Georgia Hazard Mitigation Strategy

Standard and Enhanced Plan

Effective March 18, 2019 – March 17, 2024

Prepared by the Georgia Emergency Management and Homeland Security Agency
(GEMA/HS)

2019 EXECUTIVE SUMMARY

The State of Georgia is committed to reducing the devastating impacts of natural hazard events to the citizens of this state. Because of Georgia's potential to experience a wide range of natural disasters, the Georgia Emergency Management and Homeland Security Agency (GEMA/HS) promotes the concept of hazard mitigation planning. In response to this potential for disaster and in response to federal requirements, the State of Georgia uses a combination of applicable state and federal agencies and county and local public officials to pursue solutions to reducing or eliminating Georgia's future losses to hazard events.

Georgia's Hazard Mitigation Strategy (GHMS) is a result of the State of Georgia's continued efforts to reduce the State's exposure to losses from natural hazards and to maintain eligibility for the full range of disaster assistance available under the Robert T. Stafford Disaster Relief and Emergency Assistance Act as amended by the Disaster Mitigation Act of 2000 (DMA2K). Georgia's initial Hazard Mitigation Strategy under DMA2K, which met approval in April of 2005, chronicled the original state planning efforts as well as presented a statewide hazard risk assessment and mitigation strategy.

Previously FEMA required that the plan be updated every three years. Recent legislation has extended the update cycle to five years including this plan update. This 2019 edition of the standard plan represents its fifth update, and fourth update of the enhanced plan.

The Enhanced State Mitigation Plan documents the State's commitment to the objectives of hazard mitigation. This designation recognizes Georgia as a proactive leader in implementing a comprehensive statewide program. The enhanced status acknowledges the extra effort a State has made to reduce losses, protect its resources, and create safer communities. The Enhanced status makes Georgia eligible to receive a 33% increase in Hazard Mitigation Grant Program funds in the aftermath of a presidentially declared disaster. Strong State and local mitigation planning processes and comprehensive mitigation program management at the state level are important elements in reducing vulnerability to future disaster losses.

The GHMS has been updated with a detailed account of the current state planning process; a more concise assessment of Georgia's hazard history, hazard risk, and social vulnerability; and an updated version of specific mitigation goals and actions as well as a progress report of previously proposed actions. The updated GHMS continues to provide more information derived from multiple sources, including local mitigation plans, State agencies, and partnering non-governmental agencies. The updated plan also includes both a State and local capability assessment. Also, the plan updates information regarding the maintenance of the strategy throughout the eligible years and regarding the next five-year update process.

As demonstrated through this and previous plan updates, the State of Georgia is committed to the promotion of hazard mitigation. By reviewing its previous efforts of hazard mitigation through the plan development process, the state recognizes that effective mitigation begins with local participation and eventually leads to the modification of the hazard event and/or to the reduction of human vulnerability, which ultimately leads to the reduction of losses. By developing this document as a structure for implementing hazard mitigation efforts, the State of Georgia has been given the opportunity to adjust and adapt the strategy to remain relevant. In essence, Georgia's Hazard Mitigation Strategy remains a living document that evolves throughout each update cycle to protect Georgia from natural hazard events.

Chapter 1: Introduction to Planning Process

1.1 OVERVIEW AND PURPOSE

Each chapter contains an overview and a table that lists the sections as well as the changes that have occurred within each section since the last approval in 2014. Table 1.1 describes the updates and changes that have occurred in Chapter 1.

TABLE 1.1 SUMMARY OF CHANGES TO CHAPTER 1

Chapter 1 Section	Updates to Section
1.1 Overview and Purpose	• Data and Figures updated
1.2 State Adoption and Federal Statute Compliance	• Text Updated
1.3 Planning Process	• Updated to reflect current process.
1.4 Coordination among Agencies	• Updated to reflect current list of agencies participating • Removed Section 1.4.2 due to no changes in participant coordination
1.5 Program Integration	• No changes

Hazard Mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects. Mitigation focuses on breaking the cycle of disaster damage, reconstruction, and repeated damage. Mitigation efforts provide value to people and society by creating safer communities and reducing loss of life and property.

Hazard mitigation planning is the process state, tribal, and local governments use to identify risks and vulnerabilities associated with natural disasters and to develop long-term strategies for protecting people and property from future hazard events.

This document, referred to as the Georgia Hazard Mitigation Strategy (GHMS), is an official update to the State of Georgia Hazard Mitigation Plan submitted to and approved by the Federal Emergency Management Agency (FEMA) Region IV on March 31, 2014. The Georgia Emergency Management and Homeland Security Agency (GEMA/HS) is the state agency responsible for presenting this planning document on behalf of the State of Georgia.

The primary purpose for this plan is to eliminate or reduce risk and vulnerability to natural hazards in the State of Georgia. This is achieved through a comprehensive range of activities, including education, outreach and coordination, hazard identification, risk and vulnerability assessment, and the development of mitigation strategies. The contents of this document provide the framework for hazard mitigation strategies and actions undertaken by local and state governments within the State of Georgia.

The U.S. Census Bureau estimates that the population of Georgia was 10,429,379 on July 1, 2017, a 7.6% increase since the 2010 U.S. Census. This was an increase of 330,059 from the previous year, and an increase of 740,689 since 2010. According to 2015 Census estimates, Georgia is the eighth most populous state in the United States and ranks 17th in population density, with 177 people per square mile.

As of 2010, 87.35% (7,666,663) of Georgia residents age 5 and older spoke English at home as a primary language, while 7.42% (651,583) spoke Spanish, 0.51% (44,702) Korean, 0.44% (38,244) Vietnamese, 0.42% (36,679) French, 0.38% (33,009) Chinese (which includes Mandarin), and 0.29% German. In total, 12.65% (1,109,888) of Georgia's population age 5 and older spoke a mother language other than English.

Georgia's 2010 total gross state product was $403.1 billion, and the per capita personal income for 2014 puts it 37th in the nation at $25,615. There are 15 Fortune 500 companies and 26 Fortune 1000 companies with headquarters in Georgia. Atlanta has a very large effect on the State of Georgia and the southeastern United States. The city’s communications, industry, transportation, tourism, and government are continually evolving.

Widespread farms produce peanuts, corn, and soybeans across Middle and South Georgia. The state is the number one producer of pecans in the world, with production centered in the region around Albany in Southwest Georgia. Gainesville in Northeast Georgia touts itself as the Poultry Capital of the World. Other important agricultural outputs include peaches, cotton, peanuts, rye, cattle, hogs, dairy products, turf grass, timber (particularly pine trees), tobacco, and vegetables.

The timber industry is also a substantial economic engine for the State of Georgia. Georgia has more privately owned timberland than any other state, with 22 million acres. The state also is the number one producer in the nation in timber, wood fuel and wood pellets with the largest wood pellet plant in the world located in Waycross. Finally, Georgia is the number 1 exporter of pulp, paper and paperboard mill products in the nation. The timber industry has a greater than $30 billion impact on the state’s economy.

Industrial output includes textiles and apparel, transportation equipment, food processing, paper products, chemical products, and electric equipment. The Georgia Ports Authority owns and operates four ports in the state: the Port of Savannah, the Port of Brunswick, the Port of Bainbridge and the Port of Columbus. The Port of Savannah is the fourth largest seaport in the United States, importing and exporting a total of 2.3 million TEUs per year. Other important contributions to Georgia’s economy include tourism, film, and military installations.

With a low-lying coastal area, a middle piedmont area, and a mountainous northern area, Georgia is exposed to a range of natural hazards, from hurricanes to drought and wildfire to severe winter weather. These threats, coupled with the expanding sprawl of Metro Atlanta, increasing coastal and mountainous area development, and increasing impoverishment in agricultural communities throughout the state, lead to an increased “hazardousness of place.”

Exposure to the coastal weather patterns from the Atlantic Ocean and Gulf of Mexico and the continental weather patterns driven by the jet stream means severe weather can originate from any direction and can occur during any season.

Because of the wide exposure to natural hazards and the growing population, it is critically important to identify both local and statewide hazards, risks, and vulnerabilities in order to mitigate the threat and protect human life and property.

1.2 STATE ADOPTION AND FEDERAL STATUTE COMPLIANCE

1.2.1 State Adoption

As evidence of the State of Georgia's intent to fully comply with applicable federal statutes and regulations in effect with respect to the periods in which it receives grant funding, in compliance with 44 CFR 13.11(c), a copy of the formal state adoption resolution and a copy of FEMA's approval, once received, of Georgia's Standard and Enhanced Hazard Mitigation Plans is provided in Appendix A.

The State of Georgia assures that it will comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c). The GHMS will be amended according to the process and procedures listed and described in the plan maintenance section in Chapter 5, wherever necessary to reflect appropriate changes in state and federal statues as required in 44 CFR 13.11(c) and 44 CFR 13.11(d) and as described by the State of Georgia.

1.2.2 Federal Statute Compliance

The GHMS has met the requirements of the Disaster Mitigation Act of 2000 Public Law 106-390, October 30, 2000, as stipulated in the Interim Final Rule 44 CFR 201.4 Standard State Plan criteria, published on February 26, 2002. Meeting the regulations will allow Georgia to maintain eligibility and qualify to secure all federally declared disaster assistance, including certain types of public assistance and hazard mitigation grants available through the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended).

1.3 PLANNING PROCESS

1.3.1 Plan Update Narrative

Chapter 1 of the Georgia Hazard Mitigation Plan was reviewed and updated by GEMA/HS's Hazard Mitigation Planners. As a group, the planning staff revised each section as necessary following the current update process for this plan, including the methodology, the timeline, and the participating federal and state agencies.

Since the creation of the 2005 Georgia Hazard Mitigation Strategy, the State of Georgia has conducted a series of regular meetings (quarterly through 2013, then annually since) of state agencies called the State Hazard Mitigation Planning Team (SHMPT). The purpose of these meetings is to establish and maintain relationships among state agencies with a focus on hazard mitigation within the State of Georgia. These regular meetings provide a means for the State Hazard Mitigation staff to update other state agencies and receive feedback on mitigation activities throughout the state, including the GHMS.

In addition to the annual meetings, the SHMPT meets in the aftermath of major disasters. The purpose of these post-disaster meetings is to review and, if necessary, update the plan with any information related to the disaster. In addition, the meetings allow the State Mitigation staff to learn about any disaster or damage information from the other agencies, which helps them determine possibilities for mitigation assistance to the affected agencies. The SHMPT conducted seven post-disaster reviews of the 2014 GHMS in the aftermath of the two winter storms (DRs 4165 and 4215), a flood (DR 4259), two hurricanes (DRs 4284 and 4338) and two severe weather / tornado outbreaks (DRs 4294 and 4297). The details of these post-disaster review meetings are described in Section 1.3.4.

Beginning in the Summer 2017, the GEMA/HS Hazard Mitigation Planning staff began a more active update phase by conducting a summary review of the 2014 plan and update process. After examining each chapter, it was determined that the overall format did not need significant changes. Nevertheless, the following list of suggested changes and areas to update was compiled:

- Update the risk assessment to reflect new hazard data, including maps and occurrences of hazard

events since the previous state plan update.
- Update the mitigation strategy to reflect the current status of mitigation actions and add new actions as applicable.
- Add climate change information to the risk assessment, as per FEMA guidance.
- Maintain the change to the mitigation actions from the 2016 annual update, re-ordering the mitigation actions by lead agency.

Three workshops were utilized: Understanding Risks, Understanding Vulnerabilities, and Developing Georgia's Mitigation Strategy. The workshops allowed staff to present information from the previous plan, such as the risk assessment and goals, for comment and review. A risk-ranking method was used for the workshops to help reinforce risk information and capture risk perceptions of the participants. This risk-ranking method is explained in greater detail in Chapter 2. Breakout sessions, presentations, and handouts were used in each workshop to engage the participants and facilitate discussions and activities. GEMA/HS staff facilitated each of the breakout sessions and led the presentations and group discussions.

The first workshop, Understanding Risks, was held on January 5, 2018 and included almost 28 participants from federal and state agencies, nongovernmental/nonprofit organizations, and the private sector. The definition of risk as a combination of hazard and vulnerability was presented to the participants. This workshop focused on identifying and profiling the natural hazards Georgia is exposed to. Handouts listed the 12 hazards identified in the 2014 GHMS along with characteristics of these hazards in Georgia such as history, frequency, extent, and locations at risk. GEMA/HS staff presented an overview of the planning process, which included these three workshops. A presentation was also given providing specifics on each of the 12 hazards. After these presentations, the participants were divided into four breakout groups. The breakouts involved discussion of hazard information and hazard scoring and ranking. After the breakout sessions, each group presented a summary of comments from the discussion and hazard rankings. Based on the results of the workshop and analysis of local plan information, described in Chapter 2, 1 hazard (Extreme Heat) was added to the list of hazards to be profiled.

TABLE 1.2 STATE PLAN UPDATE WORKSHOPS

Workshop	Date	Information Presented	Results
1: Understanding Risks	January 25, 2018	12 hazards in 2014 GHMS and profiles; Hazard risk ranking methodology	Breakout group discussion on hazards; hazards scored and ranked based on profile
2: Understanding Vulnerability	March 15, 2018	Vulnerability definition; historical and potential impacts of 13 hazards	Breakout group discussion on hazard vulnerabilities; hazards scored and ranked based on vulnerability and total risk
3: Developing Georgia's Mitigation Strategy	April 26, 2018	Risk summary from first 2 workshops; types of mitigation actions	Lists of potential mitigation actions for each hazard with prioritization

The second workshop, Understanding Vulnerability, was held on March 15, 2018 and included 28 participants. GEMA/HS staff gave the definition of vulnerability and presented information on impacts from the 13 natural hazards identified in the previous workshop. Handouts provided information on the historical and potential impacts of each hazard, including adjusted losses, injuries and deaths, property damage, critical facilities, economic disruption, and natural and cultural resources. The participants were divided into breakout groups, where they scored and ranked each of the hazards with respect to vulnerability. Each of the participants was

given a score sheet to rank the vulnerability of each hazard. Participants then added these scores to the average hazard scores from Workshop 1 to calculate the total risk score and rankings for all 13 hazards. After the breakout sessions, each group presented a summary of comments from the discussion as well as vulnerability and total risk rankings. Chapter 2 presents the results of the hazard scores and ranking.

The third workshop, Developing Georgia's Mitigation Strategy, was held on April 26, 2018 and included 30 participants. Risk summaries and findings from the previous two workshops were presented to the participants, including the total risk scores and rankings for all the hazards. GEMA/HS staff defined mitigation and presented the four categories of mitigation actions, along with examples. The participants were divided into breakout groups, with each assigned a different set of hazards. Each group developed a list of possible mitigation actions for their assigned hazards. These lists were compiled and presented to the entire group. Afterwards, the participants prioritized these actions by placing sticker dots on the actions they believed are most important in reducing long-term risks. Some of the results from this workshop are presented in Chapter 3.

In addition, the Mitigation Planning staff proactively reached out, individually by email, to state agencies to discuss hazard mitigation and find out what type of relevant activities each agency was doing, or had plans to do. These identified mitigation activities and priorities were reviewed by GEMA/HS Hazard Mitigation Planning staff for inclusion in the state mitigation strategy.

1.3.2 State Plan Update Participants

As noted above, the State of Georgia has historically involved multiple other state and federal agencies in the development of and subsequent updates to the GHMS, primarily through the planning staff and the SHMPT meetings. One of the goals for the 2019 update was to broaden participation by involving more federal and state agencies and nongovernmental organizations.

The development of the 2019 GHMS involved three core groups:

1. GEMA/HS Hazard Mitigation Planning staff
2. University of Georgia, Carl Vinson Institute of Government, Information Technology Outreach Services (ITOS)
3. Other agencies and partners

The planning process for the 2019 update to the GHMS was led by the GEMA/HS Hazard Mitigation Planning staff, which consists of four planners and a supervisor. This team developed the process for updating the plan, facilitated the update process, and drafted the planning document.

ITOS, a division of the Carl Vinson Institute of Government at the University of Georgia, updated and developed data that was integrated into the risk assessment. This process included collection of hazard history from the Spatial Hazard Event and Loss Database for the United States (SHELDUS) and the National Center for Environmental Information (NCEI), maps used in risk analysis, and other hazard information.

Other agencies and partner organizations were invited and contributed to the development of the risk assessment and mitigation strategies. These organizations included federal, state, and local representatives; nongovernment organizations; and the private sector. Three mechanisms were used to coordinate among these organizations: SHMPT, planning workshops, and individual emails / interviews with state agencies. Section 1.4 provides details on participants and how they participated in the state planning process.

As described above, the previous planning process utilized a group called the SHMPT. The SHMPT has evolved with each plan update and largely includes state agencies that meet annually. The annual meetings provide an opportunity for participants to receive updates on GEMA/HS hazard mitigation activities as well as mitigation-related activities from other agencies. During the State Plan Update, the SHMPT is informed of progress and

given the opportunity to provide feedback on the planning process and completed sections. For more information on the SHMPT's history and the agencies actively participating, please see Appendix B.

For the 2014 plan update, the GEMA/HS Hazard Mitigation Planning staff developed a new mechanism to expand participation to other agencies and organizations to reflect a broader representation of state interests. The result was a series of three workshops designed to inform and hear from participants about hazard risks, vulnerabilities, and mitigation strategies. GEMA/HS staff coordinated participation in these workshops with federal and state agencies, nongovernment organizations, and the private sector. GEMA/HS staff used this same process for the 2019 update. In addition, Staff emailed all State agencies requesting updates to their mitigation actions. The results of this process are incorporated into the Mitigation Actions tables in Chapter 3.

1.3.3 Plan Review and Revisions

Since the adoption of the 2014 GHMS, the document has been publicly available on the GEMA/HS website. During local plan update meetings, communities are informed about the availability of the GHMS as a resource and are encouraged to provide feedback on how the document could be improved to assist their needs. Feedback received indicates the GHMS is difficult to read and that it is difficult to find useful information. The 2014 GHMS represented a significant streamlining of the document, adding maps and tables to depict the information being described. Since the completion of the 2014 document, the planning staff has created a handout summarizing basic risk information and the mitigation strategies from the State Plan. This handout is available to counties and provides basic information from the State Plan counties can use in the update of their plans.

As described in Section 1.3.1, the active update process began with a summary review of each section of the plan to determine items that needed updating as well as identifying any changes to the planning process needed to accomplish the staff's goals for the 2019 plan. While the review did not reveal the need for significant changes to the formatting of the document nor the planning process, it did reveal the following needs:

- The hazard history needed to be updated. This was done, including the most recent events, Presidential Declarations, etc.
- While the plan did describe the State's process of compiling and analyzing local plan data, it did not include a clear description of whether the local plan data influenced the State Plan. The 2019 plan now includes a clear description of how the local plan data did influence the risk assessment section.
- FEMA guidance now requires the plan to specifically address the impacts of climate change on the identified hazards. While the 2014 plan did not do this, information has been added to each hazard profile discussing how future climate change could impact the hazards.
- Some of the map data was out of date. Out-of-date maps have been replaced with maps based on the best and most recent data available.
- The 2014 plan did not clearly describe how the mitigation actions workshop influenced the plan. With the 2019 update, staff compared the actions from the workshop to the actions in the mitigation strategy. Many of the actions from the workshop were already being done in some way. A mitigation action has been added to the mitigation strategy to analyze other high priority actions identified in the workshop for future inclusion in the plan.

The GEMA/HS staff reviewed the information on state assistance to local communities. The review did not result in any changes other than updating and streamlining the presented information.

The completed draft plan was emailed to the State Hazard Mitigation Planning Team, ESF leads and local EMA directors for review and comment prior to adoption. Participants from the SHMPT and the workshops were also contacted via email informing them the draft plan was available on the GEMA/HS website. GEMA/HS staff

members in other divisions were also given the opportunity to review the draft plan, and submitted comments were incorporated into the plan update as applicable.

1.3.4 Post-Disaster Review

Since the approval of Georgia's Hazard Mitigation Strategy update in 2014, seven major hazard events have resulted in disaster declarations in the State of Georgia. DRs 4165, 4215, 4259, 4284, 4294, 4297 and 4338 have produced winter storms, flooding, hurricanes, severe storms and tornadoes throughout the State of Georgia.

In conjunction with ITOS, the GEMA/HS Hazard Mitigation Division and the planning team staff have updated the Standard Plan's hazard, risk, and vulnerability assessment (found in Chapter 2) to include the most recent disaster information and to reflect the new risks associated with the occurrence of the new disaster events.

A post-disaster meeting was held following each disaster, which occurred after the 2014 update. During this meeting, information on disaster impacts to communities and available mitigation funding programs was provided to the attendees. A separate portion of this meeting was held to specifically discuss the damages incurred by state agencies, lessons learned, and any changes to local hazard mitigation plans, the state plan, and state agency annexes. The Department of Agriculture, Georgia Ports Authority and Department of Public Health each reported damages to state facilities from these events.

During the disaster, many of the agencies involved with the hazard mitigation program were also involved with the state's response and took active roles in the State Operations Center by participating in Emergency Support Functions (ESFs). Support agencies worked on improving their response and coordination with other state and federal agencies as well as several private nonprofit organizations.

1.4 COORDINATION AMONG AGENCIES

1.4.1 State and Federal Agency Participation

As described in the above sections, the State of Georgia used methods to involve federal and state agencies and other interested organizations. These included the annual and post-disaster review meetings of the SHMPT, three plan update workshops held between January 2018 and April 2018, and individual agency emails and interviews held between April and September 2018. Tables 1.3 through 1.5 identify and describe the participation of state and federal agencies and Non-Governmental Organizations (NGO) in the 2019 plan update. Tables 1.3 – 1.5 further identifies how the State coordinated with other agencies responsible for various sectors, including but not limited to emergency management, economic development, land use and development, housing, health and social services, infrastructure, and natural and cultural resources. Notably, the update process was led by GEMA/HS, whose primary function is emergency management for the State of Georgia. The 2019 plan update also involved coordination with other organizations such as local communities, nonprofit organizations, and the private sector.

TABLE 1.3 STATE, AGENCY PARTICIPATION IN 2019 GHMS UPDATE

Agency	Related Sector	Participation
Administrative Office of the Courts	Judicial	SHMPT, Workshops
Georgia Building Authority	Infrastructure	Workshops
Georgia Bureau of Investigation	Law Enforcement	Workshops
Georgia Criminal Justice Coordinating Council	Law Enforcement	Workshops

Agency	Related Sector	Participation
Georgia Department of Administrative Services	General Government	SHMPT, Workshops
Georgia Department of Agriculture	Agriculture	SHMPT, Workshops
Georgia Department of Banking and Finance	Financial	Workshops
Georgia Department of Community Affairs	Housing, Land Use and Development, Economic Development	SHMPT, Email
Georgia Department of Community Supervision	Law Enforcement	Email
Georgia Department of Corrections	Law Enforcement	Workshops
Georgia Department of Economic Development	Economic Development	Workshops
Georgia Department of Education	Education	SHMPT, Workshops
Georgia Department of Labor	Health and Social Services	Workshops
Georgia Department of Natural Resources	Natural and Cultural Resources	SHMPT, Workshops
Georgia Department of Natural Resources – Coastal Resources Divisions	Natural and Cultural Resources	SHMPT
Georgia Department of Natural Resources – Environmental Protection Division	Natural and Cultural Resources	SHMPT, Workshops, Email
Georgia Department of Natural Resources – Environmental Protection Division – Safe Dams	Natural and Cultural Resources	Workshops
Georgia Department of Natural Resources – Floodplain Unit	Natural and Cultural Resources	SHMPT, Workshops, Email
Georgia Department of Public Health	Health and Social Services	SHMPT, Workshops
Georgia Department of Public Safety	Law Enforcement	Email
Georgia Department of Revenue	General Government	SHMPT
Georgia Department of Transportation	Infrastructure	SHMPT
Georgia Economic Financing Authority	Economic Development	SHMPT, Workshops
Georgia Forestry Commission	Natural and Cultural Resources	SHMPT, Workshops, Email
Georgia National Fairgrounds and Agricenter		Workshops
Georgia Office of Highway Safety	Public Safety	SHMPT
Georgia Office of Planning and Budget	General Government	SHMPT
Georgia Ports Authority	Infrastructure	SHMPT, Email
Georgia Soil and Water Conservation Commission	Natural and Cultural Resources	SHMPT, Workshops
Georgia Technology Authority	Infrastructure	SHMPT
Georgia Office of the Governor	General Government	SHMPT

Agency	Related Sector	Participation
Jekyll Island Authority	Emergency Management, Land Use and Development, Infrastructure, etc.	SHMPT
Technical College System of Georgia	Education	SHMPT, Workshops, Email
University System of Georgia Board of Regents	Education	SHMPT, Workshops

TABLE 1.4 FEDERAL AGENCY PARTICIPATION IN 2019 GHMS UPDATE

Federal Agency	Participation
FEMA Mitigation Division - Risk Analysis	SHMPT, Workshops
US Army Corps of Engineers	SHMPT, Silver Jackets Team meetings*
USGS	Silver Jackets Team Meetings*
NWS	Silver Jackets Team Meetings*
NRCS	Silver Jackets Team Meetings*

*Information provided related to flooding and dam safety

TABLE 1.5 OTHER ORGANIZATIONS PARTICIPATION IN THE 2019 GHMS UPDATE

Other Organization	Participation
American Red Cross	Workshops
Association of County Commissioners of Georgia	Workshops
Atlanta Gas and Light	Workshops
Georgia Municipal Association	SHMPT, Workshops
Georgia Transmission Corporation	Workshops

1.5 PROGRAM INTEGRATION

1.5.1 State Planning Programs

GEMA/HS Hazard Mitigation Planning staff has identified 15 programs and initiatives that are relevant to hazard mitigation. These were reviewed for their effectiveness and incorporated into this plan update where appropriate. All of the programs and initiatives align with the overall goals of Georgia's Hazard Mitigation Strategy: reducing human vulnerability to hazard events, reducing the losses associated with hazard events, and reducing the number of people and properties exposed to hazard events in Georgia. Specific programs and initiatives represented in the state mitigation strategy include Safe Dams, Community Wildfire Protection Plans,

and Risk MAP. In addition, DNR conducted a study of potential sea level rise along the coast, which was incorporated into the risk assessment portion of the GHMS. GEMA/HS Hazard Mitigation Planning staff will continue to review other state programs and initiatives for possible inclusion in the GHMS. Additional information on these programs is provided in Section 3.3.

1.5.2 FEMA Mitigation Programs

The 2019 GHMS is integrated with FEMA programs such as Hazard Mitigation Assistance (HMA), the National Flood Insurance Program (NFIP), the Community Rating System (CRS), and Risk MAP. Chapters 3 and 4 discuss the mitigation actions and provide details on the State's efforts to increase NFIP and CRS participation, implementation and support of the Risk MAP program, and use of the HMA and Flood Mitigation Assistance grant programs. Additional information on these programs is found in Sections 3.3, 3.4, and 4.2.

TABLE 1.6 INTEGRATION OF STATE PROGRAMS INTO THE 2019 GHMS

State Planning Efforts	GHMS Integration
Georgia StormReady	State capability assessment, mitigation strategy
GA Planning Act	State capability assessment, mitigation strategy
Safe Dams	State capability assessment, mitigation strategy
Coastal Management	State capability assessment
Coastal Marshland Protection	State capability assessment
Erosion and Sedimentation Control	State capability assessment
River Corridor Protection	State capability assessment
Shore Protection	State capability assessment
Emergency Watershed Protection	State capability assessment
EMAP Accreditation	State capability assessment
Southern Wildfire Risk Assessment	Data added into wildfire risk assessment and hazard maps, State capability assessment
Community Wildfire Protection Plans	State capability assessment, mitigation strategy
Silver Jackets	State capability assessment, mitigation strategy
Risk MAP	State capability assessment
CRD Sea Level Rise Study	Risk Assessment

TABLE 1.7 INTEGRATION OF FEMA MITIGATION PROGRAMS INTO THE 2019 GHMS

FEMA Program	GHMS Integration
HMA	Funding sources for Mitigation Grants
NFIP	State risk assessment, mitigation strategy, Local capability assessment
CRS	State risk assessment, mitigation strategy, Local capability assessment
FMA	Funding Source for Mitigation Grants
Risk MAP	Activity being conducted in the State of Georgia.

Chapter 2: Risk Assessment

2.1 OVERVIEW

The Hazard, Risk, and Vulnerability Assessment of the Georgia Hazard Mitigation Strategy provides a scientifically sound foundation for the goals, objectives, tasks, and action steps proposed in the plan. This chapter consists of the following sections: Overview, Definition of Terms, Methodology, Overview of Natural Hazards in Georgia, Hazard-Specific Assessments, Social Vulnerability Assessment, Composite Assessment, and Loss Potential.

The Definition of Terms section defines the terms *hazard*, *risk*, *risk assessment, vulnerability*, and *mitigation* utilized in this plan.

The Methodology section outlines the processes used in developing the risk assessment, including data manipulation and analyses that led to the presented conclusions.

The Overview of Natural Hazards section discusses the overall hazard event and loss history for the State of Georgia, without regard to specific hazard types. This section includes analysis of losses associated with all hazard events and claims associated with Presidential Disaster Declarations (PDDs).

The Hazard-Specific Assessments section identifies the 13 specific hazards affecting Georgia by recounting each hazard's event, loss, and PDD history. Also, this section includes hazard-specific occurrence probabilities (risk).

The Social Vulnerability Assessment section addresses both social and environmental vulnerability to hazard events at a state level. This section also includes an analysis of vulnerable state buildings and critical facilities.

The Composite Assessment section attempts to address the overall hazard vulnerability of specific areas by combining the social vulnerability and composite hazard scores in order to highlight areas of concern.

The last section, which relates to Loss Potential, presents the state assets and locally defined critical facilities in conjunction with the composite hazard scores in order to determine the areas with the highest potential for loss.

The summary of changes to the updated mitigation strategy from the 2014 plan is recorded in Table 2.1.

Chapter 2 of the Georgia Hazard Mitigation Plan was updated with assistance by the Carl Vinson Institute of Government's Information Technology Outreach Service at the University of Georgia. The risk assessment is based on the best available risk and vulnerability statistics and data available as of September 30, 2017.

2.2 DEFINITION OF TERMS

Risk, for the purpose of hazard mitigation planning, is the potential for damage, loss, or other impacts created by the interaction of natural hazards with community assets. Hazards are natural occurrences, such as tornadoes and earthquakes. The exposure of people, property, and other community assets to natural

TABLE 2.1: OVERVIEW OF UPDATES TO CHAPTER 2: HAZARD, RISK, AND VULNERABILITY ASSESSMENT

Chapter 2 Section	Updates to Section
2.1 Overview	• Changed dates to reflect new plan
2.2 Definition of Terms	• No change
2.3 Methodology	• Updated text to reflect hazards analyzed and new profiled hazard.
2.4 Overview of Natural Hazards in Georgia	• Updated dates to section to reflect the dates as they pertain to the plan update
2.5 Hazard-Specific Assessments	• Added text to each section noting impacts of climate change on the individual hazards • Added maps and figures • Updated tables, text, and maps to reflect the current available data for hazards • Incorporated information related to climate change for each hazard assessment • Added "Extreme Heat" hazard
2.6 Social Vulnerability Assessment	• Updated data, tables and maps
2.7 Composite Assessment	• Updated tables, text, and maps to reflect the current available data for composite assessment
2.8 Loss Potential	• Updated tables, text, and maps to reflect the current available data for hazard risk

hazards can result in disasters depending on the impacts. Impacts are the consequences or effects of the hazard on the community and its assets. The type and severity of impacts are based on the extent of the hazard and the vulnerability of the asset as well as the community's capabilities to mitigate, prepare for, respond to, and recover from events. The following are FEMA definitions of terms used in risk assessments.

> **Hazard:** A source of potential danger or adverse condition. Natural hazards are created by a meteorological, environmental, or geological event.

Risk: The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard. As Figure 2.1 illustrates, risk exists when natural hazards interact with community assets.

Risk Assessment: The product or process that collects information and assigns values to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision-making.

Vulnerability: Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction and contents as well as the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power—if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

Mitigation: Hazard mitigation is sustained action taken to reduce or eliminate long-term risk to people and their property from hazards.

FIGURE 2.1 ASSESSING EXISTING AND FUTURE VULNERABILITY.

Note: Modified from U.S. Geological Survey and Oregon Partnership for Disaster Resilience Models.

2.3 METHODOLOGY

The focus of this risk assessment is to identify and describe the hazards affecting the State of Georgia and their impacts. This methodology section outlines the steps taken to analyze risk to Georgia from natural hazards. Methods pertaining to specific hazard and risk assessments are outlined in Section 2.5 under the relevant hazard-specific assessment.

2.3.1 2019 Risk Assessment

Updating the risk assessment began with a review of the 12 natural hazards identified in the 2014 GHMS. Identifying natural hazards in Georgia is a process involving local plan inputs, comments from state stakeholders, and hazard history. GEMA/HS staff started this process by examining local hazard mitigation plans to determine if additional locally identified hazards warrant consideration in this risk assessment.

During the State Plan Update workshops, participants were given the opportunity to review the hazards identified in the 2014 GHMS. Several comments were given on additional hazards to consider, including pandemic flu, extreme heat, extreme cold, pollution, fuel shortage, communications failure, technology failure, Hazardous Materials, active shooters, transportation accidents, agricultural diseases, solar flares, tsunamis, nuclear facilities, chemical release, agricultural security, sea level rise, magnetic pulse and biological terrorism. After the workshops, GEMA/HS staff analyzed each of these hazards to determine if the definition and data were sufficient to meet natural hazard profile requirements.

It was determined tsunami, extreme heat, extreme cold and sea level rise are natural in nature and warranted further review. It was determined tsunami and extreme cold fit logically within the previously identified coastal hazards and winter storm sections. Sea level rise, while not a profilable hazard by itself, was incorporated into the updated analysis of the flooding and coastal hazards sections. Finally, based on the results from the workshops and a review of the local mitigation plan assessment, described above, extreme heat was added as a new hazard in Section 2.5.13. The other suggested hazards were determined to either not meet the definition of natural hazard, or insufficient data was available to objectively document specific risk to life and property.

Historic data from the Spatial Hazard Events and Losses Database for the United States (SHELDUS) and the National Centers for Environmental Information (NCEI) and other records were reviewed to identify any additional hazards. This did not produce any additional hazards for the risk assessment. More information on SHELDUS and NCEI is provided in Section 2.4.2.

After the hazard identification process, the assessments for all 12 previously identified hazards, along with the newly identified Extreme Heat hazard, were reviewed to identify new sources of information and updated data. This included hazard events that have occurred since the 2014 GHMS adoption, hazard maps, potential risk areas, and potential vulnerability. All hazard assessments have been updated to reflect the best available descriptions and data.

A new assessment tool for the 2019 GHMS is the incorporation of climate change in the analysis of each hazard. This was based on multiple sources, including the following:

- 2014 National Climate Assessment (https://nca2014.globalchange.gov/highlights/report-findings/extreme-weather)

- The Environmental Protection Agency (https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires),
- a sea level rise HAZUS-MH study conducted by the Coastal Resources Division of the Georgia Department of Natural Resources
- a HAZUS-MH analysis of the impacts of sea level rise on state owned properties done by the Carl Vinson Institute of the University of Georgia.

Reports and maps from both sea level rise studies are included in Appendix D. Information on how climate change impacts the individual hazards is included in each separate hazard profile section.

2.3.2 Hazard Risk Ranking

To gain a better understanding of the state's risk to hazards, GEMA/HS staff developed a tool to comparatively assess and prioritize each of the hazards identified in the GHMS. GEMA/HS staff surveyed hazard ranking tools that have been used in various state and local hazard mitigation plans around the nation. While many of these ranking tools have useful components or methods, GEMA/HS staff created its own methodology incorporating best practices from other examples.

Among the problems this methodology attempts to resolve is developing a priority ranking based on total risk, factoring vulnerability into risk, and the potential for events to have occurred that are not recorded in data sources. An example of the latter is hurricanes. While some major hurricanes have made impact in the past, no hurricane has made a direct landfall on the Georgia coast in the past century; therefore, data event and impact sources such as SHELDUS and NCEI do not have information on this hazard since those records begin in the 1950s.

