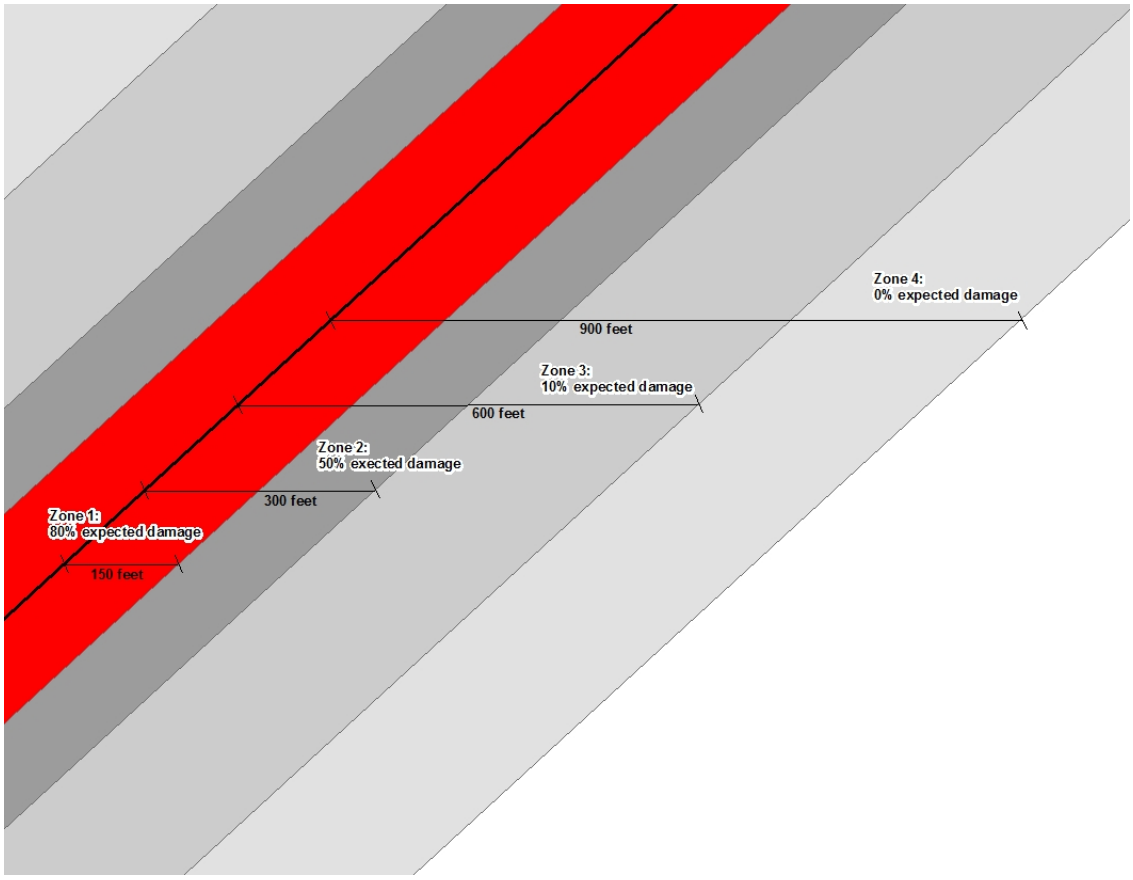


Figure 11: EF Scale Tornado Zones

An EF3 tornado has four damage zones, depicted in Table 12. Major damage is estimated within 150 feet of the tornado path. The outer buffer is 900 feet from the tornado path, within which buildings will not experience any damage. The selected hypothetical tornado path is depicted in Figure 12 and the damage curve buffer zones are shown in Figure 13.

Table 12: EF3 Tornado Zones and Damage Curves

Zone	Buffer (feet)	Damage Curve
1	0-150	80%
2	150-300	50%
3	300-600	10%
4	600-900	0%

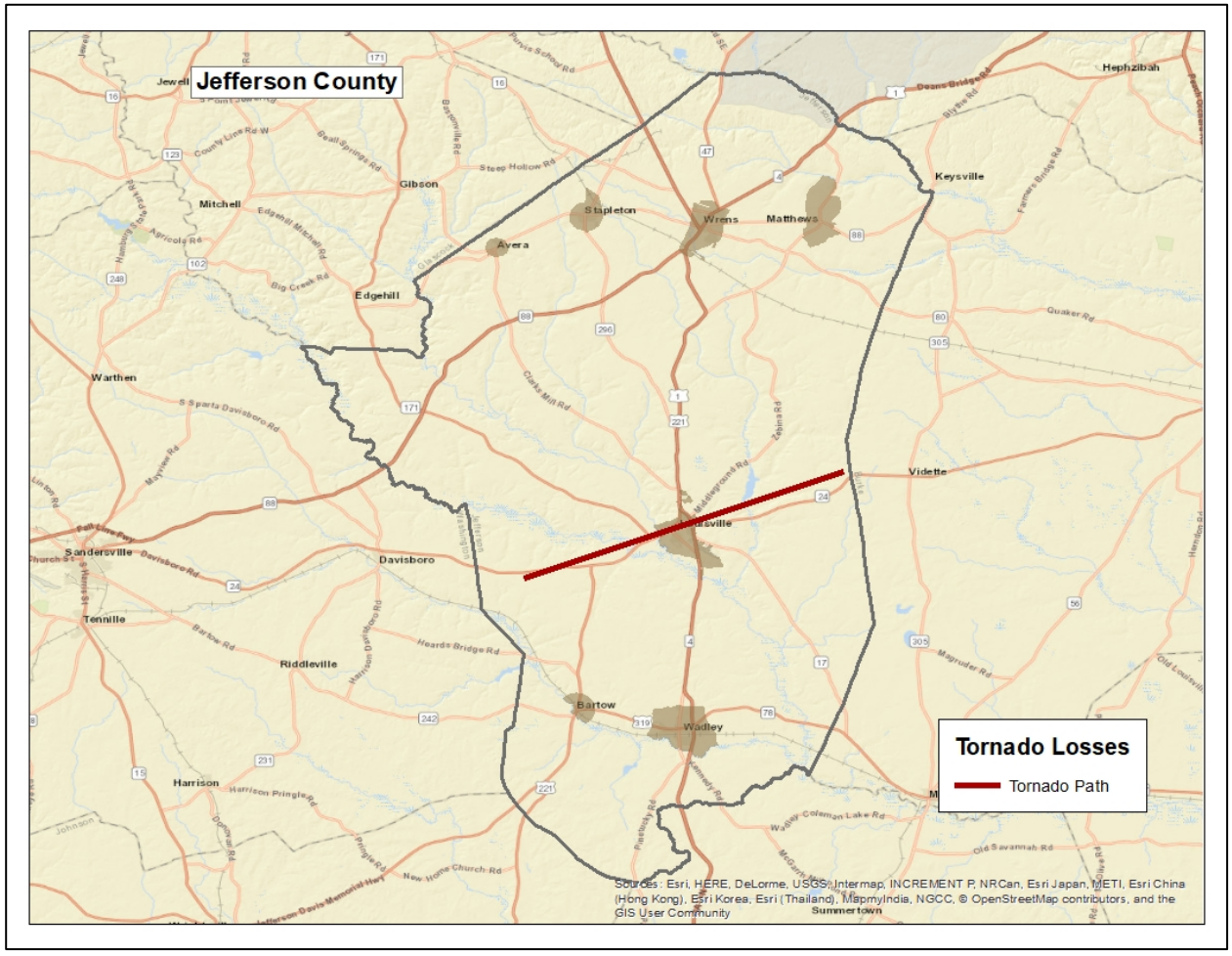


Figure 12: Hypothetical EF3 Tornado Path in Jefferson County

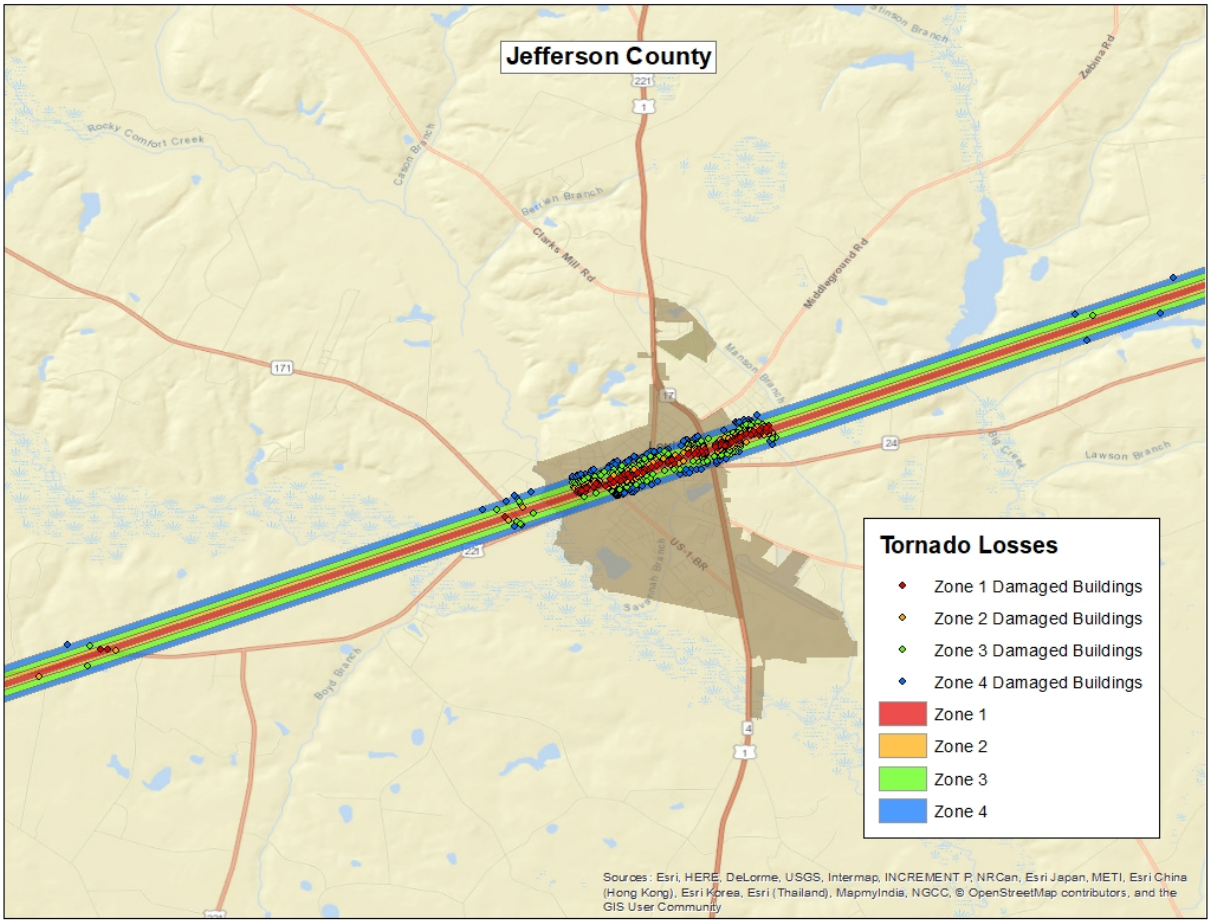


Figure 13: Modeled EF3 Tornado Damage Buffers in Jefferson County

EF3 Tornado Building Damages

The analysis estimated that approximately 538 buildings could be damaged, with estimated building losses of $31 million. The building losses are an estimate of building replacement costs multiplied by the percentages of damage. The overlay was performed against parcels provided by Jefferson County that were joined with Assessor records showing estimated property replacement costs. The Assessor records often do not distinguish parcels by occupancy class if the parcels are not taxable and thus the number of buildings and replacement costs may be underestimated. The results of the analysis are depicted in Table 13.

Table 13: Estimated Building Losses by Occupancy Type

Occupancy	Buildings Damaged	Building Losses
Residential	421	$15,964,787
Commercial	87	$9,254,827
Industrial	13	$2,386,628
Religious	14	$2,827,453
Education	2	$792,652
Government	1	$41,115
Total	538	$31,267,462

EF3 Tornado Essential Facility Damage

There was one essential facility located in the tornado path – one school. Table 14 outlines the specific facility and the amount of damage under the scenario.

Table 14: Estimated Essential Facilities Damaged

Facility	Amount of Damage
Louisville Middle School	Minor Damage

According to the Georgia Department of Education, Louisville Middle School's enrollment was approximately 291 students as of October 2017. Depending on the time of day, a tornado strike as depicted in this scenario could result in significant injury and loss of life. In addition, arrangements would have to be made for the continued education of the students in another location.

The location of the damaged Essential Facility is mapped in Figure 14.

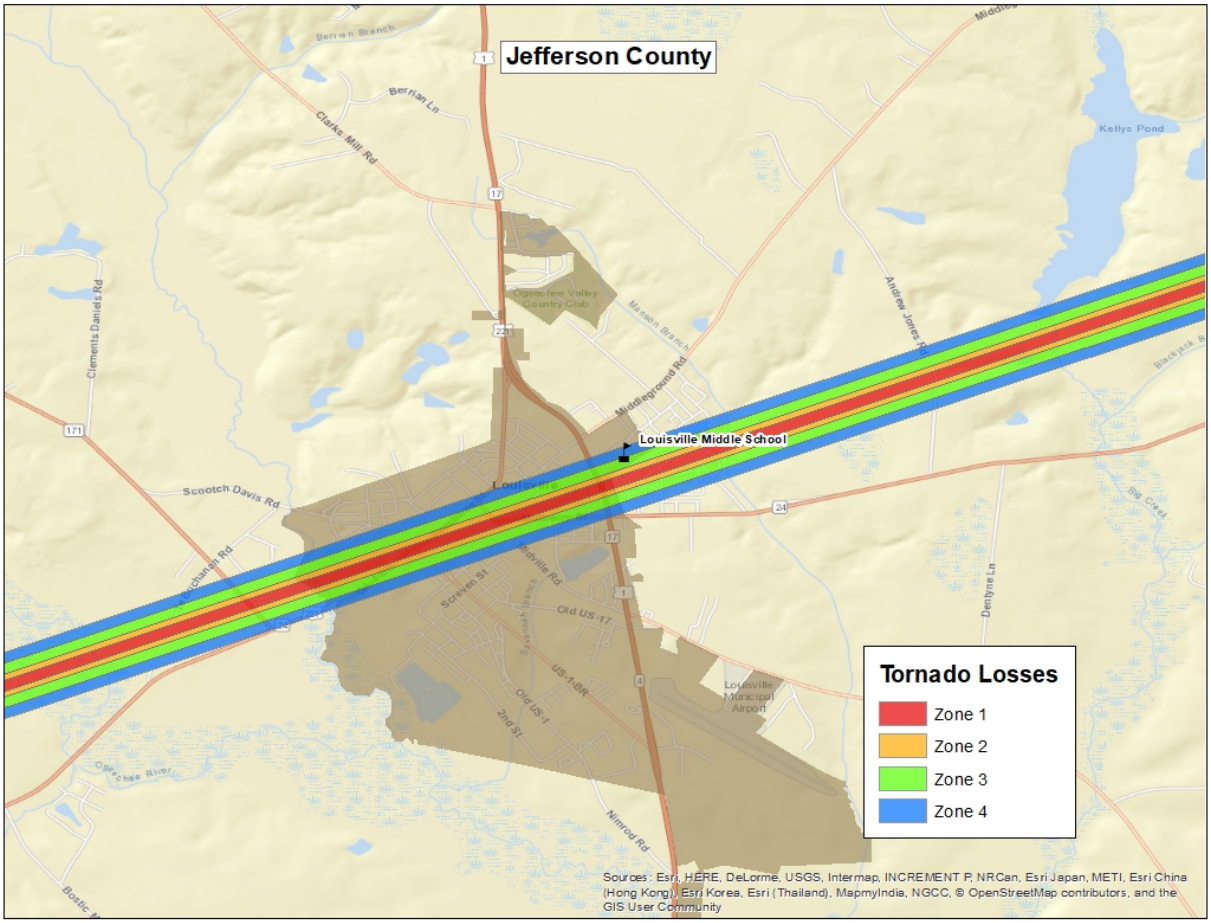


Figure 14: Modeled Essential Facility Damage in Jefferson County

Exceptions Report

Hazus Version 2.2 SP1 was used to perform the loss estimates for Jefferson County, Georgia. Changes made to the default Hazus-MH inventory and the modeling parameters used to setup the hazard scenarios are described within this document.

Reported losses reflect the updated data sets. Steps, algorithms and assumptions used during the data update process are documented in the project workflow named PDM_GA_Workflow.doc.