The basic definition that GEMA/HS staff operated from to create this methodology is that Risk = Hazard + Vulnerability. Specific categories were identified based on common definitions of hazard and vulnerability. Where possible, objective datasets were utilized such as events per year and annualized losses. Only data from 1996–2017 were incorporated because older records are often incomplete. This methodology is not intended to be a scientific process, but rather an additional tool for understanding natural hazards in Georgia.

HAZARD:

Historical Frequency	Duration	Area Impacted

VULNERABILITY:

Annualized Losses	Injuries & Deaths per Year	Human Loss	Property Damage & Effect	Critical Facilities Impacted	Economy Disruption	Natural & Cultural Resources (Environment)

Blue: Historical Impact (SHELDUS and NOAA data)
Green: Potential Hazard
Red: Potential Vulnerability

This ranking methodology was presented at the State Plan Update workshops, and participants were given the opportunity to present their perspectives of these hazards based on their understanding of the hazards and the scoring criteria presented. Worksheets used in this ranking are included in Appendix C. The hazard-specific assessments in Section 2.5 include the priority as well as the total rank out of the 13 hazards. Tables 2.2, 2.3, and 2.4 show the Hazard, Vulnerability, and Total Risk Rankings, respectively, from the workshops. Notably, Hurricane Wind's ranking increased significantly since the 2014 GHMS. This is likely due to the impacts of Hurricanes Matthew and Irma in 2016 and 2017. Further information on these events is included in Section 2.5.1.

TABLE 2.2 WORKSHOP 1 HAZARD RANKING

	Historical Impact					Potential Hazard	
Hazard	Annualized Losses	Injuries and Deaths	Historical Frequency	Historical Score		Duration and Area Impacted Table Rankings	Total Hazard Score (H+P)
Dam Failure	1	1	1	3		3	6
Drought	4	1	1	6		8	14
Inland Flooding	4	1	2	7		6	13
Seismic Hazards				0		4	4
Severe Weather	5	2	3	10		6	16
Severe Winter Weather	5	1	3	9		7	16
Geologic Hazards				0		3	3
Coastal Hazards	1	1	1	3		5	8
Tornadoes	5	3	2	10		4	14
Hurricane Wind	2	1	1	4		6	10
Wildfire	1	1	1	3		6	9
Wind	2	1	3	6		4	10
Extreme Heat	2	1	1	4		8	12

TABLE 2.3 WORKSHOP 2 VULNERABILITY RANKING

	Potential Vulnerability Impact					
Hazard	Human	Property	Critical Facilities	Economy	Environment	Impact Score
Dam Failure	3	4	2	3	2	14
Drought	0	1	1	3	2	7
Inland Flooding	2	4	3	3	3	15
Seismic Hazards	1	2	1	1	1	6
Severe Weather	2	3	1	2	1	9
Severe Winter Weather	2	2	1	2	1	8
Geologic Hazards	0	1	1	1	0	3
Coastal Hazards	3	4	3	4	3	17
Tornadoes	3	4	3	3	2	15
Hurricane Wind	3	4	3	4	3	17
Wildfire	1	3	2	2	3	11
Wind	1	2	1	1	1	6
Extreme Heat	2	0	0	2	1	5

TABLE 2.4 WORKSHOP 2 TOTAL RISK RANKING

Vulnerability Ranking

Rank	Hazard	Score	Priority
1	Tornado	34	High
2	Inland Flooding	32	High
3	Hurricane Wind	30	High
4	Severe Weather	28	High
5	Coastal Hazards	27	High
6	Drought	26	Medium
7	Severe Winter Weather	26	Medium
8	Wildfire	24	Medium
9	Wind	17	Medium
10	Extreme Heat	17	Medium
11	Dam Failure	17	Medium
12	Seismic Hazards	10	Low
13	Geologic Hazards	6	Low

Priority Level
High = >26
Medium = 16–26
Low = <16

2.4 OVERVIEW OF NATURAL HAZARDS IN GEORGIA

2.4.1 Introduction

The 2019 GHMS contains 13 natural hazards. The plan retains the 12 natural hazards profiled in the 2014 GHMS and adds Extreme Heat as a hazard. Table 2.5 shows the hazards identified in the 2014 and 2019 GHMS.

Table 2.6 is based upon a review of all 159 county hazard mitigation plans. GEMA/HS staff extracted information about hazards that the county plans included in each risk assessment. The table includes hazard type and the percentage of local plans that identify that hazard. The percentage of counties identifying each hazard did not change significantly from the 2014 GHMS.

TABLE 2.5 CHANGES IN HAZARDS FROM 2014 TO 2019 STATE PLAN

2014 Hazards	2019 Hazards
Hurricane Wind	Hurricane Wind
Coastal Hazards	Coastal Hazards
Wind	Wind
Severe Weather	Severe Weather
Tornadoes	Tornadoes
Inland Flooding	Inland Flooding
Severe Winter Weather	Severe Winter Weather
Drought	Drought
Wildfire	Wildfire
Earthquake	Earthquake
Geologic Hazards	Geologic Hazards
Dam Failures	Dam Failures
	Extreme Heat

TABLE 2.6 HAZARDS IN LOCAL PLANS

Hazard Type	% of Counties Identifying in 2013	% of Counties Identifying in 2017
Inland Flooding	98%	99%
Tornadoes	98%	99%
Drought	90%	90%
Severe Winter Storms	81%	79%
Wind	80%	73%
Wildfire	79%	82%
Tropical Cyclonic Events (Hurricane Wind)	60%	55%
Severe Weather	68%	73%
Hailstorm (Severe Weather)	64%	61%
Lightning (Severe Weather)	63%	58%
Dam Failure	32%	36%
Heat	22%	28%
Earthquake	21%	27%
Coastal Flooding	6%	6%
Sinkhole	3%	3%
Landslide	1%	4%

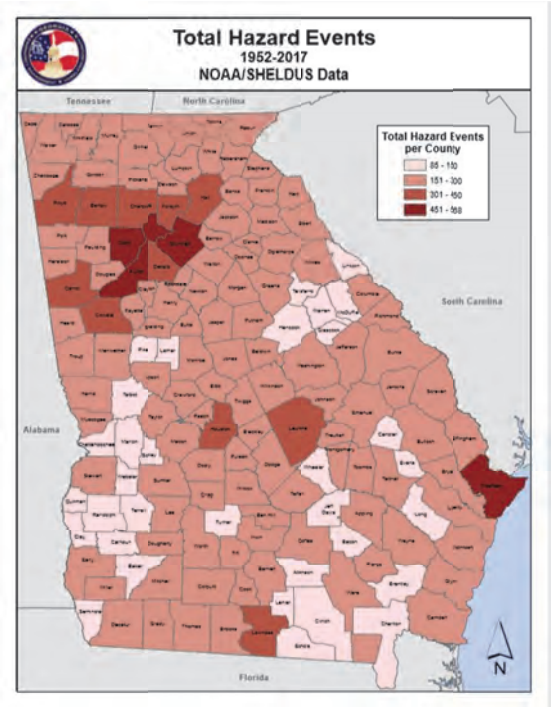
2.4.2 Hazard Profiling and Characteristics

The primary characteristics used in profiling hazards are event history, extent (magnitude), probability, and location. *History* involves describing previous events and impacts to the affected areas. *Extent* or *magnitude* is the greatest severity likely to occur. *Probability* is the likelihood an event will occur in the future. *Location* is the areas that are susceptible to being impacted by the event.

The primary sources for historical events and impacts are the Spatial Hazard Event and Loss Database for the United States (SHELDUS), produced by the Hazards & Vulnerability Research Institute at the University of South Carolina, and NOAA's National Centers for Environmental Information (NCEI) Storm Events Database. These searchable databases contain hazard-specific data with each event having the location (county), beginning date, property losses, crop losses, injuries, and fatalities. The SHELDUS database is derived from many national data sources including the NCEI and the National Geophysical Data Center. The data covers hazard events and losses from 1952 to 1995 for tornado events and from 1960 to 1995 for all other events, with updates for additional years forthcoming. The version of SHELDUS used for this plan update is 10.1, released in August of 2013. This version includes a greater number of events than previous versions. In older versions, a hazard event was included only if it exceeded $50,000 in losses or led to one or more fatalities. In SHELDUS 10.1, every loss-causing event from 1960 - 1989 and from 1995 to current

was included. Events occurring between 1990 and 1995 were still subject to the loss threshold of one fatality or $50,000 in damages. Therefore, this version of SHELDUS still undercounts some events but overall provides an improved tabulation of hazard events. The NCEI database covers events from 1996 to September 30, 2017. Prior to 1996 weather events were only published in a monthly report. Starting in 1996 NOAA began using a database to store all the events in addition to issuing the monthly report. Since the primary source of the SHELDUS data is the NCEI weather reports they share all the same attributes used for the hazard analysis. Other sources of hazard events and loss are presented as best available data in instances where SHELDUS and NCEI were incomplete. This includes coastal flooding and wildfire.

FIGURE 2.2 TOTAL HAZARD EVENTS BY COUNTY



The data gathered from SHELDUS and NCEI are visually represented in maps located in the Hazard-Specific Assessments. Figure 2.2 illustrates the total of all hazard events that occurred within the state from 1952 to 2017, based on SHELDUS data. Areas around Metro Atlanta and Savannah experienced the greatest number of total hazard events during this timeframe.

FIGURE 2.3 TOTAL HAZARD LOSSES BY COUNTY, 1952–2017

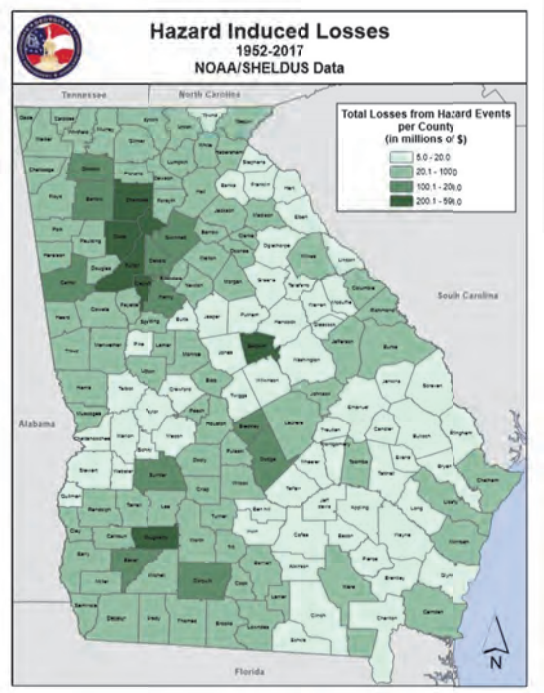


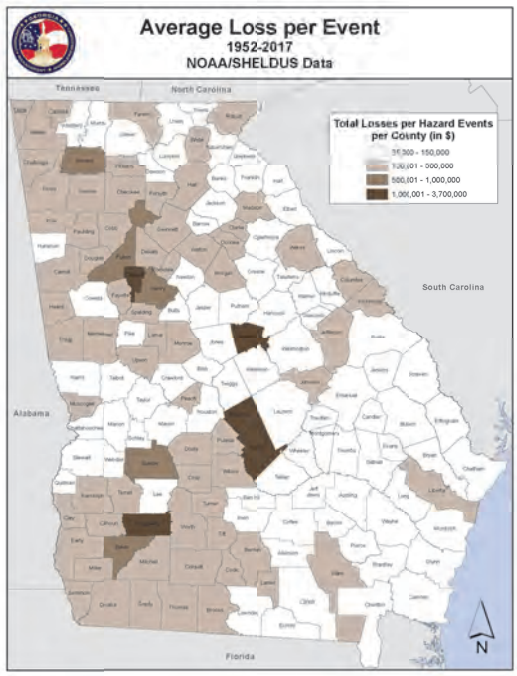
Figure 2.3 illustrates the total losses resulting from all hazard events by county from 1952 to 2017. These totals take inflation into account; therefore, all amounts are in 2016 dollars. Counties in the Metro Atlanta area experienced the greatest total losses during this timeframe.

Figure 2.4 depicts the average loss per hazard event for each county. Five counties (Baldwin, Bleckley, Clayton, Dodge and Dougherty) represent the highest loss per event category with totals between $1 million and $3.7 million per event.

The extent or magnitude of a hazard event is defined by a scientific scale or objective data that describe how severe the event could be. Examples include the Enhanced Fujita Tornado Scale and the Saffir-Simpson Hurricane Scale. A review of historical events provides a reasonable expectation for the potential extent of future events. With tornadoes, the greatest severity

experienced in Georgia is an EF4; therefore, while the potential for an EF5 tornado does exist, the most likely potential extent of a future tornado event in Georgia is an EF4. Each of the hazard-specific assessments describes potential extent.

FIGURE 2.4 AVERAGE LOSS PER EVENT BY COUNTY, 1952–2017



The best source of information for determining future probability is to review the historic occurrence or frequency of a type of hazard event. This is limited depending on the quality of historical records and the availability of data. For example, no major hurricane has made landfall in Georgia since 1898; however, there were three between 1854 and 1898. There is not enough scientific data to determine the exact probability of a future event.

FIGURE 2.5 NOAA HAZARD EVENTS PERCENTAGE, 1957–2016

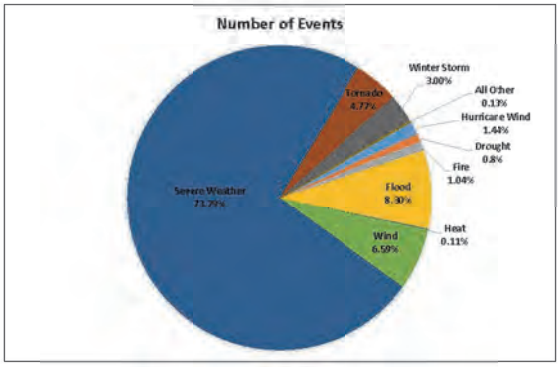


Figure 2.5 illustrates the distributions and the number of events of each hazard type, based on data from NCEI between 1997 and 2016. By far, Severe Weather (thunderstorm, lightning, hail) is the most frequent hazard event that occurs in Georgia. Figure 2.6 illustrates total losses by hazard. Tornadoes and Severe Weather created the highest dollar amount loss in Georgia.

Figure 2.7 illustrates the distribution of total injuries and fatalities from each type of hazard. NCEI data did not have any recorded injuries or fatalities from Coastal Flooding, Drought, or Landslide; therefore, these hazards are not included in this diagram. Tornado events produced more injuries and fatalities than all the other hazards combined.

FIGURE 2.6 SHELDUS ADJUSTED LOSS PERCENTAGE BY HAZARD, 1992–2012.

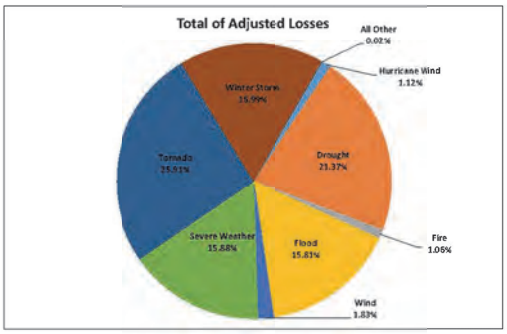
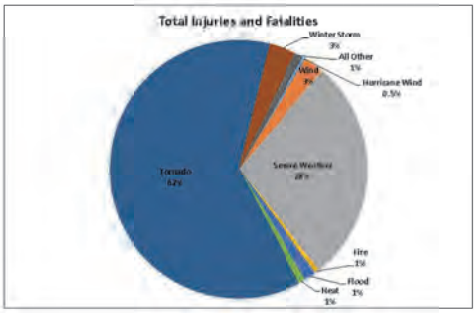


FIGURE 2.7 SHELDUS TOTAL INJURIES AND FATALITIES PERCENTAGE BYHAZARD.



2.4.3 Presidential Declared Disasters

Seven Presidentially Declared Disasters (PDD) have occurred since the 2014 GHMS was adopted. In that time, all of Georgia's 159 counties have been declared as part of at least one disaster. In February, 2014 and February, 2015, Georgia experienced two severe winter storm events, resulting in DRs 4165 and 4215, respectively. In December 2015, Georgia experienced severe flooding along the Chattahoochee, Flint, Ocmulgee and Oconee Rivers, resulting in DR 4259. The following year, in October 2016, Hurricane Matthew impacted the Georgia coast, as well as several inland counties in Southeast Georgia. This event was the first time in almost 20 years the state ordered the evacuation of the entire coast. The following January, 2017, Southwest Georgia experienced two severe weather and tornado events, resulting in DRs 4294 and 4297. These disasters are notable due to being only two weeks apart. Also, while DR 4297 covered a much larger area, a significant portion of the damages was in the same communities damaged by DR 4294 two weeks earlier. Finally, in September, 2017, Hurricane Irma entered Southwest Georgia from the Gulf of Mexico with tropical storm force winds impacting the entire state and coastal flooding impacting the entire coastline. For the first time in Georgia's history, all 159 counties were declared as part of DR 4338. Also, notably, Hurricane Matthew (2016) and Hurricane Irma (2017) are the only instances the state has ordered the evacuation of the entire coast since Hurricane Floyd in 1999. In addition, in 2016 and 2017, the State of Georgia experienced two Fire Management disasters, Georgia Tatum Gulf Fire FM-5181 affecting Dade County and Georgia West Mims Fire FM-5163 affecting Charlton, Clinch and Ware Counties. However, these events did not get declared for HMGP funding until June, 2018. Therefore, information on these disasters is limited as of the writing of this plan. Tables 2.7 and 2.8 below provide additional details for these disasters. Information on all declarations can be found in Appendix D. Notable hazard events that were also PDDs are identified in the hazard-specific assessments in Section 2.5.

TABLE 2.7 PRESIDENTIAL DECLARATIONS SINCE 2014

Federal Declaration	# Counties by Declaration Type	
	Public Assistance	Individual and Public Assistance
DR 4165	45	
DR 4215	15	
DR 4259	34	
DR 4284	20	10
DR 4294	7	1
DR 4297	22	8
DR 4338	159	7

*HMGP funding available statewide after all declarations

TABLE 2.8 FIRE MANAGEMENT DECLARATIONS SINCE 2014

Federal Declaration	Number of Counties
FM 5163	3
FM 5181	1

2.5 HAZARD-SPECIFIC ASSESSMENTS

Hazard-specific assessments are presented in the following order:

- 2.5.1 Hurricane Wind
- 2.5.2 Coastal Hazards (includes storm surge and coastal flooding)
- 2.5.3 Wind
- 2.5.4 Severe Weather (includes lightning and hail)
- 2.5.5 Tornado
- 2.5.6 Inland Flooding
- 2.5.7 Severe Winter Weather
- 2.5.8 Drought
- 2.5.9 Wildfire
- 2.5.10 Earthquake
- 2.5.11 Geologic Hazards (includes sinkhole and landslide)
- 2.5.12 Dam Failure
- 2.5.13 Extreme Heat

Each hazard assessment contains a description of the event and a hazard profile. The description defines what the hazard is and provides its general characteristics. The hazard profile describes the history of the hazard in Georgia, locations susceptible to the hazard, the likelihood of occurrence, and the probable extent. Hazard history includes SHELDUS/NCEI data when available. Maps, tables, and other figures enhance the description and profile of each hazard.

2.5.1 Hurricane Wind

Associated Hazards:

Tropical cyclones, hurricanes, tropical storms, tropical depressions, coastal storms

Priority	Rank
High	3

Hazard Description

Tropical cyclones are referred to in a multitude of ways around the globe from hurricanes in the Atlantic Ocean to typhoons in the Pacific Ocean to the more generic tropical cyclones in the southwestern Indian Ocean. According to the Atlantic Oceanographic and Meteorological Laboratory (AOML), a tropical cyclone "is the generic term for a non-frontal synoptic scale low-pressure system over tropical or subtropical waters with organized convection (i.e. thunderstorm activity) and definite cyclonic surface wind circulation." The National Oceanic and Atmospheric Administration's (NOAA) National Hurricane Center (NHC) categorizes tropical cyclones in the Atlantic Basin (Atlantic Ocean, Caribbean Sea, and Gulf of Mexico) into four types based on intensity.

> **Tropical Disturbance:** A discrete tropical weather system of apparently organized thunderstorms, generally 100–300 nautical miles in diameter, originating in the tropics or subtropics, and maintaining its identity for 24 hours or more.
>
> **Tropical Depression:** An organized system of clouds and thunderstorms with a defined circulation and maximum sustained winds of 38 mph (33 knots) or less.
>
> **Tropical Storm:** An organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 mph to 73 mph (34–63 knots).
>
> **Hurricane:** An intense tropical weather system with a well-defined circulation, producing maximum sustained winds of 74 mph (64 knots) or greater. Hurricane intensity is classified into five categories using the Saffir-Simpson Hurricane Scale (presented in Figure 2.10: Saffir-Simpson Hurricane Scale). Winds in a hurricane range from 74 to 95 mph for a Category 1 hurricane to greater than 156 mph for a Category 5 hurricane. Hurricane Camille (1969) and Hurricane Allen (1980) epitomize the destructive potential of hurricanes as both had sustained winds of 190 mph and gusts well over 200 mph.

Hurricanes can cause catastrophic damage to coastlines and areas several hundred miles inland. Hurricanes can produce winds exceeding 155 miles per hour as well as tornadoes and microbursts. Additionally, hurricanes can create storm surges along the coast and cause extensive damage from heavy rainfall. Floods and flying debris from the excessive winds are often the deadly and destructive results of these weather events. Slow moving hurricanes traveling into mountainous regions tend to produce especially heavy rain. Excessive rain can trigger landslides or mud slides. Flash flooding can occur due to intense rainfall (http://www.ready.gov/hurricanes).

Each of these hazards presents unique characteristics and challenges; therefore, the following have been separated and analyzed as individual hazards: Hurricane Wind, Coastal Hazards (including storm surge), Tornado, Flooding (inland and coastal), Wind, and Severe Weather. This section focuses on the hurricane wind hazard.

Hazard Profile

Throughout history, tropical cyclones have plagued Georgia. The NHC has accumulated records of all of the tropical cyclones that have affected the state since 1851. The National Weather Service (NWS) and NOAA's Atlantic Oceanic and Meteorological Laboratory (AOML) have records of tropical cyclone activity affecting the Georgia Coast since 1565. Table 2.9 presents the total number of hurricanes, by intensity, that have affected any portion of Georgia from 1851 through the present. Table 2.10 presents all of the tropical cyclones that have made landfall on the Georgia Coast from 1800 through the present.

TABLE 2.9 TOTAL NUMBER OF HURRICANES THAT HAVE TRACKED OVER GEORGIA, 1851 TO PRESENT

Hurricane Intensity	Number of Hurricanes
Category 1	15
Category 2	5
Category 3	2
Category 4	1
Category 5	0

TABLE 2.10 TROPICAL CYCLONES THAT HAVE MADE LANDFALL ON THE GEORGIA COAST, 1800 TO PRESENT

Tropical Cyclone Intensity	Number of Named Storms	Recurrrence Interval (years per storm)
Tropical Storm & Category 1–2	25	9
Major Hurricane: Category 3–5	6	36

Between 1800 and 1850, three major hurricanes made landfall on the Georgia Coast—in 1804, 1813, and 1824—causing a combined total of more than 600 fatalities. Between 1851 and 1899, 14 named storms and three major hurricanes (in 1854, 1893, and 1898) made landfall on the Georgia Coast, with the number of fatalities nearing 2,700. From 1900 to 1949, four named storms (1911, 1928, 1940, and 1947) made landfall on the Georgia Coast. From 1950 to the present, three hurricanes (Category 2 Hurricane David, 1979, Hurricane Matthew, 2016 and Hurricane Irma, 2017) have impacted the Georgia Coast.

Table 2.11 details the more notable events in Georgia's tropical cyclone history. The table does not include all events affecting the state, but it highlights those that had a substantial impact. Damage values are given in historic dollars.

Although all of Georgia's counties can be affected by tropical cyclonic activity, two regions stand apart when analyzed using SHELDUS data. Figure 2.8 shows the tropical cyclonic events per county from 1952 to 2017 and highlights the regions of Southwest Georgia and Coastal Georgia. Counties in Southwest Georgia are more adversely affected by tropical cyclones that enter from the Gulf of Mexico than by tropical cyclones from the Atlantic Ocean.

TABLE 2.11 NOTABLE AND HISTORIC TROPICAL CYCLONIC EVENTS AFFECTING GEORGIA

Year	Name (if applicable)	Area Affected	Remarks
1804		Savannah Area	Hutchison Island inundated; 3 deaths
1813		Coastal Georgia	28 deaths
1881		Savannah Area	$1.5 million in damages; 335 deaths
1893		Savannah Area	$10 million in damages; 1,000 deaths
1898		Coastal Georgia	Category 4; 120 deaths
1911		Coastal Georgia	18” of rain in 24 hours
1916		Southwest Georgia	$2.5 million in damages
1928		Savannah Area	11” of rain
1940		Coastal Georgia	>$1 million in damages
1947		Savannah Area	>$2 million in damages
1959	Gracie	Coastal Georgia	$5 million in damages
1964*	Dora	Coastal Georgia	DR177; $8 million in damages
1979	David	Coastal Georgia	2 deaths
1990*	Klaus/Marco	Central Georgia	FEMA DR880; *$6 million in damages
1994*	Alberto	Statewide	FEMA DR1033; Extreme flooding on Flint and Ocmulgee Rivers; >$400 million in damages
1995*	Opal	Western Georgia	FEMA DR1071; Widespread wind damages
2004*	Frances, Ivan, and Jeanne	Statewide	FEMA DR1554 and DR1560; Wind/ rain damage in 107 counties
2005	Dennis	Statewide	Wind/ rain damage; Flooding
2016*	Matthew	Coastal Georgia	FEMA 4284; Wind/rain/coastal flooding in 20 Southeast GA counties; $175 million in damages
2017*	Irma	Statewide	FEMA 4338; Wind/rain/coastal flooding affecting all 159 GA counties; 1.5 million out of power; 5 fatalities; est. $150 million in uninsured damages.
2018*	Michael	Southwest, Central and East Georgia	FEMA 4400; Wind/rain in Southwest and Central Georgia with Category 3 in Southwest GA; 3 fatalities; $350 million in uninsured losses; $2.3 – $2.8 billion in ag and timber losses

*Presidential Declared Disasters

The hazard event risk analyses take into account the recurrence interval of the hazards. Because the historical record of tropical cyclonic events is limited and subject to seasonality, a true recurrence interval is unknown and changes yearly (as demonstrated by NWS forecasting). However, using various sources for Georgia’s tropical cyclone history (NOAA, SHELDUS), one can estimate that over a 200-year period, around 36 tropical cyclones affected the state (not necessarily a direct hit). This translates to about an 18% chance of a tropical cyclone affecting Georgia per year or approximately one storm every 5.5 years.

Figure 2.9 illustrates the cumulative estimated losses from hurricane wind events in Georgia. Losses from associated hurricane hazards such as flooding, storm surge, and tornadoes are not included in these numbers.

FIGURE 2.8 HURRICANE WIND EVENTS IN GEORGIA, 1952–2017.

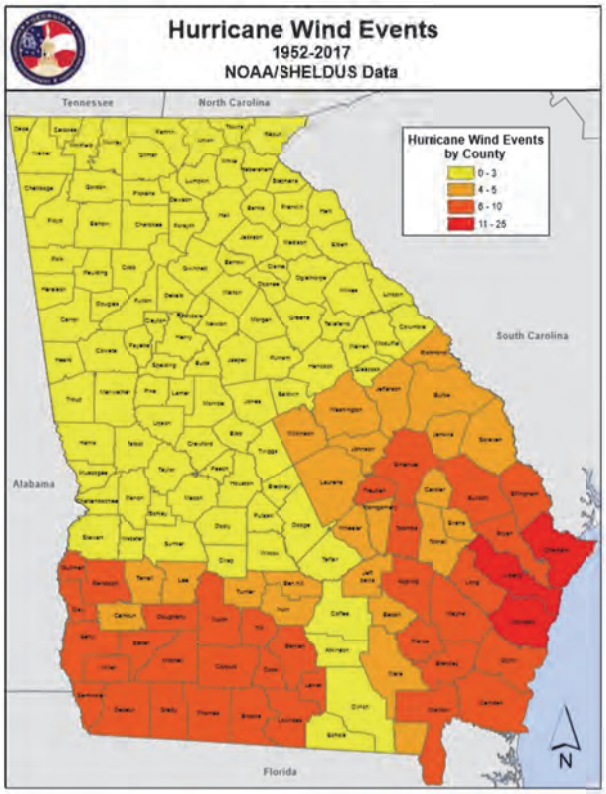


FIGURE 2.9 HURRICANE WIND LOSSES IN GEORGIA, 1952–2017.

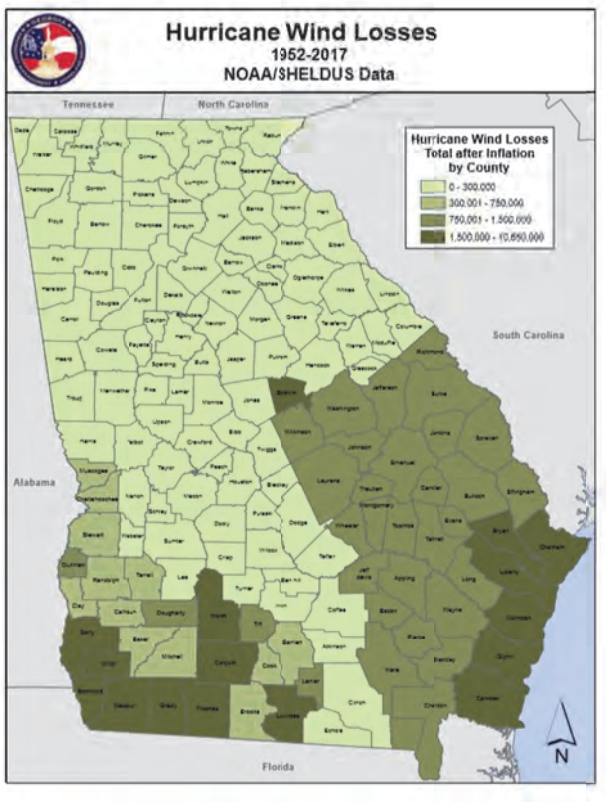


TABLE 2.12 HURRICANE WIND INTENSITY SCALE

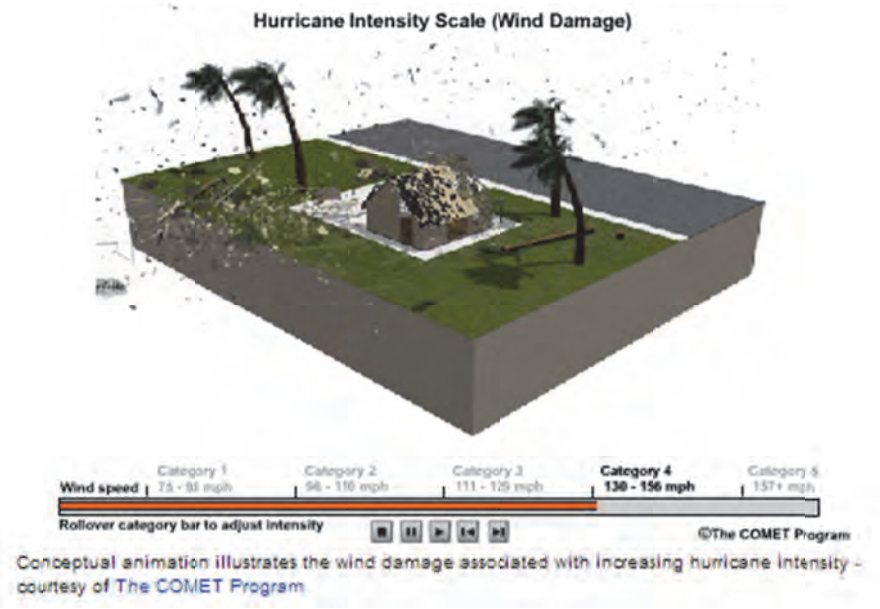
Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt 119-153 km/h	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/h	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt 209-251 km/h	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt or higher 252 km/h or higher	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Saffir-Simpson Hurricane Scale.

Source: NOAA National Hurricane Center, Http://www.nhc.noaa.gov/aboutsshws.php

FIGURE 2.10 HURRICANE INTENSITY SCALE

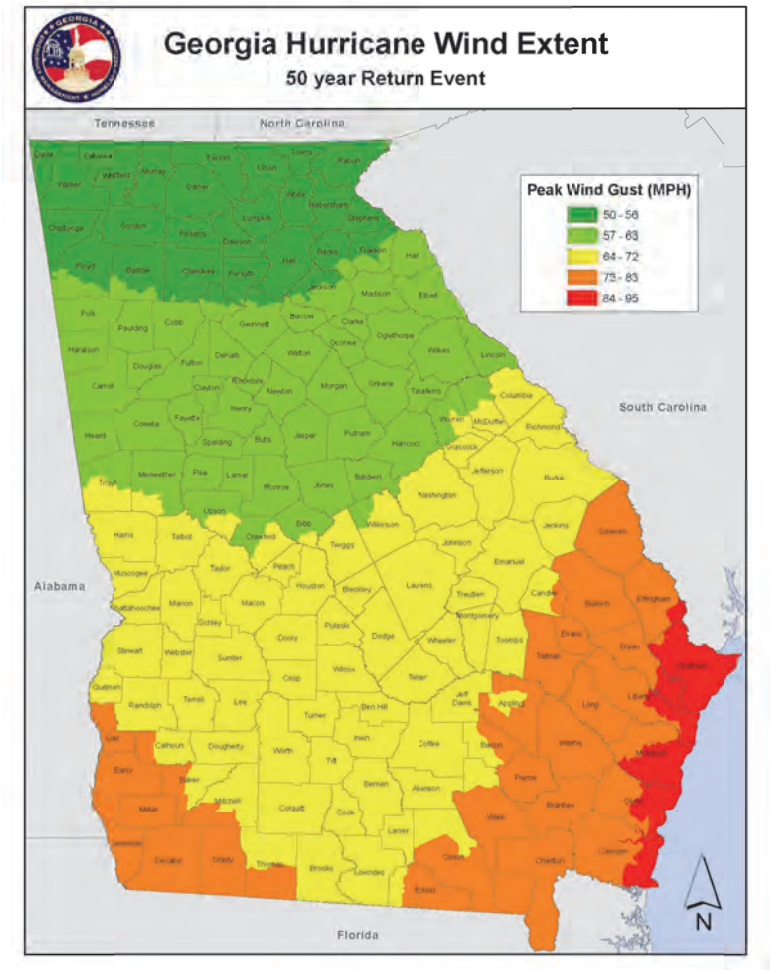
Source:



http://www.nhc.noaa.gov/pdf/sshws_table.pdf.

https://www.nhc.noaa.gov/animations/images/hurricane_winddamage.swf

FIGURE 2.11 GEORGIA HURRICANE WIND EXTENT



The best available method for determining potential extent or magnitude of a future hurricane wind event is to review historical records. Based on the hazard history for Georgia, the potential extent for a future hurricane wind event in Georgia is a Category 4 Hurricane producing maximum sustained winds of up to 156 miles per hour. The graphic in Figure 2.10 provides a simulation of damages to a wood-frame structure from winds that are approximately 130 mph (Category 4 Hurricane). The animated graphic and additional information on the Hurricane Intensity Wind Scale can be viewed at https://www.nhc.noaa.gov/animations/images/hurricane_winddamage.swf http://www.nhc.noaa.gov/pdf/sshws_table.pdf.

The map in Figure 2.11 is based on data available from HAZUS-MH. It provides estimates of hurricane peak wind gust that have a 2% chance of occurring in any given

year or, statistically, once every 50 years. Peak wind gusts are hurricane winds which maintain a specific velocity for 3 seconds. HAZUS uses peak wind gust in its loss estimation because these higher velocity winds can produce the greatest amount of damage. There is no direct correlation between maximum sustained winds (which determines Category) and peak wind gusts.

Impact from Climate Change

It is anticipated that climate change could impact multiple characteristics of hurricanes. As the global temperature warms, the overall intensity of hurricane winds may increase by approximately 3% by the year 2100. However, this may be offset by an anticipated moderate decrease (~25%) in the overall number of storms. Hurricanes may form farther away from North America, and curve northeast slightly more often, resulting in fewer land-falling events along the North American coastline. The impacts on the storm surge and flooding components of hurricanes are discussed in later sections.