Statewide Inventory Changes

The default Hazus-MH Essential Facility inventory was updated for the entire state prior to running the hazard scenarios for Jefferson County.

Updates to the Critical Facility data used in GMIS were provided by Jefferson County in March 2018. These updates were applied by The Carl Vinson Institute of Government at the University of Georgia. Table 15 summarizes the difference between the original Hazus-MH default data and the updated data for Jefferson County.

Table 15: Essential Facility Updates

Site Class	Feature Class	Default Replacement Cost	Default Count	Updated Replacement Cost	Updated Count
EF	Care	$69,566,000	8	$69,146,000	8
EF	EOC	$880,000	1	$2,380,000	1
EF	Fire	$1,574,000	4	$2,716,000	6
EF	Police	$10,921,000	3	$15,944,000	6
EF	School	$145,930,000	7	$145,930,000	7

County Inventory Changes

The GBS records for Jefferson County were replaced with data derived from parcel and property assessment data obtained from Jefferson County. The county provided property assessment data was current as of February 2018 and the parcel data current as of February 2018.

General Building Stock Updates

The parcel boundaries and assessor records were obtained from Jefferson County. Records without improvements were deleted. The parcel boundaries were converted to parcel points located in the centroids of each parcel boundary. Each parcel point was linked to an assessor record based upon matching parcel numbers. The generated Building Inventory represents the approximate locations (within a parcel) of building exposure. The Building Inventory was aggregated by Census Block and

imported into Hazus-MH using the Hazus-MH Comprehensive Data Management System (CDMS). Both the 2010 Census Tract and Census Block tables were updated.

The match between parcel records and assessor records was based upon a common Parcel ID. For this type of project, unless the hit rate is better than 85%, the records are not used to update the default aggregate inventory in Hazus-MH. The Parcel-Assessor hit rate for Jefferson County was 98.9%.

Adjustments were made to records when primary fields did not have a value. In these cases, default values were applied to the fields. Table 16 outlines the adjustments made to Jefferson County records.

Table 16: Building Inventory Default Adjustment Rates

Type of Adjustment	Building Count	Percentage
Area Unknown	202	2%
Construction Unknown	1,245	15%
Condition Unknown	229	3%
Foundation Unknown	874	10%
Year Built Unknown	2,430	29%
Total Buildings	8,447	12%

Approximately 12% of the CAMA values were either missing (<Null> or '0'), did not match CAMA domains or were unusable ('Unknown', 'Other', 'Pending'). These were replaced with 'best available' values. Missing YearBuilt values were populated from average values per Census Block. Missing Condition, Construction and Foundation values were populated with the highest-frequency CAMA values per Occupancy Class. Missing Area values were populated with the average CAMA values per Occupancy Class.

The resulting Building Inventory was used to populate the Hazus-MH General Building Stock and User Defined Facility tables. The updated General Building Stock was used to calculate flood and tornado losses. Changes to the building counts and exposure that were modeled in Jefferson County are sorted by General Occupancy in Table 1 at the beginning of this report. If replacements cost or building value were not present for a given record in the Assessor data, replacement costs were calculated from the Building Area (sqft) multiplied by the Hazus-MH RS Means ($/sqft) values for each Occupancy Class.

Differences between the default and updated data are due to various factors. The Assessor records often do not distinguish parcels by occupancy class when the parcels are not taxable; therefore, the total number of buildings and the building replacement costs for government, religious/non-profit, and education may be underestimated.

User Defined Facilities

Building Inventory was used to create Hazus-MH User Defined Facility (UDF) inventory for flood modeling. Hazus-MH flood loss estimates are based upon the UDF point data. Buildings within the flood boundary were imported into Hazus-MH as User Defined Facilities and modeled as points.

Table 17: User Defined Facility Exposure

Class	Hazus-MH Feature	Counts	Exposure
BI	Building Exposure	8,447	$1,844,559,298
Riverine UDF	Structures Inside 1% Annual Chance Riverine Flood Area	112	$18,415,435

Assumptions

- Flood analysis was performed on Building Inventory. Building Inventory within the flood boundary was imported as User Defined Facilities. The point locations are parcel centroid accuracy.
- The analysis is restricted to the county boundary. Events that occur near the county boundary do not contain loss estimates from adjacent counties.
- The following attributes were defaulted or calculated:
  First Floor Height was set from Foundation Type
  Content Cost was calculated from Building Cost

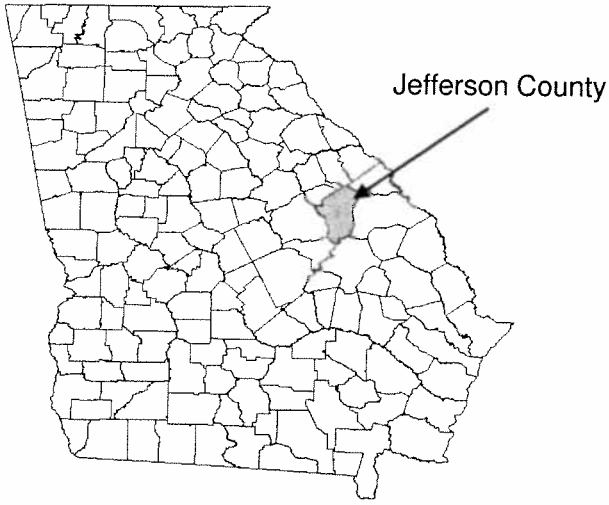
FLOOD INSURANCE STUDY

JEFFERSON COUNTY, GEORGIA

AND INCORPORATED AREAS

Community Name	*Community Number*
*AVERA, CITY OF	130600
BARTOW, CITY OF	130115
JEFFERSON COUNTY (UNINCORPORATED AREAS)	130538
KEYSVILLE, TOWN OF	130104
LOUISVILLE, CITY OF	130441
STAPLETON, CITY OF	130433
WADLEY, CITY OF	130116
WRENS, CITY OF	130117

*NO SPECIAL FLOOD HAZARD AREAS IDENTIFIED



Effective: December 17, 2010

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
13163CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS report at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Selected Flood Insurance Rate Map panels for this community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone(s)	New Zone
Al through A30	AE
B	X
C	X

Initial Countywide FIS Effective Date: December 17, 2010

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TABLES

EXHIBITS

FLOOD INSURANCE STUDY
JEFFERSON COUNTY, GEORGIA AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Jefferson County, including the Cities of Avera, Bartow, Louisville, Stapleton, Wadley, and Wrens; Town of Keysville and the unincorporated areas of Jefferson County (referred to collectively herein as Jefferson County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that the Town of Keysville is geographically located in Burke and Jefferson Counties. Only the portion of Keysville located in Jefferson County is included in this FIS report. See the separately published FIS report and Flood Insurance Rate Map (FIRM) for Burke County for flood-hazard information outside of Jefferson County.

Please note that the City of Avera has no mapped special flood hazard areas.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

The Digital Flood Insurance Rate Map (DFIRM) and FIS report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

1.2 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

All communities within Jefferson County have no previously printed FIS reports.

Redelineation for approximately studied streams and new approximate analyses for this countywide FIS report were performed by Post, Buckley, Schuh and Jernigan, Inc. (PBS&J), for the Georgia Department of Natural Resources (DNR), under contract No. EMA-2008-CA-5870. The work was completed in July 2009.

Base map information shown on the Flood Insurance Rate Map (FIRM) was derived from the National Agriculture Imagery Program produced at a scale of 1:12,000 from photography dated 2007 or later. The projection used in the preparation of this map is State Plane Georgia East, and the horizontal datum used is North American Datum (NAD) of 1983.

1.3 Coordination

An initial meeting is held with representatives from FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify the streams to be studied or restudied. A final meeting is held with representatives from FEMA, the community, and the study contractor to review the results of the study.

The initial meeting was held on July 9, 2008, and attended by representatives of the Georgia DNR, the Cities of Louisville, Wadley, and Wrens, Jefferson County, and Watershed Concepts.

The results of the study were reviewed at the final meeting held on September 9, 2009, and attended by representatives of PBS&J, FEMA, Georgia DNR, and the communities. All problems raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Jefferson County, Georgia, including the incorporated communities listed in Section 1.1. The flood hazards in Jefferson County were studied by approximate methods.

For this countywide revision, all areas studied by approximate methods were either newly studied or revised based on updated hydrologic and hydraulic models. Approximate analyses were used to study those areas having low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed by FEMA and Jefferson County.

For this countywide FIS, the FIS report and FIRM were converted to countywide format, and the flooding information for the entire county, including both incorporated and unincorporated areas, is shown. Also, the vertical datum was converted from the National Geodetic Vertical Datum of 1929 (NGVD) to the North American Vertical Datum of 1988 (NAVD). In addition, the Transverse Mercator, State Plane coordinates, previously referenced to the NAD 1927, are now referenced to the NAD 1983.

2.2 Community Description

Jefferson County, which is located in eastern Georgia, is bordered on the west by Washington County, on the east by Richmond County, on the south by Johnson and Emanuel Counties, and on the north by Glascock, Warren, and Richmond Counties.

According to the 2000 Census, the population of Jefferson County was 17,266. The county has a total land area of 528 square miles (U.S. Census Bureau, 2009).

Jefferson County, originally part of Burke and Warren counties, was created in 1796 and named for Thomas Jefferson. The City of Louisville is the County Seat (State of Georgia, 2009).

The average high temperature occurs in July and is 92 degrees Fahrenheit (°F). The average low temperature is 57°F and occurs in January. Jefferson County receives an average of 45.9 inches of rainfall per year (The Weather Channel, 2009).

2.3 Principal Flood Problems

Based on recent flood-related state and federal disaster declarations, Jefferson County has experienced flooding associated with severe storms, torrential rains, severe low pressure systems, torrential downpours, severe thunderstorms, and hurricanes (Georgia Emergency Management Agency, 2009).

2.4 Flood Protection Measures

Flood protection measures are not known to exist in Jefferson County.

3.0 ENGINEERING METHODS

For the flooding sources studied in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates.

These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance (100-year) flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied.

Discharges for approximate analysis streams were estimated using the published U.S. Geological Survey (USGS) regional regression equations for rural areas in Georgia (Stamey and Hess, 1993). Regression equations estimate peak discharges for ungauged streams based on characteristics of nearby gauged streams. Drainage areas were developed from USGS 30-meter Digital Elevation Models (DEMs).

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

For the streams studied by approximate methods, cross section data was obtained from the USGS 10-meter DEMs. Hydraulically significant roads were modeled as bridges, with opening data approximated from available inventory data or approximated from the imagery. Top of road elevations were estimated from the best available topography. The studied streams were modeled using the US Army Corps of Engineers (USACE) Hydrologic Engineering Center's (HEC) HEC-RAS version 4.0 (HEC, 2008).

Floodplains were delineated using the computer 1-percent-annual-chance water-surface elevations and the USGS 10-meter DEMs (USGS, 2009).

The hydraulic analyses for this study were based on unobstructed flow. The flood delineations are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was NGVD. With the finalization of NAVD, many FIS reports and FIRMs are being prepared using NAVD as the referenced vertical datum.

All models created for this FIS report are referenced to NAVD. Structure and ground elevations in the community must, therefore, be referenced to NAVD. It is important to note that adjacent communities may be referenced to NGVD.

In this countywide revision, an average vertical datum conversion of -0.61 foot was calculated from NGVD to NAVD, using the National Geodetic Survey's (NGS) VERTCON online utility (NGS, 2009). The data points used to determine the conversion are listed in Table 1.

Table 1 - Vertical Datum Conversion

Quad Name	Corner	Latitude	Longitude	Conversion from NGVD to NAVD
Bastonville	SE	33.250	-82.500	-0.581
Bowdens Pond	SE	33.250	-82.375	-0.617
Avondale	SE	33.250	-82.250	-0.646
Mitchell	SE	33.125	-82.675	-0.554
Gibson	SE	33.125	-82.500	-0.591
Wrens	SE	33.125	-82.375	-0.597
Matthews	SE	33.125	-82.250	-0.604
Grange	SE	33.000	-82.500	-0.600
Louisville	SE	33.000	-82.375	-0.620
Kellys Pond	SE	33.000	-82.250	-0.627
Davisboro	SE	32.875	-82.500	-0.610
Louisville South	SE	32.875	-82.375	-0.643
Wadley	SE	32.750	-82.375	-0.627
			Average:	**-0.609**

For additional information regarding conversion between NGVD and NAVD, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance (100-year) flood elevations and delineations of the 1- and 0.2-percent-annual-chance (500-year) floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data Table, and Summary of Stillwater Elevations Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community, although none were mapped for this study.

For the streams studied by approximate methods, the boundaries were delineated using the USGS 10-meter DEMs (USGS, 2009).

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A), and the 0.2-percent-annual-chance floodplain boundary corresponds

to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 1)

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced.

No floodways have been mapped for Jefferson County.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood depths are shown within this zone.

Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square

mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance risk zones as described in Section 5.0. Insurance agents use the zones in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1-percent-annual-chance floodplains.

The countywide FIRM presents flooding information for the entire geographic area of Jefferson County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. Historical data relating to the maps prepared for each community are presented in Table 2.

7.0 OTHER STUDIES

No previous countywide FIS reports have been prepared for the counties surrounding Jefferson County.

This report either supersedes or is compatible with all previous studies on streams studied in this report and should be considered authoritative for purposes of the NFIP.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA, Federal Insurance and Mitigation Division, Koger Center – Rutgers Building, 3003 Chamblee Tucker Road, Atlanta, Georgia 30341.

9.0 BIBLIOGRAPHY AND REFERENCES

Georgia Emergency Management Agency, Georgia Disaster History. Retrieved April 16, 2009, from http://www.gema.ga.gov.

Hydrologic Engineering Center, HEC-RAS River Analysis System, Version 4.0.0, U.S. Army Corps of Engineers, Davis, California, March 2008.

National Geodetic Survey, VERTCON-North American Vertical Datum Conversion Utility. Retrieved April 3, 2009, from http://www.ngs.noaa.gov.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE	FIRM EFFECTIVE DATE	FIRM REVISION DATE
*Avera, City of	N/A	None	N/A	None
Bartow, City of	August 22, 1975	None	January 1, 1992	None
Jefferson County (Unincorporated Areas)	December 17, 2010	None	December 17, 2010	None
Keysville, Town of	December 17, 2010	None	December 17, 2010	None
Louisville, City of	August 15, 1975	None	January 1, 1992	None
Stapleton, City of	April 4, 1975	None	August 19, 1986	None
Wadley, City of	August 22, 1975	None	August 19, 1986	None
Wrens, City of	May 10, 1974	August 27, 1976	June 17, 1986	None

*No special flood hazard areas identified

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

JEFFERSON COUNTY, GA
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

Stamey, T.C. and G. W. Hess, Techniques for Estimating Magnitude and Frequency of Floods in Rural Basins of Georgia, Water Resources Investigation Report 93-4016, U.S. Geological Survey, 1993.

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GEORGIA FORESTRY COMMISSION

Community Wildfire Protection Plan

An Action Plan for Wildfire Mitigation and Conservation of Natural Resources

Jefferson County, Georgia

A Program of the Georgia Forestry Commission
with support from the U.S. Forest Service

JULY, 2017

SIGNATURE PAGE

_____ _____

Honorable Mitchell McGraw, Chairman Date
Board of County Commissioners
Jefferson County

_____ _____

Jim Anderson Date
EMA Director, Fire Chief
Jefferson County

_____ _____

Dave Beachy Date
District Fire Chief
Jefferson County Fire Department

_____ _____

Keith Boulineau Date
President
Jefferson County Fire Association

_____ _____

Shane Barrow Date
Chief Ranger/Forest Tech
Georgia Forestry Commission

Prepared by:

Shane Barrow, Glascock/Jefferson Chief Ranger / Forest Tech
Eric Mosley, Community Wildfire Protection Specialist
Beryl Budd, Wildfire Prevention Specialist (revised 2017)

Georgia Forestry Commission
2755 Mennonite Church Rd
Stapleton GA 30823

The following report is a collaborative effort among various entities; the representatives listed below comprise the core decision-making team responsible for this report and mutually agree on the plan's contents:

County Commission Chair, Jefferson County

Jefferson County Emergency Management Director

Jefferson County Fire Chief

Shane Barrow, Chief Ranger/Forest Tech
Glascock/Jefferson County Forestry Unit
Georgia Forestry Commission

Eric Mosley
Community Wildfire Protection Specialist
Georgia Forestry Commission

PLAN CONTENTS

Appended Documents:

Jefferson County Southern Wildfire Risk Assessment Summary (SWRA)

Jefferson County Wildfire Pre-suppression Plan

NFPA 1141 Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas.

I. OBJECTIVES

A Community Wildfire Protection Plan (CWPP) provides a community with a road map to reduce its risk from wildfire. A CWPP is designed through collaboration between state and local fire agencies, homeowners and landowners, and other interested parties such as city councils, utilities, homeowners associations, environmental organizations, and other local stakeholders. The plan identifies strategic sites and methods for risk reduction and structural protection projects across jurisdictional boundaries.

Comprehensive plans provide long-term guidance for growth, reflecting a community's values and future expectations. The plan implements the community's values and serves to protect natural and community resources and public safety. Planning also enables communities to address their development patterns in the Wildland Urban Interface and determine how they can reduce their risk through alternative development patterns. The formal legal standing of the plan and its central role in local government decision making underscores the opportunity to use this planning process as an effective means for reducing wildfire risk.

The mission of the following plan is to set clear priorities for the implementation of wildfire mitigation in Jefferson County. The plan includes prioritized recommendations for the appropriate types and methods of fuel reduction and structure ignitability reduction that will protect this community and its essential infrastructure. It also includes a plan for wildfire suppression. Specifically, the plan includes community-centered actions that will:

- Educate citizens on wildfire, its risks, and ways to protect lives and properties,
- Support fire rescue and suppression entities,
- Focus on collaborative decision-making and citizen participation,
- Develop and implement effective mitigation strategies, and
- Develop and implement effective community ordinances and codes.

II. COMMUNITY COLLABORATION

Wildfire risk reduction strategies are most effective when approached collaboratively – involving groups of residents, elected officials, community decision makers, emergency managers, and natural resource managers –and when combined with effective outreach approaches. Collaborative approaches make sense as the initial focus of any community attempting to work toward wildfire risk reduction. In all Community Wildfire Protection Plan collaborations, the goal is to cooperatively identify problems and reach a consensus for mutual action. In the case of wildfire mitigation, a reduction in the wildfire risk to the community's lives, houses, and property is the desired outcome.

The collaborative core team convened in early February 2011 to assess risks and develop the Community Wildfire Protection Plan. The group is comprised of representatives from local county government, local fire authorities, and the Georgia Forestry Commission.

Below are the groups included in the task force:

Jefferson County Government
County Fire Department
Emergency Management
Board of County Commissioners
Georgia Forestry Commission

It was decided to conduct community assessments on the basis of the high risk communities and the individual fire districts in the county. The Chief of the Jefferson County Fire Department and the representative of the local Georgia Forestry Commission office reconvened in late August and again in late October for the purpose of completing the following:

Risk Assessment	Assessed wildfire hazard risks and prioritized mitigation actions. The wildfire risk assessment will help homeowners, builders, developers, and emergency personnel whether the area needs attention and will help direct wildfire risk reduction practices to the areas at highest risk.
Fuels Reduction	Identified strategies for coordinating fuels treatment projects.
Structure Ignitability	Identified strategies for reducing the ignitability of structures within the Wildland interface.
Emergency Management	Forged relationships among local government and fire districts and developed/refined a pre-suppression plan.
Education and Outreach	Developed strategies for increasing citizen awareness and action and to conduct homeowner and community leader workshops. Outreach and education programs are designed to raise awareness and improve audience knowledge of wildfire risk reduction needs and practices. In the best cases, education and outreach programs will influence attitudes and opinions and result in effective action.

III. COUNTY BACKGROUND AND WILDFIRE HISTORY

County Background

Jefferson County, in east central Georgia southwest of Augusta, was established in 1796 on land formerly a part of Burke and Warren counties. It was named after U.S. president Thomas Jefferson, author of the Declaration of Independence and the first U.S. secretary of state.

Louisville, the county seat, was the third capital of Georgia. Unlike its predecessors, Savannah and Augusta, it was founded specifically as the permanent state capital, with the first planned capitol building, which was completed in 1796. In recognition of French support during the Revolutionary War (1775-83), Georgia legislators named the town for Louis XVI, king of France (who had been executed three years earlier). The original design of Louisville was based on the squares of Philadelphia, Pennsylvania.

Jefferson County Courthouse

During the brief period when Louisville was the state capital (1796-1806), the papers connected with the Yazoo land fraud were publicly burned and the Great Seal of Georgia was adopted (1799). According to the 1820 census the population of Jefferson County then included 3,932 free whites and 3,094 slaves. In 1807 Georgia government moved to its fourth capital, farther west in Baldwin County. The Jefferson County Courthouse (1904), a Neoclassical building designed by W. F. Denny, sits on the site of the original capitol.

By 1860 Jefferson County had 41 free blacks, 6,045 slaves, and 4,133 whites, of whom 431 were slaveholders. During the Civil War (1861-65), Louisville was a target on General William T. Sherman's march to the sea, and stores and houses on Broad Street were burned.

Jefferson County has maintained an agrarian base since its founding. In 1860 there were 475 farms. The 2002 U.S. Department of Agriculture Census showed 388 farms on a total of 137,217 acres across Jefferson County. Historically, cotton was the major cash crop. The Jefferson Energy Cooperative, based in Wrens, provides power for the area's farms, including cotton, wheat, timber, cattle, and dairy operations.

The author Erskine Caldwell (1903-87), though born in Coweta County, spent his young adult years in Jefferson County, where his father, a Presbyterian minister, was posted in the town of Wrens. Though he worked as a writer for the local newspaper, his job as a driver for a country doctor had greater impact. On house calls, he saw the squalid living conditions of early-twentieth-century sharecroppers and day laborers. His two most successful novels, *Tobacco Road* (1932) and *God's Little Acre* (1933), were inspired by his observations of the hard lives they led. *You Have Seen Their Faces* (1937), with the photographer Margaret Bourke-White (his second wife), also reflected his experiences during this time. As a journalist, he exposed in national magazine articles the mistreatment of tenant farmers in Jefferson and adjacent counties.

Other well-known residents of Jefferson County include two Georgia governors, William Schley and Howell Cobb, as well as Cobb's brother, jurist Thomas R. R. Cobb, who served as a general during the Civil War. Another Confederate general, Ambrose Wright, was born in Louisville and later became owner and editor of the *Augusta Chronicle*. Prominent twentieth-century state legislator Roy V. Harris also grew up in the county.

Wildfire History

Recent data show that a majority of the fastest growing areas in the U.S. are in wildfire-prone environments. It is not a surprise that some of these fastest growing areas are in Georgia. In the last decade of the 20th Century, Georgia's population increased substantially. Homeowners in Georgia must contend with natural hazards including wildfire, tornados, and flooding. This combination of factors – burgeoning population, abundant natural areas, development pressures, and lack of public awareness makes Georgia a perfect state for creating solutions to various hazards. Georgia is looked to throughout the southern region as a leader in comprehensive and hazard mitigation planning.

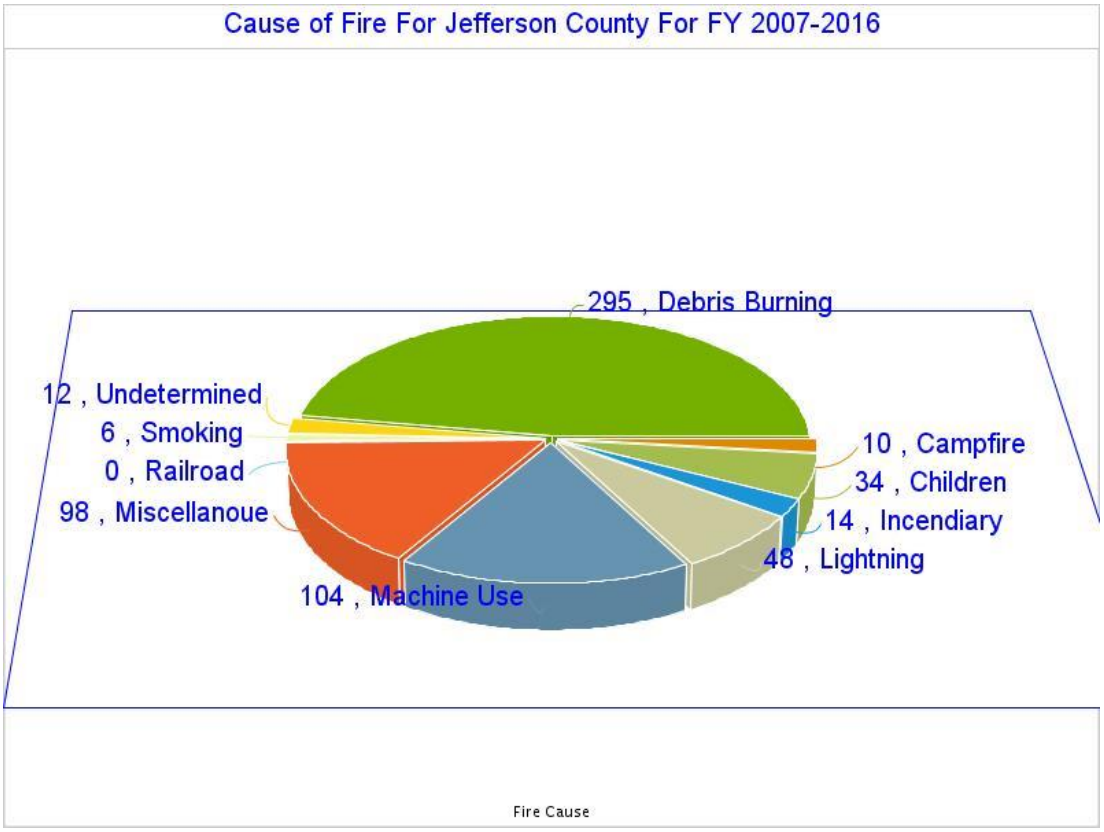
Many of Georgia's existing and new residents living in the urban interface are unaware of the vital role fire plays in our landscape and that their homes are extremely vulnerable to wildfire damage. Balancing development pressures with wildfire risk reduction and education creates a unique challenge for local governments, emergency managers, and wildfire management agencies such as the Georgia Forestry Commission.

Over the past ten years, Jefferson County has averaged 63 reported wildfires per year. The occurrence of these fires is fairly uniform throughout the year with a slight peak in the months of February and March and a slight decrease during the fall months. These fires have burned an average of 171 acres annually. While the numbers of fires remain fairly similar every month, there is a marked difference in the monthly acreage lost. The monthly acres lost during the late winter through summer period show a tenfold increase over the acres lost during the fall and early winter. Additionally while the annual numbers of fires have not increased noticeably during the 10 year period that records are available, the annual acreage lost appears to have decreased in later years. This perhaps a result of the increase in the practice of prescribed burning. The local Georgia Forestry Commission office needs to be commended for their valiant work increasing their very impressive prescribed burning regiment. The Glascock / Jefferson Unit lead their district in Central Georgia for burning. Despite their work, more homes are being built outside of traditional communities into the wildland urban interface. With this migration of people to the wildland urban interface the potential for a wildfire disaster continues to increase for Jefferson County.

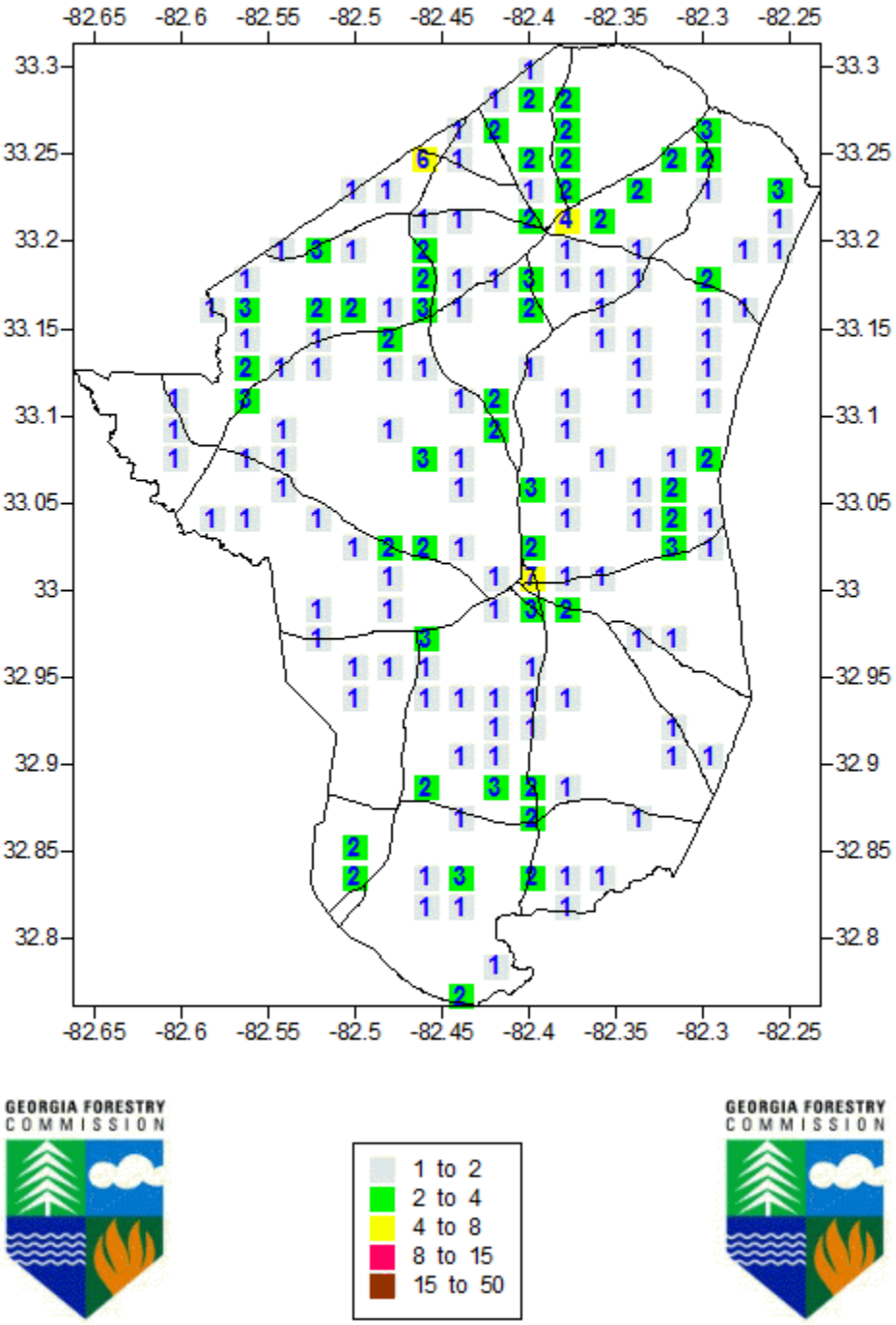
The leading cause of these fires in Jefferson County was careless Debris Burning, which accounted for 48% of the total. The second leading cause was Machine Use (17%) followed by a variety of miscellaneous causes (16%). Lightning started 8% of the wildfires during the 10 year period.