2.5.2 Coastal Hazards

Associated Hazards:
Tropical cyclones, hurricanes, tropical storms, tropical depressions, coastal storms, coastal winter storms, storm surge, coastal flooding

Priority	Rank
High	5

This section includes a broad discussion of coastal hazards, including storm surge, coastal flooding, high surf, and abnormal tides.

Hazard Description

The NHC defines *storm surge* as "an abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed sea surface and the level that would have occurred in the absence of the cyclone." Storm surge that is produced by a tropical cyclone is a function of both geography and the cyclone's characteristics. Tropical cyclone characteristics affecting storm surge values include the intensity of the hurricane (strength of the winds and central pressure), angle of approach, and forward speed. Geographic characteristics that affect the extent of storm surge include bathymetry (underwater terrain), slope of the continental shelf, roughness of the continental shelf, shape of the coastal region, and existence of natural or man-made barriers.

The overall observed height of water that will impact a region from a tropical cyclone is referred to as the storm tide. *Storm tide* is the actual level of the sea water resulting from the astronomical tide combined with the storm surge. The value of a storm tide includes the storm surge created by the tropical cyclone and the tidal variations that exist in a region. Along the Georgia Coast, the tidal variation or total height difference between low tide and high tide can be as much as 10 feet (5 feet above sea level during high tide, and 4.5 feet below sea level during low tide) during spring tides. Compounding the destructive potential of a storm tide is the occurrence of wind-driven waves. These large waves can reach heights of 10 feet and exist on top of the rising waters as hurricane force winds blow across the surface of the ocean.

Hurricanes primarily occur during hurricane season, which spans June 1 through November 30, although hurricanes have been known to form outside of the official hurricane season. The official hurricane season accounts for 95% of observed activity; therefore, on average, only 5% of hurricanes form outside of hurricane season.

While a tropical cyclone may show signs of approach up to days before the storm peaks, the storm surge will often appear somewhat suddenly. Depending on the size and strength of the storm, the surge can reach inland for miles along a vast span of coastline. This rapid rate of onset is the major contributor to the many deaths associated with storm surge. The duration of the surge event depends on the depth of the surge and other environmental factors such as drainage capability. The waters from the surge may remain for days in certain areas. The frequency of storm surges of a particular magnitude greatly depends on the frequency of tropical cyclones with the ability to produce the surge.

It should be noted that tropical cyclones are not the only type of storms that can cause destructive storm surge. Although less common in Georgia, nor'easters and strong winter storms can result in elevated water

levels. While not as high at their peak, surges from these events can be more destructive over a sustained period of time.

Coastal flooding is defined as flooding of coastal areas not caused by tropical cyclone events. Coastal flooding is caused by strong, persistent onshore wind, high astronomical tide, and/or low atmospheric pressure, and it results in damage, erosion, flooding, fatalities, or injuries. *Coastal areas* are defined as those portions of coastal land zones adjacent to the waters and bays of the oceans.

High surf is defined as large waves breaking on or near shore, resulting from swell spawned by a distant storm or from strong onshore winds, causing a fatality, injury, or damage. In addition, if accompanied by anomalous astronomical high tides, high surf can produce beach erosion and possible damage to beachfront structures. High surf conditions are usually accompanied by rip currents and near-shore breaks.

Profile

No major hurricanes have made landfall along the Georgia Coast since 1898; therefore, the historical data that can be used for comprehensive risk analysis of storm surge are limited. Table 2.13 describes notable storm surge events that have affected Georgia since the early 1800s. This list only includes hurricanes with recorded storm tide elevations. Other hurricanes during this period may have produced storm surge or coastal flooding, but no storm tide records are available. The greatest extent of storm surge was associated with a Category 4 hurricane in September 1813. According to Table 2.9 in Section 2.5.1, the recurrence interval for a major hurricane making landfall in Georgia is approximately once every 36 years.

TABLE 2.13 NOTABLE STORM SURGE EVENTS IN GEORGIA FROM TROPICAL CYCLONES

Date	Event	Description of Impact on Georgia
September 7-8, 1804	"Great Gale of 1804"	St. Simons Island was flooded with water 7' above normal. The tide rose 10' above MSL on the Savannah waterfront. Severely flooded Pablo Creek (currently the intracoastal waterway). More than 500 persons drowned.
September 16-17, 1813	Category 3-4 Hurricane	Storm surge of at least 19 feet above Mean Low Water (MLW)
September 14-15, 1824	Major Hurricane	Exceeded 1804 storm in flooding and damage. St. Simons Island completely overflowed.
September 8, 1854	Category 3 Hurricane	Fort Pulaski- storm tide elevation 10.50 feet above normal.
August 27, 1881	Hurricane	Fort Pulaski- storm tide level 11.57 feet above normal. Isle of Hope- 11.82 feet above normal
August 27, 1893	Category 3 Hurricane	Fort Pulaski- storm tide elevation between 12-13 feet above normal. Heavy storm surge of approximately 16 feet in other areas.
October 2, 1898	Category 4 Hurricane	Hutchinsons Island, opposite Savannah, was completely inundated to a depth of 4 to 8 feet. Campbell Island, near Darien, GA, was inundated, while Darien reported a tidal wave about 13 feet above mean high water mark and Sapelo Island, GA, reported about 18 feet. This hurricane caused 179 deaths and damage was estimated at around $2.5 million. 16 foot storm surge in downtown Brunswick.

October 14, 1947	Hurricane	High tides along the Georgia and South Carolina coasts ranged from 12 feet above mean low tide at Savannah Beach, GA, and 9.6 feet at St. Simons Island near Brunswick, GA.
September 4, 1979	Hurricane David	Storm surge of 3-5 feet and heavy surf
October 8-9, 2016	Hurricane Matthew	DR 4284; Storm surge of 2-8 feet along the entire Georgia coast, including surge of 7.5 feet at Fort Pulaski.
September 11-13, 2017	Hurricane Irma	DR 4338; Storm surge of 4-8 feet along the entire Georgia coast, including surge of 5 feet at Fort Pulaski, compounded by a rising tide resulting in the second highest water level on record.

SHELDUS and NCEI data include information on some coastal flooding events. Four counties have experienced one coastal flooding incident, while two counties reported more than one event between 1952 and 2017. The NCEI narratives describe these events as not associated with storms but rather attribute them to unusual tidal events. Coastal flooding was minor, and beach erosion was the most substantial impact.

Figures 2.12 and 2.13 show the location of these coastal flooding events and the losses associated with them, respectively.

FIGURE 2.12 COASTAL FLOODING EVENTS IN GEORGIA, 1952 - 2017

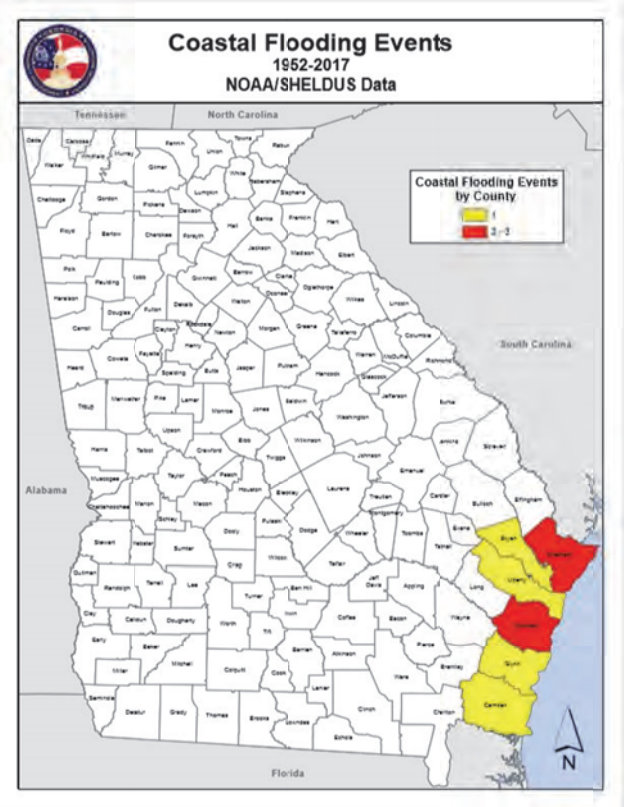


FIGURE 2.13 COASTAL FLOODING LOSSES IN GEORGIA, 1952-2017

FIGURE 2.14 COASTAL NON-FLOODING EVENTS IN GEORGIA, 1952–2017

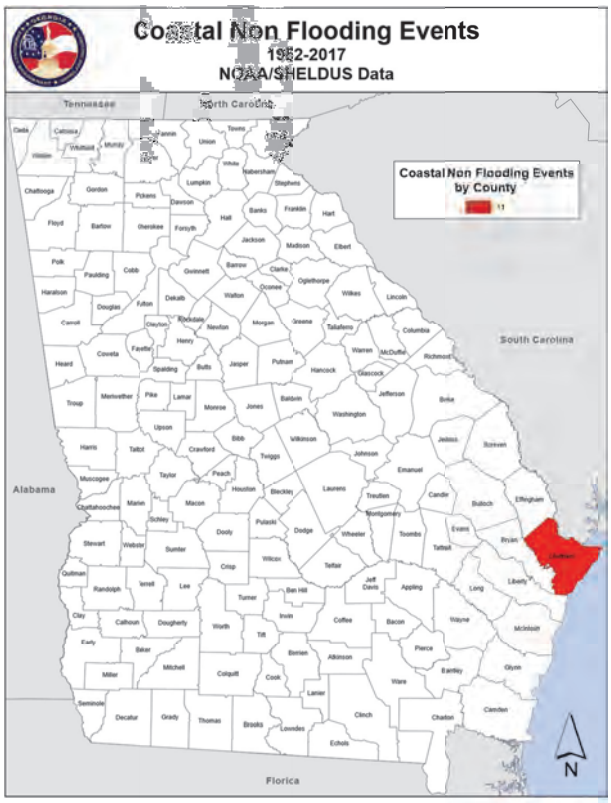
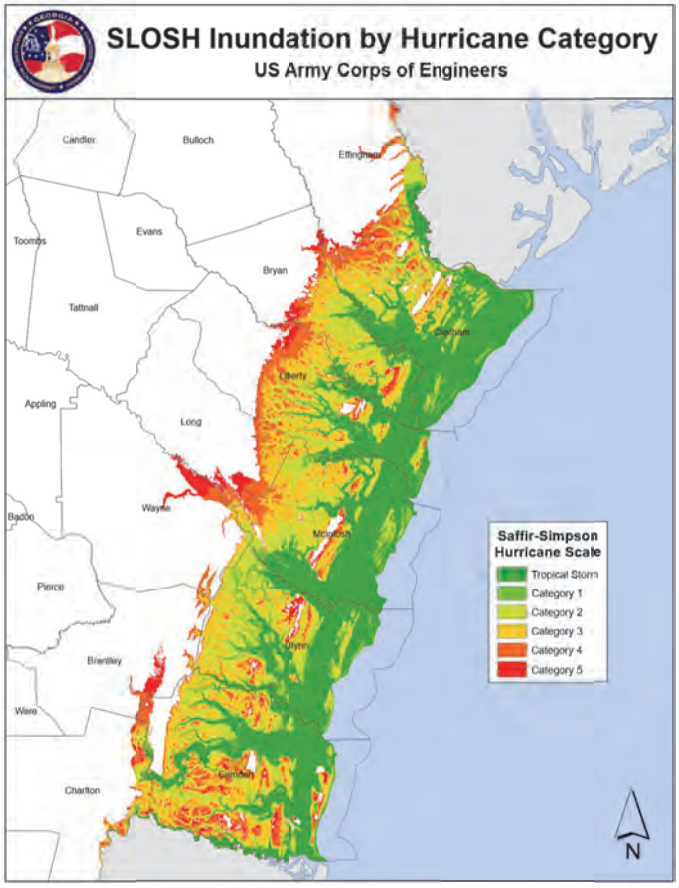


FIGURE 2.15 COASTAL NON-FLOODING LOSSES IN GEORGIA, 1952–2017

Figures 2.14 and 2.15 reflect rip current and high tide events that have occurred in Chatham County. Between 2005 and 2016, there were 11 occurrences, resulting in 12 injuries and 5 deaths. While these were not flood events, the State did incur some costs in repairing beach erosion.

FIGURE 2.16 MODEL OF POTENTIAL STORM SURGE INUNDATION BY HURRICANE CATEGORY



The Sea, Lake, and Overland Surges from Hurricanes (SLOSH) is a deterministic model based on historical, hypothetical, or predicted hurricane data (pressure, size, forward speed, track, and wind speed) that estimates storm surge heights at particular locations when impacted by a certain magnitude storm. The surge levels are defined by the corresponding category of hurricane on the Saffir-Simpson Scale. The areas inundated by a Category 4 or 5 hurricane are combined due to their decreased probability of occurrence. Figure 2.16 shows approximate SLOSH inundation areas along the Georgia coastline for Category 1–5 hurricanes and tropical storms. The exact heights of the surge are not noted because horizontal positional accuracy is unknown due to a lack of reliable surge data in Georgia.

Although the SLOSH-based hazard scores stop at the inland borders of the six coastal counties, strong hurricanes can drive storm surge farther inland to other noncoastal counties. This is not represented on the maps because the underlying data does not include information related to counties beyond the coast. Also, the SLOSH model does not account for any barriers to the storm surge such as Interstate 95 acting as a berm. Figure 2.16, however, offers the best available information.

Impact from Climate Change

It is anticipated that climate change could impact multiple characteristics of hurricanes. As the global temperature warms, the overall intensity of hurricane winds may increase by approximately 3% by the year 2100. However, this may be offset by an anticipated moderate decrease (~25%) in the overall number of storms. Hurricanes may form farther away from North America, and curve northeast slightly more often, resulting in fewer land-falling events along the North American coastline.

As climate change continues and sea level rise occurs, coastal areas of Georgia will be more at risk. Tidal cycles will not grow more or less intense, but with a higher mean sea level, the same strength of tide could result in higher than historically normal tide levels.

The state of Georgia has scientific data that demonstrates the need to plan for an increase in Sea Level Rise at a minimum rate of 1 meter for the next 100 years. This historical data comes from NOAA's tidal gage at Fort Pulaski, GA**.** The mean sea level trend is 3.23 millimeters/year with a 95% confidence interval of +/- 0.28 mm/yr based on monthly mean sea level data from 1935 to 2016 which is equivalent to a change of 1.06 feet in the past 100 years

The Department of Natural Resources Coastal Resources Division conducted an analysis of coastal flooding, using HAZUS-MH, with a one meter sea level rise for the 11 counties closest to the coast, those

being the six coastal counties and five counties one county inland from the coast, based on the following hurricane scenarios:

- A category 1 hurricane coming ashore near Brunswick, and St Simons Island with typical storm surge and no sea level rise.
- A category 1 hurricane coming ashore near Brunswick, and St Simons Island with typical storm surge after 1 meter sea level rise.
- A category 4 hurricane traveling along the coast, skirting the entire coast, with no sea level rise.
- A category 4 hurricane traveling along the coast, skirting the entire coast, after 1 meter sea level rise.
- Category 5 hurricane coming ashore near Sapelo Island with worst case winds and storm surge with no sea level rise.
- Category 5 hurricane coming ashore near Sapelo Island with worst case winds and storm surge after 1 meter sea level rise.

While there are no projected dates or timeframes for the different scenarios, the 1 meter sea level rise is based on studies projecting a 1 meter rise in sea level by the year 2100. The study used existing development for all scenarios. Notably, the study also includes a category 1 hurricane similar to the 2nd scenario, but with "worst case" storm surge and wind, but there was no "worst case" category 1 scenario with no sea level rise, so no comparison can be made.

Table 2.14 shows the increased economic impacts from a 1 meter (3.3') rise in sea levels according to the study. The full report from the study is located in Appendix D.

TABLE 2.14 SEA LEVEL RISE COMPARISON OF ECONOMIC IMPACTS

Scenario	Building Loss	Content Loss	Inventory Loss	Total Loss
Category 1-no sea level rise	$299,662,000	$149,372,000	$445,000	$449,479,000
Category 1 with sea level rise	$2,073,733,000	$1,353,473,000	$9,376,000	$3,436,582,000
Difference	**$1,774,071,000**	**$1,204,101,000**	**$8,931,000**	**$2,987,103,000**
Percent Change	**592%**	**806%**	**2007%**	**665%**
Category 4-no sea level rise	$20,522,737,000	$10,771,808,000	$151,524,000	$31,446,070,000
Category 4 with sea level rise	$22,930,984,000	$13,076,474,000	$213,430,000	$36,220,888,000
Difference	**$2,408,247,000**	**$2,304,666,000**	**$61,906,000**	**$4,774,818,000**
Percent Change	**12%**	**21%**	**41%**	**15%**
Category 5-no sea level rise	$854,855,000	$405,460,000	$3,986,000	$1,264,301,000
Category 5 with sea level rise	$2,319,754,000	$1,373,858,000	$8,848,000	$3,701,960,000
Difference	**$1,464,899,000**	**$968,398,000**	**$4,862,000**	**$2,437,659,000**
Percent Change	**171%**	**239%**	**122%**	**193%**

In addition to the above, the Information Technology Outreach Service of the University of Georgia conducted a HAZUS-MH analysis of State owned and operated facilities in the six coastal counties comparing the potential losses to those facilities with current sea levels to the projected 1-meter sea level

rise. Table 2.15 below shows the results of those analyses. According to the analysis, there is no change in the exposure, but there are slightly higher building and content losses from a 1 meter sea level rise.

TABLE 2.15 SEA LEVEL RISE IMPACTS ON STATE FACILITIES

Study Name	Exposure at Risk	Building Losses	Combined Building and Content Losses	Building Loss Ratio
Bryan - No Sea Level Rise	$12,745,000	$818,000	$3,084,000	6.4
Bryan - Sea Level Rise	$12,745,000	$840,000	$3,127,000	6.6
Camden - No Sea Level Rise	$7,918,000	$281,000	$811,000	3.5
Camden - Sea Level Rise	$7,918,000	$266,000	$804,000	3.4
Chatham - No Sea Level Rise	$431,163,000	$21,134,000	$27,552,000	4.9
Chatham - Sea Level Rise	$431,163,000	$22,327,000	$29,090,000	5.2
Glynn - No Sea Level Rise	$155,230,000	$9,478,000	$22,866,000	6.1
Glynn - Sea Level Rise	$155,230,000	$10,460,000	$25,011,000	6.7
Liberty - No Sea Level Rise	$1,759,000	$109,000	$250,000	6.2
Liberty - Sea Level Rise	$1,759,000	$117,000	$264,000	6.7
McIntosh - No Sea Level Rise	$44,818,000	$2,024,000	$3,962,000	4.5
McIntosh - Sea Level Rise	$44,818,000	$2,129,000	$4,151,000	4.8
Total all Counties - No Sea Level Rise	$653,633,000	$33,844,000	$58,525,000	5.2
Total all Counties - Sea Level Rise	$653,633,000	$36,139,000	$62,447,000	5.5
Difference	$0	$2,295,000	$3,922,000	.3

2.5.3 Wind

Associated Hazards:

Thunderstorms, downbursts, gustnadoes

Priority	Rank
Medium	9

Hazard Description

The National Centers for Environmental Information NCEI divides wind events into several types, including High Wind, Strong Wind, Thunderstorm Wind, Tornado, and Tropical Cyclone. For the purpose of this risk assessment, the Wind Hazard includes data related to high wind, strong wind, and thunderstorm wind events. Tropical cyclone wind is covered under the Hurricane Wind section. Wind hazards related to tornadoes and winter storms are addressed as individual hazards separately in this risk assessment under the relevant subsections. The following definitions come from the NCEI Storm Data Preparation document.

> **High Wind:** Sustained non-convective winds of 35 knots (40 mph) or greater lasting for one hour or longer, or winds (sustained or gusts) of 50 knots (58 mph) for any duration (or otherwise locally/regionally defined), on a widespread or localized basis.
>
> **Strong Wind:** Non-convective winds gusting less than 50 knots (58 mph), or sustained winds less than 35 knots (40 mph) resulting in a fatality, injury, or damage.
>
> **Thunderstorm Wind:** Winds, arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 50 knots (58 mph), or winds of any speed (non-severe thunderstorm winds below 50 knots) producing a fatality, injury, or damage.

Downbursts, including dry or wet microbursts or macrobursts, are classified as Thunderstorm Wind events. In some cases, the downburst may travel several miles away from the parent thunderstorm, or the parent thunderstorm may have dissipated.

A *gustnado* is a small and usually weak whirlwind that forms as an eddy in thunderstorm outflows. It does not connect with any cloud-base rotation and is not a tornado. Since their origin is associated with cumuliform clouds, gustnadoes are classified as Thunderstorm Wind events.

Profile

Figure 2.17 shows historical wind events in Georgia from 1952 to 2017 based on SHELDUS/NCEI data. The majority of events have taken place in the northern portion of the state. Not surprisingly, the historical losses map based on SHELDUS/NCEI data in Figure 2.18 mirrors that of Figure 2.16: the majority of losses have occurred in the areas with the most wind events.

To determine the potential extent, or strength, of the hazard, the planning staff looked at two factors: the average wind speeds and the potential wind gusts. Figure 2.19 shows the average hazard score by county for wind risk. The hazard scores, which range from 1 to 5, correspond to wind speeds, as shown in Table 2.16. The highest risk areas are located along the Atlantic Coast and the southern portion of the state. The wind risk map, Figure 2.20, illustrates the wind gust speeds that have a return interval of 50 years for the counties in Georgia.

Figure 2.20 also partially addresses the potential for future events by identifying the wind gusts that occur approximately every 50 years. Based on the 20 year record from SHELDUS and NOAA, the State of

Georgia has experienced approximately 45 wind events per year, which equates to a greater than 100% chance of an event occurring each year.

FIGURE 2.17 WIND EVENTS IN GEORGIA, 1952–2017

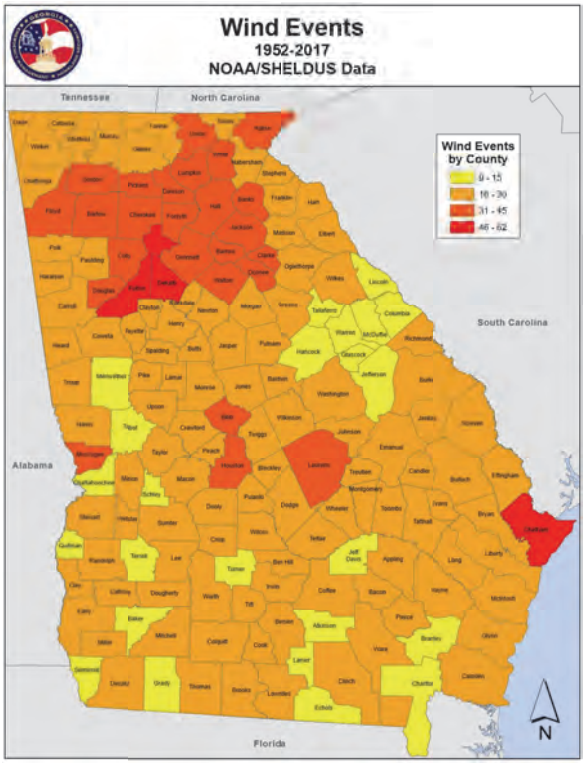


FIGURE 2.18 WIND LOSSES IN GEORGIA, 1952–2017

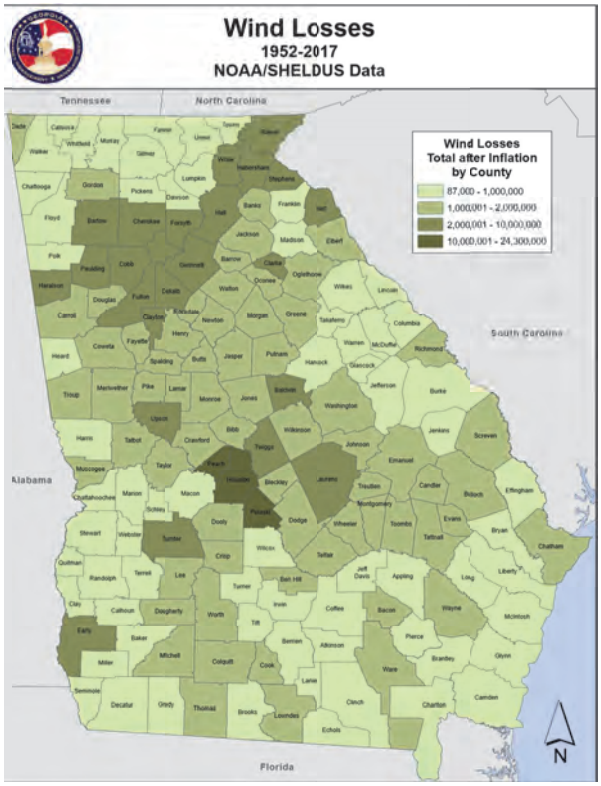


FIGURE 2.19 AVERAGE HAZARD WIND SCORE IN GEORGIA, BY COUNTY

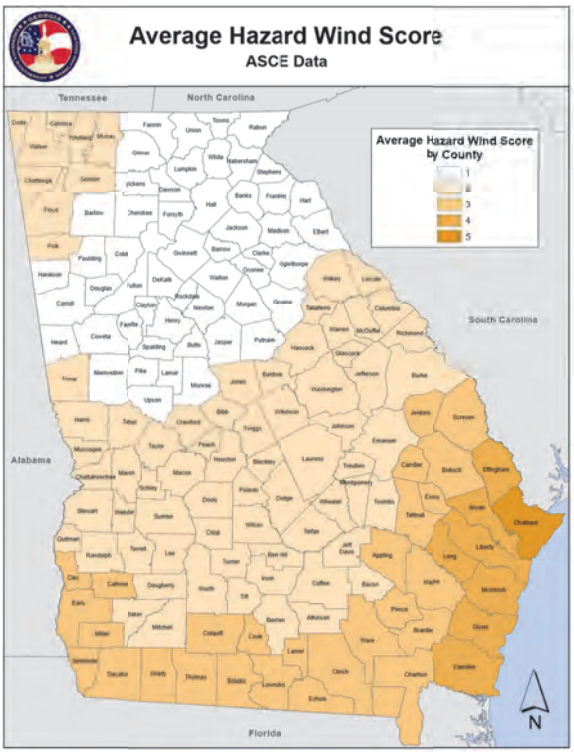
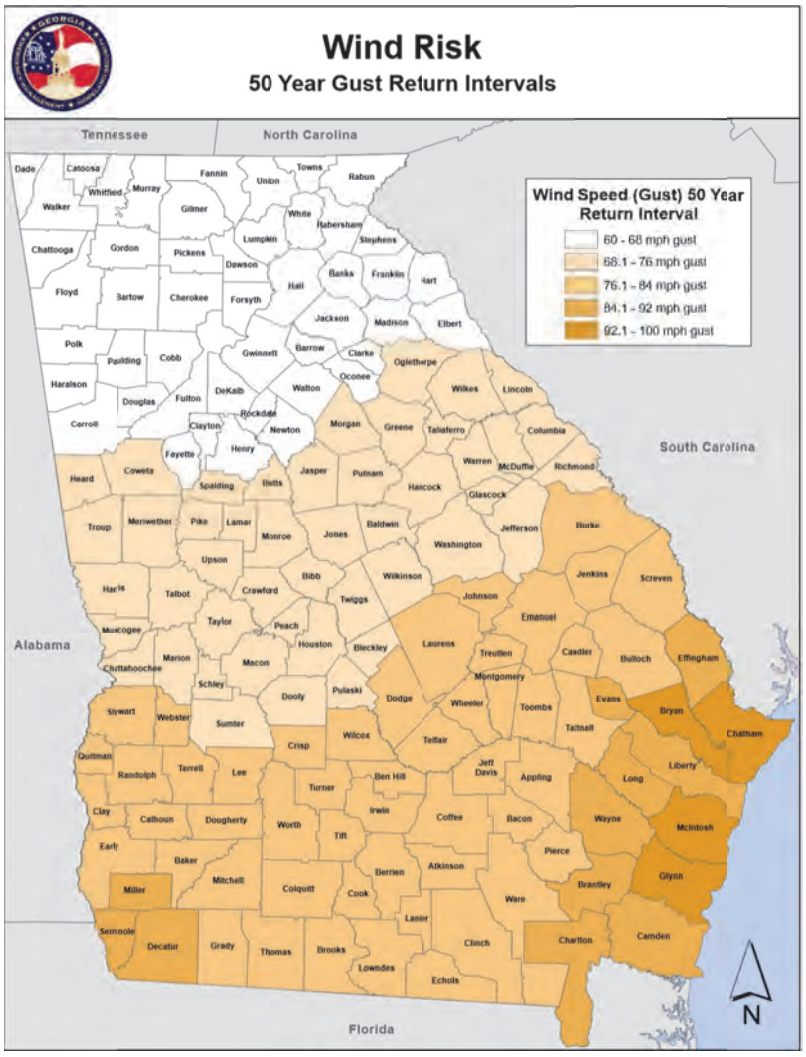


TABLE 2.16 ASSOCIATION BETWEEN WIND SPEED AND HAZARD SCORES

Hazard Score	Wind Speeds
1	<90 mph gust
2	91 – 100 mph gust
3	101 – 110 mph gust
4	111 – 120 mph gust
5	>120 mph gust

FIGURE 2.20 WIND RISK IN GEORGIA, 50 YEAR GUST RETURN INTERVALS



Impacts from Climate Change

How climate change affects the intensity and frequency of thunderstorm winds is uncertain and is being studied intensively. There has been a sizable upward trend in the number of storms causing large financial and other losses. However, there are societal contributions to this trend, such as increases in population and wealth. For Georgia, until the impacts of climate change upon severe weather are better understood, the anticipated frequency and intensity of them will likely remain close to historical averages. However, damage to life and property will likely increase due to population and financial growth.

2.5.4 Severe Weather

Associated Hazards:	Priority	Rank
Thunderstorms, hail, lightning	High	4

Hazard Description

This section provides general and historical information about the main elements of severe weather: thunderstorms, lightning, and hail. Other elements of severe weather such as tornadoes and wind are addressed in other sections of this chapter.

Thunderstorms are formed when moist air near the earth's surface is forced upward through some catalyst (convection or frontal system). As the moist air rises, the air condenses to form clouds. Because condensation is a warming process, the cloud continues to expand upward. When the initial updraft is halted by the upper troposphere both an anvil shape and a downdraft form. This system of up-drafting and down-drafting air columns is termed a "cell."

As the process of updrafts and downdrafts feeds the cell, the interior particulates of the cloud collide and combine to form rain and hail, which falls when the formations are heavy enough to push through the updraft. The collision of the water and ice particles within the cloud creates a large electrical field that must discharge to reduce charge separation. This discharge is the lightning that occurs from cloud to ground or cloud to cloud in the thunderstorm cell. In the final stage of development, the updraft weakens as the downdraft-driven precipitation continues until the cell dies.

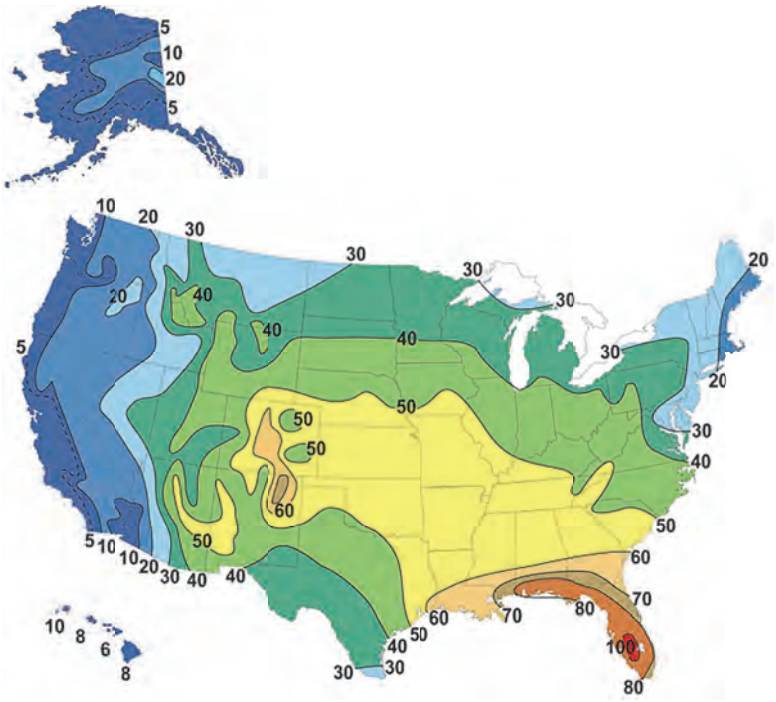
Each thunderstorm cell has the ability to extend several miles across its base and to reach 40,000 feet in altitude. Thunderstorm cells can compound and move abreast to form a squall line of cells, extending farther than any individual cell's potential.

Thunderstorms exhibit no true seasonality and can occur throughout the year. Convectively driven systems dominate in the summer, and frontal driven systems dominate during the other seasons. The rate of onset is rapid in that a single cell endures only 20 minutes. However, various cells in different stages of development can form a thunderstorm that lasts up to a few hours as it moves across the surface. Georgia experiences thunderstorms an average of 50 to 80 days per year.

The NWS defines thunderstorms in terms of severity. A severe thunderstorm produces winds greater than 57 miles per hour and/or hail greater than 1 inch in diameter and/or a tornado. The NWS chose these measures of severity as parameters for storms capable of producing considerable damage. Therefore, these are measures of magnitude that may project intensity.

Lightning occurs when the difference between the positive and negative charges of the upper layers of the cloud and the earth's surface becomes great enough to overcome the resistance of the insulating air. The current flows along the forced conductive path to the surface (in cloud to ground lightning) and reaches up to 100 million volts of electrical potential. The Vaisala U.S. National Lightning Detection Network, from 2008 to 2017, recorded 3-20 lightning flashes per square mile per year throughout the State of Georgia. (Source: https://www.weather.gov/images/safety/NLDN_CGFlash08-17-miles.png) In Georgia, lightning strikes peak in July, with June and August experiencing the next highest numbers of strikes.

FIGURE 2.21 AVERAGE NUMBER OF DAYS WITH THUNDERSTORMS, EASTERN UNITED STATES. Source: NOAA.



Hail is a type of precipitation that forms during the updraft- and downdraft-driven turbulence within the cloud. The hailstones are formed by layers of accumulated ice (with more layers creating larger hailstones) that can range from the size of a pea to the size of a grapefruit. Hailstones span a variety of shapes but usually are spherical. Hail storms mostly endanger crops but have been known to damage automobiles, aircraft, and structures. Hail stones can vary in diameter, and in Georgia hail of up to 2.75 inches has been recorded.

Profile

Figures 2.22 and 2.23, respectively, present severe weather (thunderstorms, lightning, and hail) event and loss history based on SHELDUS/NCEI data. Figure 2.22 shows that from 1952 to 2017 the area around Metro Atlanta experienced the most identified severe weather events. This could be due to urban areas having more valuables to damage and, thus, SHELDUS/NCEI is more likely to recognize the occurrence as an event. As Figure 2.23 illustrates, the losses stemming from severe weather events can affect rural farm communities to an extent similar to that of urban areas.

While most events related to severe weather are limited in terms of their impact, duration, and spatial extent, the hazard remains one of the most common in the State of Georgia. According to SHELDUS/NCEI data, an average of 331 severe weather events per year occurred between 1952 and 2017. These events in total have caused 990 injuries, 168 fatalities, and more than $1.2 billion in damages. Over the period from 1997 to 2017, the historic occurrence jumps to 499 severe weather events per year, which equals a greater than 100% chance of occurrence in any given year.

According to the Vaisala U.S. National Lightning Detection Network, from 2008 to 2017 Georgia averaged approximately 641,790 cloud-to-ground lightning flashes per year. While lightning frequently occurs, only 8 deaths were reported in 2008–2017 as a result of lightning, placing Georgia in the top 10 in the United States. However, Georgia is in the top 30 states when comparing lightning deaths to the state's population. (sources: https://www.weather.gov/media/safety/08-17Fatality_Map_state.pdf, https://www.weather.gov/media/safety/08-17Flash_Density_State.pdf).

Severe weather is not spatially confined to any particular location in Georgia; therefore, the entire state is equally at risk of severe weather.