County = Jefferson	Cause	Fires		Acres	Fires 5 Yr Avg	Acres 5 Yr Avg
Campfire	Campfire	0		0.00	0.60	1.05
Children	Children	2		0.67	1.40	0.74
Debris: Ag Fields, Pastures, Orchards, Etc	Debris: Ag Fields, Pastures, Orchards, Etc	2		1.72	3.00	12.82
Debris: Construction Land Clearing	Debris: Construction Land Clearing	0		0.00	0.80	0.47
Debris: Escaped Prescribed Burn	Debris: Escaped Prescribed Burn	4		86.49	3.80	24.29
Debris: Household Garbage	Debris: Household Garbage	0		0.00	2.20	3.66
Debris: Other	Debris: Other	1		0.11	2.00	7.24
Debris: Residential, Leafpiles, Yard, Etc	Debris: Residential, Leafpiles, Yard, Etc	11		29.78	6.40	16.04
Debris: Site Prep - Forestry Related	Debris: Site Prep - Forestry Related	2		37.30	4.60	21.06
Incendiary	Incendiary	0		0.00	0.40	0.50
Lightning	Lightning	2		15.50	1.80	5.33
Machine Use	Machine Use	3		7.00	4.00	15.95
Miscellaneous: Cutting/Welding/Grinding	Miscellaneous: Cutting/Welding/Grinding	0		0.00	0.20	2.46
Miscellaneous: Firearms/Ammunition	Miscellaneous: Firearms/Ammunition	0		0.00	0.20	0.37
Miscellaneous: Other	Miscellaneous: Other	1		0.06	1.00	10.96
Miscellaneous: Power lines/Electric fences	Miscellaneous: Power lines/Electric fences	2		1.09	4.40	4.45
Miscellaneous: Structure/Vehicle Fires	Miscellaneous: Structure/Vehicle Fires	1		0.16	1.40	0.76
Miscellaneous: Woodstove Ashes	Miscellaneous: Woodstove Ashes	0		0.00	0.60	0.12
Railroad	Railroad	2		1.81	1.20	1.93
Undetermined	Undetermined	9		31.02	4.20	15.96
Totals for County: Jefferson Year: 2017		42		212.71	44.20	146.15

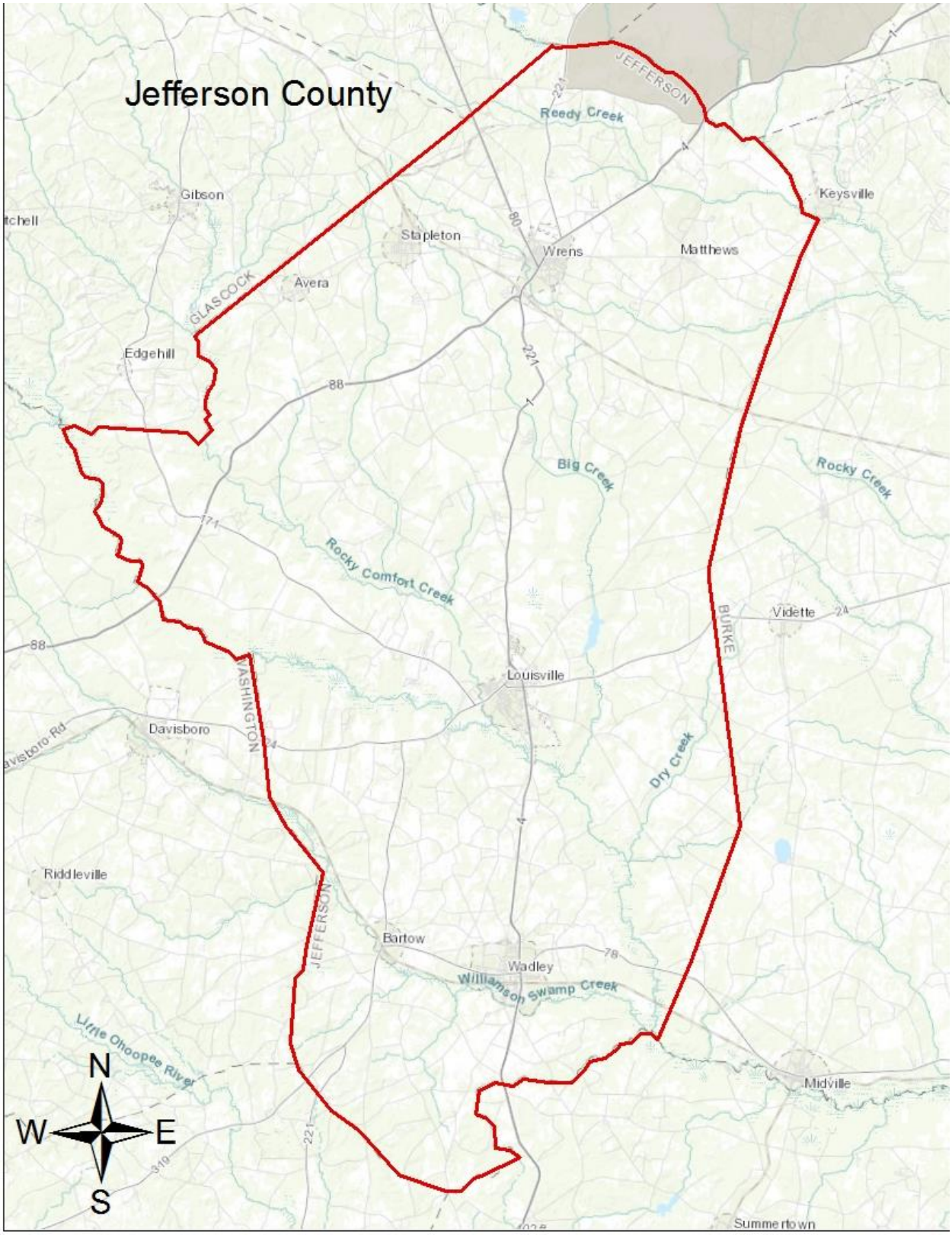
Acreage Burned /Number of Fires For Jefferson County For FY 2007-2016				
Year	**Acreage Burned**	**Number of Fires**	**Average Size**	**Statewide Average Size**
2007	247.84	90	2.75	18.64
2008	257.76	89	2.90	4.56
2009	203.61	58	3.51	3.90
2010	41.57	33	1.26	3.93
2011	311.99	111	2.81	17.56
2012	133.01	69	1.92	5.08
2013	122.10	48	2.54	4.53
2014	166.12	49	3.39	5.02
2015	192.35	50	3.85	4.42
2016	37.49	32	1.17	6.29

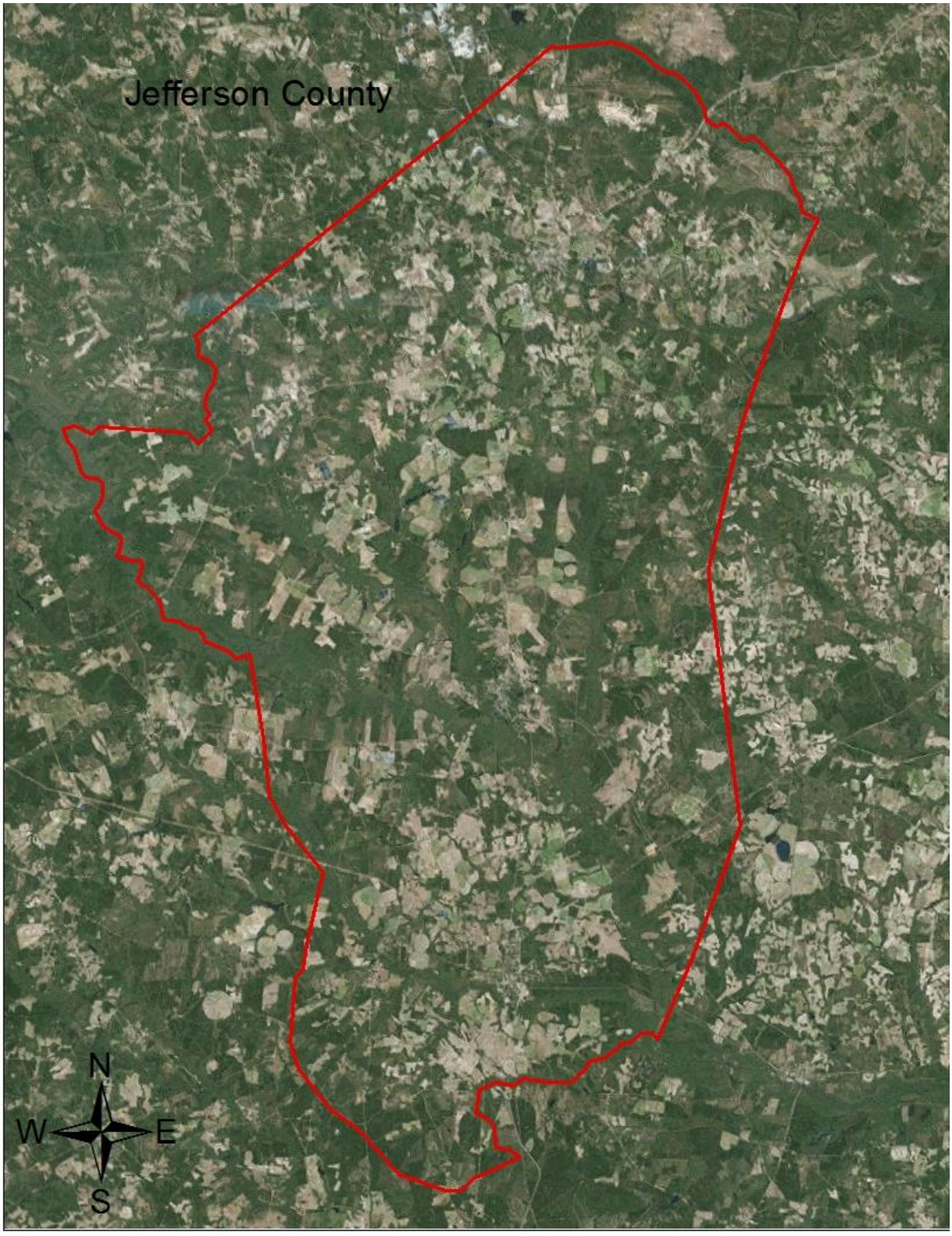


Fire Occurrence Map for Jefferson County for Fiscal Year 2012-2016



IV. COUNTY BASE MAPS

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Jefferson County
Gibson
Stapleton
Wrens
Matthews
Keysville
Avera
Edgehill
Louisville
Vidette
Davisboro
Riddleville
Bartow
Wadley
Midville
Steep Hollow Rd
Beall Springs Rd
Edgehill Mitchell Rd
Big Creek Rd
Clarke Mill Rd
Middleground Rd
Zebina Rd
Deans Bridge Rd
Heards Bridge Rd
Harrison Davisboro Rd
Magruder Rd
Kennedy Rd
Pinetucky Rd
Wadley Coleman Lake Rd
Old Savannah Rd
McGarrh Mill Pond Rd
New Home Church Rd
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V. COMMUNITY WILDFIRE RISK ASSESSMENT

The Wildland Urban Interface

There are many definitions of the Wildland-Urban Interface (WUI), however from a fire management perspective it is commonly defined as an area where structures and other human development meet or intermingles with undeveloped wildland or vegetative fuels. As fire is dependent on a certain set of conditions, the National Wildfire Coordinating Group has defined the wildland-urban interface as a set of conditions that exists in or near areas of wildland fuels, regardless of ownership. This set of conditions includes type of vegetation, building construction, accessibility, lot size, topography and other factors such as weather and humidity. When these conditions are present in certain combinations, they make some communities more vulnerable to wildfire damage than others. This "set of conditions" method is perhaps the best way to define wildland-urban interface areas when planning for wildfire prevention, mitigation, and protection activities.

There are three major categories of wildland-urban interface. Depending on the set of conditions present, any of these areas may be at risk from wildfire. A wildfire risk assessment can determine the level of risk.

1. "Boundary" wildland-urban interface is characterized by areas of development where homes, especially new subdivisions, press against public and private wildlands, such as private or commercial forest land or public forests or parks. This is the classic type of wildland-urban interface, with a clearly defined boundary between the suburban fringe and the rural countryside.

2. "Intermix" wildland-urban interface areas are places where improved property and/or structures are scattered and interspersed in wildland areas. These may be isolated rural homes or an area that is just beginning to go through the transition from rural to urban land use.

3. "Island" wildland-urban interface, also called occluded interface, are areas of wildland within predominately urban or suburban areas. As cities or subdivisions grow, islands of undeveloped land may remain, creating remnant forests. Sometimes these remnants exist as parks, or as land that cannot be developed due to site limitations, such as wetlands.

(courtesy *Fire Ecology and Wildfire Mitigation in Florida* 2004)

Wildland Urban Interface Hazards

Firefighters in the wildland urban interface may encounter hazards other than the fire itself, such as hazardous materials, utility lines and poor access.

- Hazardous Materials

    - Common chemicals used around the home may be a direct hazard to firefighters from flammability, explosion potential and/or vapors or off-gassing. Such chemicals include paint, varnish and other flammable liquids; fertilizer; pesticides; cleansers; aerosol cans, fireworks, batteries and ammunition. In addition, some common household products such as plastics may give off very toxic fumes when they burn. Stay OUT of the smoke from burning structures and any unknown sources such as trash piles.

- Illicit Activities

    - Marijuana plantations or drug production labs may be found in wildland urban interface areas. Extremely hazardous materials such as propane tanks and flammable/toxic chemicals may be encountered, as well as booby traps.

- Propane tanks

    - Both large (household size) and small (gas grill size) liquefied propane gas (LPG) tanks can present hazards to firefighters, including explosion. See the "LPG Tank Hazards" discussion for details.

- Utility lines

    - Utility lines may be located above and below ground and may be cut or damaged by tools or equipment. Don't spray water on utility lines or boxes.

- Septic tanks and fields

    - Below-ground structures may not be readily apparent and may not support the weight of engines or other apparatus.

- New construction materials

    - Many new construction materials have comparatively low melting points and may "off-gas" extremely hazardous vapors. Plastic decking materials that resemble wood are becoming more common and may begin softening and losing structural strength at 180° F, though they normally do not sustain combustion once direct flame is removed. However, if they continue to burn they exhibit the characteristics of flammable liquids.

- Pets and livestock

    - Pets and livestock may be left when residents evacuate and will likely be highly stressed, making them more inclined to bite and kick. Firefighters should not put themselves at risk to rescue pets or livestock.

- Evacuation occurring

    - Firefighters may be taking structural protection actions while evacuations of residents are occurring. Be very cautious of people driving erratically. Distraught residents may refuse to leave their property, and firefighters may need to disengage from fighting fire to contact law enforcement officers for assistance. In most jurisdictions firefighters do not have the authority to force evacuations. Firefighters should not put themselves at risk trying to protect someone who will not evacuate!

- Limited access

    - Narrow one-lane roads with no turn-around room, inadequate or poorly maintained bridges and culverts are frequently found in wildland urban interface areas. Access should be sized-up and an evacuation plan for all emergency personnel should be developed.

The wildland fire risk assessments conducted in 2011 by the Jefferson County Fire Department and the Georgia Forestry Commission returned an average score of 112, placing Jefferson County in the "very high risk" hazard range. The risk assessment instrument used to evaluate wildfire hazards to Jefferson County's WUI was the Hazard and Wildfire Risk Assessment Checklist. The instrument takes into consideration accessibility, vegetation (based on fuel models), roofing assembly, building construction, and availability of fire protection resources, placement of gas and electric utilities, and additional rating factors. The following factors contributed to the wildfire hazard score for Jefferson County:

- Dead end roads with inadequate turn arounds
- Narrow roads without drivable shoulders
- Long, narrow, and poorly labeled driveways
- Limited street signs and homes not clearly addressed
- Thick, highly flammable vegetation surrounding many homes
- Minimal defensible space around structures
- Homes with wooden siding and roofs with heavy accumulations of vegetative debris
- No pressurized or non-pressurized water systems available
- Above ground utilities
- Large, adjacent areas of forest or wildlands
- Heavy fuel buildups in adjacent wildlands
- Undeveloped lots comprising half the total lots in many rural communities
- High occurrence of wildfires in the several locations
- Distance from fire stations
- Lack of homeowner or community organizations

The Communities-at-Risk within Jefferson County that led to its **Very High Hazard (107)** risk rating are:

Community	Score	Hazard Rating
Ogeechee Heights	114	Very High
Taylor Lane	54	Moderate
Golf Drive	105	Very High
Berrien Branch	71	Moderate
Casson Creek Subdivision	120	Very High
Oak Hill Subdivision	101	Very High
Stellaville Community	128	Extreme
Mathews Community	105	Very High
Red McDonald Community	156	Extreme
Sitadey Oaks Community	147	Extreme
Gus Perdue Community	116	Very High
Country Club Circle	74	Moderate
Kelly Quarter	142	Extreme
Whitley Community	115	Very High
Deerwood Circle	110	Very High
Sylvan Grove	93	High
Brown Terrace	78	High
Jefferson County Average	107	Very High Hazard

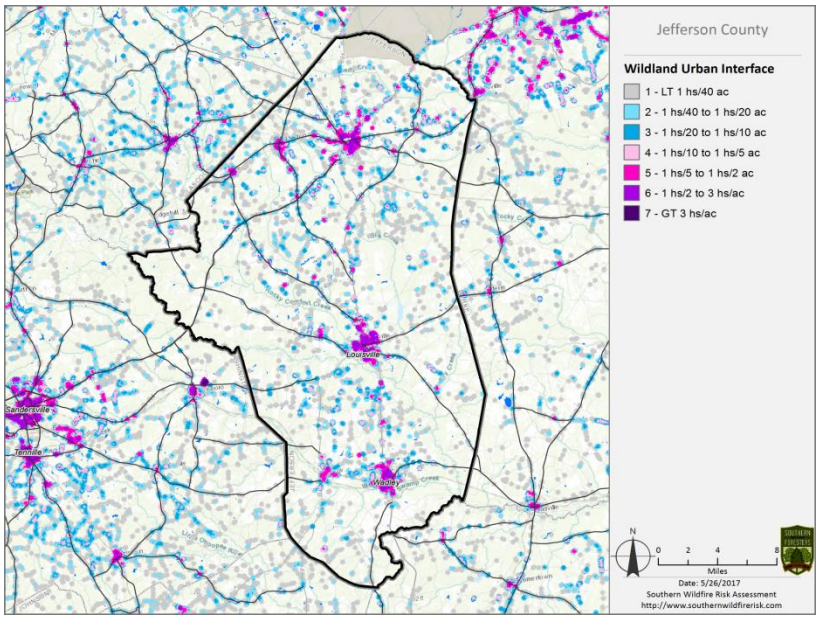
These hazard ratings were completed by the Georgia Forestry Commission's local office and Community Wildfire Protection Specialist during the month of October. The Georgia Forestry Commission Hazard and Wildfire Risk Assessment Score Sheets were used. This document evaluates communities (groups of homes) based upon six criteria: community access, surrounding vegetation, building construction, fire protection, utilities and additional rating factors. The cumulative wildfire hazard rating scores range from a low rating of 0 to 50 points to an extreme hazard rating with over 120 points. The cumulative wildfire hazard rating scores help establish priorities for mitigation activities in the CWPP Action Plan. Those various mitigation recommendations are provided below the action plan created for Jefferson County.