FIGURE 2.22 THUNDERSTORMS/ LIGHTNING/ HAIL EVENTS IN GEORGIA, 1952–2017

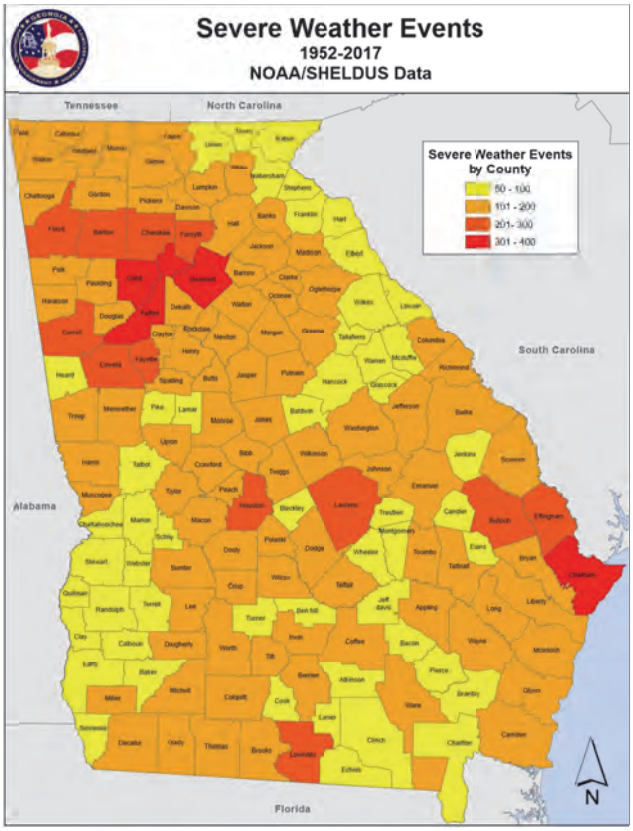
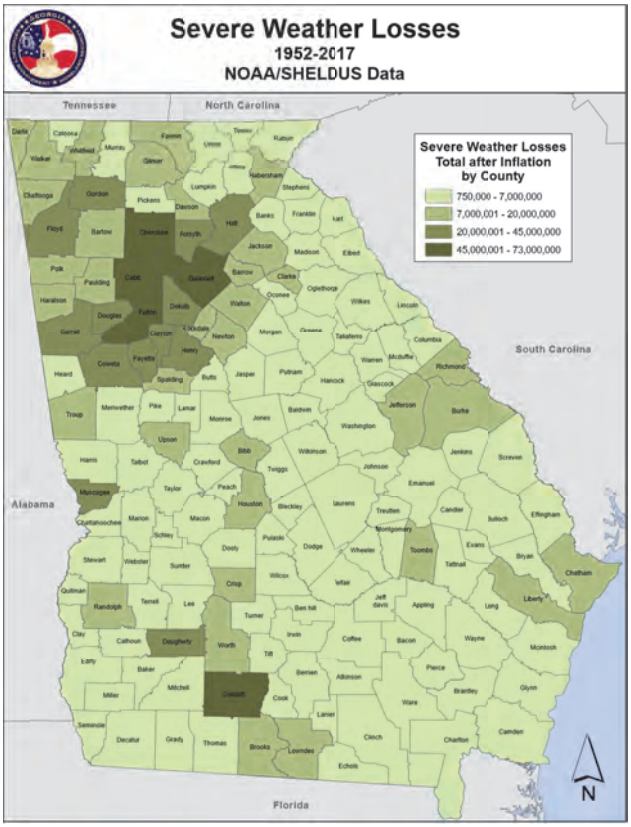


FIGURE 2.23 THUNDERSTORMS/ LIGHTNING/ HAIL LOSSES IN GEORGIA, 1952–2017



Impacts from Climate Change

How climate change affects the intensity and frequency of severe weather, including lightning and hail, is uncertain and is being studied intensively. There has been a sizable upward trend in the number of storms causing large financial, property and other losses. However, there are societal contributions to this trend, such as increases in population and wealth. For Georgia, until the impacts of climate change upon severe weather are better understood, the anticipated frequency and intensity of them will likely remain close to historical averages. However, damage to life and property will likely increase due to population and financial growth.

2.5.5 Tornado

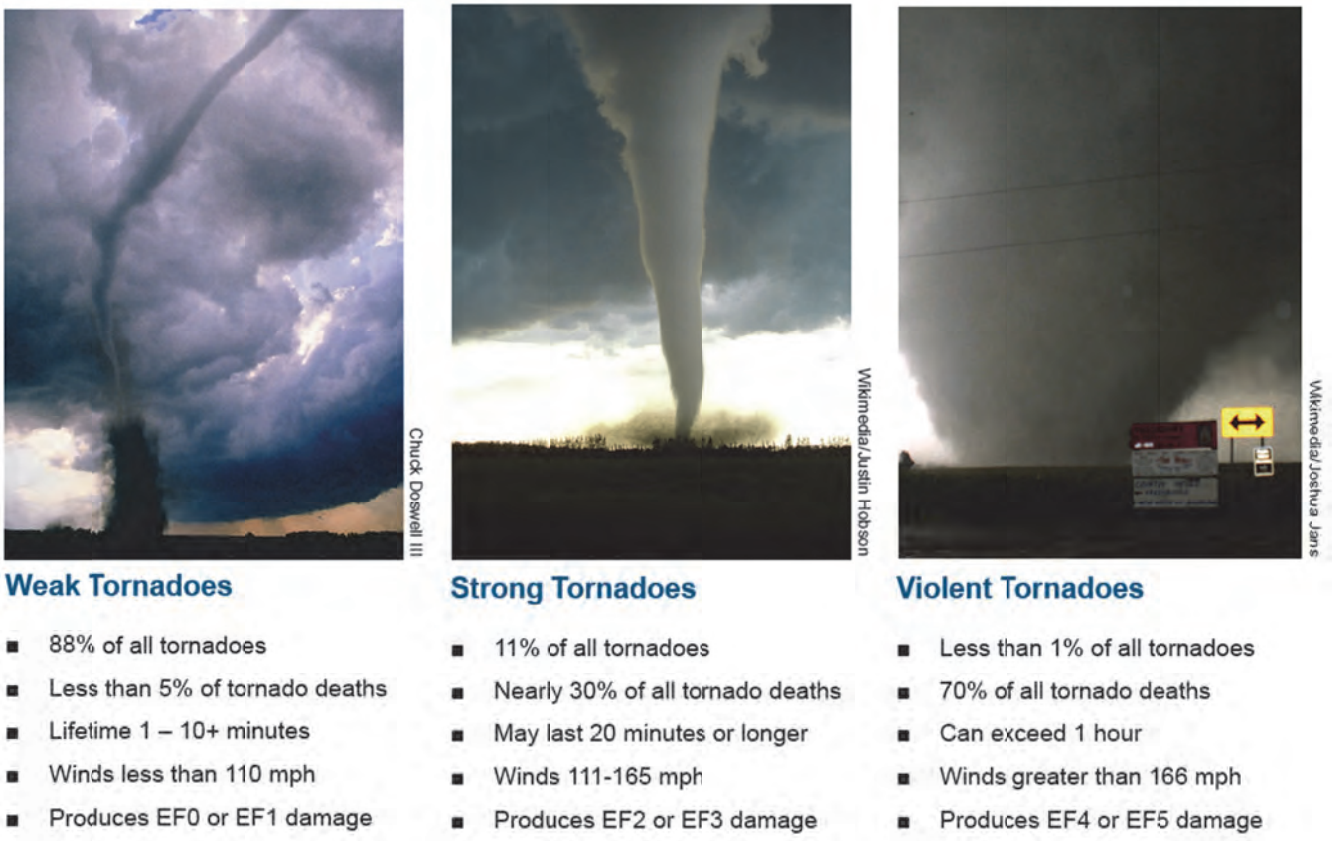
Associated Hazards:	Priority	Rank
Thunderstorms, tropical cyclones	High	1

Hazard Description

A tornado is a violently rotating column of air (seen only when containing condensation, dust, or debris) in contact with the surface of the ground. Exceptionally large tornadoes may not exhibit the classic “funnel” shape but can appear as a large, turbulent cloud near the ground or a large rain shaft. Destructive because of strong winds and windborne debris, tornadoes can topple buildings, roll mobile homes, uproot vegetation, and launch objects hundreds of yards.

Most significant tornadoes (excluding some weak tornadoes and coastal waterspouts) stem from the right, rear quadrant of large thunderstorm systems where the circulation develops between 15,000 and 30,000 feet. As circulation develops, a funnel cloud (rotating air column aloft) or tornado descends to the surface. These tornadoes are typically stronger and longer-lived. The weaker, shorter-lived tornadoes can develop along the leading edge of a singular thunderstorm.

FIGURE 2.24 TORNADO CHARACTERISTICS BY STRENGTH.
Source: NOAA National Weather Service



Although tornadoes can occur in most locations, the majority of tornado activity in the United States takes place in the Midwest and Southeast. Within the State of Georgia, tornadoes can occur anywhere. In terms of the continuum of area of impact for hazard events, tornadoes are fairly isolated. Typically ranging from a few hundred feet to one or two miles across, tornadoes affect far less area than larger meteorological events such as hurricanes, winter storms, and severe weather.

An exact season does not exist for tornadoes; however, most occur in early spring to midsummer (February–June). The rate of onset of tornado events is rapid. Typically, the first sign of the tornado is a descending funnel cloud. This sign may be only minutes from the peak of the event, giving those in danger minimal sheltering time. However, meteorological warning systems attempt to afford those in danger more time to shelter. The frequency of specific tornado intensities is undetermined because no pattern seems to exist in occurrence. Finally, the duration of tornado events ranges from the few minutes of impact at a particular location to the actual tornado lasting up to a few hours.

Tornadoes are measured after the occurrence using subjective intensity measures. The Enhanced Fujita Scale (Fujita-Pearson Tornado Classification) describes the damage and then gives estimates of the magnitude of peak 3-second gusts in miles per hour. Table 2.17 lists the rankings on the Enhanced Fujita Scale and the corresponding magnitude and intensity measures.

TABLE 2.17 ENHANCED FUJITA SCALE

EF Number	3 Second Gust (mph)	Damage
0	65–85	**Light damage.** Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
1	86–110	**Moderate damage.** Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
2	111–135	**Considerable damage.** Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
3	136–165	**Severe damage.** Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
4	166–200	**Devastating damage**. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
5	More than 200	**Incredible damage.** Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); high-rise buildings have significant structural deformation; incredible phenomena occur.

Source: NOAA.

FIGURE 2.25 TORNADO EVENTS IN GEORGIA, 1952–2017

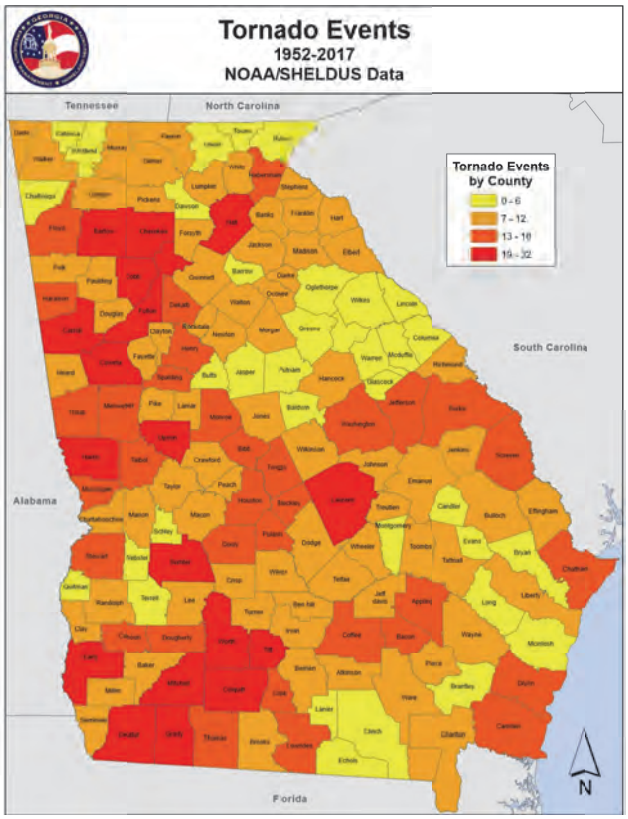


FIGURE 2.26 TORNADO LOSSES IN GEORGIA, 1952–2017

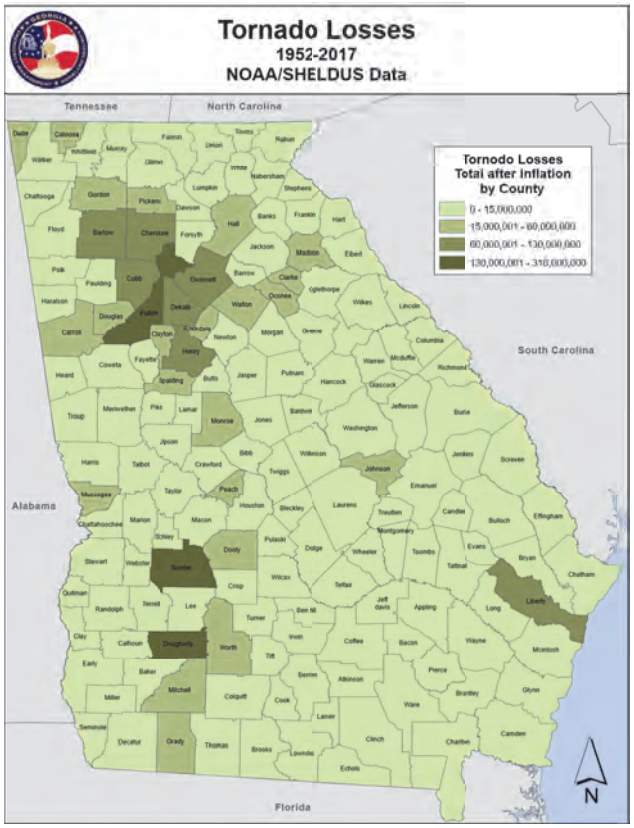


FIGURE 2.27 TORNADO TRACKS IN GEORGIA, 1950–2016

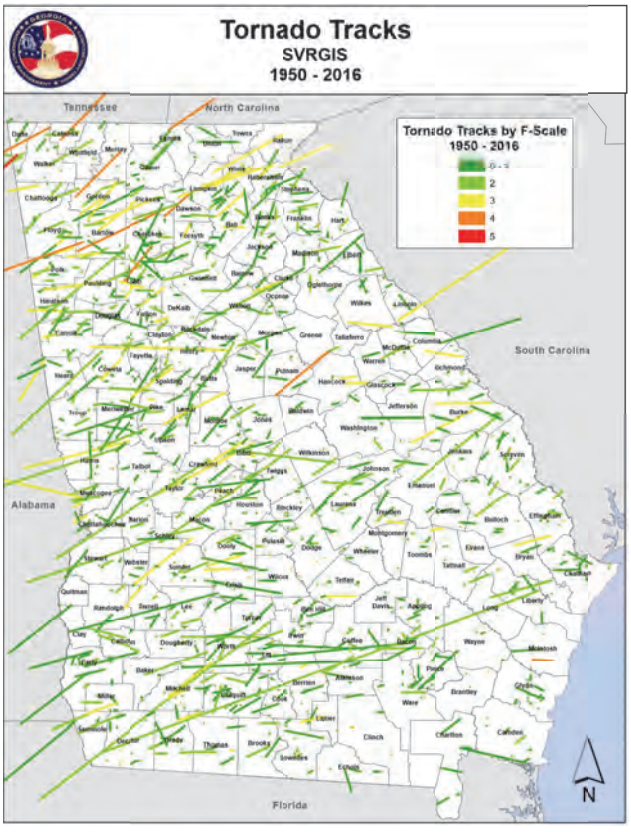


Figure 2.25 illustrates the tornado events per county from 1952 to 2017. Based on this map, counties in Northwest and Southwest Georgia have experienced a higher number of tornado events. However, tornadoes can occur anywhere within the state. In terms of losses associated with these events, Figure 2.26 illustrates that the areas with the most losses from tornadoes exist around the City of Atlanta. This phenomenon is most likely due to the fact urban areas have more potential for loss in terms of property (not necessarily including crop damage).

Table 2.18 details the more notable tornado events that have affected the State of Georgia. The data spans from the early 1900s to the present and includes storms that appear in the historical

record with numerous fatalities or vast damage. The events listed in the table are not a complete history of tornado activity in Georgia, but are a sample meant to demonstrate the ability of tornadoes to impact the State.

The best available information to determine future probability of a tornado event is to review historic frequency. In total, 1,743 tornado events occurred between 1952 and 2017 in Georgia according to SHELDUS/NCEI data. This equates to a historic average of approximately 27 events per year. These events have caused a total of 3,189 injuries, 175 fatalities, and more than $2.4 billion in damages. Moreover, in the most recent 20 year record, there have been 646 events (average 32/year), 1,220 injuries, 83 fatalities and more than $1.2 billion in damages. Statistically, this equates to a greater than 100% probability of a tornado occurring in any given year. Notably, many tornadoes occur as a part of a larger outbreak of separate tornado events. For example, a weekend long tornado outbreak in January, 2017 included over 40 separate events in one weekend. On the other hand, other years have recorded as few as three occurrences.

NOAA's Severe Weather GIS (SVRGIS) data contain several spatial datasets for tornado events covering the years 1950–2016. Figure 2.27 shows tornado tracks from SVRGIS data. These tracks suggest that tornadoes seem to predominantly travel in a northeasterly direction in the state. These datasets indicate that the highest recorded magnitude tornado event in Georgia is an EF4.

TABLE 2.18 NOTABLE TORNADO EVENTS IN GEORGIA

Year	Area Affected	Description
1903	Gainesville Area	200 deaths; 400 injuries; 1,500 homeless
1936	Gainesville Area	203 deaths; >1,000 injuries; 800 homes destroyed
1944	Hall and Franklin Counties	18 deaths
1974	Dawsonville Area	4 deaths
1992*	Lumpkin County	FEMA DR969; F4 tornado; 6 deaths; 170 injuries; >1,000 homes damaged; $2 million in damages
1993*	Hall County	FEMA DR980; 44 homes damaged; $2.5 million in damages
1994*	Northwestern Georgia	FEMA DR1020; 19 deaths; >200 injuries; $67.5 million in damages
1994*	Camden County	FEMA DR1042; F2 intensity

Year	Area Affected	Description
1995*	Albany Area	FEMA DR1076; 36 injuries; 250 buildings damaged
1998*	Hall County & Metro Atlanta	FEMA DR1209; tornadoes causing extensive damage to homes and critical facilities
1999*	Dooly and Candler Counties	FEMA DR1271; tornadoes causing damage to homes, especially in Vienna
2000*	Southwest Georgia	FEMA DR1315; 18 deaths; >100 injuries; $5 million in damages
2007*	Southwest Georgia	FEMA DR1686; 2 deaths; numerous injuries; hospital destroyed in Sumter County
2008*	Metro Atlanta Area, Including Downtown	FEMA DR1750; 3 deaths; 39 injuries; $38 million in damages
2008*	Macon and Surrounding Areas and Southeast Georgia	FEMA DR1761; 2 deaths; 25 injuries; $71.2 million in damages
2011*	North and Central Georgia	FEMA DR1973; 15 tornadoes including one EF4 and four EF3; 15 deaths; 143 injuries; $167 million in damages
2017*	Southwest Georgia	FEMA DR 4294; Straight line winds/10 tornadoes in SW Georgia; 5 deaths; estimated $15 million in uninsured losses
2017*	Central and South Georgia	FEMA DR 4297; >30 tornadoes; 16 deaths; estimated $30 million in uninsured losses

*Presidential declared disaster

Impacts from Climate Change

How climate change affects the intensity and frequency of severe thunderstorms, causing tornadoes, is being studied intensively. There has been a sizable upward trend in the number of storms causing large financial and other losses. However, there are societal contributions to this trend, such as increases in population and wealth. For Georgia, until the impacts of climate change upon severe weather are better understood, the frequency and intensity of them will likely remain close to historical averages. However, damage to life and property will likely increase due to population and financial growth.

2.5.6 Inland Flooding

Associated Hazards:

Thunderstorms, tropical cyclones, dam failure

Priority	Rank
High	2

Hazard Description

According to 44CFR59.1, flooding is a general and temporary condition of partial or complete inundation of normally dry land areas. This can be from the overflow of inland or tidal waters or the unusual and rapid accumulation or runoff of surface waters from any source and any resulting mudslides or mudflows. The causes of flooding include mass sources of precipitation such as tropical cyclonic systems, frontal systems, and isolated thunderstorms combined with other environmental variables such as changes to the physical environment, topography, ground saturation, soil types, basin size, drainage patterns, and vegetative cover. Adverse impacts can include structural damage, temporary backwater effects in sewers and drainage systems, death of livestock, agricultural crop loss, loss of access to critical facilities due to roads being washed-out or overtopped, and unsanitary conditions resulting from materials being deposited during recession.

Floods are loosely classified as either coastal or riverine. Coastal flooding is addressed in Section 2.5.2 Coastal Hazards. Riverine flooding occurs from inland water bodies such as streams and rivers. Riverine flooding is often classified as either typical or flash based on the rate of onset. The former is slow to build, peak, and recede, often allowing sufficient time for evacuations. The latter type of riverine flooding is referred to as a “flash” flood, which rapidly peaks and recedes, giving insufficient time for evacuations. The more dangerous flash floods are common to the mountainous, impermeable surfaces of northern Georgia. Urban flash flooding can also present dangerous conditions, especially with roads washing out.

On a broad scale, flooding can occur around any body of water or low-lying surface given enough precipitation or snow melt. The spatial extent of the flooding event depends on the amount of water overflow but can usually be mapped because of existing floodplains (areas already prone to flooding).

In Georgia, flooding is highly dependent on precipitation amounts and is highly variable within the state. Georgia’s climate is primarily affected by latitude, proximity to the Atlantic Ocean and Gulf of Mexico, and topography. Certain seasons are more prone to flooding based on the likelihood of excessive precipitation. Typically, the wet seasons are winter, early spring, and midsummer, and the drier seasons are fall and late spring. However, this varies across the state with the northern portion receiving maximum precipitation amounts during the winter as a result of frontal systems, whereas Central and Coastal Georgia receive maximums in the mid to late summer as a result of tropical cyclones and convective thunderstorm activity.

Profile

The rate of onset and duration of flooding events depends on the type of flooding (typical flood or flash flood). The frequency measure for flooding events typically refers to the 1% annual chance flood, often called the 100 year flood. This means every year there is a 1% chance of occurrence of this magnitude of flood. This magnitude of flood is often mapped as 100 year floodplains, which usually shows those areas at substantial risk to some severe flooding. The Atlanta area likely has a higher number of events due to growth and development within floodplains in the region prior to floodplain mapping efforts that began in the 1970s. As a result, land and structures in this region are more likely to experience flood events.

Figure 2.28 maps the flooding hazard event history in the State of Georgia from 1952 to 2017. Figure 2.29 maps the associated losses by county. Although the event totals pale compared to more frequent events such as severe weather, the total losses speak to the impact of flooding on Georgia. The regions with major losses from flooding include the Atlanta area, the Augusta area, and southwestern Georgia. However, the entire State of Georgia has experienced loss from flooding.

FIGURE 2.28 FLOOD EVENTS IN GEORGIA, 1952–2017

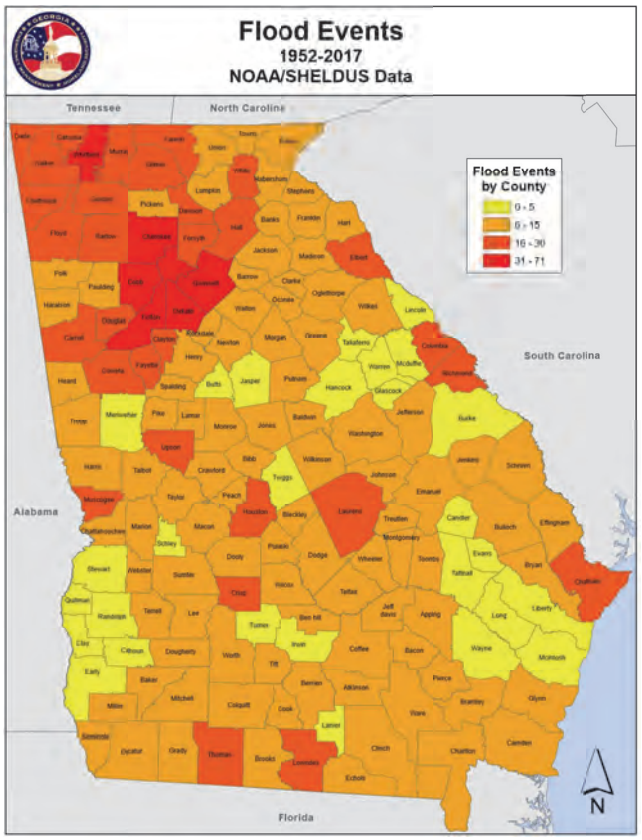
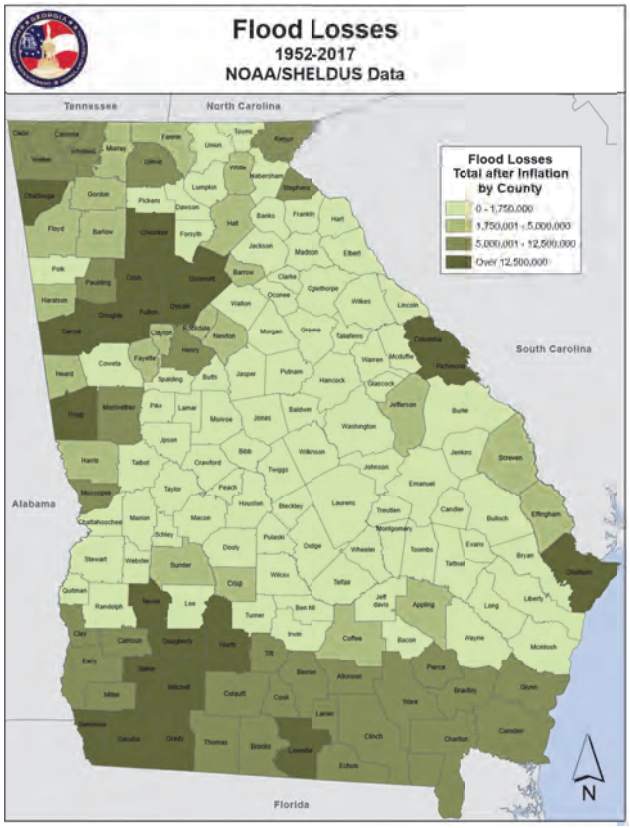


FIGURE 2.29 FLOOD LOSSES IN GEORGIA, 1952–2017



In total, 1,919 inland flooding events occurred between 1952 and 2017 in Georgia according to the SHELDUS/NCEI data. This equates to a historic average of approximately 30 events per year. These storms in total have caused 48 injuries, 80 fatalities, and more than $1 billion in damages. In the past 20 years, (1997-2016) there have been 1,123 flood events, causing 13 injuries, 18 fatalities, and $764 million in damages. In the past 20 years, Georgia has seen an average of 56 flood events per year. This equates to a greater than 100% chance of a flood occurring somewhere in the state in any given year.

Table 2.19 lists notable flooding events in Georgia since the late 1800s along with an estimate of the magnitude of the flood and recurrence interval. Although the majority of floods are minor in their impact, the risk analysis demonstrates the susceptibility of Georgia to experiencing significant flooding events. Note the 1994 Tropical Storm Alberto and 2009 Metro Atlanta flood events were extreme events with damages almost 10 times the amount of any other recorded flood event.

The worst flooding event in Georgia since stemmed from a decaying tropical system, previously known as Tropical Storm Alberto. The system produced torrential rainfall and resulted in some of the worst flooding ever observed across portions of Georgia, Alabama, and Florida during July 1994 (see Figure 2.30). By far, the worst flooding occurred along Georgia's Flint and Ocmulgee Rivers and their tributaries. Some of the hardest hit cities along these rivers included Albany, Macon, and Montezuma. Across the entire three-state area affected by the flooding, 17 NWS river forecast locations set new record flood stages, some breaking the old record by 5–7 feet. In all, 47 NWS river forecast locations exceeded flood stage. Crests of 5–15 feet above flood stage were common, while portions of some rivers observed crests that exceeded flood stage by more than 20 feet.

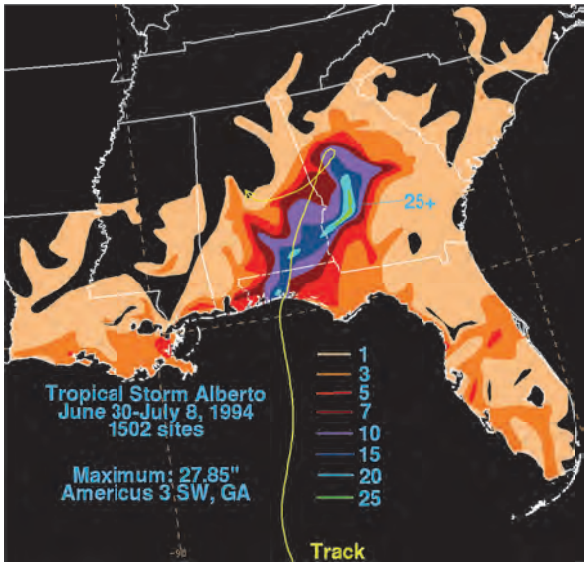
TABLE 2.19 NOTABLE FLOOD EVENTS IN GEORGIA, 1881–2009

Year	Area Affected	Recurrence Interval	Remarks
1881	Savannah Area	>100 years	335 deaths; $1.5 million in damages
1893	Savannah Area	>100 years	2,500 deaths; $10 million in damages
1916	Chattahoochee, Coosa, and Flint Rivers	25 to >100 years	8-21 inches of rain; $2.3 million in damages
1925	Central / South Georgia	25 to >100 years	8-11 inches of rain; 2 deaths
1929	Savannah, Ogeechee, and Altamaha Rivers	25 to >100 years	6-10 inches of rain; $3 million in damages
1940	Ogeechee and Savannah Rivers	10 to 75 years	25 deaths; $850,000 in damages; hurricane
1977*	Toccoa Creek	Unknown	DR541; Dam failure; 39 deaths; $2.8 million in damages
1990*	Conasauga, Chattooga, Toccoa and Oconee Rivers	50 to >100 years	FEMA DR857; 9 deaths; $13.9 million in damages
1990*	Savannah, Ogeechee and Ohoopee Rivers	>100 years	FEMA DR880; $7.6 million in damages, tropical storm
1991*	Altahama, Apalachicola, Ochlockonee, Ogeechee, Satilla, and Savannah Rivers	25 to 50 years	FEMA DR897; $3.4 million in damages
1994*	Flint, Chattahoochee, and Altamaha Rivers	>100 years	FEMA DR1033; 31 deaths; >20 inches of rain; $400 million in damages; Tropical Storm Alberto
1994*	Savannah area	25 to >100 years	FEMA DR1042; 15 inches of rain; $10.5 million in damages
1995*	Western Georgia	25 to 50 years	FEMA DR1209; 5-9 inches of rain; $20 million in damages; hurricane
2004*	Middle and South Georgia	10 to 50 years	FEMA DR1560; 4-9 inches of rain; $20 million in damages; hurricane
2004*	Northern and Southwestern Georgia	10 to 50 years	FEMA DR1554; 4-9 inches of rain; $30 million in damages; hurricane
2009*	Southwestern Georgia	10 to >500 years	FEMA DR1833; 5-10 inches of rain; $36.5 million in damages
2009*	Northwest Georgia, Atlanta Area	> 500 years (Epic)	FEMA DR1858; 9-12 inches of rain; $225 million in damages

2015*	North and West Georgia	10-50 Years	FEMA DR4259; 7-15 inches of rain; $30 million in damages.

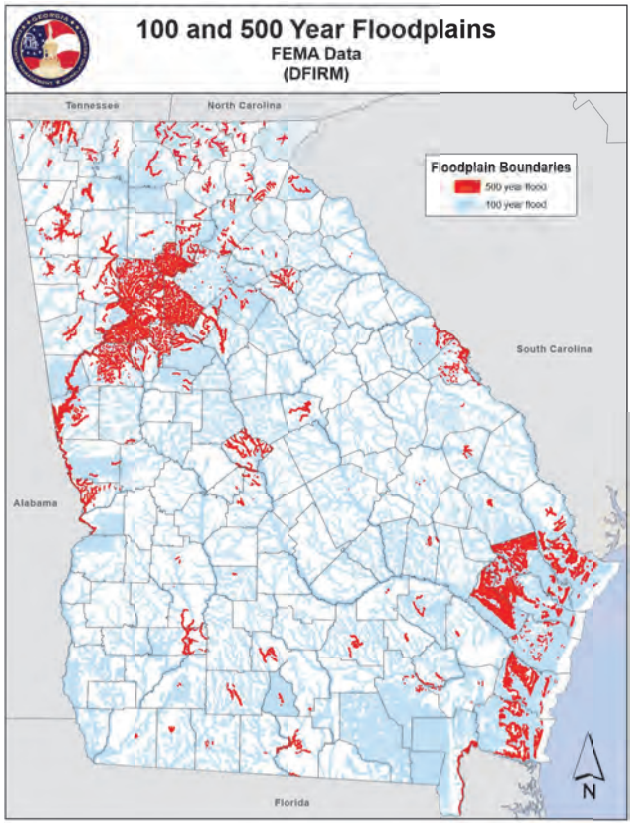
*Presidential declared disasters

FIGURE 2.30 TROPICAL STORM ALBERTO RAINFALL TOTALS, IN INCHES



The flooding from Tropical Storm Alberto took a significant toll on human life, killing 33 people. Of that total, 31 deaths occurred in Georgia and the other two in Alabama. Many of the fatalities, as is typical with flood events, occurred as a result of flash flooding, and most occurred in vehicles. In addition, approximately 50,000 people were forced from their homes by the flooding. More than 18,000 dwellings were damaged or destroyed, and nearly 12,000 people applied for emergency housing. In Macon, Georgia, the fresh water supply to nearly 160,000 people was disrupted when the water treatment plant, located along the banks of the Ocmulgee River, was flooded. Some residences were without fresh water for as long as 19 days. In addition, thousands of people and pieces of equipment were engaged in various flood-fighting efforts throughout the three-state area impacted by the flooding. Dozens of federal, state, and local government agencies and private organizations as well as various volunteer groups were heavily involved in the massive mobilization of resources.

FIGURE 2.31 100 AND 500 YEAR FLOODPLAINS IN GEORGIA



Flooding related to Tropical Storm Alberto, estimated to have caused nearly $750 million in property damages across Georgia, Alabama, and Florida. In addition to the more than 18,000 dwellings damaged or destroyed, hundreds of bridges and well over 1,000 roads sustained damages. Also, 218 dams (most of them small dams located in Georgia) were damaged, and many failed altogether. Agricultural losses totaled approximately $100 million. In Georgia, Alabama, and Florida combined, more than 900,000 acres of crops were affected by the flooding. Georgia and Alabama suffered the greatest crop losses with more than 400,000 acres in each state impacted. In all three states, peanuts and cotton were the commodities most severely affected. Livestock losses were also significant, especially to poultry, with as many as 250,000 chickens reportedly lost to the flooding.

Similar to storm surge models, flood models are statistically based on historical flooding events that estimate the areas inundated by certain magnitudes of floods (typically the 1% annual chance flood often referred to as the100 year flood). Figure 2.31 maps the 1% (100 year) and 0.2% (500-year) floodplains for the State of Georgia based on the FEMA Digital Flood Insurance Rate Map (DFIRM) floodplain layer. This activity was initially funded up to Federal Fiscal Year (FY) 2008, through the map modernization program, followed by the Risk Mapping Assessment and Planning (M.A.P) efforts funded from fiscal year 2009. As of this plan update, all counties in Georgia have available DFIRM data. It should be noted that during the map modernization updates, not all 500 year floodplains were mapped, and, for many counties, only 100 year floodplains were mapped during the map modernization process

With the adoption of the Risk M.A.P. program since fiscal year 2009, the Georgia Department of Natural Resources is developing Risk M.A.P products by watershed, with the goal of eventually developing updated flood products for the entire State. These include updated regulatory 1% annual chance flood boundaries, delineation of the 0.2% annual chance flood boundaries, as well as flood risk products such as Changes since the Last Flood Insurance Risk Map, Areas of Mitigation Interest and Water Surface Depth and Probability Grids for specified storms including the 10%, 4%, 2%, 1% and 0.2% annual chance flood frequencies. Because of this mapping effort, local officials will have access to more accurate flood risk information to help make more informed decisions about reducing the community's flood risk, thereby resulting in safer, more resilient communities.

Currently, there is no concise resource for estimating the potential extent of a flood event. Many resources, such as recorded flood gauge data and flood insurance studies, are available and often adequate for local plan use, but are inconsistent at best when viewed on a statewide basis. As noted above, the Georgia Department of Natural Resources is in the process of developing Risk M.A.P studies, including depth grids, in various areas of the State, but the data is only available in limited areas at the time of this update.

Impacts from Climate Change:

The State of Georgia has experienced a 3-6% decrease in flood magnitude over the past decade. However, major weather factors that contribute to flooding include heavy or prolonged precipitation, snowmelt, thunderstorms, storm surges from hurricanes, and ice or debris jams. Human factors that contribute to flooding include structural failures of dams and levees, altered drainage, and land-cover alterations (such as pavement). Increasingly, temperature warming increases heavy downpours, causes more extensive storm surges due to sea level rise, and leads to more rapid spring snowmelt. The risks from future floods are significant, given expanded development in coastal areas and floodplains, unabated urbanization, land-use changes, and climate change. Because of this, flooding may intensify in many U.S. regions, even in areas where total precipitation is projected to decline.

For Georgia, the risk for all flooding types – flash floods, river floods, and urban floods, all potentially leading to dam failure – will theoretically increase if precipitation occurs more frequently or falls more efficiently.

Specifically, the Department of Natural Resources Coastal Resources Division conducted a study of riverine flooding with a 1 meter sea level rise for the 12 counties closest to the coast, those being the 6 coastal counties and 6 counties one county inland from the coast, based on a 1% annual chance flood. Table 2.20 shows the increased losses from a 1 meter (3.3') rise in sea levels according to the study. The full report from the study is located in Appendix D.

Table 2.20 Increased Riverine Flooding from Sea Level Rise

Loss Type	No Sea Level Rise	1 meter Sea Level Rise	Difference
Total Buildings Damaged	2,698	6,451	3,753
Building Loss	$44,334,051	$74,313,589	$29,979,538
Content Loss	$38,211,156	$71,550,022	$33,338,866
Inventory Loss	$9,611,802	$21,432,433	$11,820,632
Displaced People	5,000	14,000	9,000
Debris	5,500 tons	8,500 tons	3,000 tons

.

2.5.7 Severe Winter Weather

Associated Hazards:

Snowfall, ice, high winds, extreme cold temperatures, winter coastal storms

Priority	Rank
Medium	7

Hazard Description

Severe winter storms bring the threat of ice. Freezing rain consists of super-cooled falling liquid precipitation that freezes on contact with the surface when temperatures are below freezing. This results in an ice glazing on exposed surfaces including buildings, roads, and power lines. Sleet is easily discernable from freezing rain in that the precipitation freezes before hitting the surface. Often sleet bounces when hitting a surface and does not adhere. However, sleet can compound into sufficient depths to pose some threat to motorists and pedestrians.

A heavy accumulation of ice, which is often accompanied by high winds, has the ability to devastate infrastructure and vegetation. Often, sidewalks and streets become extremely dangerous to pedestrians and motorists. Primary industries such as farming and fishing suffer losses associated with winters of extreme temperatures and precipitation. In the southern states, this destructiveness is often amplified due to the lack of preparedness and response measures. Also, the infrastructure is not designed to withstand certain severe weather conditions such as weight build-up from snow and ice.

Within Georgia, the impacts of winter storms are often contained within the northern part of the State. However, events like the 1993 “storm of the century” illustrated the vast impacts that one storm can have on the entire state. The winter storms with the greatest impacts on Georgia are the result of coastal storms coming up from the Gulf of Mexico, including the winter storms in 1973 and 1993. The 1973 storm produced snowfalls of up to 19 inches in parts of Central Georgia including the City of Thomaston in Upson County. Also, a major ice storm occurred in 2014, bringing up to 1 inch of ice to the eastern portion of the State near Augusta.

Severe winter weather is seasonal, with most storms occurring between January and March, with the highest probability of occurrence in February. The rate of onset and duration varies, depending on the weather system driving the storm. Georgia rarely experiences severe winter weather; however, the impacts of the storms substantiate severe winter weather’s inclusion in risk assessments for most southern states.

Profile

The best measures for describing the magnitude and intensity of severe winter weather include average amounts of precipitation (snow fall), inches of accumulated ice, low and high temperatures, and wind gust speeds. Historic amounts are reflected in Figures 2.32 – 2.35 (Snow and Ice total maps) below.

NOAA's National Centers for Environmental Information (NCEI) is now producing the Regional Snowfall Index (RSI) for significant snowstorms that affect the eastern two-thirds of the United States. The RSI ranks snowstorm impacts on a scale from 1 to 5, similar to the Fujita scale for tornadoes or the Saffir-Simpson Scale for hurricanes. (Source: https://www.ncdc.noaa.gov/snow-and-ice/rsi/)

TABLE 2.21 NOAA RSI CATEGORIES FOR SOUTHEAST

Category	RSI Value	Description
1	1–3	Notable
2	3–6	Significant
3	6–10	Major
4	10–18	Crippling
5	18.0+	Extreme

The RSI differs from these other indices because it includes population. RSI is based on the spatial extent of the storm, the amount of snowfall, and the juxtaposition of these elements with population. Including population information ties the index to societal impacts. Currently, the index uses population based on the 2000 Census.

The RSI is an evolution of the Northeast Snowfall Impact Scale (NESIS), which NCEI began producing operationally in 2005. While NESIS was developed for storms that had a major impact in the Northeast, it includes the impact of snow on other regions as well. It can be thought of as a quasi-national index that is calibrated to Northeast snowstorms. By contrast, the RSI is a regional index; a separate index is produced for each of the six NCEI climate regions in the eastern two-thirds of the nation. Georgia is in the Southeast climate region.

The RSI is important because of the need to place snowstorms and their societal impacts into a historical perspective on a regional scale. For example, in February 1973 (Figure 2.32), a major snowstorm hit the Southeast, affecting areas not prone to snow. The storm stretched from the Louisiana and Mississippi Gulf Coasts northeastward to the Carolinas. More than 11 million people received more than 5 inches of snow, and 750,000 people in Georgia and South Carolina experienced more than 15 inches of snow. This is currently the 10th highest ranked storm for the Southeast region. More information on RSI is available at https://www.ncdc.noaa.gov/snow-and-ice/rsi/. Figure 2.33 shows a similar map for the winter storm that hit the Southeast in March of 1993.

FIGURE 2.32 MAP OF THE EFFECTS OF A 1973 WINTER STORM WITH RSI OF 12.52

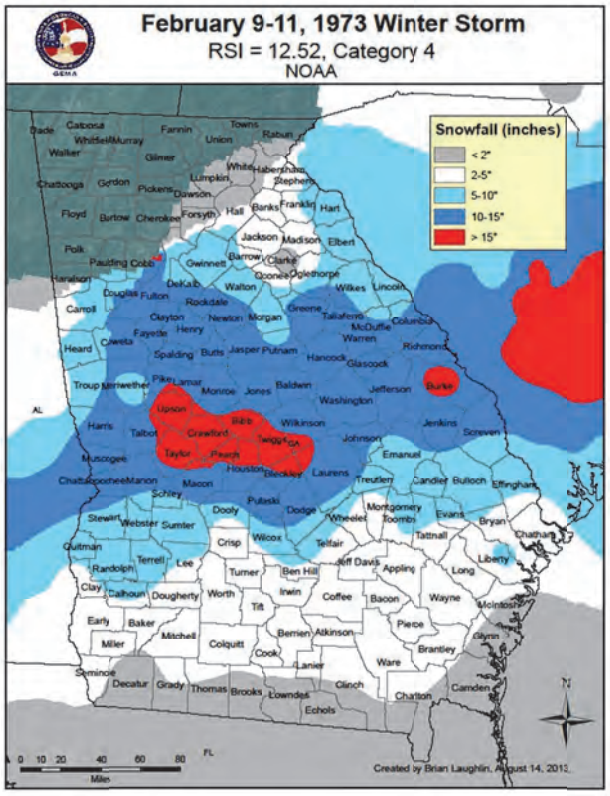


FIGURE 2.33 MAP OF THE EFFECTS OF A 1993 WINTER STORM WITH RSI OF 20.57

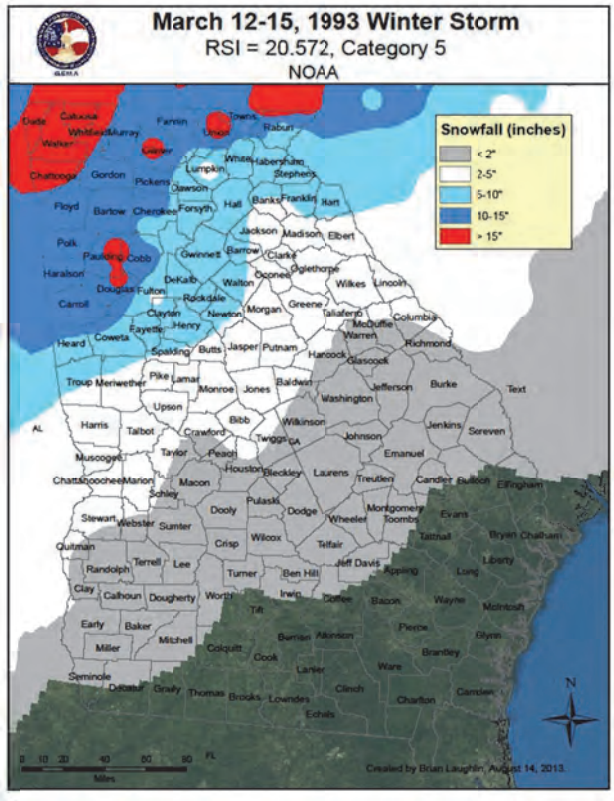


FIGURE 2.34 MAP OF THE EFFECTS OF A 2014 WINTER STORM WITH RSI OF 4.398

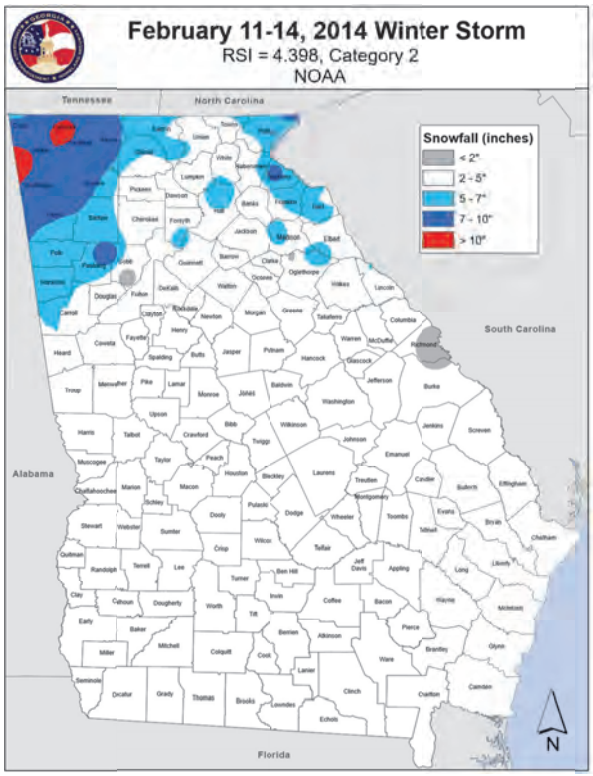
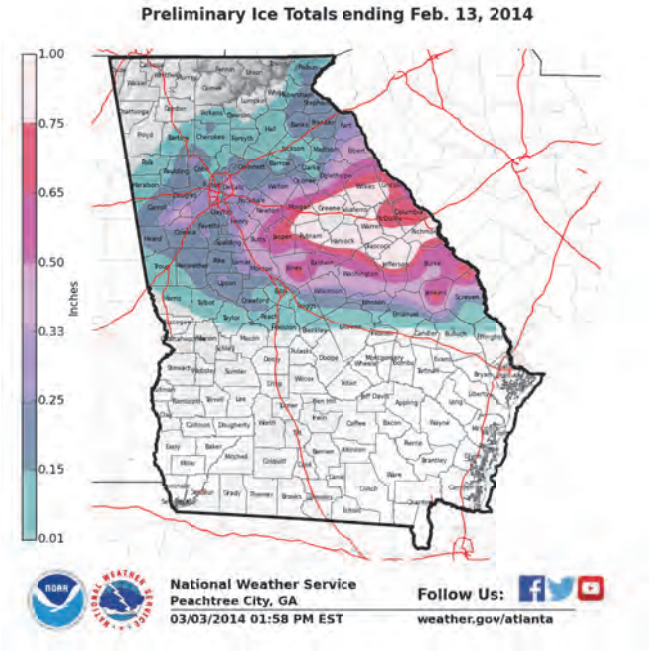


FIGURE 2.35 2014 WINTER STORM ICE TOTALS



The severe winter weather historical events map, Figure 2.36, illustrates the relationship with latitude. Areas that typically have cooler temperatures are more likely to experience more extreme temperatures. The map roughly corresponds to the southern, piedmont, and mountainous regions of Georgia. The losses incurred from severe winter weather shown in Figure 2.37 do not mirror the event distribution. The areas with the highest losses do not always correspond with the areas with the most events; however, all are located in North Georgia. North Georgia counties are not the only ones at risk, however. Figure 2.32 shows that snowfall from the winter storm of 1973 had greater impacts on Central and South Georgia. Figures 2.34 and 2.35 show snow and ice totals from a February 2014 severe winter storm with snow focused on northern Georgia and the highest ice totals in the eastern portion of the state.

Figures 2.32, 2.33, 2.34 and 2.35 also help in defining the potential extent of winter storms in the State. While these are extreme cases, they indicate the possibility of over a foot of snow and up to an inch of ice. The impacts of these amounts depend on where they occur. With the vast majority of winter weather events, the higher amounts of snow and ice tend to occur in the more northern portions of the State. However, as noted in the above examples, the higher amounts of snow and ice in the 1973 and 2014 events were not in the northern portions of the State.

FIGURE 2.36 WINTER STORM EVENTS IN GEORGIA, 1952–2017.

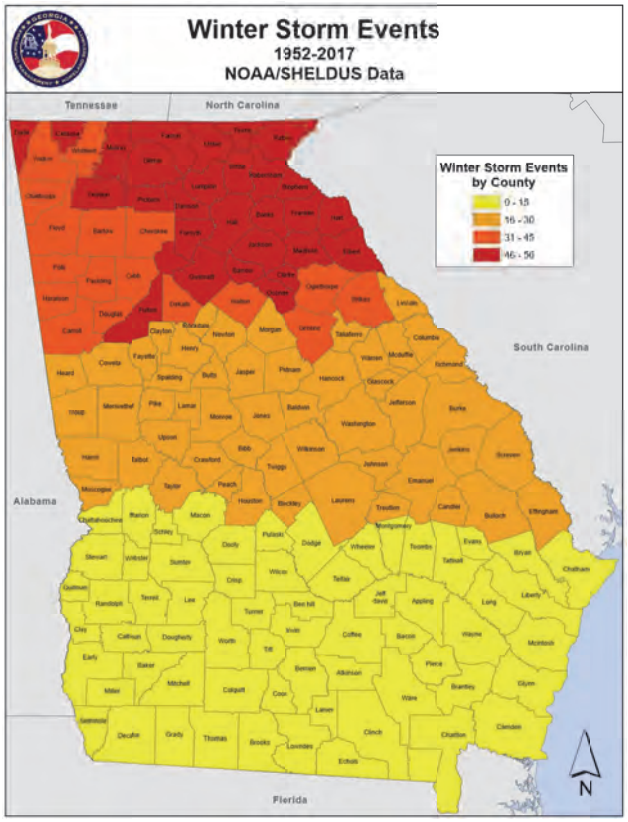


FIGURE 2.37 WINTER STORM LOSSES IN GEORGIA, 1952–2017

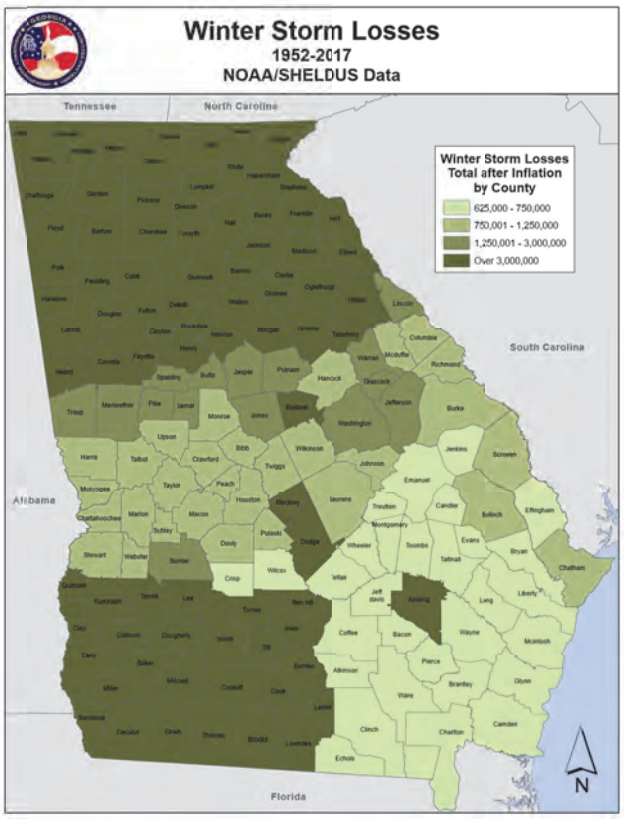


Table 2.22 lists major winter storms that have occurred in Georgia. The most notable of these events occurred in March of 1993. On the morning of March 12, 1993, the collision of a low-pressure system from the Gulf of Mexico, an arctic high pressure system from the Great Plains, and a steep southward jet stream brought high winds, heavy rain and snow, tornadoes, record low temperatures, and blizzard conditions to the State of Georgia. The entire Southeast region, including Georgia, shut down for three days. As a result of the incident, FEMA declared Georgia counties eligible for federal assistance to cover expenses associated with debris removal and emergency protective measures. This storm also was rated a Category 5 by the NOAA RSI. Also, in January 2014, a significant winter storm impacted the state. This storm is notable for its serious impacts on the transportation system around the Metro-Atlanta area and resulted in major changes in the State's preparation and response planning for winter storms. Two weeks later, the State was impacted once again by a major winter storm, this time bringing heavy snow to Northwest Georgia and up to 1 inch of ice to parts of eastern Georgia.

In total, 3,957 severe winter weather events occurred from 1952 to 2017 in Georgia according to SHELDUS/NCEI data. This equates to a historic average of approximately 64 events per year. These storms in total have caused 471 injuries, 50 fatalities, and more than $1 billion in damages. In the more recent 20 years (1997 – 2016) there were 406 occurrences, 62 injuries, 11 fatalities and more $820 million in damages. This equates to approximately 20 events per year.

TABLE 2.22 NOTABLE WINTER STORM EVENTS IN GEORGIA

Date	Areas Affected	Description
1/21-24/1940	North and Central GA	Up to 14.5 inches of snow in North GA; Central GA reported up to 10 inches
2/9-11/1973	Central and South GA	More than 15 inches reported in Upson, Taylor, Bibb, Twiggs, Wilkinson and Burke counties;
2/17-20/1979	North GA	10 inches in Toccoa, GA
1/21-24/1987	North and Central GA	11.5 inches in Dallas and Helen
3/12-15/1993	North and Central GA	Several locations in North GA and Metro Atlanta area reporting 13-21 inches
1/22-2/1/2000*	North and Central GA	FEMA DR1311; Severe ice storms, freezing rain, damaging wind, severely cold temperatures; 51 declared counties
1/9-11/2011	North and Central GA	Several locations in North and Central GA reporting 7-13 inches; RSI = 4.158, Category 2
1/28/2014	North and Central Georgia	Several locations in North and Central Georgia reporting 3-5 inches of snow and sleet.
2/11-12/2014*	Central and East Georgia	FEMA DR 4165; Severe winter storm in North, Central and East Georgia with locations reporting 0.25 – 0.75 inches of sleet, 0.1 - 0.25 inches of freezing rain and 1 - 2 inches of snow with ice accumulations up to 1 inch in some places.
2/15-17/2015*	Northeast Georgia	FEMA DR 4215; Severe Winter Storm in Northeast Georgia, with locations receiving locations receiving up to .65 inches of ice.

*Presidential declared disaster

Impacts from Climate Change:

Winter storms have increased in frequency and intensity since the 1950s, and their tracks have shifted northward over the United States. This trend will likely continue over the United States, but given the northward shift in the tracks of these systems, impacts to Georgia may remain unchanged. In other words, the increase in intensity may be offset in Georgia by the northward shift of the storm tracks.

2.5.8 Drought

Priority	Rank
Medium	6

Hazard Description

Drought is a normal, recurrent feature of climate consisting of a deficiency of precipitation over an extended period of time (usually a season or more). This deficiency results in a water shortage for some social or environmental sector. Drought should be judged relative to some long-term average condition of balance between precipitation and evapotranspiration in a particular area that is considered "normal." Drought should not be viewed as only a natural hazard because the demand people place on the water supply affects perceptions of drought conditions. The impacts of drought are vast, including limited water supplies in urban areas and insufficient water for farmland.

Droughts occur in virtually every climatic zone (on every continent). Because the impacts of drought conditions are largely dependent on the human activity in the area, the spatial extent of droughts can span a few counties to an entire country.

Temporal characteristics of droughts are drastically different from other hazards due to the possibility of extremely lengthy durations as well as a sluggish rate of onset. Drought conditions may endure for years to decades and therefore have a high potential to cause devastation in a given area. The duration characteristic of droughts is so important that droughts are classified in terms of length of impact. Droughts lasting one to three months are considered short term; droughts lasting four to six months are considered intermediate; and droughts lasting longer than six months are long term. With the slow rate of onset, most populations have some inkling that drought conditions are increasingly present. However, barring drastic response measures, most only have to adapt to the changing environment.

Seasonality has no general impact on droughts in terms of calendar seasons. However, "wet" and "dry" seasons obviously determine the severity of drought conditions. In other words, an area is less susceptible to drought conditions during its wet season. The frequency of droughts is undetermined due to the fact that the hazard spans such a long period of time. However, climatologists track periods of high and low moisture content similarly to the tracking of cooling and warming periods.

Measures of drought magnitude and intensity can be found in some of the drought indices. Dr. Michael Hays with the National Drought Mitigation Center (NDMC) lists six drought indices currently being used: the Percent of Normal Precipitation, Standardized Precipitation Index, Palmer Drought Severity Index, Crop Moisture Index, Surface Water Supply Index, and Reclamation Drought Index. Basically, all of these indices are comparable and not absolute measures of magnitude or intensity. In other words, the indices highlight areas that are wetter or drier using statistical calculations based on a limited climatic history.

The historical events and losses maps for drought (Figures 2.38 and 2.39) indicate the heart and northern portion of Georgia have experienced the most drought events. This is perhaps due to South and Coastal Georgia's preexisting proneness to aridity. As the loss map illustrates, drought causes a drain totaling more than 50 million dollars in some counties. Most of these losses are probably crop losses since agriculture is often greatly affected by drought.

FIGURE 2.38 DROUGHT EVENTS IN GEORGIA, 1952–2017

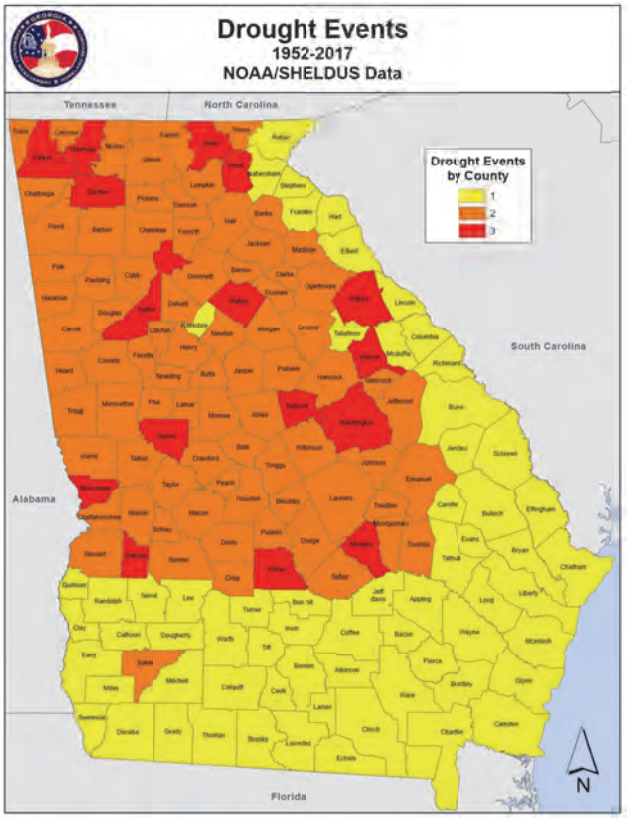
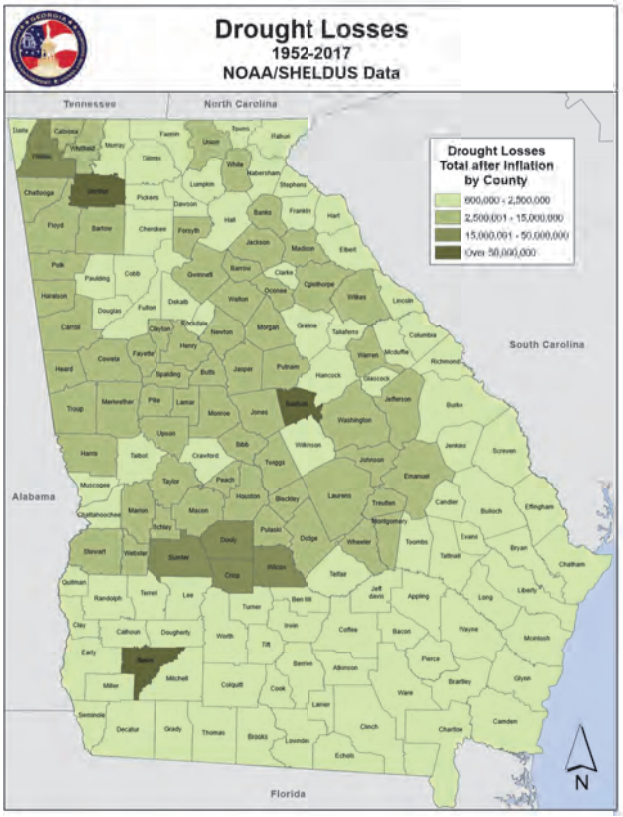


FIGURE 2.39 DROUGHT LOSSES IN GEORGIA, 1952–2017



Because droughts are “creeping” disasters, only large-scale events are considered notable. One of the most severe drought events in Georgia occurred in 1977 and resulted in a federal disaster declaration. The drought spanned most of the Midwestern and Southeastern United States and doomed many harvests of hay, corn, soybean, cotton, and peanut. The declaration included 130 of Georgia’s 159 counties, with costs to farmers topping $300 million (figure not inflation-adjusted).

Other notable droughts have severely affected municipal and industrial water supplies, stream-water quality, recreation, hydropower generation, navigation along waterways, and agricultural production. Table 2.23 lists the more notable droughts to hit Georgia since the beginning of the 20th century.

Typically, the risk analysis of hazard events takes into account the recurrence interval of the hazard. Droughts, however, are not measured in terms of recurrence intervals. Instead, drought prediction and indication models utilize historical and current meteorological and geological data to determine the current and possible extent of drought conditions. These models, which can be found at the NDMC website, are dynamic and, therefore, are not useful in the composite score. Also, drought does not seem to affect particular portions of Georgia more than other areas and, thus, is not a spatially defined hazard.

The nature of drought events, along with the limited data on previous occurrences, makes estimating a future probability difficult at best. Nevertheless, Table 2.23 shows eleven drought events occurring within 113 years. Looking at the 100-year record from 1903 to 2016, 41 of those 100 years were affected by drought. This yields a probability of a 36% chance of a drought occurring in any given year.

TABLE 2.23 NOTABLE DROUGHT EVENTS IN GEORGIA

Year	Area Affected	Remarks
1903–1905	Statewide	Severe
1924–1927	North-central Georgia	One of the most severe of the century
1930–1935	Mostly statewide	Affected most of US
1938–1944	Statewide	Regional drought
1950–1957	Statewide	Regional drought
1968–1971	Southern and Central Georgia	Variable severity
1977	Statewide	Disaster 3044
1985–1990	North and Central Georgia	Regional drought
1999–2009	Statewide	Severe
2011 - 2013	Statewide	Variable severity
2016	Northwest Georgia	Severe drought, associated with North Georgia wildfires

One index of drought, also an effective measure of extent or magnitude, is the Standardized Precipitation Index (SPI), which is based on the probability of precipitation for any time scale. This index is used by many drought planners because of the versatility of computing for different time scales and the ability to provide early warning of drought and to assess drought severity. The SPI includes the impacts of precipitation deficits on groundwater, reservoir storage, soil moisture, snowpack, and stream flow. Monthly maps of the SPI are downloadable from the NDMC. Figure 2.40 is an example of an SPI map of the continental United States. This map shows that drought conditions can range from a score of +2.00, which is exceptionally wet, to an SPI score of –2.0 or less, indicating exceptionally dry conditions. Notably, Georgia has experienced -2

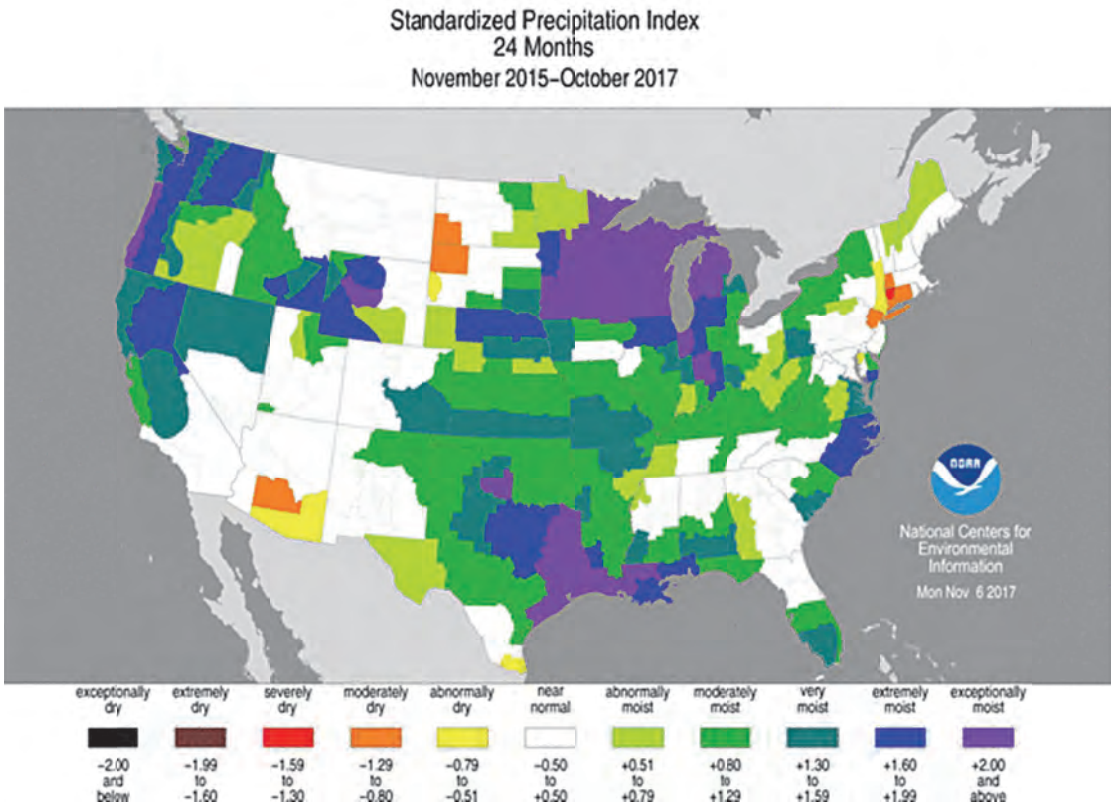
conditions on the SPI index. Between August 2007 and March 2008 and again between February 2012 and February 2013, much of the State experienced -2 (Extremely dry) conditions.

TABLE 2.24 STANDARDIZED PRECIPITATION INDEX SCORES AND CORRESPONDING CONDITIONS

SPI Score	Condition
+2 and above	Extremely wet
+1.5 to +1.99	Very wet
+1.0 to +1.49	Moderately wet
-0.99 to +0.99	Near normal
-1.0 to -1.49	Moderately dry
-1.5 to -1.99	Severely dry
-2.0 and less	Extremely dry

Because of the slow rate of onset and the long duration of droughts in Georgia, long-term management and mitigation measures are appropriate. The Environmental Protection Division (EPD) of Georgia's Department of Natural Resources (DNR) publishes the Georgia Drought Management Rules, which address both pre-drought mitigation strategies and drought response strategies. Refer to the Drought Management Rules for more details on drought assessments for the State of Georgia.

FIGURE 2.40 STANDARDIZED PRECIPITATION INDEX, NOVEMBER 2015–OCTOBER 2017



Impacts from Climate Change:

Georgia could experience more frequent and/or more severe droughts, but not by a significant margin. Higher temperatures lead to increased rates of evaporation, including more loss of moisture through plant leaves. As soil dries out, a larger proportion of the incoming heat from the sun goes into heating the soil and adjacent air rather than evaporating its moisture, resulting in hotter summers under drier climatic conditions.

2.5.9 Wildfire

Priority	Rank
Medium	8

Hazard Description

A wildfire is an uncontained fire that spreads through the environment. Wildfires have the ability to consume large areas, including infrastructure, property, and resources. When massive fires, or conflagrations, develop near populated areas, evacuations can take place. Not only do the flames harm the environment, but the massive volumes of smoke spread by certain atmospheric conditions also affect the health of nearby populations.

Wildfires result from the interaction of three crucial elements: fuel, ignition (heat), and oxygen. Natural and man-made forces cause the three crucial elements to coincide in a manner that produces wildfire events. Typically, fuel consists of natural vegetation. However, as the urban and suburban footprint expands, wildfires can use other types of fuel such as buildings. In terms of ignition or source of heat, the primary natural source is lightning. However, humans are more responsible for wildfires than lightning (causing around 80% of fires). Man-made sources vary from the unintentional (fireworks, campfires, machinery) to the intentional (arson). With these two elements provided, the wildfires can spread as long as oxygen is present.

Weather is the most variable factor affecting wildfire behavior. Strong winds propel wildfires quickly across most landscapes (unless fire breaks are present). Shifting winds create erratic wildfires, complicating fire management. Dry conditions provide faster burning fuels, either making the area more vulnerable to wildfire or increasing the mobility of preexisting wildfires.

Wildfires are notorious for spawning secondary hazards, such as flash flooding and landslides, long after the original fire is extinguished. Both flash flooding and landslides result from fire consuming the vegetation that provides precipitation interception and infiltration as well as slope stability.

All of Georgia is prone to wildfire due to presence of wildland fuels associated with wildfires. Land cover associated with wildland fuels include:

- Coniferous, deciduous, and mixed forest
- Shrub-land
- Grasslands/herbaceous
- Woody and emergent wetlands.

The spatial extent of wildfire events greatly depends on both the factors driving the fire and efforts of fire management and containment. Within the State of Georgia, fires in 2007 engulfed more than 400,000 acres and even reached into Florida. However, these fires occurred in largely isolated regions with limited exposure to human development. While these fires posed minimal impact to development, air quality and visibility were greatly reduced throughout large areas of Southeast Georgia due to smoke.

Wildfires can occur during any season of the year. However, drier seasons, which vary within the State of Georgia, are more vulnerable to severe wildfires because of the abundance of quick-burning fuels. In terms of rate of onset and duration, wildfires vary depending on the available fuels and weather patterns. Some wildfires can engulf an area in a matter of minutes from the first signs, whereas others may be slower

burning and moving. The frequency of wildfires is not typically measured because the high probability of human ignition is statistically unpredictable.