Prescribed burning of woodlands is the best management practice to reduce hazardous fuel accumulation. The Georgia Forestry Commission can provide a prescribed burning plan, establish fire breaks, and can also provide equipment standby and assist with burning when personnel are available.

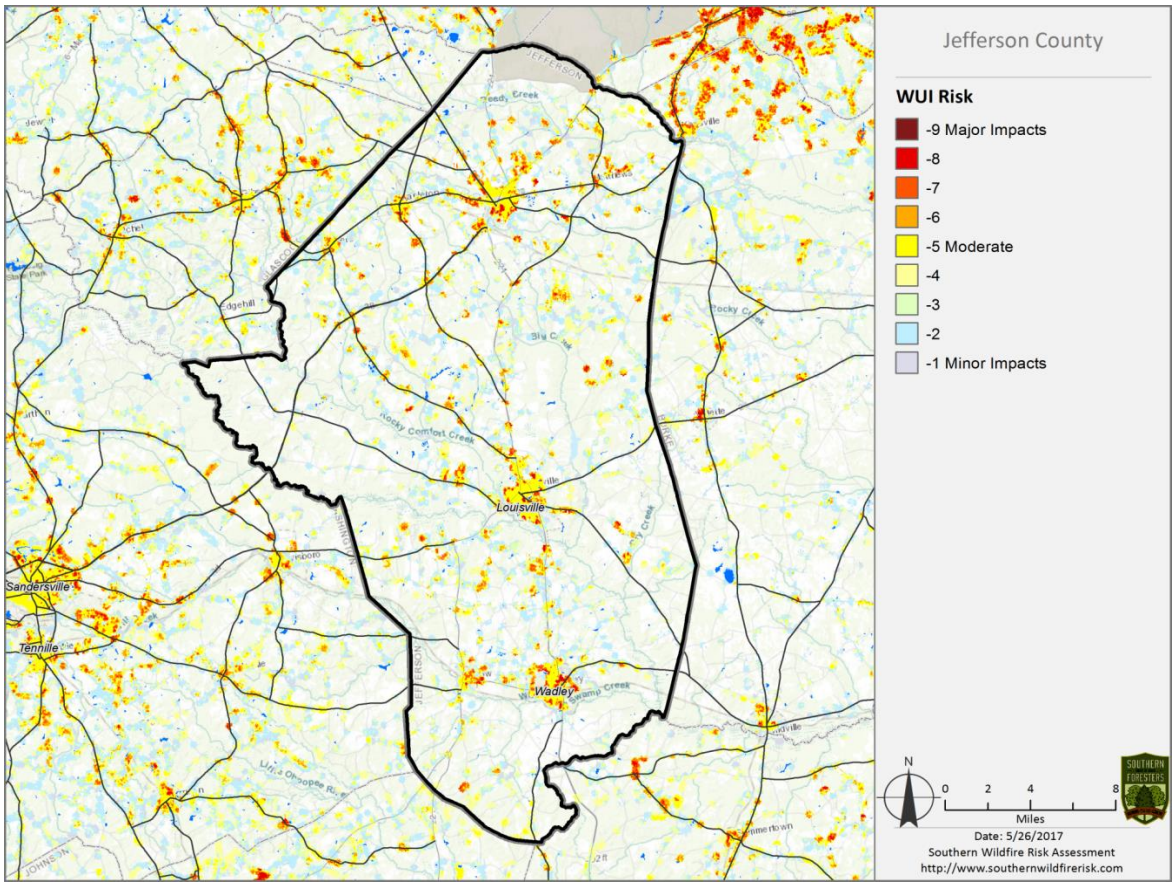
VI. SOUTHERN WILDFIRE RISK ASSESSMENT & HAZARD MAPS

The Southern Wildfire Risk Assessment tool, developed by the Southern Group of State Foresters, was released to the public in July 2014. This tool allows users of the Professional Viewer application of the Southern Wildfire Risk Assessment (SWRA) web Portal (SouthWRAP) to define a specific project area and summarize wildfire related information for this area. A detailed risk summary report is generated using a set of predefined map products developed by the Southern Wildfire Risk Assessment project which have been summarized explicitly for the user defined project area. A risk assessment summary was generated for Jefferson County. The SouthWRAP (SWRA) products included in this report are designed to provide the information needed to support the following key priorities:

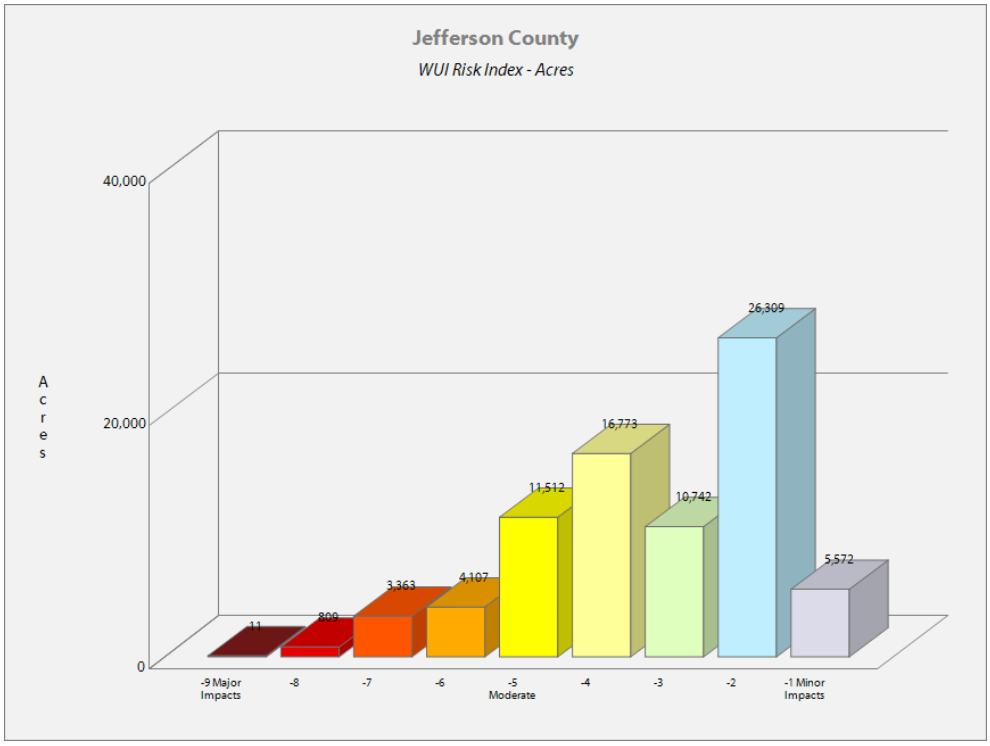
- Identify areas that are most prone to wildfire
- Identify areas that may require additional tactical planning, specifically related to mitigation projects and Community Wildfire Protection Planning
- Provide the information necessary to justify resource, budget and funding requests
- Allow agencies to work together to better define priorities and improve emergency response, particularly across jurisdictional boundaries
- Define wildland communities and identify the risk to those communities
- Increase communication and outreach with local residents and the public to create awareness and address community priorities and needs
- Plan for response and suppression resource needs
- Plan and prioritize hazardous fuel treatment programs

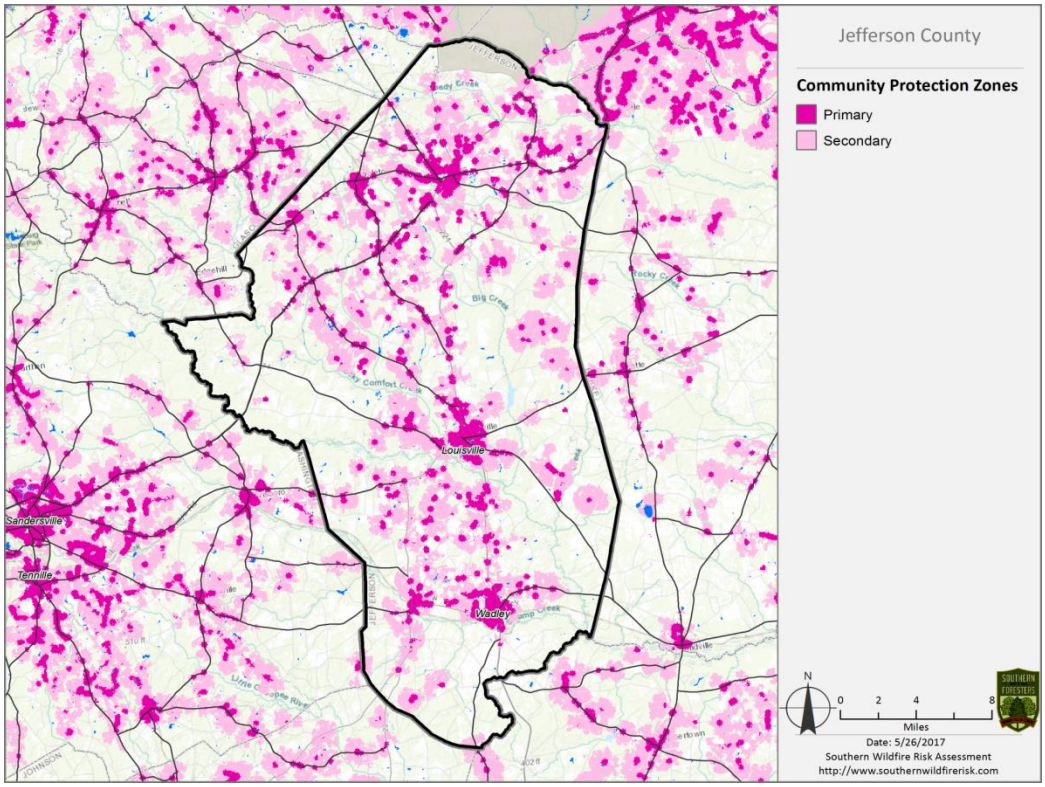


Wildland Urban Interface (WUI) map from the Jefferson County SWRA.

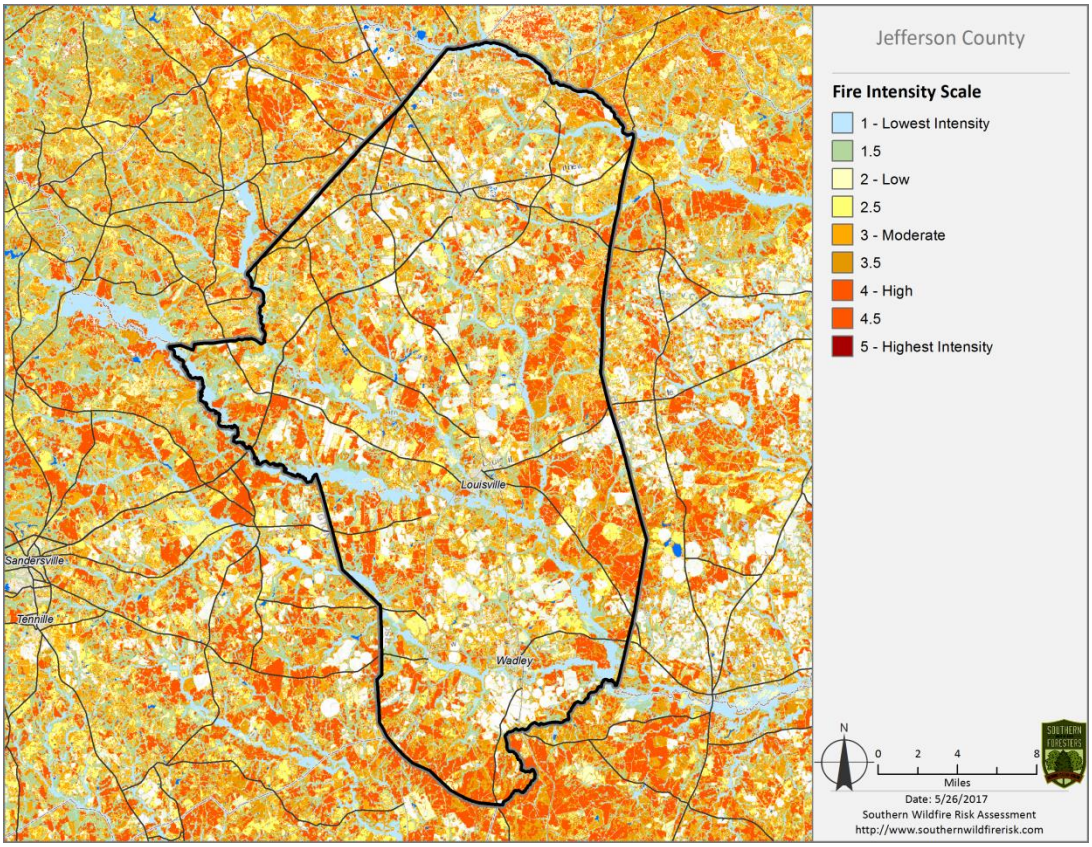


Wildland Urban Interface (WUI) Risk map (above) and WUI acres graph (below)





Community Protection Zone map (above) and Fire Intensity Scale map (below)



VII. PRIORITIZED MITIGATION RECOMMENDATIONS

Executive Summary

As Central Georgia continues to see increased growth from other areas seeking less crowded and warmer climates, new development will occur more frequently on forest and wildland areas. The County will have an opportunity to significantly influence the wildland fire safety of new developments. It is important that new development be planned and constructed to provide for public safety in the event of a wildland fire emergency.

Over the past 20 years, much has been learned about how and why homes burn during wildland fire emergencies. Perhaps most importantly, case histories and research have shown that even in the most severe circumstances, wildland fire disasters can be avoided. Homes can be designed, built and maintained to withstand a wildfire even in the absence of fire services on the scene. The national Firewise Communities program is a national awareness initiative to help people understand that they don't have to be victims in a wildfire emergency. The National Fire Protection Association has produced two standards for reference: NFPA 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire. 2008 Edition and NFPA 1141 Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas.

When new developments are built in the Wildland/Urban Interface, a number of public safety challenges may be created for the local fire services: (1) the water supply in the immediate areas may be inadequate for fire suppression; (2) if the Development is in an outlying area, there may be a longer response time for emergency services; (3) in a wildfire emergency, the access road(s) may need to simultaneously support evacuation of residents and the arrival of emergency vehicles; and (4) when wildland fire disasters strike, many structures may be involved simultaneously, quickly exceeding the capability of even the best equipped fire departments.

The following recommendations were developed by the Jefferson County CWPP Core team as a result of surveying and assessing fuels and structures and by conducting meetings and interviews with county and city officials. A priority order was determined based on which mitigation projects would best reduce the hazard of wildfire in the assessment area.

Proposed Community Hazard and Structural Ignitability Reduction Priorities

Primary Protection for Community and Its Essential Infrastructure		
Treatment Area	Treatment Types	Treatment Method(s)
1. All Structures	Create minimum of 30-feet of defensible space**	Trim shrubs and vines to 30 feet from structures, trim overhanging limbs, replace flammable plants near homes with less flammable varieties, remove vegetation around chimneys.

2. Applicable Structures	Reduce structural ignitability**	Clean flammable vegetative material from roofs and gutters, store firewood appropriately, install skirting around raised structures, store water hoses for ready access, and replace pine straw and mulch around plantings with less flammable landscaping materials.
3. Community Clean-up Day	Cutting, mowing, pruning**	Cut, prune, and mow vegetation in shared community spaces.
4. Driveway Access	Culvert installation	See that adequate lengths of culverts are installed to allow emergency vehicle access.
5. Road Access	Identify needed road improvements	As roads are upgraded, widen to minimum standards with at least 50 foot diameter cul de sacs or turn arounds.
Proposed Community Wildland Fuel Reduction Priorities		
Treatment Area	Treatment Types	Treatment Method(s)
1. Adjacent WUI Lands	Reduce hazardous fuels	Encourage prescribed burning for private landowners and industrial timberlands particularly adjacent to residential areas. County resolution to state recommending that the Ga Forestry Commission not charge for prescribed burning in WUI areas. Seek grant for WUI mitigation team.
2. Railroad Corridors	Reduce hazardous fuels	Encourage railroads to better maintain their ROW eliminating brush and grass through herbicide and mowing. Maintain firebreaks along ROW adjacent to residential areas.
3. Existing Fire Lines	Reduce hazardous fuels	Clean and re-harrow existing lines.

Proposed Improved Community Wildland Fire Response Priorities		
1. Water Sources	Dry Hydrants	Inspect, maintain and improve access to existing dry hydrants. Add signage along road to mark the hydrants. Locate additional dry hydrants as needed.
2. Fire Stations	Equipment	Wildland hand tools. Lightweight Wildland PPE Gear. Investigate need for "brush" trucks near communities at risk.
3. Water Sources	Drafting equipment	Investigate need for additional drafting pumps.
4. Personnel	Training	Obtain Wildland Fire Suppression training for fire personnel to include S130, S190, and S215.
**Actions to be taken by homeowners and community stakeholders		

Proposed Education and Outreach Priorities

1. Conduct "How to Have a Firewise Home" Workshop for County Residents
Set up and conduct a workshop for homeowners that teach the principles of making homes and properties safe from wildfire. Topics for discussion include defensible space, landscaping, building construction, etc. Workshop will be scheduled for evenings or weekends when most homeowners are available and advertised through local media outlets. Distribute materials promoting Firewise practices and planning through local community and governmental meetings.
2. Conduct "Firewise" Workshop for Community Leaders
Arrange for GFC Firewise Coordinator to work with local community leaders and governmental officials on the importance of "Firewise Planning" in developing ordinances and codes as the county as the need arises. Identified "communities-at-risk" including: Kelly Quarter, Mathews Community Stellaville, and Ogeechee Heights should be sought after for inclusion in the National Firewise Communities Program.

3. Spring Clean-up Event

Conduct clean-up event every spring involving the Georgia Forestry Commission, Jefferson County Fire Departments, Cities of Wrens, Louisville, Wadley and local residents of rural Jefferson County. National Wildfire Preparedness Day is held annually on the 1st Saturday in May, which is an excellent time to hold such an event. Set up information table with educational materials and refreshments. Initiate the event with a morning briefing by GFC Firewise coordinator and local fire officials detailing plans for the day and safety precautions. Activities to include the following:

- Clean flammable vegetative material from roofs and gutters
- Trim shrubs and vines to 30 feet away from structures
- Trim overhanging limbs and remove ladder fuels
- Clean hazardous or flammable debris from adjacent properties

4. Informational Packets

Develop and distribute informational packets to be distributed by realtors and insurance agents. Included in the packets are the following:

- Be Firewise Around Your Home
- Firewise Guide to Landscape and Construction
- Firewise Communities USA materials
- Fire Adapted Community
- Ready Set Go information

5. Wildfire Protection Display

Create and exhibit a display for the general public at the local events. Display can be independent or combined with the Georgia Forestry Commission display.

6. Press

Invite the local and regional news media to community "Firewise" functions for news coverage and regularly submit press releases documenting wildfire risk improvements in Jefferson County.

VIII. ACTION PLAN

Roles and Responsibilities

The following roles and responsibilities have been developed to implement the action plan:

Role	Responsibility
Hazardous Fuels and Structural Ignitability Reduction	
Jefferson County WUI Fire Council	Create this informal team or council comprised of residents, GFC officials, County Fire department officials, a representative from the city and county government and the EMA Director for Jefferson County. Meet periodically to review progress towards mitigation goals, appoint and delegate special activities, work with federal, state, and local officials to assess progress and develop future goals and action plans. Work with residents to implement projects and Firewise activities.
Key Messages to focus on	1 Defensible Space and Firewise Landscaping 2 Debris Burning Safety 3 Firewise information for homeowners 4 Prescribed burning benefits
Communications objectives	1 Create public awareness for fire danger and defensible space issues 2 Identify most significant human cause fire issues 3 Enlist public support to help prevent these causes 4 Encourage citizens to employ fire prevention and defensible spaces in their communities.
Target Audiences	1 Homeowners 2 Forest Landowners and users 3 Civic Groups 4 School Groups
Methods	1 News Releases 2 Personal Contacts 3 Key messages and prevention tips 4 Visuals such as signs, brochures and posters 5 Social media

Spring Clean-up Day	
Event Coordinator	Coordinate day's events and schedule, catering for cookout, guest attendance, and moderate activities the day of the day of the event.
Event Treasurer	Collect funds from residents to cover food, equipment rentals, and supplies.
Publicity Coordinator	Advertise event through neighborhood newsletter, letters to officials, and public service announcements (PSAs) for local media outlets. Publicize post-event through local paper and radio PSAs.
Work Supervisor	Develop volunteer labor force of community residents; develop labor/advisory force from Georgia Forestry Commission, Jefferson County Fire Departments, and Emergency Management Agency. Procure needed equipment and supplies. In cooperation with local city and county officials, develop safety protocol. Supervise work and monitor activities for safety the day of the event.

Funding Needs

The following funding is needed to implement the action plan:

Project	Estimated Cost	Potential Funding Source(s)
1. Create a minimum of 30 feet of defensible space around structures	Varies	Residents will supply labor and fund required work on their own properties.
2. Reduce structural ignitability by cleaning flammable vegetation from roofs and gutters; appropriately storing firewood, installing skirting around raised structures, storing water hoses for ready access, replacing pine needles and mulch around plantings with less flammable material.	Varies	Residents will supply labor and fund required work on their own properties.
3. Amend codes and ordinances to provide better driveway access, increased visibility of house numbers, properly stored firewood, minimum defensible space brush clearance, required Class A roofing materials and skirting around raised structures, planned maintenance of community lots.	No Cost	To be adopted by city and county government.
4. Spring Cleanup Day	Varies	Community Business Donations.
5. Fuel Reduction Activities	$15 / acre	FEMA & USFS Grants

Assessment Strategy

To accurately assess progress and effectiveness for the action plan, the Jefferson County WUI Fire Council will implement the following:

- Annual wildfire risk assessment will be conducted to re-assess wildfire hazards and prioritize needed actions.

- Mitigation efforts that are recurring (such as mowing, burning, and clearing of defensible space) will be incorporated into an annual renewal of the original action plan.

- Mitigation efforts that could not be funded in the requested year will be incorporated into the annual renewal of the original action plan.

- Continuing educational and outreach programs will be conducted and assessed for effectiveness. Workshops will be evaluated based on attendance and post surveys that are distributed by mail 1month and 6 months following workshop date.

- The Jefferson County WUI Council will publish an annual report detailing mitigation projects initiated and completed, progress for ongoing actions, funds received, funds spent, and in-kind services utilized. The report will include a "state of the community" section that critically evaluates mitigation progress and identifies areas for improvement. Recommendations will be incorporated into the annual renewal of the action plan.

- An annual survey will be distributed to residents soliciting information on individual mitigation efforts on their own property (e.g., defensible space). Responses will be tallied and reviewed at the next Jefferson County WUI Council meeting. Needed actions will be discussed and delegated.

This plan should become a working document that is shared by local, state, and federal agencies that will use it to accomplish common goals. An agreed-upon schedule for meeting to review accomplishments, solve problems, and plan for the future should extend beyond the scope of this plan. Without this follow up this plan will have limited value

lX. GRANT FUNDING & MITIGATION ASSISTANCE

Community Protection Grant: US Forest Service sponsored prescribed fire program. Communities with "at-risk" properties that lie within ten miles of a National Forest, National Park Service or Bureau of Land Management tracts may apply with the Georgia Forestry Commission to have their land prescribe burned free-of-charge. Forest mastication, where it is practical with Georgia Forestry Commission equipment, is also available under this grant program.

FEMA Mitigation Policy MRR-2-08-01: through GEMA – Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation Program (PDM).

1. To provide technical and financial assistance to local governments to assist in the implementation of long term, cost effective hazard mitigation accomplishments.

2. This policy addresses wildfire mitigation for the purpose of reducing the threat to all-risk structures through creating defensible space, structural protection through the application of ignition resistant construction and limited hazardous fuel reduction to protect life and property.

3. With a completed registered plan (addendum to the State Plan) counties can apply for pre-mitigation funding. They will also be eligible for HMGP funding if the county is declared under a wildfire disaster.

Georgia Forestry Commission: Plowing and prescribed burning assistance, as well as forest mastication, can be obtained from the GFC as a low-cost option for mitigation efforts.

The Georgia Forestry Commission Firewise Community Mitigation Assistance Grants – Nationally recognized Firewise Communities can receive up to $5000 grants to help address potential wildfire risk reduction projects. Grant submission can be made through local Georgia Forestry Commission offices or your Regional Wildfire Prevention Specialist.

The International Association of Fire Chiefs (IAFC) and American International Group, Inc. (AIG) offer grants to assist local fire departments in establishing or enhancing their community fuels mitigation programs while educating members of the community about community wildfire readiness and encouraging personal action.

X. GLOSSARY

Community-At-Risk – *A group of two or more structures whose proximity to forested or wildland areas places homes and residents at some degree of risk.*

Critical Facilities – *Buildings, structures or other parts of the community infrastructure that require special protection from an approaching wildfire.*

CWPP – *The Community Wildfire Protection Plan.*

Defensible Space – *The immediate landscaped area around a structure (usually a minimum of 30 ft.) kept "lean, clean and green" to prevent an approaching wildfire from igniting the structure.*

Dry Hydrant - *A non-pressurized pipe system permanently installed in existing lakes, ponds and streams that provides a suction supply of water to a fire department tank truck.*

FEMA – *The Federal Emergency Management Agency whose mission is to support our citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards.*

Fire Adapted Community – *A community fully prepared for its wildfire risk by taking actions to address safety, homes, neighborhoods, businesses and infrastructure, forest, parks, open spaces, and other community assets.*

Firewise Program – *A national initiative with a purpose to reduce structural losses from wildland fires.*

Firewise Community/USA – *A national recognition program for communities that take action to protect themselves from wildland fire. To qualify a community must have a wildfire risk assessment by the Georgia Forestry Commission, develop a mitigation action plan, have an annual firewise mitigation/education event, have dedicated firewise leadership, and complete the certification application.*

Fuels – *All combustible materials within the wildland/urban interface or intermix including, but not limited to, vegetation and structures.*

Fuel Modification – *Any manipulation or removal of fuels to reduce the likelihood of ignition or the resistance to fire control.*

Hazard & Wildfire Risk Assessment – *An evaluation to determine an area's (community's) potential to be impacted by an approaching wildland fire.*

Healthy Forests Initiative - *Launched in August 2002 by President Bush (following passage of the Healthy Forests Restoration Act by Congress) with the intent to reduce the risks severe wildfires pose to people, communities, and the environment.*

Home Ignition Zone (Structure Ignition Zone) - *Treatment area for wildfire protection. The "zone" includes the structure(s) and their immediate surroundings from 0-200 ft.*
Mitigation – An a*ction that moderates the severity of a fire hazard or risk.*

National Fire Plan – *National initiative, passed by Congress in the year 2000, following a landmark wildland fire season, with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future.*

National Fire Protection Association (NFPA) - *An international nonprofit organization established in 1896, whose mission is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education.*

National Wildfire Preparedness Day – *Started in 2014 by the National Fire Protection Association as a day for communities to work together to prepare for the fire season. It is held annually on the first Saturday in May.*

Prescribed Burning (prescribed fire) –*The use of planned fire that is deliberately set under specific fuel and weather condition to accomplish a variety of management objectives and is under control until it burns out or is extinguished.*

Ready, Set, Go - *A program fire services use to help homeowners understand wildfire preparedness, awareness, and planning procedures for evacuation.*

Southern Group of State Foresters – *Organization whose members are the agency heads of the forestry agencies of the 13 southern states, Puerto Rico and the Virgin Islands.*

Stakeholders– *Individuals, groups, organizations, businesses or others who have an interest in wildland fire protection and may wish to review and/or contribute to the CWPP content.*

Wildfire or Wildland Fire – *An unplanned and uncontrolled fire spreading through vegetative fuels.*

Wildland/Urban Interface - *The presence of structures in locations in which the authority having jurisdiction (AHJ) determines that topographical features, vegetation, fuel types, local weather conditions and prevailing winds result in the potential for ignition of the structures within the area from flames and firebrands from a wildland fire* (NFPA 1144, 2008 edition.

XI. SOURCES OF INFORMATION

Publications/Brochures/Websites:

- FIREWISE materials can be ordered at www.firewise.org
- Georgia Forestry Commission www.georgiafirewise.org
- Examples of successful wildfire mitigation programs can be viewed at the website for National Database of State and Local wildfire Hazard Mitigation Programs sponsored by the U.S. Forest Service and the Southern Group of State Foresters www.wildfireprograms.com
- Information about a variety of interface issues (including wildfire) can be found at the USFS website for Interface South: www.interfacesouth.org
- Information on codes and standards for emergency services including wildfire can be found at www.nfpa.org
- Information on FEMA Assistance to Firefighters Grants (AFG) can be found at www.firegrantsupport.com
- Information on National Fire Plan grants can be found at http://www.federalgrantswire.com/national-fire-plan--rural-fire-assistance.html
- Southern Wildfire Risk Assessment website SouthWRAP www.SouthernWildfireRisk.com
- Fire Adapted Communities www.fireadapted.org
- Ready, Set, Go www.wildlandfirersg.org
- National Wildfire Preparedness Day www.wildfireprepday.org

Appended Documents:

Jefferson County Southern Wildfire Risk Assessment Summary Report (SWRA)

All files that make up this plan are available in an electronic format from the Georgia Forestry Commission.

GEORGIA FORESTRY COMMISSION

Georgia Forestry Commission
5645 Riggins Mill Rd.
Dry Branch, GA 31020

800-GA-TREES
GaTrees.org

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TIMBER IMPACT ASSESSMENT

Georgia Ice Storm, February 11-13, 2014

By: James Johnson, Chip Bates & Gary White, Georgia Forestry Commission
(jjohnson@gfc.state.ga.us; cbates@gfc.state.ga.us ; gwhite@gfc.state.ga.us)

BACKGROUND

A winter storm impacted multiple southern states and more than 90 Georgia counties experienced some form of winter precipitation, beginning February 11th and lasting through the 13th. Northern tier counties recorded snowfalls of up to 13" (Rabun County), and although some timber / tree impacts occurred in this "snow zone," they were not widespread or considered severe.

During the storm, ice accumulation was measured from between a tenth of an inch and one inch (or possibly higher) in a zone from roughly north metro Atlanta to Augusta in northern Georgia, and from Macon to Sylvania in central Georgia. Because ice is much heavier than snow, widespread tree damage occurred, resulting in power disruption to nearly a million customers.

Governor Deal declared a state of emergency on Monday, February 10th, and a presidential declaration of emergency was issued as the storm hit the state. The map below depicts this zone (*Figure 1*).

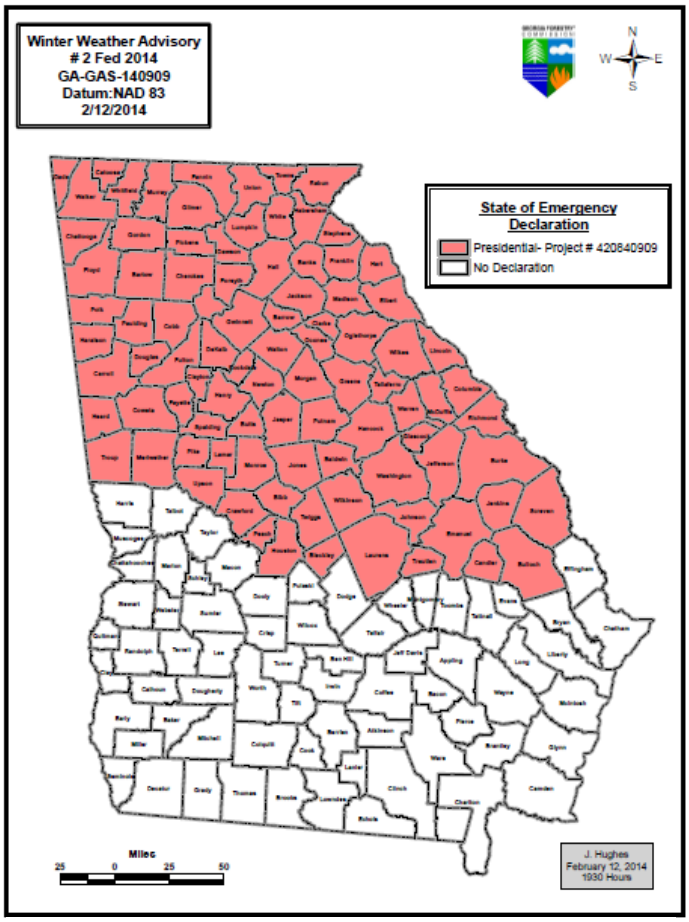


Figure 1: Counties included in the presidential declaration zone

The National Weather Service provided estimates of ice accumulations, and this information, coupled with field observation reports, helped define the area surveyed by the Georgia Forestry Commission for timber impact accounts. Small amounts of ice are known to affect trees, and higher amounts (especially exceeding three-fourths of an inch) can cause serious damage to certain timber types and age classes.