Magnitude and intensity are typically only measured by the size of the wildfire and the locations of burning. Fires are classified in three ways: understory fires, crown fires, and ground fires. Naturally occurring wildfires burn at relatively low intensities, consuming grasses, woody shrubs, and dead trees. These understory fires often play an important role in plant reproduction and wildlife habitat renewal, and they self-extinguish due to low fuel loads or precipitation. Crown fires, which consist of fires consuming whole living trees, are low probability but high consequence events due to the creation of embers that can spread by wind. Crown fires typically match perceptions of wildfires. In areas with high concentrations of organic materials in the soil, ground fires can burn, sometimes persisting undetected for long periods until the surface is ignited.

Profile

Data on historical occurrence and extent of wildfires varies depending on the source. Table 2.25 provides the National Interagency Fire Center figures for wildland fire and burn acreage totals from 2002 to 2017 in Georgia. The data indicates wildland fires in Georgia can vary substantially in size, with the vast majority being small. Higher totals in 2007 coincide with several swamp fires in Southeast Georgia that year. Even with the 2007 figures, the average extent of wildland fires is approximately 21 acres. Based on this data, Georgia can expect to experience approximately 4,793 wildland fires in any given year.

TABLE 2.25 GEORGIA WILDFIRES AND ACRES (NIFC)

Year	Fires	Acres
2002	7,185	160,041
2003	3,430	9,908
2004	6,257	27,500
2005	5,573	19,263
2006	8,352	40,202
2007	8,726	837,895
2008	5,454	23,081
2009	3,732	13,714
2010	3,489	14,534
2011	8,387	149,222
2012	3,331	19,136
2013	2,942	6,736
2014	3,562	19,199
2015	2,331	10,556
2016	5,086	52,119
2017	3,929	200,785
Total	**76,685**	**1,603,891**
Average	**4,793**	**100,243**

The most notable wildfire events are most likely the 2007 fires that affected the southeast quadrant of Georgia. These massive fires, the largest in Georgia's history, burned more than 400,000 acres and destroyed 9 homes. Initial estimates of Georgia Forestry Commission's (GFC) expenditures for fire control efforts totaled more than $62 million. Georgia has received 12 Fire Management Assistance Declarations, which are reflected in Table 2.26 below. Notably, the majority of these declarations are for 2 major wildfire events (2007 and 2011 – See Table 2.26) in the Southeastern portion of the State.

In 2014, the Southern Wildfire Risk Assessment produced updated reports and information based on the best available data and models. Figure 2.41 shows the model and the factors that go into it. One of the updated products of this model is a Wildland Urban Interface risk layer that shows the potential risk of a wildfire on people and their homes. This dataset takes into account both housing density and modeled flame length to produce a risk index showing the areas that would be most impacted. Figure 2.43 shows the Wildfire Risk map for Georgia.

TABLE 2.26 FIRE MANAGEMENT ASSISTANCE DECLARATIONS

Fire Management Assistance Declarations		
Number	**Date**	**Incident Description**
2362	5/23/2001	Blounts Pasture Fire
2685	4/17/2007	Sweat Farm Road Fire
2686	4/26/2007	Kneeknocker Swamp Fire
2688	5/5/2007	Roundabout Fire
2693	5/9/2007	Bugaboo Scrub Fire
2697	5/31/2007	Harveytown Fire
2875	3/25/2011	Elan Church Road Fire
2876	3/25/2011	Mosley Road Fire
2920	6/15/2011	Racepond Fire
2921	6/16/2011	Sweat Farm Again Fire
5163	11/11/2016	Tatum Gulf Fire
5181	5/8/2017	West Mims Fire

The Fire Intensity Scale (Figure 2.44) is another layer that was produced in the 2014 update. This data shows areas where fires would be the most intense when available fuel and potential fire behavior are factored together. As Figure 2.39 shows, areas such as Atlanta with its urban development, have less impact potential than the more forested areas in Northwest Georgia or Southeast Georgia.

The Burn Probability data (Figure 2.45) is the result of modeling different scenarios with parameters that include the available fuel, terrain, weather conditions and historical fires. This map uses the parameters reflected in Figure 2.41 to show the likelihood of an area to burn.

FIGURE 2.41 SOUTHERN WILDFIRE RISK ASSESSMENT MODEL.

Source: SWRA Final Report (2006).

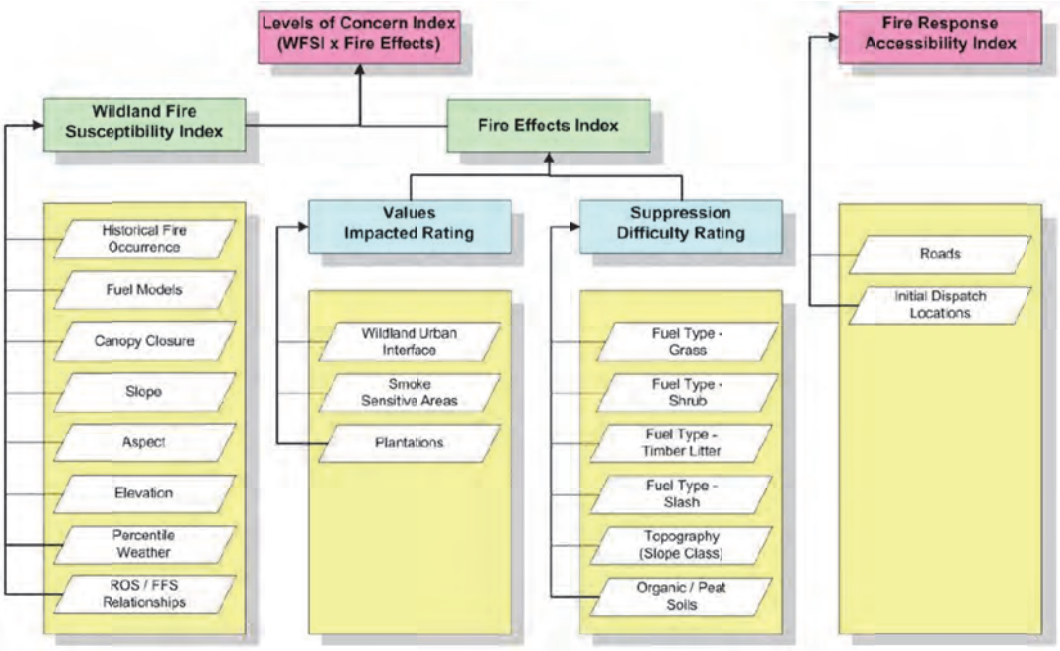


FIGURE 2.42 WILDFIRE IMPACT POTENTIAL.

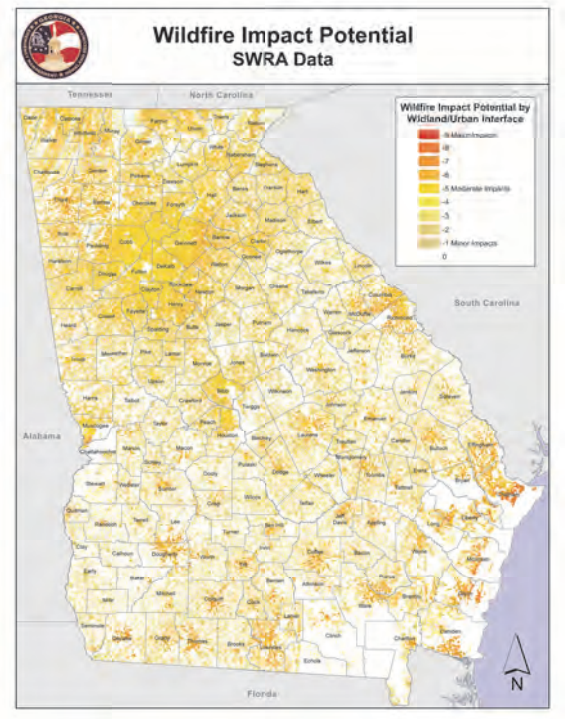


FIGURE 2.43 WILDFIRE RISK LEVEL, GEORGIA.

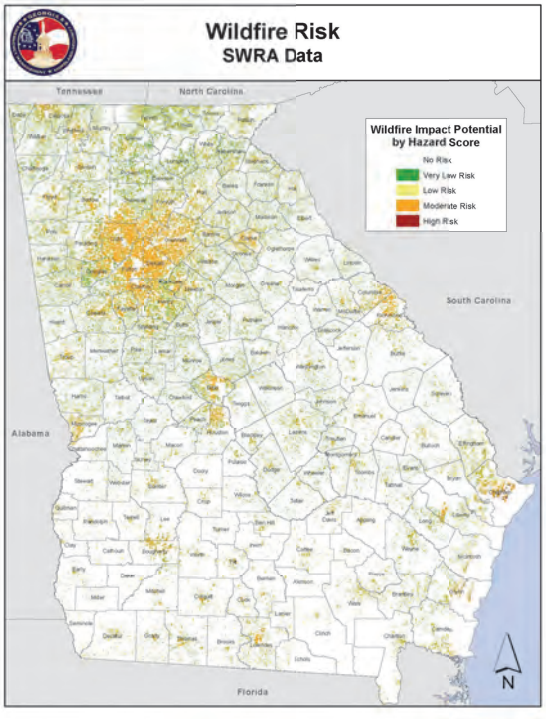


FIGURE 2.44 FIRE INTENSITY SCALE

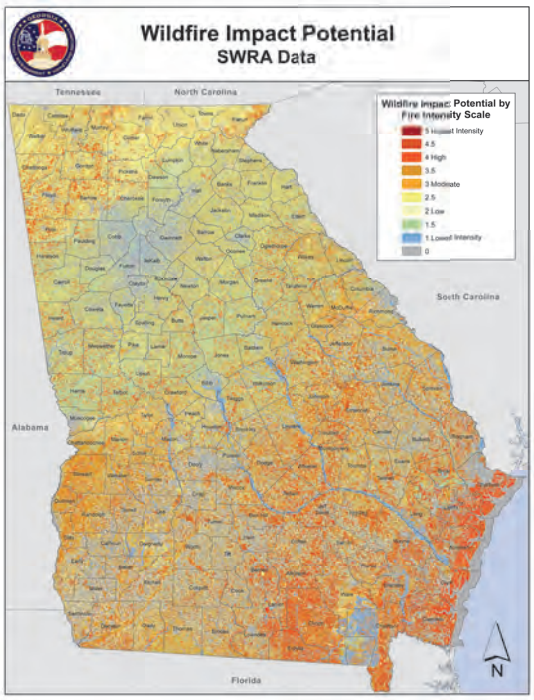
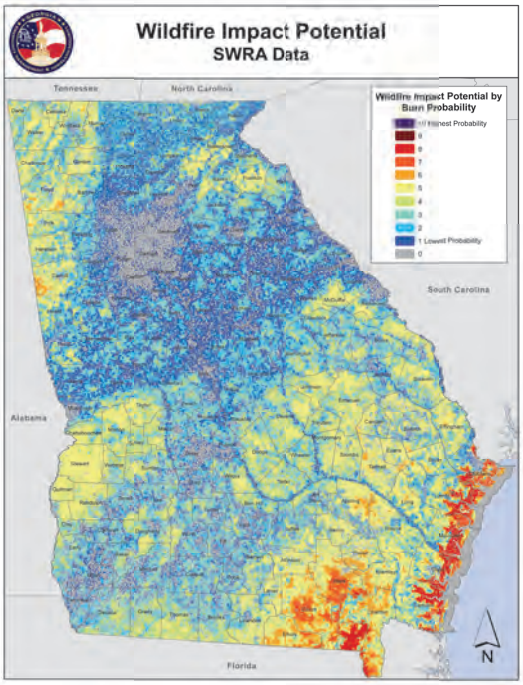


FIGURE 2.45 WILDFIRE BURN PROBABILITY



The wildfires that cause the greatest loss of life and property are those located in the Wildland-Urban Interface (WUI). WUI has been defined in many ways, but from a fire management perspective, it is commonly considered an area where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Wildfires are dependent on a certain set of conditions, including 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 WUI: boundary, intermix, and island. Depending on the set of conditions present, any of these areas may be at risk from wildfire.

> **Boundary WUI** 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 WUI, with a clearly defined boundary between the suburban fringe and the rural countryside. Due to the higher concentration of development that abuts the wildland areas, Boundary or Interface as it is commonly called, presents the highest level of risk of the three categories.

Intermix WUI 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.

Island WUI, 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.

A more in-depth local wildfire risk assessment can help determine the specific level of risk to a community. A great source for local wildfire risk assessment is the Community Wildfire Protection Plans (CWPP). Copies of completed CWPPs and more information on the program can be found at http://www.gfc.state.ga.us/forest-fire/CWPP/index.cfm.

FIGURE 2.46 EXAMPLE OF WUI BOUNDARY. (GFC).

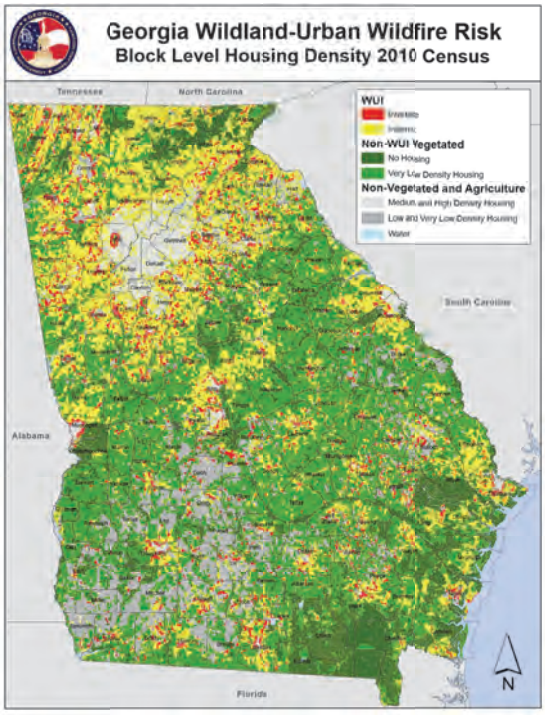


FIGURE 2.47 LOCATION OF WUI AREAS IN GEORGIA.

Figure 2.47 illustrates areas within Georgia that most likely fall under boundary (interface) or intermix categories. The WUI areas were created by identifying census blocks that

contained both at least 6.17 housing units/km² (or 1 house/40 acres) and substantial amounts of vegetation prone to wildfires (Radeloff et al. 2005). The map indicates that all counties in Georgia contain WUI areas. Table 2.27 provides the size and percentage increase of WUI areas in the state.

TABLE 2.27 WILDLAND-URBAN INTERFACE AREAS IN GEORGIA, 1990–2010

	Total Area (mi²)	Intermix Area	Intermix %	Interface Area	Interface %	WUI Total	WUI %
1990	59,131,458,950	9,668,026,927	16.35%	2,110,058,205	3.57%	11,778,085,132	19.92%
2000	59,131,458,950	11,881,950,792	20.09%	2,487,979,653	4.21%	14,369,930,445	24.30%
2010	59,425,174,404	13,443,969,176	22.62%	2,787,403,529	4.69%	16,231,372,705	27.31%

Source: http://silvis.forest.wisc.edu/maps/wui/2010/download.

Impacts from Climate Change

Since 1983, the National Interagency Fire Center has documented an average of 72,000 wildfires per year. Compiled data from the U.S. Forest Service suggest that the actual total may be even higher for the first few years of nationwide data collection that can be compared. The data does not show an obvious trend during this time. However, ongoing changes in temperature, drought, and snowmelt may contribute to warmer, drier conditions that fuel wildfires in parts of the United States. Any increase in wildfire activity would be much more likely in the western United States, as fires burn more land in the western United States than in the East.

2.5.10 Earthquake

Associated Hazards:

Ground shaking, liquefaction, landslides, tsunamis

Priority	Rank
Low	12

Hazard Description

Earthquakes are generally defined as the sudden motion or trembling of the earth's surface caused by an abrupt release of slowly accumulated strain. This release typically manifests on the surface as ground shaking, surface faulting, tectonic uplift and subsidence, ground failures, and tsunamis. In the United States, earthquake activity east of the Rocky Mountains is relatively low compared to the West because it is away from active plate boundaries and the plate interior strain rates are known to be very low.

The physical property of earthquakes that causes the majority of damage within the United States is ground shaking. The vibrations from the seismic waves that propagate outward from the epicenter can cause failure in structures not adequately designed to withstand earthquakes. Because the seismic waves have different frequencies of vibration, they disseminate differently through subsurface materials. For example, high frequency compression and shear waves arrive first, whereas lower frequency Rayleigh and Love waves arrive later. Seismic waves can also move in a variety of ways. The surface vibration can be horizontal, vertical, or a combination of the two, which causes a wider array of structures to collapse.

Another manifestation of earthquakes is surface faulting. This phenomenon is defined as the offset or tearing of the earth's surface by a differential movement across a fault. Structures built across active faults tend to sustain damage regularly. There are no active faults within or near Georgia. Distinct inactive faults are known within the state north of the Columbus, Macon, and Augusta fall line and run generally northeast-southwest. One of these is the Brevard Fault Line, which last moved 185 million years ago and is not associated with ongoing seismic activity in Georgia.

The third earthquake phenomenon that causes damage is tectonic uplift and subsidence. Tectonic uplift can cause the shallowing of harbors and waterways, and tectonic subsidence can cause permanent or intermittent inundation similar to what happened as a result of the 1964 Alaskan earthquake. Due to the association of tectonic uplift and subsidence with active faults, Georgia is not at risk to this phenomenon.

The fourth earthquake damage-causing phenomena are earthquake-induced ground failures, including liquefaction and landslides. During an earthquake, the areas that are rich in sand and silt and have groundwater within 30 feet of the surface temporarily behave as viscous fluids during strong ground shaking. Structures built on these materials can settle, topple, or collapse as the ground "liquefies" beneath them. Landslides can also form when earthquake shaking or seismic activity dislodges rock and debris on steep slopes triggering rock falls, avalanches, and slides. Also, unstable or nearly unstable slopes consisting of clay soils can lose shear strength when disturbed by ground shaking and fail, resulting in a landslide. Georgia is at very low risk of seismic-induced liquefaction or landslides.

The final earthquake-induced phenomena are tsunamis, large gravity-driven waves triggered by the sudden displacement of a large volume of water (by an underwater earthquake, landslide, or volcanic eruption). The waves produced travel in all directions from the origin at speeds of up to 600 miles per hour. In deep water, tsunamis normally have small wave heights; however, as the waves reach shallower water near land, the wave speed diminishes and the amplitude drastically increases. Upon impact with a shoreline, the waves can inundate land, rapidly engulfing everything in its path. Successive wave crests follow, typically arriving

minutes to hours later, frequently with later arrivals being more dominant. Frequently, the first tsunami waves are downward, causing dramatic exposure of beach. Because of this, people are often killed trying to collect newly exposed seashells when the water returns.

Although large tsunamis rarely hit the East Coast of the United States, the possibility of such events occurring anywhere along the Atlantic and Gulf Coasts exists. For example, a severe earthquake in the Grand Banks of Newfoundland on November 18, 1929 generated tsunami waves that caused considerable damage in coastal Newfoundland and reached as far south as Charleston, South Carolina. Similarly, a large earthquake on November 18, 1867 caused tsunami waves larger than 20 feet in the Virgin Islands and Puerto Rico.

Profile

Earthquakes with a magnitude of less than 5.0 are not known to produce significant damage. Georgia's greatest risks for earthquakes of magnitude 5.0 or greater are from three different seismic areas:

- **New Madrid Fault Zone:** centered on the Mississippi River north of Memphis
- **Southern Appalachian Seismic Zone:** running west of the Appalachians between Knoxville and northeastern Alabama
- **Charleston, South Carolina**

Modest earthquakes distributed throughout the Georgia Piedmont also occur; however, the risk level remains low due to the much lower magnitude and intensity associated with these events. The spatial extent of specific earthquakes largely depends on its magnitude (discussed below). For example, the New Madrid earthquakes of 1811 and 1812, centered between St. Louis and Memphis on the Mississippi River, caused damage as far away as Cincinnati and Richmond and were felt as far as Boston.

The temporal characteristics of earthquakes include rate of onset, duration, and the frequency of recurrence. Earthquakes rarely give warning of their impending occurrence and are therefore currently considered unpredictable by many in the scientific community. When one occurs, ground failure can follow within a few seconds, and strong shaking can last from a few seconds to several minutes, depending on the severity of the event and the distance an individual is from its occurrence. Earthquake recurrence is based primarily on historical activity. Since earthquakes are infrequent within the eastern United States, future earthquake probability remains low.

Earthquake magnitude and intensity are measured via the moment magnitude and the Mercalli scales, respectively. The moment magnitude scale (abbreviated as MMS; denoted as MW or M) is used by seismologists to measure the size of earthquakes in terms of the energy released. The magnitude is based on the seismic moment of the earthquake, which is equal to the rigidity of the Earth multiplied by the average amount of slip on the fault and the size of the area that slipped. The scale was developed in the 1970s to succeed the 1930s-era Richter magnitude scale (denoted as ML). Even though the formulae are different, the new scale retains the familiar continuum of magnitude values (See Table 2.28). The MMS is the scale now used to estimate magnitudes for all modern large earthquakes by the U.S. Geological Survey (USGS).

Because accounts of earthquakes occurring before the 1960s relied predominantly upon those experiencing the event rather than seismographs, the Modified Mercalli Intensity Scale is used to evaluate and compare earlier events to modern ones. The Modified Mercalli Scale is a qualitative measure of the degree of shaking that an earthquake incurs on people, structures, and the ground at a particular location. Due to this reliance on subjectivity, Mercalli values of intensity vary for each event and by distance from the event (as opposed

to the MMS scale). Table 2.29 explains the Modified Mercalli Scale of Intensity. Figure 2.48 shows an example of historical earthquake intensity from the 1886 Charleston, South Carolina earthquake.

TABLE 2.28 EARTHQUAKE MAGNITUDES

Magnitude	Description	Effects
<2	Micro	Not felt; infrequently recorded in the Eastern US
2.0 – 2.9	Minor	Not felt by most; frequently Recorded
3.0 – 3.9	Minor	Often felt; Rarely causes damage
4.0 – 4.9	Light	Noticeable shaking of indoor items; Significant damage unlikely
5.0 – 5.9	Moderate	Damage to poorly constructed buildings near epicenter; Possible slight damage to well-constructed
6.0 – 6.9	Strong	Destructive in area up to 200 miles across
7.0 – 7.9	Major	Serious damage over large area
8.0 – 8.9	Great	Serious damage in areas several hundred miles across
9.0 – 9.9	Great	Devastating in areas several thousand miles across
>10	Great	Never recorded

TABLE 2.29 MODIFIED MERCALLI SCALE OF INTENSITY

Mercalli Intensity	Description	Effects
I	Instrumental	Detected only by sensitive instruments
II	Feeble	Felt by few persons (upper floors)
III	Slight	Felt noticeably indoors; Similar to passing truck
IV	Moderate	May awaken sleeping; Household items possibly disturbed
V	Rather Strong	Felt by nearly all; Broken household items
VI	Strong	Felt by all; Chimney damage; Slight other damage
VII	Very Strong	Difficult to stand; Considerable damage in poorly constructed buildings
VIII	Destructive	Considerable damage in average buildings with partial collapse; Chimneys, stacks, columns fall
IX	Ruinous	General panic; Damage to all structures
X	Disastrous	Rails bent; More collapse and damage to all types of structures
XI	Very Disastrous	Few masonry structures standing; Bridges destroyed
XII	Catastrophic	Total damage; Ground moves in waves or ripples; Objects airborne

FIGURE 2.48 MERCALLI EARTHQUAKE INTENSITY FROM 1886 CHARLESTON, SC EARTHQUAKE Source: USGS.

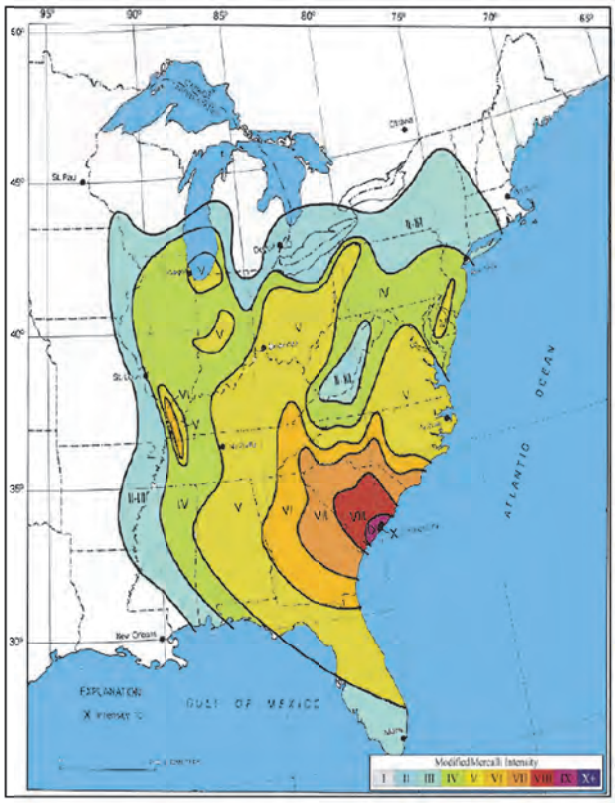
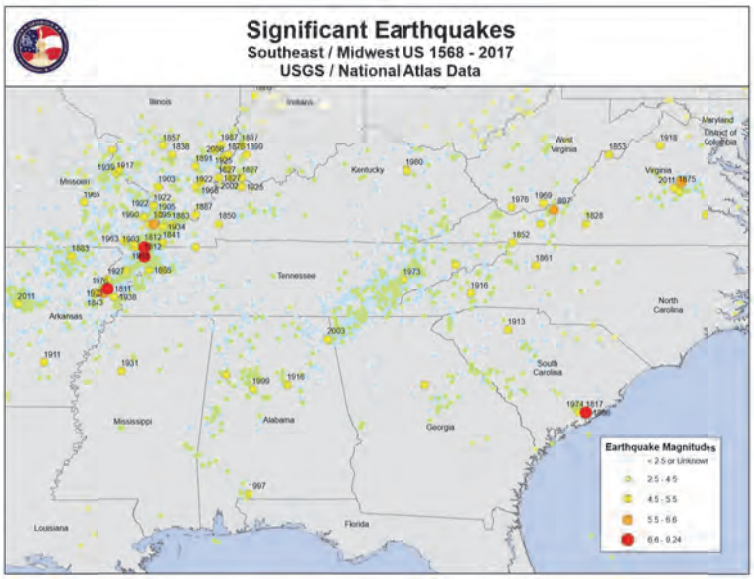


FIGURE 2.49 SIGNIFICANT EARTHQUAKES IN THE U.S. SOUTHEAST AND MIDWEST, 1568–2017



While SHELDUS/NCEI reports no earthquake events between 1952 and 2017, Georgia has been seismically active throughout that time period with minor to light earthquakes. No disasters have been declared for the State of Georgia related to earthquake events because of little to no losses associated with seismic activity during this timeframe.

Georgia's earthquake history, however, demonstrates the state's potential for experiencing damaging seismic activity, even from events occurring outside of the state lines. Table 2.30 lists notable events that have affected Georgia since the late 19th century. Note the magnitude value is estimated based on the historical record or Mercalli Scale of Intensity rating. Figure 2.49 maps notable earthquakes from 1568 through 2017 for parts of the U.S. Southeast and Midwest (possibly affecting Georgia).

Frequency, and thus risk, is difficult to determine with earthquakes. However, recent estimates suggest that an earthquake of 6.0 magnitude or greater is likely to occur every 80 years within the New Madrid Seismic

Zone. Though the last such event occurred back in 1895, this does not mean one is overdue because earthquake recurrence is highly variable (sometimes with recurrences longer than twice their expected average). Similar earthquake recurrence intervals apply to regions in northwestern Georgia.

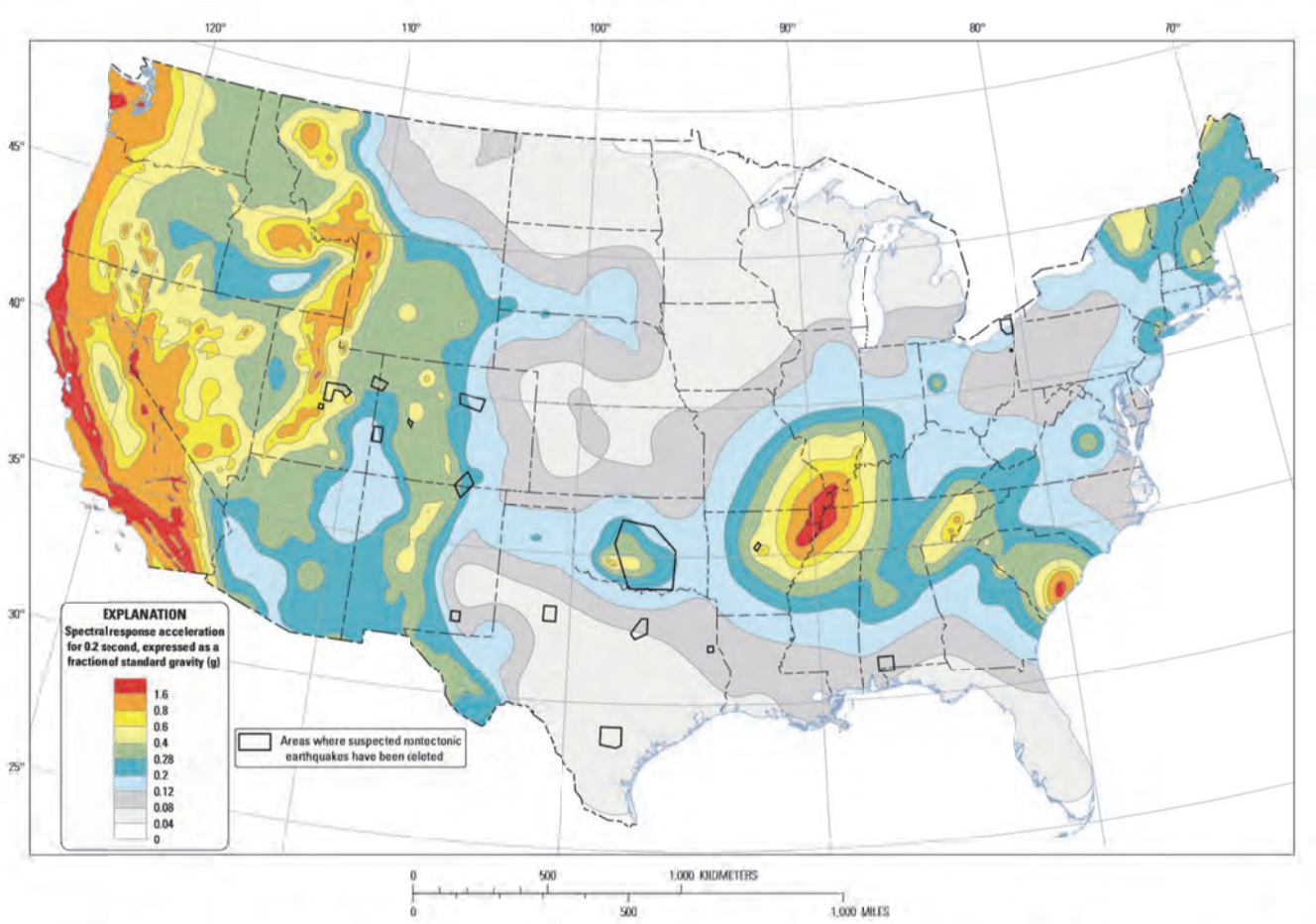
TABLE 2.30 NOTABLE EARTHQUAKE EVENTS AFFECTING GEORGIA

Year	Magnitude	Area Affected	Remarks
1811–1812	7.3–7.8	New Madrid	XI intensity; Rerouted Miss. River; Damage in Richmond; Felt in Boston
1886	6.9	Charleston, SC	V–VIII intensity
1914	5	North Georgia	Caused little damage
1964	4.5	Lake Sinclair	Tremors every 2-3 years
1972	4.5	Clarks Hill Reservoir	Quakes felt every 20 seconds
1976		Toombs County	Intensity V
1985	3.0-3.5	Columbus	
1996	2.4	DeKalb County	Norris Lake area
2003	4.9	North Georgia / Alabama border	Some power outages; Felled trees; Minor household damage
2010	2.8	Northwestern Georgia	Dalton area
2013	2.5–2.8	Georgia / South Carolina border	Thurmond Lake area

Figure 2.47 is a USGS seismic map that portrays the estimated probability of spectral acceleration for a 0.2 second period with the probability of exceedance at 10% in 50 years for the conterminous United States. This map illustrates the various regions of potential seismic activity that could affect the State of Georgia: the New Madrid fault, Southern Appalachian, and Charleston, South Carolina.

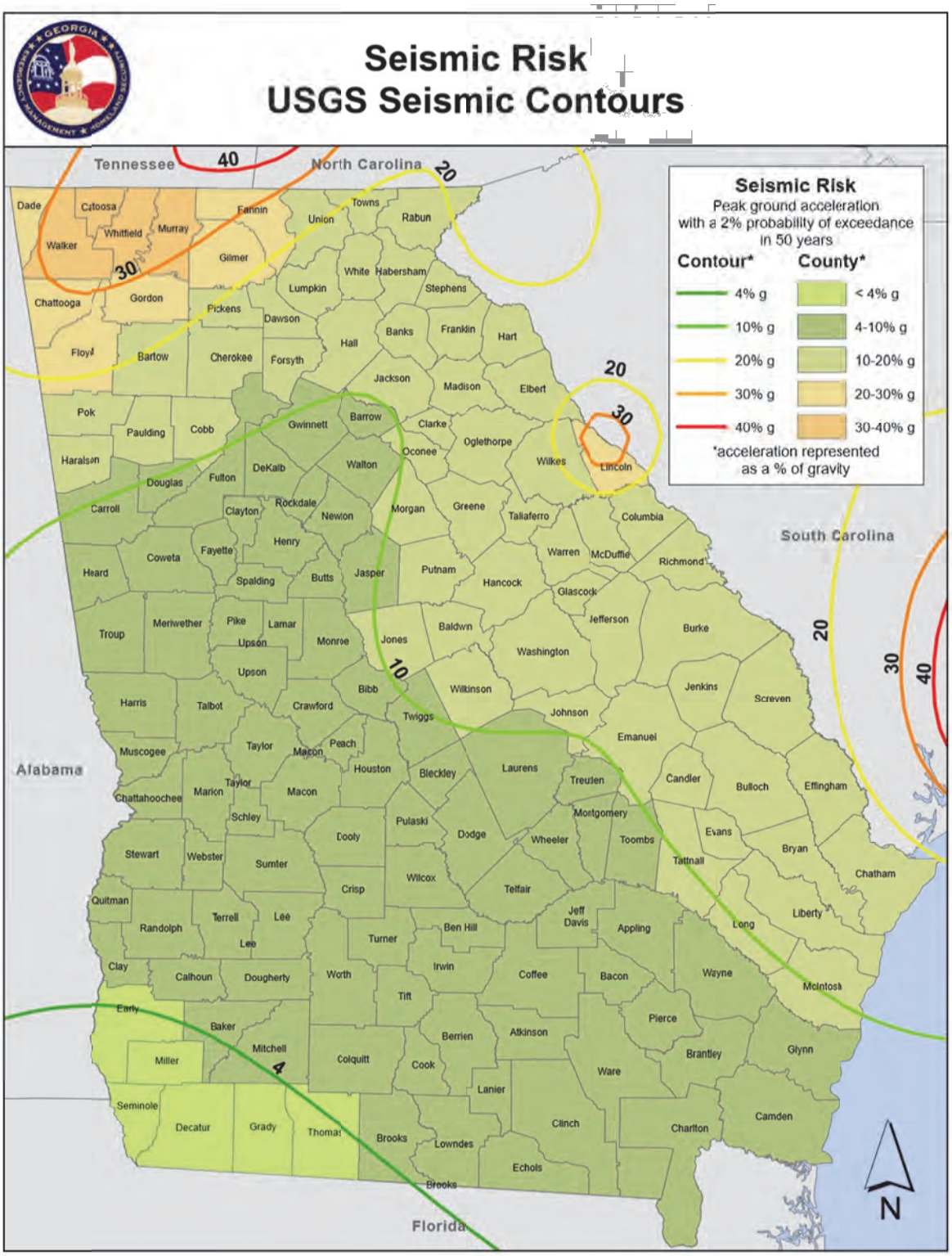
The Georgia-specific earthquake hazard risk map, Figure 2.51, uses the data from the previous figure. This map, like Figure 2.50, presents the 0.2 second spectral acceleration as a percentage of gravity. In other words, the seismic contour lines delineate areas of higher risk of exceeding a certain intensity of earthquake. The areas of greatest risk are shown to be the mountainous counties of Northwest Georgia, which have a 2% chance of exceeding 30% of gravity over a 50 year period.