Another factor that affects tree damage is wind. Once ice accumulations peaked, a cold front moved through the state. Although wind speed varied, some areas reported winds of up to 35mph. Even minor winds during ice-loading can break or uproot trees. These occurrences were a major factor in the timber / tree damage associated with this storm, and may account for some of the variability detected.

OBSERVATIONS

A team of Georgia Forestry Commission foresters surveyed the zone believed to have endured the greatest impacts to our forests, and developed the map below. Please note that damage was observed beyond these counties, but it tended to be less intense than those shown by the map's shaded areas. Some of the highlighted counties had tremendous variations in the amount of damage observed. In addition, timber damage evaluation surveys were separated into rough categories of damage (at the county level), isolated timber stands within counties in the two lesser categories may have severe damage, and stands in the severe counties may only have minor damage. The variability of damage to similar stands even a few miles apart was extreme, so mangers should carefully evaluate timber throughout this broad region.

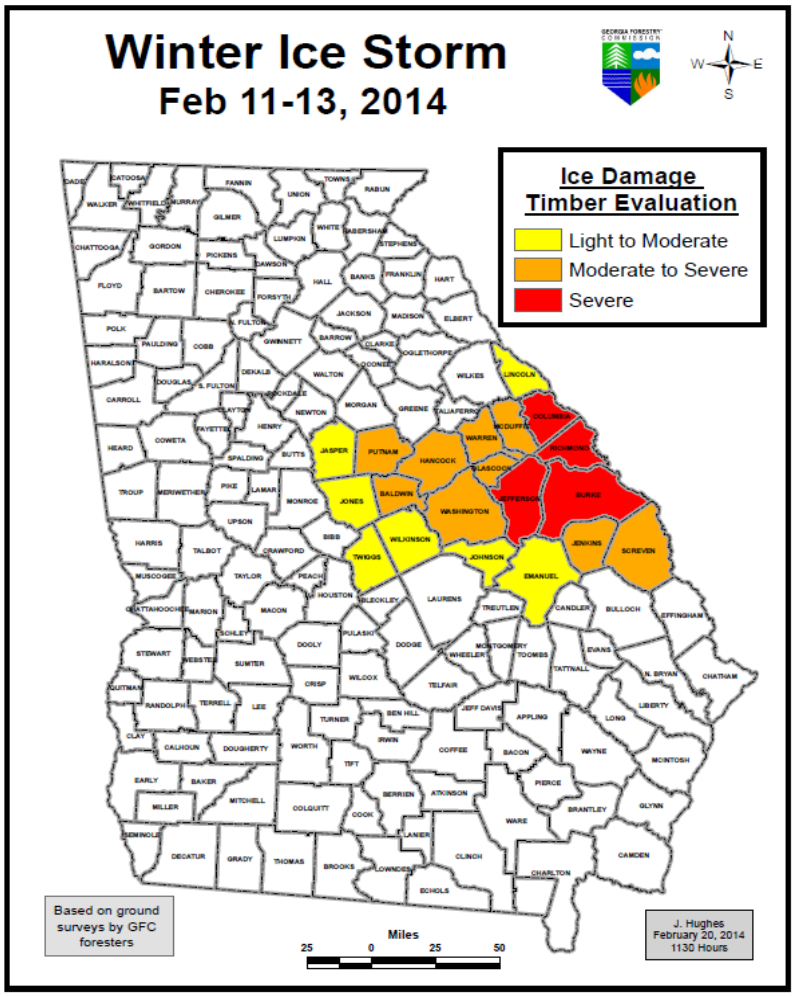


Figure 2: Counties with widespread Ice Damage

This survey examined landscape-level impacts and classifies them accordingly.

The categories of damage are based upon field observations about:

- Occurrence (frequency) of damage within a county.
- Levels of damage within two types of pine that were most frequently damaged (young pine stands, and pine stands on which a first-thinning had recently occurred.)

Ice Damage Intensity:

Light to moderate damage – Only branches and limbs broken from the tree, with minor damage to the overall stand and trees bent less than 45 degrees. No salvage operation will be necessary and the stand should recover with no additional management requirements, though long term yields will likely be impacted.

Moderate to severe damage – Branches and limbs broken from the trees with damage to the overall stand. More than 25% of stems broken and a salvage operation should be considered to minimize losses and remove trees that likely will not survive.

Severe damage – More than 30% of stems broken, tops broken out across the stand, limbs stripped, and trees bent more than 45 degrees. A salvage operation must be considered and a clearcut may be the prudent management decision.

Ice damage was not detected on most timber types but was concentrated on two types of pine: recently thinned pine stands, and younger stands less than 25 feet in height.

Recently thinned pine stands: These are primarily pine plantations that were thinned for the *first time* within the past several years. Trees adjust to the amount of space and competition within a stand, and those that have been thinned for the first time are adjusting to reduced protection from neighboring trees and are growing in diameter, which strengthens the main stem. They also respond by accelerating root growth which helps anchor the tree and aids in the increased moisture uptake needed to support larger live crowns. Depending on residual stand-density after thinning, it takes trees about five years to fully respond to the increased growing space. In the meantime, they are more prone to wind (and ice) damage.

These stands were particularly hard hit, which is unfortunate for landowners who have invested 15 to 20-plus years of growth getting their trees to this size. First-thinnings typically remove lower value wood (such as pulpwood / fuel wood), with the objective of allowing the residual stand to produce higher value products (such as sawtimber, plywood, and poles). From an investment standpoint, timber growth following a first thinning maximizes profits, so salvaging an ice-damaged stand is a devastating blow to expected returns.

Photo (left) – Twenty-one year old loblolly stand in Burke County; suffered over 30% stem breakage.

Thinning likely occurred two years ago.

Photo (right) – Nineteen year old loblolly stand in Jefferson County; suffered almost 50% stem breakage.

Thinning occurred within the past year.

Numerous older pine stands that had been thinned twice (or more) were also examined. Although some had damage, most would be considered minor, with many not requiring a salvage operation. The damage in these stands tended to be uprooted trees rather than stem breakage. This type of wind throw (tree that is completely uprooted) in older stands seemed prevalent throughout the region.

Landowners and managers of storm-damaged stands are highly encouraged to read and understand the implications of ice on different types of stands. Web links which provide detailed guidance are provided on the last page of this document.

Young pine stands: Pine plantations (of most species) that were 25 feet and taller - and *had never been thinned* - seemed to weather this ice storm well. The ability of dense stands to provide tree-to-tree support and prevent winds from uprooting individual trees was a big factor in these stands' withstanding minimal damage. Younger (and shorter) stands, however, didn't fare as well. One of the critical factors seemed to be that the trees still had many live branches almost to ground level, which likely accumulated so much ice that breaking points were reached for limbs and main stems.

Young stands of about six feet in height also seemed to fair well. Some of these have many bent stems (with some breakage), but young trees tend to correct this problem.

Some younger loblolly stands were damaged (especially in the counties noted as "Severe" on the map on page 2), but more damage occurred on longleaf and slash pine. Longleaf stands suffered the worst damage with stem and limb breakage but no stands seen were completely leveled. The resiliency of nature can be surprising, and the fate of these stands will become evident over the next few years. When tops break out, a lateral branch will assume dominance and there will be variation in long-term stem straightness.

Careful examination will be needed to determine the amount of permanent problems this storm has inflicted on each stand. Re-evaluation after the next growing season should give managers a better perspective on what lies ahead.

Photo (Left) – Five year old slash pine stand in Burke County showing many bent and leaning trees, with some breakage. Note the many leaning trees with limb breakage.

Photo (Right) – Nine year old longleaf pine stand in Burke County showing top and limb breakage. Note the many tops broken and some limb breakage.

EXTENT OF DAMAGE

GFC foresters evaluated the counties noted on the previous map and developed estimates of damage based upon a combination of this field work combined with a geospatial analysis of this region. These estimates do not include areas outside this zone, nor do they include hardwood, which was also impacted. Most hardwood damage consisted of limb and top breakage with most trees retaining enough live branches to support survival. Damage can be expected in the growth form of these trees and possibly in sluggish growth rates.

For pine type timber, an estimated 70,000+ acres were impacted, valued in excess of $65 million. The majority of these acres (61,000+) were in the recently thinned pine category. This estimate doesn't include damage outside of the zone shown on the map (page 2), and it does not account for hardwood damage acreages or values, so it should be considered conservative. Some of the merchantable pine will likely be salvaged, which could reduce the damage estimate somewhat. However, the values used were based upon landowners intending to grow these stands for at least 30 years, with the growing objective of solid wood products (sawtimber, plywood, and poles). So even if salvage occurs, part of the "loss" is in the future growth of these higher value products.

RECOMMENDATIONS

With the wide range of damage inflicted by this ice storm, there will likely be three distinct categories by which landowners make their evaluations:

1) Light damage or losses that may not warrant a salvage operation. This could include merchantable stands (trees are large enough to sell), which simply don't have enough timber damage to warrant a commercial harvest, or pre-merchantable stands where there is a good chance they will recover over time.

2) Stands with significant damage, mandating a salvage operation to recoup whatever value can be obtained from the stand. This might include a complete harvest for widespread damage, or a partial harvest of damaged timber to provide a commercial harvest.

3) Situations falling between the two scenarios above, in which a good bit of the timber is damaged but there might be enough timber to leave growing. In these cases, landowners are encouraged to use the services of a professional forester to help make the best decision for the situation. Immediately following a storm, it is difficult for landowners to accurately gauge how well a stand may recover, or to measure the amount of timber that could be allowed to remain for future growth and income.

For landowners facing a complete harvest to salvage their damaged timber, please consider reforesting the area. The Farm Service Agency has a cost share program that can assist with site preparation and planting costs called the Emergency Forest Restoration Program (EFRP). Apply at your local office.

Special thanks to other GFC foresters who helped develop this information:
Jeff Kastle, Chris Thompson, Chris Howell, Chris Barnes, Jeremy Hughes and Charles Bailey

URBAN TREE ASSESSMENTS

Georgia Forestry Commission certified arborist/foresters surveyed damage and storm-generated tree debris left to be removed from urban and rural communities. Survey results showed counties that experienced the most damage to their rural stands also suffered the most damage to their urban trees. The highest amount of damage, as one might expect, was found in Burke County.

Neighborhoods with large pine trees experienced the most loss, with the bulk of damage to branches and tree tops which were broken by the weight of ice. Additionally, "leaf on" trees, such as magnolia and cherry laurel, and old water oaks with structural issues, made up a large component of community forest tree failure. Crews observed very few trees that were completely destroyed or uprooted by the storm.

Much debris remains to be cut and stacked by homeowners and tree care companies before its removal from community rights-of-way can begin. Many trees that have lost more than 50% of their limbs, and trees that have been uprooted or split so that heartwood of the main trunk is evident, will need to be removed. Otherwise, impacted trees will require pruning, with particular attention being paid to higher risk trees with “hangers” (limbs broken, but not yet detached) and split limbs (see photo below). This will likely increase beyond initial assessments the total biomass that will eventually be collected.

Although the tree at left suffered minor ice damage, notice the branches that are broken and still hanging in the tree. These could impact the structure, the vehicle or humans. These “hangers” should be removed.

The pine tree at right lost half of the living portion of its crown and pruning is needed to remove branch stubs.

Special thanks to GFC foresters who helped with field work: Gary White, Joe Burgess, Joan Scales, Mark McClellan, Jeremy Hughes, Keith Murphy, Chris Howell and also Mark Millirons.

These resources can help forest landowners learn more about options and considerations for situations in which trees have been damaged by winter weather:

TIMBERLAND WIND / ICE DAMAGE:

How to Evaluate and Manage Storm-Damaged Forest Areas:
http://www.fs.fed.us/r8/foresthealth/pubs/storm_damage/contents.html

Evaluating wind / ice damage stands:
http://www.forestry.uga.edu/outreach/pubs/pdf/forestry/assessing_tornado_damaged_forest_stands5-30-08_1.pdf

Wind Wood Utilization (this has numerous documents and links that are beneficial):
http://www.windwoodutilization.org/salvage.asp

URBAN AND HAZARD TREE SAFETY:

http://www.gatrees.org/community-forests/management/trees-storm-safety/

Excellent site for Storm Damage…with an Urban Forestry angle:
http://hort.ifas.ufl.edu/treesandhurricanes/

TAXES:

National Timber Tax website (Master Index has good list of subject areas):
http://www.timbertax.org/

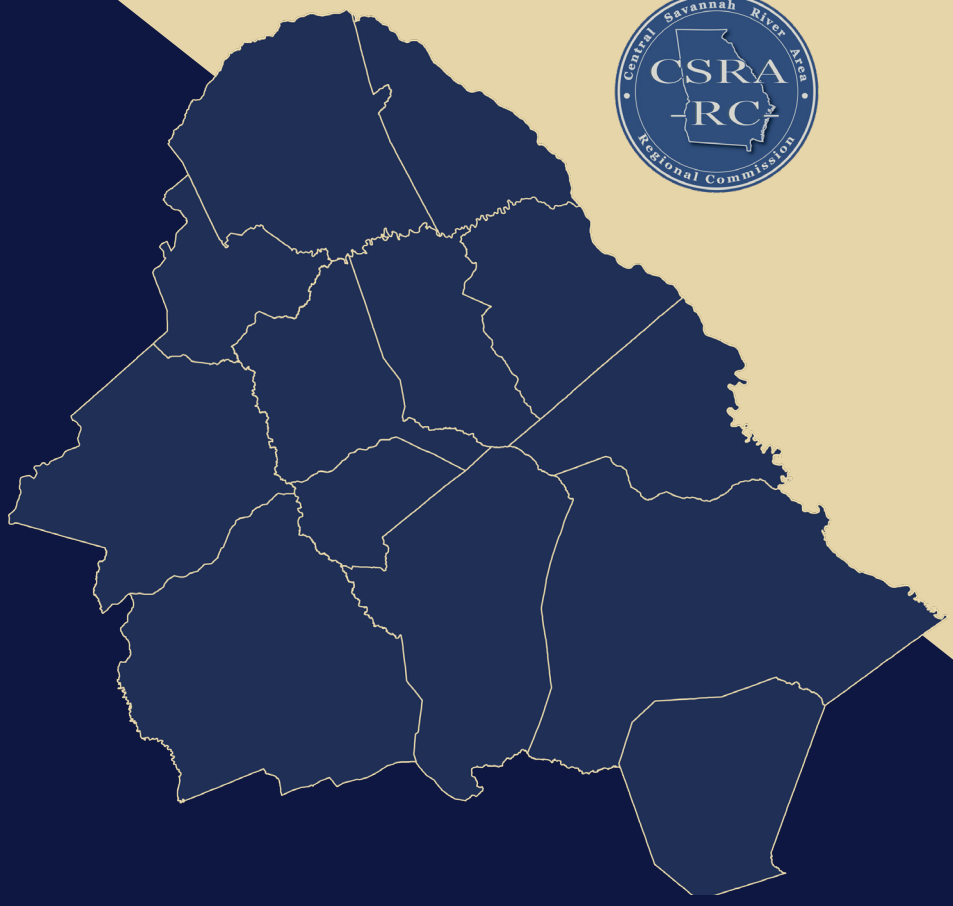
TIMBER SALES:

General information:
http://www.gatrees.org/forest-management/private-forest-management/timber-selling/

Landowners are encouraged to utilize professional foresters and arborists to help with decisions about timber management or potentially hazardous trees around homes and urban environments. Seeking independent advice is a sound way to reduce hasty judgments and insure all available options are considered.