FIGURE 2.50 SEISMIC HAZARD MAP FOR THE CONTERMINOUS UNITED STATES.



Two-percent probability of exceedance in 50 years map of 0.2 second spectral response acceleration

FIGURE 2.51 GEORGIA SEISMIC RISK.



Impacts from Climate Change

There are theories that climate change will increase the frequency and intensity of earthquakes and seismic activity, but nothing definitive has been found since technically earthquakes are not a climate response but rather a tectonic event.

2.5.11 Geologic Hazards

Associated Hazards:	Priority	Rank
Sinkholes, landslides, debris flow, mudslides, flooding, tropical cyclones, wildfire	Low	13

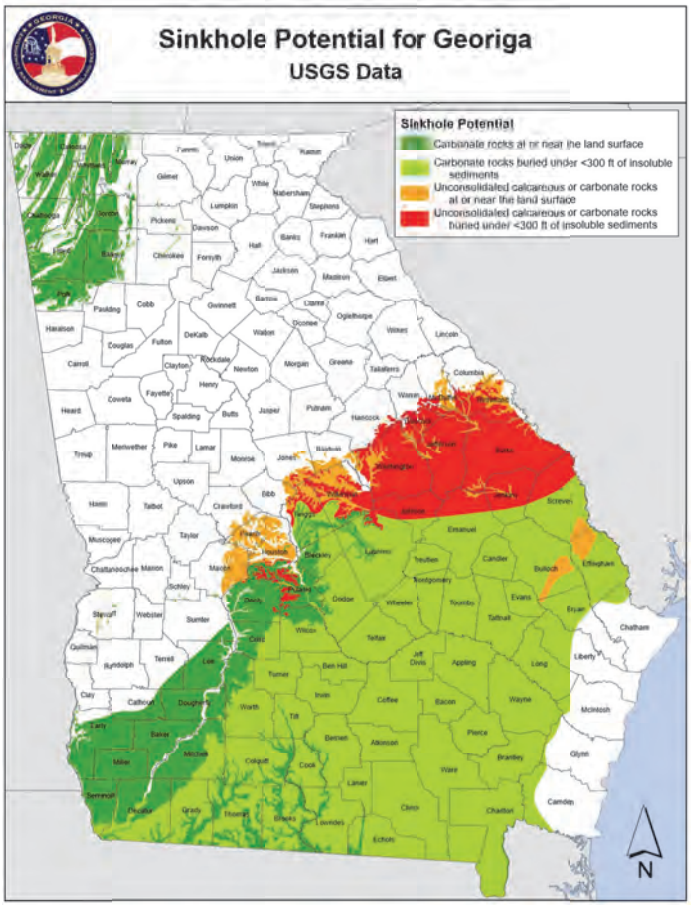
This section is intended to cover a broad spectrum of geologic hazards, including sinkholes, landslides, debris flow and mudslides.

Sinkhole

Sinkholes are generally defined as a natural depression or hole in the surface topography formed by mechanisms such as the gradual removal of soluble bedrock by percolating water, the collapse of cave roofs (due to some seismic activity), or the lowering of the water table. These natural phenomena occur in areas where the subsurface rock consists of evaporites (salt, gypsum, and anhydrite) and carbonates (limestone and dolomite). However, the correlation between sinkholes and land-use practices indicate that sinkholes are often human-induced through overpumping groundwater and through altering natural water drainage patterns.

In the State of Georgia, sinkholes occur due to the underlying carbonate rock beneath the area running along the fall line (border between the coastal plain and Piedmont region of Georgia) and the southern Appalachian Mountains. The spatial dispersion of sinkhole-susceptible soils in Georgia is found in Figure 2.52. In terms of spatial extent, sinkholes can affect areas from less than one meter to several hundred meters in diameter and depth.

FIGURE 2.52 GEOLOGY ASSOCIATED WITH SINKHOLE POTENTIAL IN GEORGIA.



Temporal characteristics greatly depend on the underlying bedrock, and seasonality is not a factor. In other words, seasonality has no effect on sinkholes because the hazard is not meteorological. The rate of onset and duration of the event greatly depend on the type of sinkhole forming. Subsidence and solution sinkholes typically form gradually in areas of thin overburden or exposed carbonate rock, respectively. Collapse sinkholes occur rapidly in areas with thick overburden after the confining layer is breached. Therefore, the rate of onset is slow for subsidence and solution sinkholes but rapid for collapse sinkholes, and the duration of the event is longer for subsidence and solution sinkholes and shorter for collapse sinkholes. No frequency estimates

exist for sinkholes except that they are more likely to develop in areas with soluble bedrock, which are depicted in Figure 2.52.

Profile

Official measures and scales of magnitude and intensity do not exist for sinkholes. However, the magnitude can be measured by the areal extent of the sinkhole, and intensity can be estimated by the losses involved with the hazard event.

The databases used for hazard and risk assessment based on historic events and losses (SHELDUS, PDD) do not include information on sinkhole events. This relates to the fact that no sinkholes have caused significant losses in the State of Georgia at least since 1960. However, one notable sinkhole event took place during the 1994 flooding of Albany, Georgia, in Dougherty County in the wake of Tropical Storm Alberto. Numerous sinkholes formed under the floodwaters, with notable events occurring in Riverside and Oakview Cemeteries in downtown Albany, where a combination of flood waters and subsiding terrain released disturbed gravesites. Although the gravesites were affected by both floodwaters and sinkholes, the federal and state declarations and subsequently administered grants for Dougherty County for this event only pointed to flooding as the hazard event.

Sinkholes are identified as hazards in four local hazard mitigation plans as of June 5, 2018. Sinkholes are prevalent primarily in Lowndes County, particularly in the southern part of the county. Historically, some sinkholes in Lowndes County are quite large, measuring hundreds of yards across. Others are small with diameters of 30 to 40 feet. However, the degree of the threat of potential sinkholes in Lowndes County is unknown. Based on limited data, there is a 25% chance of a sinkhole event occurring in Lowndes County each year. There is, however, no data available at this time to predict when or where such a sinkhole might occur in Lowndes County.

To assess the risk or probability of future sinkhole events, a detailed history of sinkholes through some period of time must be known. Currently, Georgia does not have a detailed history of sinkhole events for the entire state. With no recorded losses from sinkhole events except those compounded by other hazards (such as the Albany floods), the sinkhole hazard threat in the State of Georgia is not significant enough to warrant further analysis or inclusion in the composite assessment at the end of this chapter.

Landslides and Debris Flow

Landslides occur in all U.S. states and territories and can be caused by a variety of factors including earthquakes, storms, volcanic eruptions, and fire as well as by human modification of land. Landslides can occur quickly, often with little notice, and the best way to prepare is to stay informed about changes in and around a home that could signal that a landslide is likely to occur.

In a landslide, masses of rock, earth, or debris move down a slope. Debris and mud flows are rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground during heavy rainfall or rapid snowmelt, changing the earth into a flowing river of mud or “slurry.” The materials can flow rapidly, striking with little or no warning at avalanche speeds. They also can travel several miles from their source, growing in size as they pick up trees, boulders, cars, and other materials.

Landslide problems can be caused by land mismanagement, particularly in mountain, canyon, and coastal regions. In areas burned by forest and brush fires, a lower threshold of precipitation can initiate landslides. Land-use zoning, professional inspections, and proper design can minimize many landslide, mudflow, and debris flow problems.

Profile

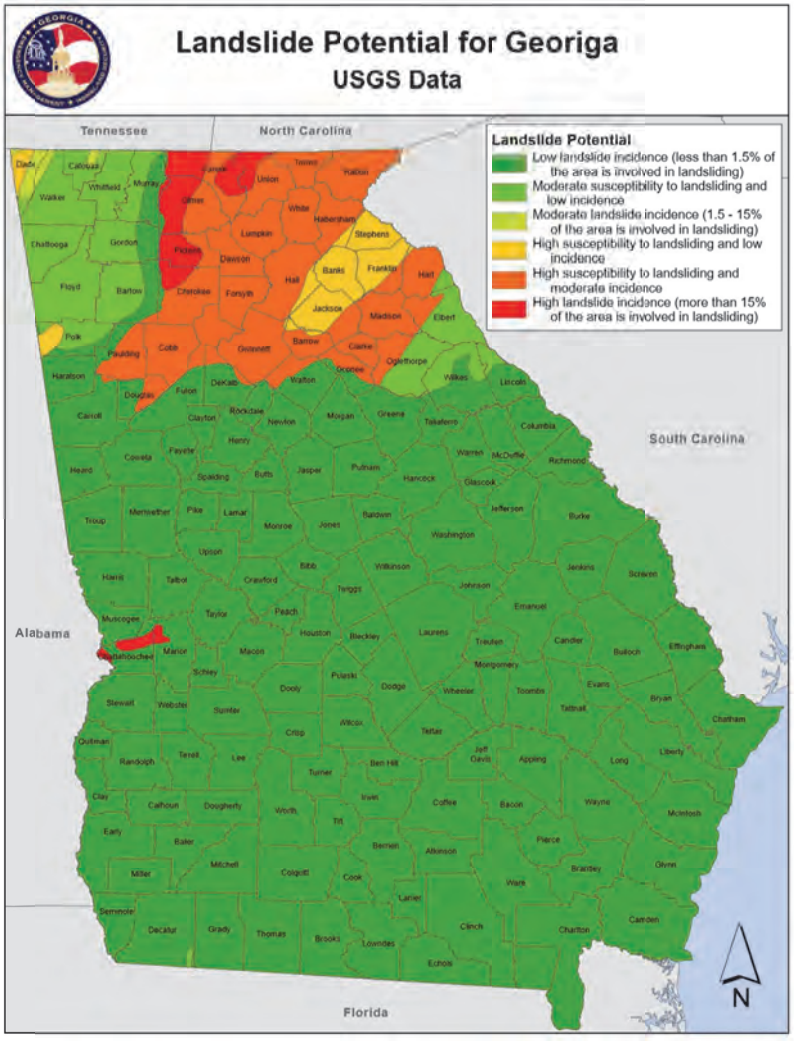
A comprehensive historical record is difficult to compile because many landslide and debris flow events are minor, do not cause significant damage, or go unreported. For 1952 to 2017, SHELDUS/NCEI lists only three events, two of which occurred in Rabun County. In 2004 a landslide was triggered in Rabun County by excessive rainfall from Hurricane Ivan as it passed through the state. Property losses from this event were estimated at $100,000. In 2006, Rabun County experienced another landslide as a result of heavy rains, causing no significant damages. In 2015, Gilmer County experienced multiple landslides as a result of heavy rains. Damages were estimated at $200,000.

In August 2013, heavy rains created a mudslide in Sandy Springs, Georgia, that closed a local road. The road was closed for several months while a retaining wall was constructed at a cost of approximately $1 million. Residents have reported eight other mudslides in the area.

The most vulnerable locations in Georgia are identified in Figure 2.53. Higher risk areas are mostly located in North Georgia, where steeper slopes exist in mountain and hill terrain.

Given the variety of events that could cause landslides or debris flows and the incomplete records of previous occurrences, it is not currently possible to determine the future probability, nor any measure of magnitude or severity, of an event in Georgia.

FIGURE 2.53 LANDSLIDE POTENTIAL FOR GEORGIA



Impacts from Climate Change

Heavier downpours and greater precipitation amounts, which are anticipated with climate change, would increase the frequency and intensity of landslides and sinkholes, but these events have been too historically infrequent to speculate on how much worse they could become.

2.5.12 Dam Failure

Associated Hazards:	Priority	Rank
Flooding, technological (man-made) hazards	Medium	11

Hazard Description

A dam is a constructed barrier across flowing water that obstructs, directs, or slows the velocity of the water, creating a reservoir, lake, or impoundment. The structure is created to retain water for a variety of purposes such as generating power, providing water for irrigation or water supply, or controlling flooding.

The threat of dam failures is triggered by carelessness of design, construction, and maintenance. The integrity of older dams, often affected by weathering, mechanical changes, and the influence of chemical agents, is deteriorating. Not only is dam failure risk increasing (with aging infrastructure) but the population vulnerable to this hazard is also increasing due to downstream development. Even structures outside of the known 100 year floodplain could be affected by dam failures because of the water's often sudden release and velocity.

Dam failures are generally grouped into three classifications: hydraulic, seepage, and structural. The three types of failure sometimes compound upon one another to create complex and interrelated hazard events.

Hydraulic failures are a result of the uncontrolled flow of water over and around the dam structure as well as the erosive action on the dam and its foundation. The uncontrolled flow causing the failure is often classified as wave action, toe erosion, or gullying. Earthen dams are particularly susceptible to hydraulic failure because earthen materials erode more easily than other materials, such as concrete and steel. This type of failure constitutes approximately 40% of all dam failures.

While all dams exhibit some seepage, the velocity and amount of water are controlled to prevent failure. Seepage occurs through the structure and its foundation and erodes the structure from within. Seepage accounts for approximately 4% of all dam failures.

Structural failure involves the rupture of the dam or the foundation by water movement, earthquake, or sabotage. Large earthen dams and dams constructed with weak materials (such as silt) are especially susceptible to structural failure. This type of failure accounts for approximately 30% of all dam failures.

In Georgia, all of the major rivers are dammed at least once before leaving the state's boundaries. Also, numerous smaller dams, including agricultural dams, exist throughout the state. Therefore, the possibility of dam failure hazards exists throughout the state. The spatial extent of a dam failure event depends on the amount of water within the dammed reservoir and the downstream topography. Because of the high velocity of the water, flooding can strike beyond known floodplains.

Dam failures often have a rapid rate of onset, leaving little time for evacuation. The first signs of the failure may go unnoticed upon visual inspection of the dam structure. However, continual maintenance and inspection of dams often provides knowledge on the possibility of failure with certain precipitation amounts. The duration of the flooding event caused by the failure also depends on the amount of water and downstream topography. Given smaller volumes of water and a topography suited for transporting the water rapidly downstream, the event may only last hours. Because of the lack of seasonality and other predictive factors, the frequency of dam failures cannot be determined.

In terms of magnitude and intensity of the flooding event caused by dam failures, no measures exist. However, the National Dam Safety Program (NDSP) produces rankings and definitions of dam structures based on potential impact. Table 2.31 lists the dam categories and potential impact of dam failure.

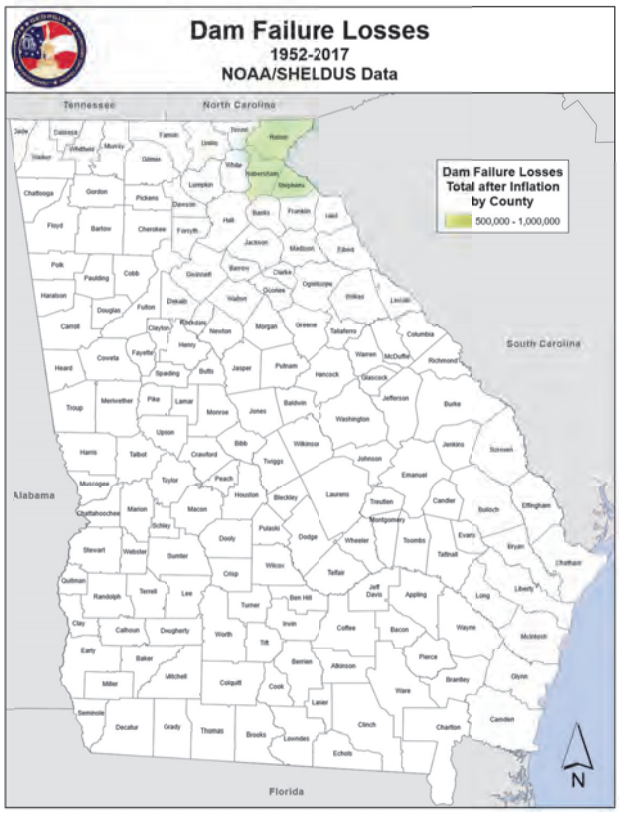
TABLE 2.31 DAM CLASSIFICATION FROM NDSP

Classification	Loss of Human Life	Economic, Environmental, or Lifeline Loss
High	Probable, >1	Yes (not necessary for classification)
Significant	None expected	Yes
Low	None expected	Low and generally limited to owner

The maps of historical dam failure events and associated losses in the State of Georgia, Figures 2.54 and 2.55, only show one event from 1952 to 2017.

FIGURE 2.54 DAM FAILURE EVENTS IN GEORGIA, 1952–2017

FIGURE 2.55 DAM FAILURE LOSSES IN GEORGIA, 1952–2017



In 1977, the Kelly Barnes Dam in Toccoa failed. The original structure consisted of a rock crib dam built in 1899 in order to create a small reservoir for a hydroelectric plant. The Toccoa Falls Bible Institute built an earthen dam over the original rock crib dam in 1937 to develop a more stable electric power source. The dam structure was raised several times, reaching 42 feet above the rock foundation by 1957, when power production was halted and the reservoir was solely utilized for recreation. At around 1:30 am on Sunday, November 6, 1977, the Kelly Barnes Dam failed. This collapse resulted in a flash flood that swept downstream causing 39 fatalities and $2.3 million in property damage. The cause of the failure is undetermined but probably stemmed from a local slide on the steep downstream slope most likely associated with piping (a form of seepage) and a localized breach in the crest followed by progressive erosion, saturation of the downstream embankment, and the subsequent total collapse of the structure.

TABLE 2.32 DAM FAILURE NOTABLE EVENTS

Date	Name	Description
11/6/1977*	Kelly Barnes Dam	DR541; Dam Collapse, Flooding

*Presidential declared disaster.

From 1992 to 2017, SHELDUS/NCEI reports a total of 3 events, including the Kelly Barnes event described above. This equates to a statistical 5% chance the State could experience a dam failure event in any given year.

Other dam failures have occurred in Georgia, some related to the spring of 1990 flooding and the July 1994 flooding associated with Tropical Storm Alberto. However, these dam failures were not documented as significantly contributing to already flooded conditions.

To complete a risk assessment for dam failures in the State of Georgia, the location of all the potential sources of the hazard (the dams) must be located and evaluated using some categorization of failure potential (risk). In an attempt to meet this criterion, the Georgia Safe Dams Act of 1978 established Georgia's Safe Dams Program. The Environmental Protection Division (EPD) within the Georgia Department of Natural Resources (DNR) is responsible for administering the program. The purpose of the program is "to provide for the inspection and permitting of certain dams in order to protect the health, safety, and welfare of all citizens of the state by reducing the risk of failure of such dams." The program is responsible for inventorying and classifying dams and regulating and permitting high hazard dams.

For this plan update, Georgia EPD provided safe dams data for Category I and Category II dams. The definitions of these dams are different from the NDSP definitions.

> **Category I** includes dams for which improper operation or dam failure would result in probable loss of human life. Situations constituting "probable loss of life" involve frequently occupied structures or facilities, including, but not limited to, residences, commercial and manufacturing facilities, schools, and churches.
>
> **Category II** is the classification in which improper operation or dam failure is not expected to result in probable loss of human life. (Georgia Department of Natural Resources, Environmental Protection Division Rules Chapter 391-3-8)

The map in Figure 2.56 shows the location of all Category I and Category II dams in the state. Figure 2.57 depicts the total number of Category I dams by county. This data illustrates that the most populous area of the state, the Atlanta Metro region, also has the greatest amount of risk due to dam failure as this area has the highest number of Category I dams.

FIGURE 2.56 CLASSIFICATION OF DAMS IN GEORGIA.

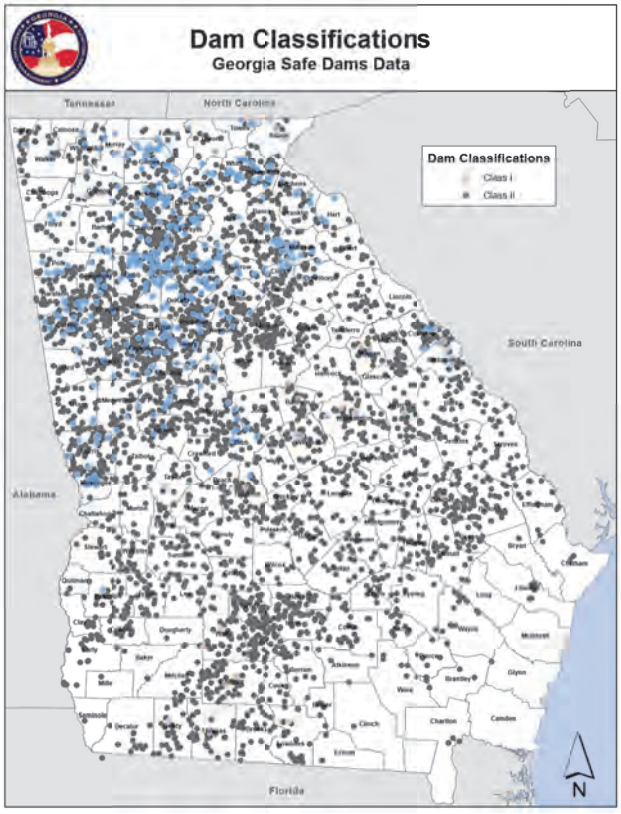
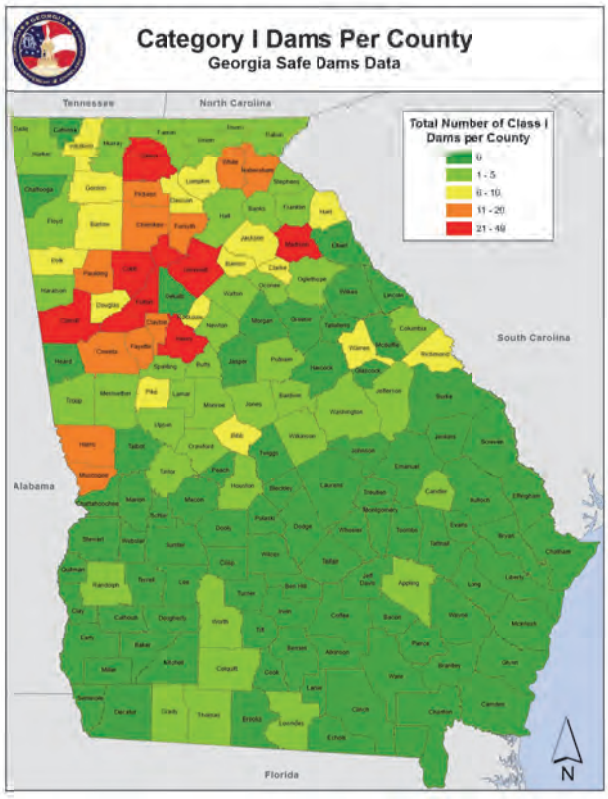


FIGURE 2.57 CATEGORY 1 DAMS PER COUNTY IN GEORGIA.



The dams presented in Figures 2.55 and 2.56 are considered watershed dams in that they meet Georgia's definition of a dam (any structure 25 feet or more in height or one impounding a 100-acre area of water at the top of the dam) that was built with 100% federal money on private land through the coordination of the USDA Natural Resources Conservation Service (NRCS) and local Soil and Water Conservation districts. This data, provided by NRCS and representing a small portion of dams that exist within the State of Georgia, allow for analysis to determine the counties with the most impact potential (based on the mere existence of dams). The dam impact potential map, Figure 2.58, illustrates the NRCS-classified watershed dam locations within Georgia coupled with a summary of total dams per county. The highest concentration of watershed dams within Georgia counties is in Cherokee and Carroll Counties, and most of the watershed dams are in the northern portion of the state. The dam failure risk map, Figure 2.59, utilizes a NRCS risk analysis that includes an indicator of failure potential, population at risk, structures at risk, and interstates and secondary roads at risk to calculate an overall risk index for each of the 357 watershed dams shown in Figure 2.58. All of the dams' risk values within each county were combined to calculate each county's overall dam failure risk. The counties with the highest risk are Gwinnett, Cobb, and Muscogee. This map also illustrates that the northern portion of Georgia has the highest risk for dam failure.

FIGURE 2.58 IMPACT POTENTIAL FOR DAMS IN GEORGIA.

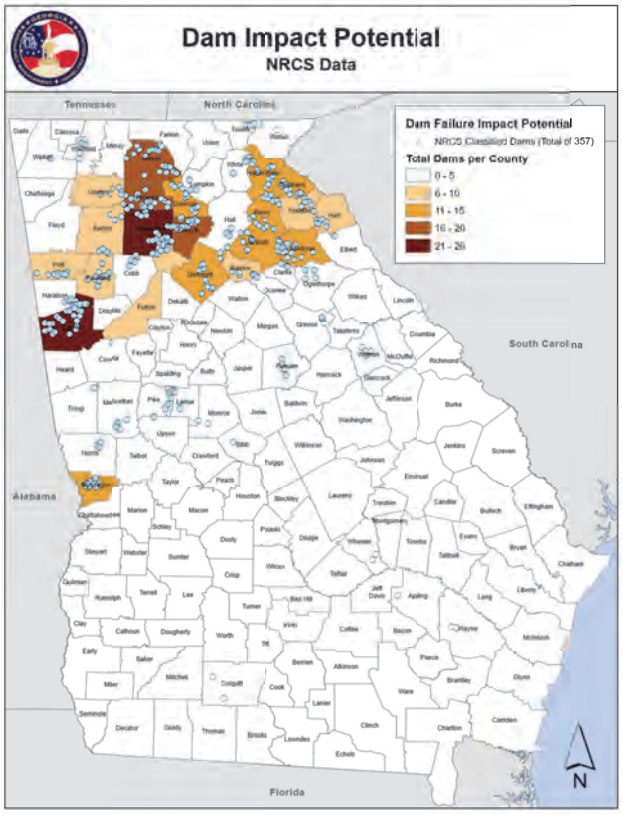
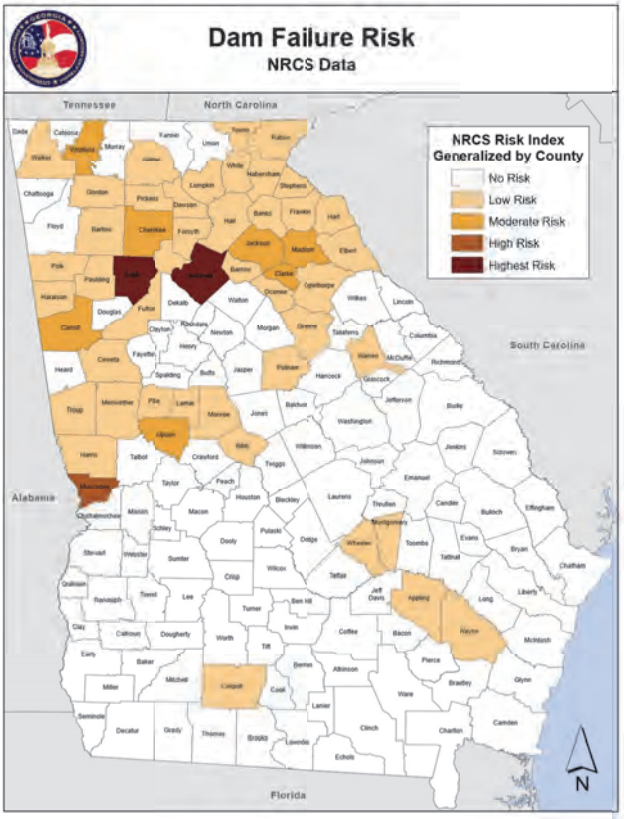


FIGURE 2.59 FAILURE RISK FOR DAMS IN GEORGIA.



Impacts from Climate Change

The trend in flood magnitude for Georgia is actually a 3-6% decrease over the past decade. However, flooding may intensify in many U.S. regions, even in areas where total precipitation is projected to decline. Major weather factors that contribute to flooding include heavy or prolonged precipitation, snowmelt, thunderstorms, storm surges from hurricanes, and ice or debris jams. Human factors that contribute to flooding include structural failures of dams and levees, altered drainage, and land-cover alterations (such as pavement).

As warming increases, this causes heavy downpours and leads to more rapid spring snowmelt. These heavier, more intense rains could potentially result in more dam failures, though, as noted above, the impacts from many of those failures may be indistinguishable from larger ongoing events.

2.5.13 Extreme Heat

Associated Hazards:	Priority	Rank
High Heat, Heat Waves, Excessive Heat	Medium	10

This section is intended to cover times of dangerously high temperatures which endanger peoples' life, health and safety.

Hazard Description

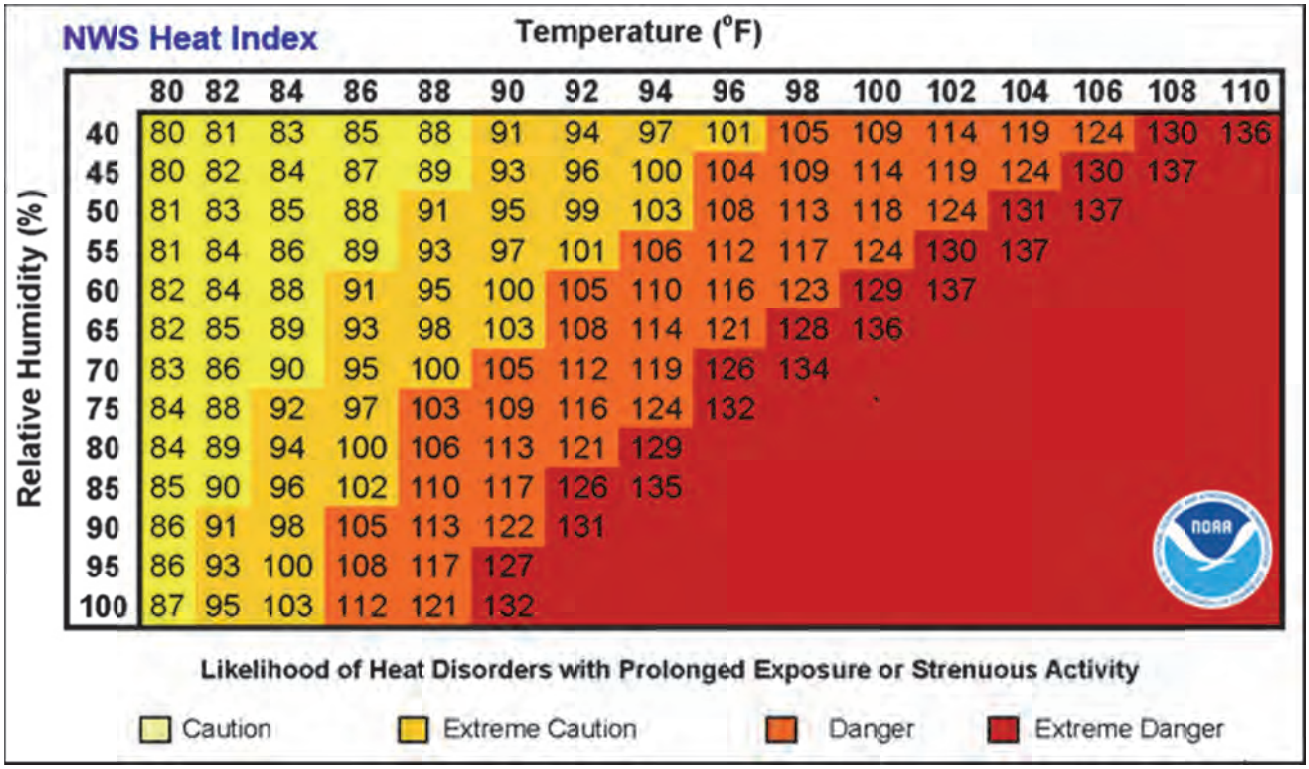
The term extreme heat can be subjective to a degree. FEMA, in their "Mitigation Ideas" publication defines extreme heat as "the condition where temperatures consistently stay ten degrees or more above a region's average high temperature for an extended period." The key to this definition is, extreme heat is relative to the average temperature, regardless of the time of year. For example, the National Center for Environmental Information (NCEI) records heat events in Georgia with 60 and 70 degree temperatures in December and January, simply because they are significantly higher than the average temperature for that time of year. According to www.ready.gov/heat, FEMA also offers another definition of extreme heat: "In most of the United States, extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees." This definition can also lead to some subjectivity in the term "extreme." For example, people that live in the southern parts of the country are more adapted to temperatures in the 90s and 100s than people that live in the more northern tiers. This is not to say those temperatures are not still dangerous. Notably, in recent years, more heat related deaths have occurred in the southern tier states than the northern tiers. The National Weather Service, however, focuses on "Excessive Heat," defining it as heat indices of 105 degrees or more using a combination of temperature and humidity as a "real feel."

Profile

NOAA and SHELDUS together document 359 Extreme Heat type events from 1952 - 2017. NCEI, alone, documents 318 separate Excessive heat events between 2002 and 2015. Establishing a realistic statistical probability, however, is difficult at best. Notably, many of these "separate" occurrences in the NCEI records occurred on the same day, which, for the purpose of statistical modeling, artificially inflates the number of events. In the record, there are 13 days with recorded events in the 2002 – 2015 timeframe. Based on that, 13 days in 13 years leads to a 100% statistical chance of an occurrence in any given year. This, however, is also questionable based on the records because many of these days are consecutive. Based on the FEMA definition of Extreme Heat (2-3 days), recorded events on consecutive days could be considered one occurrence due to the "regional" nature of extreme heat / excessive heat / heat wave events. Notably, in the NCEI record, there are many years with no documented "Heat" or "Excessive Heat" events.

Official measures and scales of magnitude and intensity do not exist for extreme heat. The best way to determine a realistic magnitude for extreme heat would be based on temperatures and heat indices. According to the National Weather Service, the heat index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature. Figure 2.60 below shows how the heat index is determined based on temperature and humidity. Establishing a statistical magnitude, or extent, is difficult at best. The NCEI records mentioned above are inconsistent in whether they describe the temperature of the event, the heat index of the event, or neither. Nevertheless, in August 2011, Chatham County recorded a heat index of 118 degrees. In June 2012, The City of Macon recorded a high temperature of 108 degrees. While these temperatures are extreme for Georgia, the record shows they can occur.

FIGURE 2.60 NATIONAL WEATHER SERVICE HEAT INDEX



In terms of impacts, aside from taxing power systems, the primary losses from extreme heat events are deaths and injuries. Figure 2.61 depicts the number of heat events that occurred between 1952 and 2017. Figure 2.62 depicts the number of casualties that have occurred in that timeframe. Georgia recorded 4 injuries and 143 deaths. This equates to 2-3 deaths/injuries per year. One recorded event in September 2015 showed temperatures in the low 90s, which is not abnormal for that time of year; however, a child did perish after being left in a vehicle where temperatures reached 130-170 degrees, well within the extreme danger zone indicated by the Heat index chart above.

Figure 2.61 Heat Events 1952 – 2017

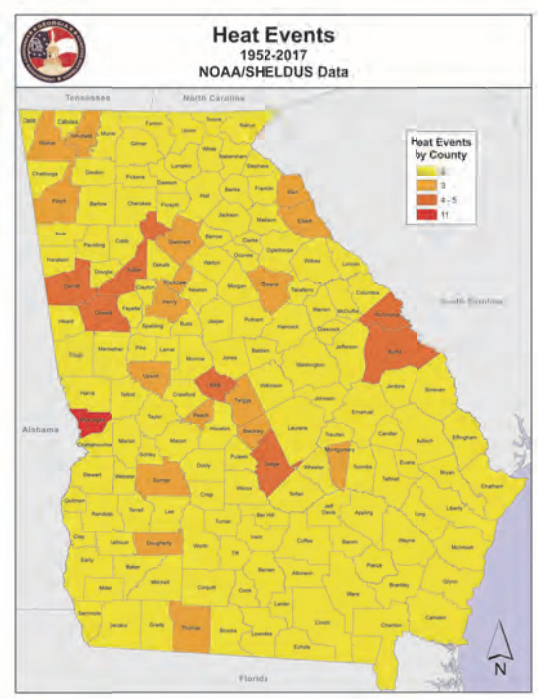
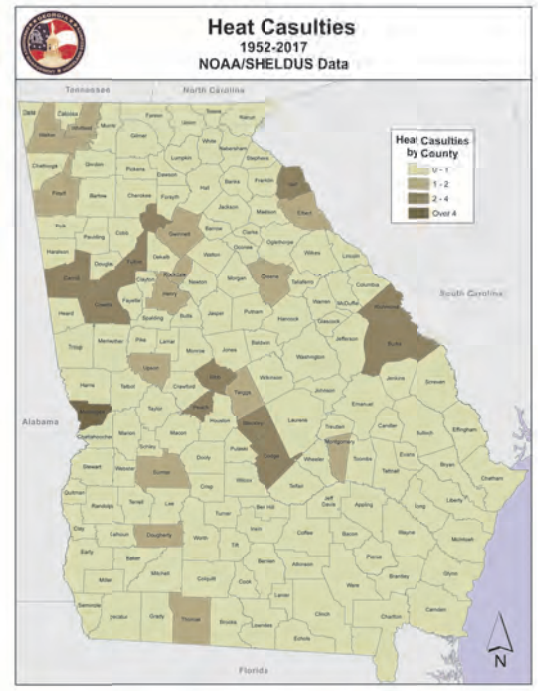


Figure 2.62 Heat Casualties 1952 - 2017



Impacts from Climate Change

As temperatures rise, Georgia could become susceptible to more frequent and/or intense heat waves. Heat waves are periods of abnormally hot weather lasting days to weeks. The number of heat waves has been increasing in recent years, with the number of intense heat waves being almost triple the long-term average. Analyses show that climate change has generally increased the probability of heat waves, and prolonged (multi-month) extreme heat has been unprecedented since the start of reliable instrumental records in 1895.