CSRA

Regional Plan 2040



OUR COUNTIES

BURKE
COLUMBIA
GLASCOCK
HANCOCK
JEFFERSON
JENKINS
LINCOLN
MCDUFFIE
AUGUSTA-RICHMOND
TALIAFERRO
WARREN
WASHINGTON
WILKES

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CSRA

Regional Plan

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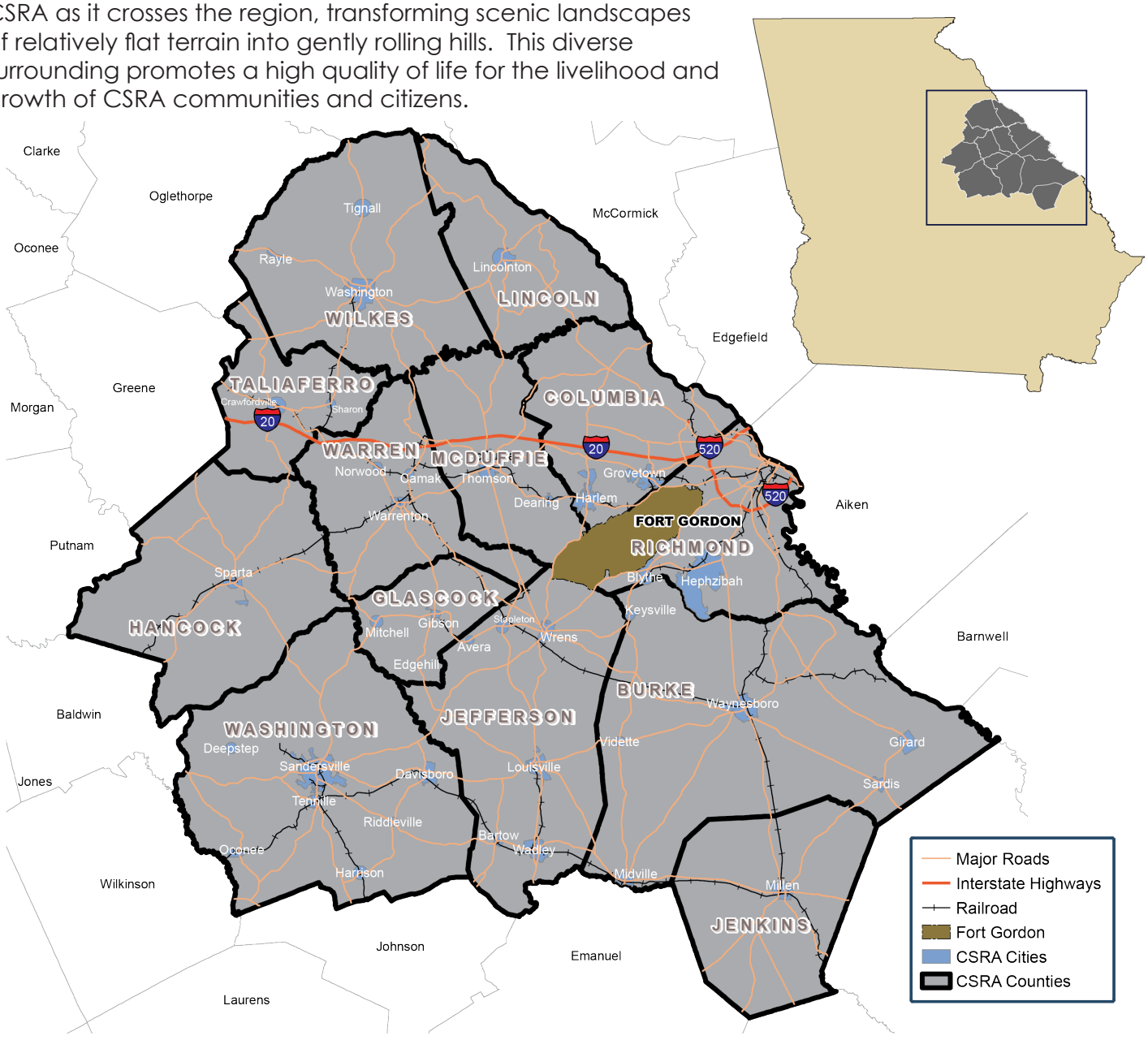
This document was prepared in 2018 and 2019.

EXECUTIVE SUMMARY

CSRA REGIONAL PLAN

Regional Overview

The Central Savannah River Area (CSRA) is bordered on the eastern side by the Savannah River and anchored by the city of Augusta at the heart of east-central Georgia. The Savannah River provides recreation and tourism for the CSRA border counties. Five counties in Georgia and two in South Carolina form a metropolitan cluster and regional core that leads out to the surrounding rural areas of the region. To the north, west, and south of the urban core, the rural CSRA is occupied by a lush agricultural belt where food and service crops are produced in the rich soil and livestock are nurtured for sale at market. The fall line of the ancient seashore helps define the geography of the CSRA as it crosses the region, transforming scenic landscapes of relatively flat terrain into gently rolling hills. This diverse surrounding promotes a high quality of life for the livelihood and growth of CSRA communities and citizens.



The CSRA region encompasses an area of nearly 6,500 square miles, with 465,126 residents according to the U.S. Census Bureau's 2015 American Community Survey. Located in east-central Georgia along the Savannah River, the CSRA region includes 13 counties: Burke, Columbia, Glascock, Hancock, Jefferson, Jenkins, Lincoln, McDuffie, Richmond, Taliaferro, Warren, Washington, and Wilkes. The largest city in the CSRA is Augusta – a major component of the economic core of the region. The Augusta-Richmond County, GA-SC Metropolitan Statistical Area (MSA) includes Richmond, Columbia, Burke, Lincoln and McDuffie counties in Georgia and Aiken and Edgefield counties in South Carolina.

This region represents both urban and rural interests - with two urban counties holding over 300,000 residents combined, and the balance of the region's counties containing anywhere from just over 1,700 residents to about 24,000. Augusta-Richmond and Columbia counties were the nexus of over 90 percent of regional population growth (81,745 residents) between 1990 and 2015. As urban areas have grown, some rural areas have experienced decline. These shifts in population affect the overall resident quality of life, including availability of basic services like high-speed internet and health care, affordable housing, and daily work commutes. The state of Georgia's recently adopted Achieving Connectivity Everywhere (ACE) Act will require all communities to think outside the box and plan for broadband (aka highspeed internet) deployment throughout their jurisdictions. Improving broadband access for the region will help our healthcare, public safety and educational institutions provide better service, enable individual connectivity, and greatly improve the accessibility of commerce to other parts of the state and nation.

One emerging regional development factor is the planned growth at Fort Gordon, slated to bring several thousand soldiers and associated contractors to the region over the next several years through the U.S. Army Cyber Center of Excellence. This growth will directly affect the counties adjacent to Fort Gordon and will likely have extended effects across the region as these new residents search for housing, recreation, and retail opportunities and require local public services. To address impacts of land use and encroachment on Fort missions, McDuffie, Augusta-Richmond, Columbia, Burke and Jefferson Counties are participating in a Joint Land Use Study (JLUS). Some recommendations from the forthcoming final JLUS report are included in this document as implementation activities.

While Fort Gordon has a measurable impact on the regional economy, it is not the only player. Another major growth industry for this region is energy. This includes is Plant Vogtle, a nuclear power plant that is expanding with the construction of two core reactors. This multi-billion dollar construction project has affected favorably the economy of several neighboring counties and created a need for housing, community facilities, land use controls, transportation improvements, and intergovernmental cooperation.

Another major sector in the region is healthcare. Indeed, this region boasts 10 hospitals and an expanding network of prompt care centers. The Medical College of Georgia at Augusta University is also located in this region; health professionals are trained here to be care providers at all levels, from doctors to certified nursing and occupational health assistants. In this region, some larger, urban hospitals have increased capacity; while some rural hospitals have closed or are struggling.

The CSRA contains a wealth of natural, cultural and environmental resources that provide the region with numerous social, economic, and environmental benefits. The rural portions of the region have some of the most beautiful and interesting natural and cultural resources. These less densely populated small towns, counties, and agricultural areas can both promote and protect critical resources and sectors like farming through agritourism and heritage tourism. This may enable them to achieve a higher quality of life through an expanded economy and increased public access to resources. With that said, whether urban or rural, our natural and cultural resources are in need of protection if we want to continue reaping their benefits. For example, the region's watersheds will need to be monitored to ensure future development does not render them vulnerable. Additionally, many of the nearly 200 federal and state designated historic districts and sites lack preservation plans or protection ordinances, and this can be remedied.

Although the urban and rural areas sometimes choose to address challenges differently, many basic community needs are the same, and cities and counties must work together to find common solutions. One of the biggest successes for the region's transportation planning and intergovernmental coordination was the passage of the Transportation Investment Act (TIA) in 2012. This approved a 10-year, one percent (1%) sales tax to fund regional and local transportation improvements such as replacing bridges, widening roads and adding sidewalks. This funding significantly enhances the CSRA region's transportation network and creates jobs for contractors, surveyors, and an ever expanding workforce.

CSRA Regional Commission Responsibilities

The CSRA Regional Commission (CSRA RC) is based in Augusta, GA and serves the previously mentioned thirteen counties along with 41 municipalities, providing services in the areas of planning and land-use development, grant writing and administration, economic development, historic preservation, and geographic information systems development and implementation to member jurisdictions.

Additionally, the CSRA RC is the home of the Area Agency on Aging (AAA) for the region and serves the 13 counties in the region as well as Screven County. In this capacity, the CSRA RC works with local providers to ensure that services for seniors are provided and monitored. By utilizing pass-through funds from state and federal sources, the Commission's AAA serves as a gateway for programs and resources aimed at helping aging residents improve the quality of their lives before and during their retirement years.

The CSRA RC is also the parent company of CSRA Business Lending. CSRA Business Lending makes loans to small and start-up businesses for the purposes of creating jobs and economic development opportunities within its service area.

CSRA Regional Vision

The vision of the Central Savannah River Area is to remain a place that reflects the best of what Georgia has to offer – a place where residents innovate and create and where commerce thrives; a place where residents are healthy and active because their surroundings encourage physical fitness; and, fundamentally, a place full of natural and man-made beauty, where residents take pride in and draw sustenance from their everyday surroundings.

What's the Regional Plan?

The CSRA Regional Plan (the Plan) is the long-range plan for the management of the region's projected growth by local governments and the CSRA Regional Commission. The Plan's horizon is twenty years but will be updated every five (5) years to address changing regional conditions. The CSRA Regional Commission Council, supported by CSRA RC staff, undertook the process of a full update of its regional plan. The regional vision statement included herein encompasses the best of the committee's and the public's input for the present and future development of the CSRA region. A regional Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, resident comments, and online survey results were utilized in defining regional goals, priority needs and opportunities, and an implementation plan. Feedback mechanisms for the Plan included public hearings and listening sessions. Goals and needs were developed and categorized by the following subject areas: economic development, natural and cultural resources, community facilities and services, housing, land Use and transportation, and Intergovernmental coordination. The CSRA's vision and goals, together with an appraisal of socioeconomic, land use, and environmental opportunities and threats, set the strategic direction for the regional work program. The regional work program then defines priorities and timing for implementation.

The Plan document is divided into four (4) sections:

Regional Goals - This section looks at the future of the region and lays out a road map for it. The goals section includes supporting policies that operate as guidance for decision-makers. It is supported by SWOT analysis, community survey, and other data gathered to inform the plan creation (included in the appendices). The "Regional Goals" section includes maps that depict future development and descriptions of desired development patterns.

Regional Needs and Opportunities - This section examines areas in which needs exist, as well as strengths that can be built on for the future. Every item designated as a priority in this section is tied to an implementation strategy and action items in the implementation program.

Implementation Program - This section includes concrete strategies and actions aimed at realizing the vision and addressing the priority regional needs and opportunities.

Appendices - This section contains data tables, acronym explanations and other information and analysis used in the formulation of the three plan components mentioned above.

Stakeholder Involvement Summary

Public involvement was the key to learning what regional needs were to be addressed. During the process, the RC gathered information and comments from stakeholders and the public through multiple events such as public hearings, steering committee input, listening sessions, an online survey, and social media. CSRA RC staff created a dedicated space on the CSRA RC website to serve as a portal for information about the plan. Stakeholder feedback was used directly in plan development, from the SWOT analysis to the specific implementation measures that form our regional work program.

Our involvement process included the following engagement activities:

- Identified key stakeholders in addition to the general public, designating CSRA RC's Council as the plan's Steering Committee and RC staff as a Technical Advisory Group
- Held two public hearings and three community listening sessions
- Partnered with the Augusta Food Oasis for two (of the three previously mentioned) listening sessions to inform residents about both the Regional Plan overall and more specifically regional food access, which had emerged as a topic of importance.
- Published an online survey to gather additional resident input, with links provided on the RC website, social media, and emails
- Provided a dedicated space on the CSRA RC website to serve as a portal for information about the plan
- Distributed information at RC partner events
- Utilized social media to post information on agency Facebook and Twitter pages
- Created an informational lobby display for the RC office entrance area, along with handouts for citizens with general plan information

Regional Goals and Priorities

Economic Development Goal – to cultivate and maintain a vibrant, diversified economy that expands job opportunities in the region, develops a qualified workforce, supports downtowns as multi-use destinations, and improves the quality of life for all residents

- Create and promote agricultural, natural, and heritage tourism opportunities and assets
- Increase job opportunities through business expansion, attraction and retention
- Develop better- qualified workers

Natural and Cultural Resources Goal – to protect and preserve natural, environmental and cultural resources in the region from development pressure, build a network of connected communities, and highlight our historic resources and natural assets

- Protect natural resources and historic properties

Community Facilities and Services Goal – to provide community facilities and services throughout the region that encourage appropriate development and more walkable, mixed use communities that enhance the overall quality of life for all residents

- Improve and expand infrastructure across region, including water and sewer expansion, flood and drainage improvements, sidewalk construction, and increased broadband access
- Increase access to healthy, affordable food
- Provide resources for residents that allow them to choose whether to age in place or move into housing developments or care facilities for older adults

Housing Goal – to provide a range of housing types and choices, available in urban and rural areas, that is safe and physically and economically accessible to all residents

- Rehabilitation, redevelopment, or removal of vacant and/or dilapidated structures
- Additional housing supply and variety

Land Use and Transportation Goal - to effectively utilize existing infrastructure to ensure the coordination of land use and transportation planning in support of improved resident quality of life, including provisions for pedestrians, trails and bicycles, housing, access to recreation and green space, and protected natural and historic areas

- Improvement and repair of roads and bridges, including increased street connectivity
- Reduce, eliminate, or prevent encroachment on Fort Gordon military installation

Intergovernmental Coordination Goal – to create a culture of collaborative planning and government decision-making, wherein communities join together to define commonalities and development strategies that benefit multiple jurisdictions to further effective growth, increase access to resources, generate cost savings, and promote healthy, active residents

- Examine the possibility of regional code enforcement through the RC

Actions to be Pursued

The following are some key strategies and actions the Regional Commission, in partnership with local governments and other agencies, will be undertaking over the next five (5) years. Additional strategies and actions are located in the "Implementation Program" portion of this document. These strategies and implementation items are considered the CSRA region's important steps towards growing and developing this area with cooperation and inclusiveness for a better quality of life for citizens, business and industry in the region's cities and counties.

STRATEGY: Provide support to local organizations/agencies currently engaged in agritourism and/or heritage tourism and coordinate with local governments to choose target areas for promotion.
ACTION Utilize GIS to create thematic or location-based story maps in different counties or groups of counties that highlight unique assets.

STRATEGY: Review and update important city/county documents.
ACTION: Survey HPCs to pinpoint weaknesses in existing historic preservation ordinances.

STRATEGY: Maintain existing infrastructure and secure funding for new infrastructure as needed.
ACTION: Help communities (as identified annually) secure funding and/or agreements for broadband deployment /expansion and other infrastructure needs through grant writing, data collection, and document/plan updates.

STRATEGY: Examine and update local land use polices as they relate to community food systems.
ACTION: Create and distribute resident fact sheets/guides for doing specific things like having raised beds, composting, or keeping chickens in counties with zoning.

STRATEGY: Educate the public and local government officials on what is currently available and what's missing in our regional food system.
ACTION: Create a regional map of farmer's markets, community/school gardens, etc.

STRATEGY: Increase the number of GICH communities.
ACTION: Assist communities interested in GICH with creation or updates of housing inventories and action plans including the cities of Washington, Waynesboro and Sandersville.

STRATEGY: Implement the 2018 Joint Land Use Study recommendations.
ACTION: Host the inaugural meeting between Fort personnel and local governments to review development projects and activities and assess challenges.