2.6 SOCIAL VULNERABILITY ASSESSMENT

While vulnerability can include a range of assets that can be impacted by hazards, the data in this vulnerability assessment is limited to social vulnerability. Social vulnerability comprises the social, economic, demographic, and housing characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to environmental hazards.

The tool used to determine the social vulnerability of each county is the Social Vulnerability Index (SoVI®). SoVI® 2010-14 measures the social vulnerability of U.S. counties to environmental hazards. The index is a comparative metric that facilitates the examination of the differences in social vulnerability among counties and graphically illustrates these differences. It shows where there is uneven capacity for preparedness and response and where resources might be used most effectively to reduce vulnerability. SoVI® also is useful as an indicator in determining each county's different capabilities to recover from disasters.

2.6.1 Methods

The index synthesizes 29 socioeconomic variables, listed in Table 2.33, that research literature suggests contribute to a reduction in a community's ability to prepare for, respond to, and recover from hazards. SoVI® data sources are based solely on the U. S. Census Bureau estimates.

TABLE 2.33 VARIABLES INCLUDED IN THE SOCIAL VULNERABILITY INDEX (SOVI) ANALYSIS

SOVI Variables
Hospitals per capita
Median age
Service industry employment
Percent Households on Social security
Extractive industry employment
Percent Native American population
Percent Asian
Percent Black
Percent Hispanic
Percent population under 5 or over 65
Percent population over 65
Nursing Home Residents per capita
Percent population without health insurance
Percent Female population
Percent Civilians Unemployed
Per capita income
People per household
Percent Households earning over 200,000
Percent Poverty
Median House Value
Percent Renters
Median Gross Rent
Percent Female headed households
Percent Mobile homes
Percent population less than 12th grade education
Female labor force participation
Population Speaking English as Second Language with limited Proficiency
Population Housing with No Car
Percent Unoccupied Housing Units

The data is compiled and processed by the Hazards and Vulnerability Research Institute at the University of South Carolina. The variables in Table 2.33 are grouped together into 8 similar components. Each component is assigned a positive or negative cardinality, based on its anticipated impact on the social vulnerability of the area. The lower the SOVi score, the more capable the community is to recover from disasters. Therefore, the components that research suggests would improve a community's capability to recover are given a negative cardinality. For example, the research suggests more affluent communities tend to be more resilient, or better able to recover. Therefore, the wealth component is given a negative cardinality because it would lower the SOVi score meaning the community is more resilient to disasters. Table 2.34 below shows the components and their cardinality (i.e. whether they have a positive or negative effect on the SOVi score.) The SoVI variables listed in Table 2.33 explain 78% of the variance in the data. A complete list of the variables within each component is included in Appendix D.

TABLE 2.34 COMPONENT IMPACT ON SOCIAL VULNERABILITY INDEX (SOVI) ANALYSIS

Component	Score Impact
Wealth	**-**
Race (Black) and Social Status	**+**
Age (Elderly)	**+**
Ethnicity (Hispanic) and lack of Health Insurance	**+**
Special Needs Populations	**+**
Service Sector Employment	**+**
Race (Native American)	**+**
Gender (Female)	**+**

2.6.2 Assessing Social Vulnerability by Jurisdiction

After completing the SoVI methodology, the results are tabulated and mapped in GIS. Tables 2.35 and 2.36 list the counties with the highest and lowest SoVI scores, respectively, for the State of Georgia.

TABLE 2.35 MOST VULNERABLE COUNTIES IN GEORGIA

Highest Vulnerability	SoVI Score
Taliaferro County	6.44
Clay County	6.44
Randolph County	5.44
Towns County	5.40
Union County	4.39
Terrell County	4.07
Jefferson County	3.81
Dougherty County	3.77
Wilkes County	3.68
Pulaski County	3.52

TABLE 2.36 LEAST VULNERABLE COUNTIES IN GEORGIA

Lowest Vulnerability	SoVI Score
Chattahoochee County	-9.70
Wheeler County	-7.57
Forsyth County	-6.96
Oconee County	-5.78
Lee County	-5.59
Fayette County	-5.42
Effingham County	-4.99
Harris County	-4.96
Columbia County	-4.88
Bryan County	-4.47

The map of relative SoVI scores, Figure 2.63, shows the social vulnerability of all counties in the state. Table 2.37 gives the number of counties that fall under each SoVI score. The scores are categorized based on standard deviations from the average score for the entire state. Table 2.38 provides the standard deviation for each of the hazard scores.

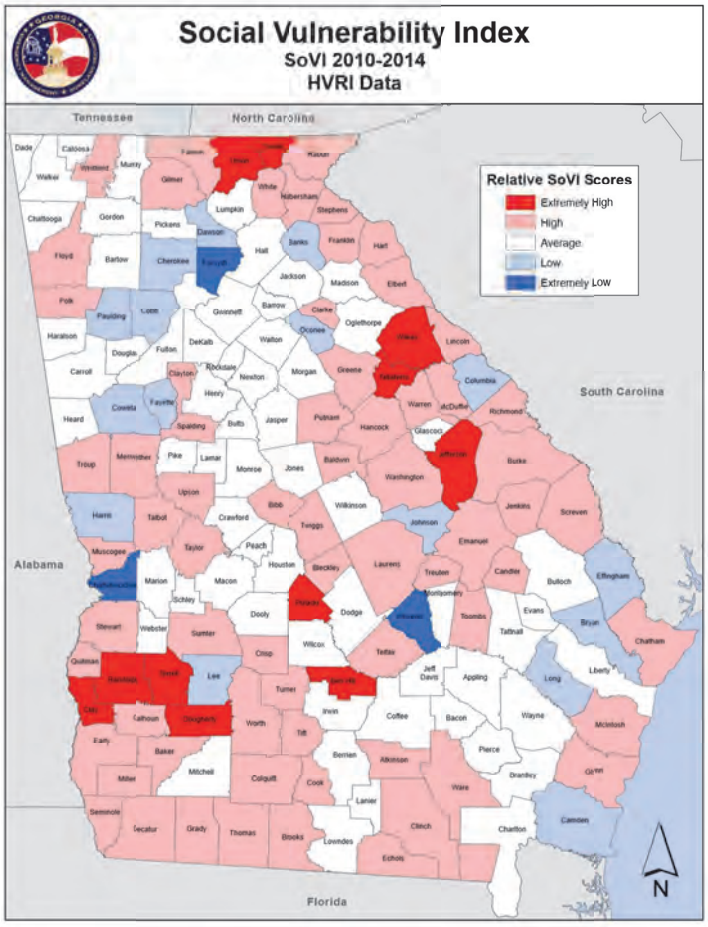
TABLE 2.37 NUMBER OF COUNTIES BY SOVI SCORE

SoVI Score	Number of Counties
Extremely High	11
High	67
Average	62
Low	16
Extremely Low	3

TABLE 2.38 STANDARD DEVIATION FROM STATE AVERAGE, SOVI SCORES

SoVI Score	Number of Counties
Extremely High	6.44 to 3.22
High	3.21 to -0.01
Average	-0.02 to -3.23
Low	-3.24 to -6.46
Extremely Low	-6.47 to -9.70

FIGURE 2.63 SOCIAL VULNERABILITY INDEX BY COUNTY.



2.7 COMPOSITE ASSESSMENT

The composite assessment is a compilation of the Social Vulnerability Index scores in Section 2.6 and hazard risk scores for storm surge (SLOSH), wind, flood, wildfire, and earthquake. These are the only hazards included in the composite risk because they are the only ones that are spatially constricted or exhibit a strong spatial pattern. The hazard scores are different from those used in the risk ranking in that they only factor in location and potential extent. The scores for each of these five hazards are described in the Tables 2.39 to 2.43.

TABLE 2.39 SLOSH HAZARD SCORES

Hazard Score	Description
5	Inundated by a Category 1 hurricane
4	Inundated by a Category 2 hurricane
3	Inundated by a Category 3 hurricane
2	Inundated by a Category 4 hurricane Inundated by a Category 5 hurricane

TABLE 2.40 WIND HAZARD SCORES

Hazard Score	Description
5	>120 mph gust
4	111–120 mph gust
3	101–110 mph gust
2	91–100 mph gust
1	<90 mph gust

TABLE 2.41 FLOOD HAZARD SCORES

Hazard Score	DFIRM Zone	Description
4	Floodway / AE / FW	Floodway (within AE)
4	VE	1% Annual Chance of Flood with velocity, BFE
3	A	1% Annual Chance of Flood no BFE
3	AE	1% Annual Chance of Flood with BFE
3	AH	1% Annual Chance of Flood Ponding has BFE
3	AO	1% Annual Chance of Flood Sheet flow has depths
3	1 PCT FUTURE	1% Annual Chance of Flood Future Conditions
2	0.2 PCT ANNUAL CHANCE	0.2% Annual Chance of Flood
1	AREA NOT INCLUDED	Area not included in survey
1	D	Undetermined but possible

TABLE 2.42 WILDFIRE HAZARD SCORES

Hazard Score	Description
4	High Risk
3	Moderate Risk
2	Low Risk
1	Very Low Risk
0	No Houses
	Agriculture
	Bodies of Water
	Dense Urban Development

TABLE 2.43 EARTHQUAKE HAZARD SCORES

Hazard Score	Description
4	50–83% g value
3	33–50% g value
2	17–33% g value
1	0–17% g value

Figure 2.64 illustrates the composite of the hazard scores. The values, ranging from 0 to 21, represent the least to the most hazardous areas in the state, respectively. The areas highlighted in red have the highest composite hazard scores, indicating greater hazard potential. This map proves useful in sub county assessments because the scores provide somewhat continuous hazard data that is not confined by jurisdictional or other unrelated boundaries.

Figure 2.65 illustrates the average hazard score by county and includes the same hazards listed above. This map identifies the counties that have substantially more risk of hazard events than other counties. For example, the coastal region of Georgia and the mountainous northern portion of the state are at more risk than the interior. Because the hazards are not weighted in terms of impact (storm surge being more hazardous than wind, for example), these similarities in risk are caused by different hazards. For example, the coast is mainly at risk to flooding events (storm surge and inland flooding), while the mountainous north is more at risk to seismic events along with inland flooding. The most at-risk counties (based on average) and their respective scores are found in Table 2.44.

FIGURE 2.64 COMPOSITE HAZARD SCORES FOR GEORGIA.

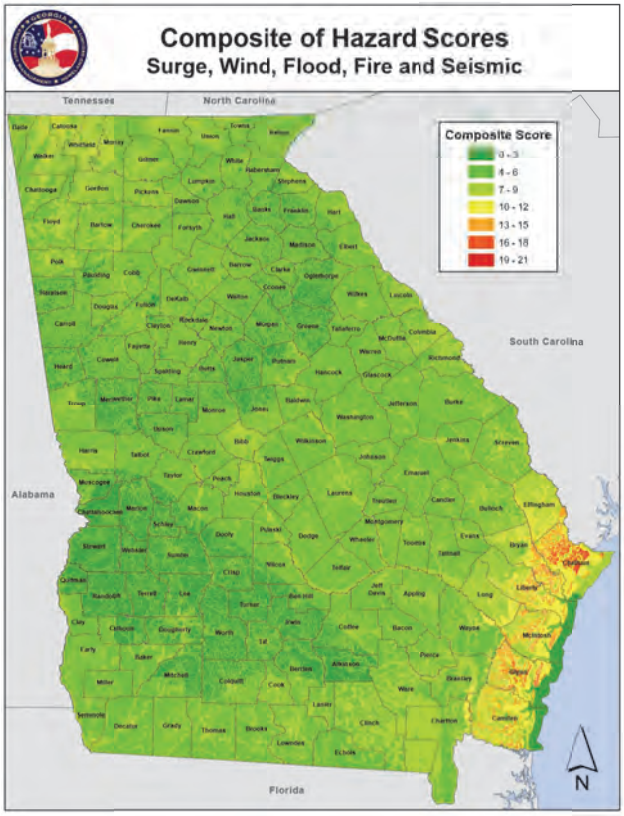


FIGURE 2.65 AVERAGE HAZARD SCORE BY COUNTY.

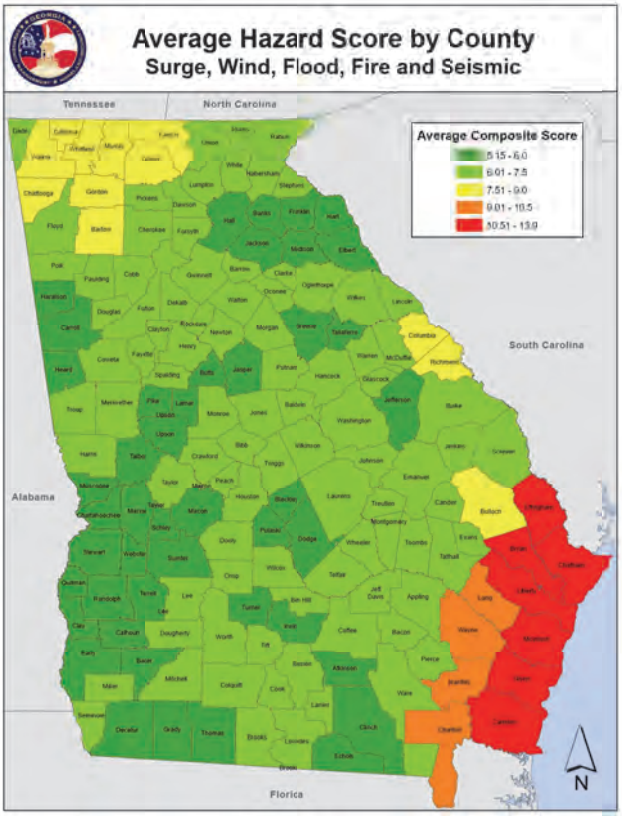


FIGURE 2.66 COMBINED HAZARD SCORE AND SOCIAL VULNERABILITY INDEX SCORE

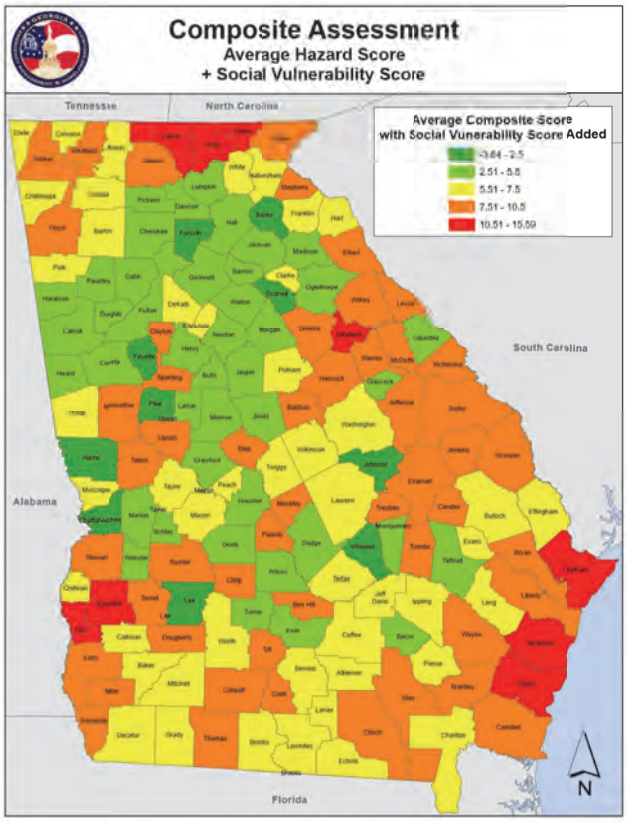


FIGURE 2.67 COMBINED HAZARD RISK AND SOCIAL VULNERABILITY INDEX SCORE, CHANGES TO TOTAL SCORE

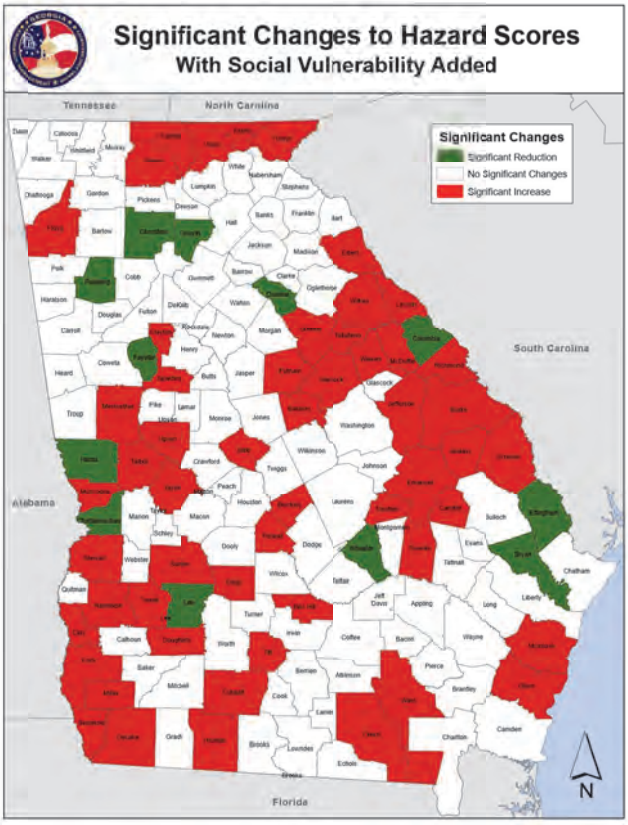


TABLE 2.44 COUNTIES WITH HIGHEST AVERAGE HAZARD SCORES

County	Average Hazard Score
Chatham County	13.9
McIntosh County	13.0
Glynn County	12.8
Liberty County	12.5
Bryan County	12.4
Camden County	11.6
Effingham County	11.1
Wayne County	10.2
Long County	10.1
Brantley County	9.9

TABLE 2.45 COUNTIES WITH HIGHEST COMPOSITE SCORE

County	Composite Score (Hazard+SoVI)
Glynn County	15.6
McIntosh County	14.1
Chatham County	14.1
Taliaferro County	12.3
Towns County	12.2
Clay County	11.8
Union County	11.0
Randolph County	10.9
Fannin County	10.9
Wilkes County	10.5

By combining the hazard scores with social vulnerability scores from Section 2.6, an estimate of total risk can be calculated for each county. Figure 2.66 combines the average hazard score with the SoVI score for each county. These scores are categorized into five groups. The red and orange shading indicates the most at-risk and vulnerable counties within the State of Georgia, and the green counties are the least at-risk and vulnerable. The counties with the highest combined scores are listed in Table 2.45.

Adding social vulnerability to the hazard scores changes the risk for several counties, and Figure 2.67 highlights those counties with significant changes. Some counties with less risk have a higher combined score due to high SoVI scores. A comparison of Figures 2.63 and 2.67 shows the relationship between the Social Vulnerability (SoVi) scores and the changes to the hazard score when SoVi is added in as reflected in Table 2.67. Specifically, counties in Figure 2.67 showing an increase in vulnerability after Social Vulnerability is added in are many of the same counties shown in Figure 2.63 to have a high or extremely high SoVi scores. In contrast, counties in Figure 2.67 showing a significant reduction after SoVi is added in, are many of the same counties in Figure 2.63 with a low SoVi score. This leads to the conclusion that counties with lower social vulnerability are better able to recover from disasters than counties with higher social vulnerability, thereby reducing their overall vulnerability to the hazards. On the other hand, counties with higher social vulnerability are considered to be less capable of recovering, thereby increasing their overall vulnerability to disasters. An explanation of the variables used in the SoVi, including how each variable impacts the overall SoVi score, is provided in Section 2.6.1. As Section 2.6 explained, these are the counties where the population has comparatively less capacity than other counties to prepare for, respond to, and recover from a hazard event. In contrast, the total risk to some counties decreases when social vulnerability is factored in because the population of these counties exhibits greater potential for preparation, response, and recovery.

Development can also affect a community's risk. The data indicates, for example, that growing suburban communities surrounding larger metropolitan statistical areas have lower SoVI scores, which when added to the composite scores lowered the overall assessed vulnerability of those communities. Examples of this

include Columbia, Harris, Lee, and Fayette Counties, which surround Augusta, Columbia, Albany, and Atlanta, respectively. This would seem to suggest that population increases due to suburban development tend to lower a community's overall vulnerability. In scoring the different variables, the index assigns those related to wealth a low score, thereby reducing the social vulnerability of wealthy areas. These suburban areas noted above tend to be more affluent, having a higher per capita income than their surrounding areas, thereby lowering their vulnerability in the Social Vulnerability Index score. If these changes in development continue, they could affect future risk and vulnerability assessments. Note that variables related to growth and development are included in SoVI and, therefore, are incorporated into the composite assessment. Thus, the ranking of the most vulnerable and most at-risk counties has been updated to reflect these factors.

2.8 LOSS POTENTIAL

At present, the best available method to estimate potential losses is in relation to two types of facilities: state-owned or leased facilities, and locally reported critical facilities. The analysis derives critical facility data from the Georgia Mitigation Information System (GMIS). This system allows authorized users to add local critical facility data to a database and generate reports against hazard datasets. Since completion of the last hazard mitigation plan, GMIS has continued to be enhanced to make the tools and data as useful as possible. GEMA/HS requires each county to enter its critical facility data as part of the local planning process. This section discusses the critical facility loss potential of local jurisdictions and state facilities. Information on repetitive loss properties is also presented.

Changes in development can increase or decrease biophysical vulnerability. Therefore, as vulnerability changes due to development, the estimates of loss change as well. With increases in development in the higher hazard areas, the estimates of loss will increase accordingly. This GHMS update includes the monetary potential for loss for both state facilities and critical facilities. Completed mitigation projects such as acquisitions are a minor change in development that may have decreased loss estimates for those areas. Since the 2014 GHMS, 70 properties have been acquired by 12 local governments using 16 projects. GEMA/HS Hazard Mitigation staff members are in the process of developing additional methods for tracking development changes that could affect loss potential.

Future updates may address the impacts of development on these numbers by calculating the changes in value at risk and standardizing the difference using an indicator of development such as population change. Additional data and time would be necessary for such an analysis. For this update, however, the Planning staff looked at overall population changes throughout the State between 2010 - 2017 and increased urbanization from 1998 – 2015. Figure 2.68 below shows population changes from 2010 to 2017. Figure 2.69 shows areas of increased urbanization from 1998 to 2015. While the date ranges are slightly different for the two datasets, a comparison of the two maps shows a correlation between the areas of population increases and increased urbanization. On the other hand, areas with population decreases on figure 2.68 generally correlate to areas of less new urbanization shown on Figure 2.69. Additional data would be necessary to show how the various elements of the population (race, gender, age, income, etc.) changed and how that impacted the area's overall vulnerability. Nevertheless, adding people to a community means more people are at risk to the hazards that community is exposed to. Likewise, adding to urbanized areas, means more structures are vulnerable to the hazards in the area. While additional analysis is necessary to determine actual impact, it can be inferred that population, at least to a degree, drives urbanization, thereby placing more people and more structures and infrastructure at risk to the hazards the area faces. On a local level, these types of changes can have significant impacts on the local risk assessments, especially in newly suburbanized areas surrounding larger communities. However, on a statewide level, this analysis only confirms these areas are ones that have historically been growing communities. Therefore, these population and urbanization changes did not have a significant impact on the state's updated overall risk assessment.

2.8.1 Estimating Potential Losses by Jurisdiction

Critical facility data for this analysis include structures that should be able to continue to function and provide services in some capacity (not necessarily in accordance with their normal purpose) to surrounding populations during and after a hazard event. Typical critical facilities include hospitals, fire stations, police stations, critical record storage, schools, and similar facilities. As of September 30, 2017, the GMIS database contains 18,528 locally reported critical facilities. This total represents an increase of 385 critical facility records in the database since the last plan was produced.

FIGURE 2.68 POPULATION CHANGES BETWEEN 2010 AND 2017

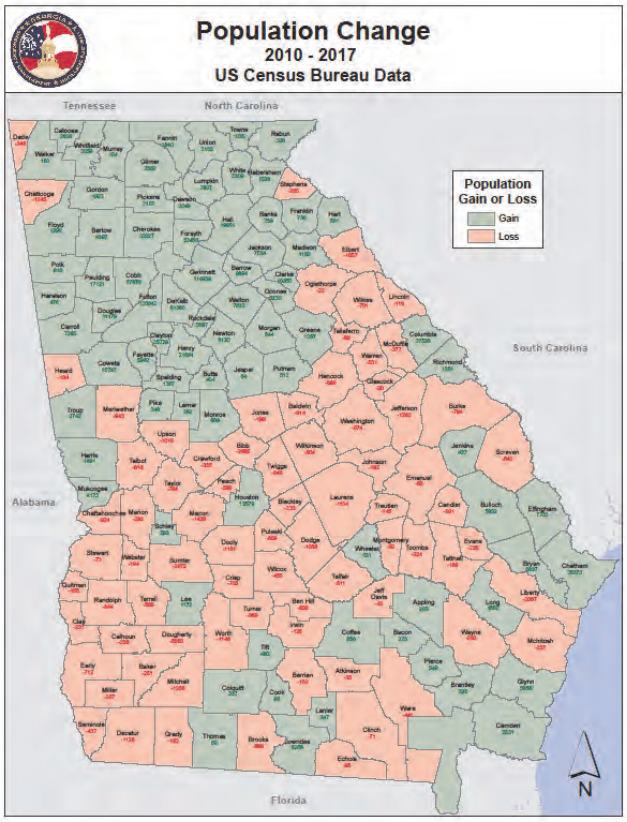
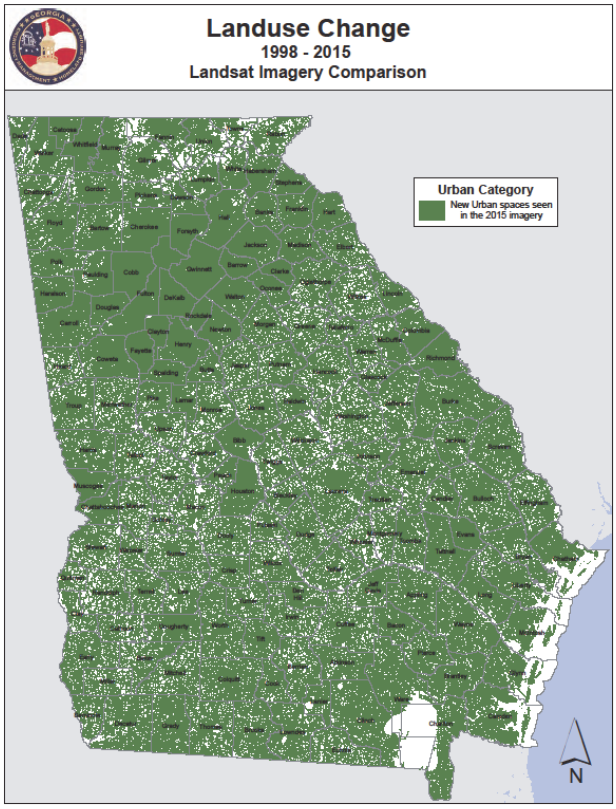


FIGURE 2.69 LAND USE CHANGES FROM INCREASED URBANIZATION



The GMIS database is also designed to include numerous attributes of each locally reported critical facility (See Table 2.46). The accuracy and completeness of the facility information depends on the local officials using the GMIS. Therefore, as more and more local jurisdictions add to the database, the data continues to improve. For a record to be considered complete in the GMIS system, all of the attributes must be reported by the local officials. However, to produce the most comprehensive results possible, the analyses conducted for this report include incomplete records as well. The information presented below focuses on the two attributes in the GMIS system with the least missing data: estimated value and occupancy type.

TABLE 2.46 GMIS CRITICAL FACILITY ATTRIBUTES

Attribute Name	
ID	Is it Critical?
Latitude	Longitude
Jurisdiction	Building Name
Facility Type	Address 1
Address 2	City
Zip	County FIPS
Risk Types	Occupancy
Area	Structure Type Description
Year Constructed	Building Value
Valuation Type	Valuation Year
Content Description	Content Replacement Value
Contents Value Year	Structure Function Value
Quarter Loss	Half Loss
Three Quarter Loss	Full Loss
Daytime Occupancy	Nighttime Occupancy

Incorporating the locally provided GMIS data into the GIS hazard maps allows the spatial joining of the critical facility data with the composite hazard assessment. Also, the GMIS data is used to determine the percentages of critical facilities located in specific hazard categories (high to low composite hazard scores) and the estimated value of the critical facilities at varied risk to hazards. These results are found in Tables 2.47 and 2.48.

TABLE 2.47 LOCAL CRITICAL FACILITIES BY HAZARD CATEGORY

Hazard Category	Hazard Score Range	2014 Total Facilities	2019 Total Facilities	2014 % Total Facilities	2019 %Total Facilities
High	18-25	59	206	0.3%	1.11%
Moderate	9-17	1,395	2,162	19.9%	11.68%
Low	0-8	16,681	16,150	80.1%	87.21%

TABLE 2.48 LOCAL CRITICAL FACILITY VALUE AT RISK, BY HAZARD CATEGORY

Hazard Category	Hazard Score Range	2014 Estimated Value at Risk	2019 Estimated Value at Risk	2014 % Total Value	2019 % Total Value
High	18-25	$16,725,605	$258,446,191.48	0.02%	0.01%
Moderate	9-17	$16,469,725,013	$519,299,192,844.00	19.9%	17.33%
Low	0-8	$66,171,116,486	$2,476,568,618,040.00	80.1%	82.66%

As the tables illustrate, the majority of critical facilities and the facilities facing the greatest amount of estimated value at risk are located in low hazard areas. In terms of the estimated value of critical facilities at risk, 99% of the facilities are represented.

Table 2.49 identifies the critical facility types most commonly found in GMIS. These percentages reveal the types of critical facilities that counties are reporting into GMIS. All of these facilities fit the definition of critical facility: structures that should continue to function and provide services in some capacity to surrounding populations during and after a hazard event.

To evaluate the monetary potential for loss by jurisdiction, the locally reported critical facility data was combined with the average composite hazard scores. Table 2.50 presents the results of this evaluation and ranks the jurisdictions based on the highest value per facility, the highest average risk score per facility, and a combination of the two (the average value standardized by the average risk). As the table illustrates, these jurisdictions have potential for higher losses to the self-reported critical facilities due to these factors. Table 2.51 lists the jurisdictions with the highest total value in critical facilities, as reported in GMIS. One notable limitation to the tables, as noted earlier, the local critical facility is locally driven, including what is considered to be a critical facility. For the purposes of local critical facilities, as opposed to using a standard definition, each community defines what they consider to be critical based on the anticipated needs of their community during and after a disaster. For example, some communities only include the standard essential facility types of EOCs, police, fire, care facilities and schools. Other communities have determined things like banks and grocery stores are critical to the community's ability to recover, particularly in smaller communities with only one grocery store or few banks.

TABLE 2.49 CRITICAL FACILITY TYPES: PERCENTAGE OF TOTAL REPORTED

Building Type	Number of Buildings	% of Total
Government, Water/Sewer	5203	28.10%
Emergency Services, Fire Fighters	2132	11.51%
Education, Government Offices	1447	7.81%
Education, K – 12	1210	6.53%
Government, Private	718	3.88%
Education, Private	594	3.21%
Law Enforcement, Police	521	2.81%
Education, Library	448	2.42%
Law Enforcement, Court House	443	2.39%
Medical, Hospital	390	2.11%
Emergency Services, Emergency Services, Fire Fighters	305	1.65%
Government, Water/Sewer	290	1.57%
Medical, EMS	270	1.46%
NGO, Transportation	227	1.23%
Government, Non-Profit	213	1.15%
Law Enforcement, Sheriff	187	1.01%
Education, Jr Colleges	183	0.99%
Education, K – 12	181	0.98%
NGO, Water/Sewer	181	0.98%
Government, Offices	160	0.86%
Law Enforcement, Jails	158	0.85%
Education, University	150	0.81%
Emergency Services, EMS	147	0.79%
Education, VoTech	133	0.72%
Government Offices	130	0.70%
Law Enforcement, State Patrol	130	0.70%
Government, EMA	121	0.65%
Law Enforcement, Prisons	111	0.60%
NGO, Private	107	0.58%
Government, Private	106	0.57%
NGO, Private	98	0.53%
NGO, Non-Profit	93	0.50%

Building Type	Number of Buildings	% of Total
Education, Government Offices	86	0.46%
Law Enforcement, Court House	76	0.41%
Law Enforcement, Police	71	0.38%
Education, Clinics	67	0.36%
NGO, Transportation	56	0.30%
NGO, Communications	50	0.27%
Medical, NH	47	0.25%
Emergency Services, Government, Fire Fighters	43	0.23%
Medical, Private	40	0.22%
Education, Government, K - 12	39	0.21%
Government, Transportation	38	0.21%
Education, Library	36	0.19%
Law Enforcement, Sheriff	33	0.18%
NGO, EMA	32	0.17%
Government, City Hall	30	0.16%
Law Enforcement, Prisons	30	0.16%
Government, Transportation	29	0.16%
Medical Offices	28	0.15%
Education, Jr Colleges	25	0.14%
Law Enforcement, Jails	25	0.14%
Law Enforcement, Marshalls	25	0.14%
Medical, EMS	25	0.14%
NGO, ALF	23	0.12%
Education, University	22	0.12%
Government, Landfill	22	0.12%
Medical, Hospital	22	0.12%
Medical, Clinics	21	0.11%
Government, City Hall	20	0.11%
Medical Offices	20	0.11%
Emergency Services, NGO, EMA	18	0.10%
Government, Library	18	0.10%
NGO, Communications	18	0.10%

TABLE 2.50 RANKINGS OF POTENTIAL FOR LOSS BY JURISDICTION

Rank	High Avg. Value / Facility	High Avg. Risk / Facility	High Avg. Standardized
1	City of Warner Robins	City of Tybee Island	City of Warner Robins
2	Bryan County	Chatham County	Bryan County
3	Habersham County	Town of Thunderbolt	Habersham County
4	City of Marietta	City of Garden City	City of Marietta
5	Heard County	Glynn County	Heard County
6	Bulloch County	City of Brunswick	Columbus-Muscogee County
7	Cobb County	City of St. Marys	Cobb County
8	City of Canton	City of Midway	City of Austell
9	Effingham County	City of Port Wentworth	City of Perry
10	Cherokee County	City of Savannah	City of Fitzgerald

TABLE 2.51 RANKINGS OF TOTAL VALUE OF CRITICAL FACILITIES BY JURISDICTION

Rank	High Value/ Facility
1	City of Warner Robins
2	Bryan County
3	Habersham County
4	City of Marietta
5	City of Savannah
6	Cobb County
7	Columbus-Muscogee County
8	City of Atlanta
9	City of Rome
10	Heard County

2.8.2 Assessing Vulnerability of State Facilities

The Building, Land & Lease Inventory of Property (BLLIP) database provides information on state-owned and leased properties as well as other assets such as radio and fire towers. This data is provided and sponsored by the Georgia Building Authority, Georgia State Financing and Investment Commission, State Properties Commission, and Commission for a New Georgia in collaboration with the Information Technology Outreach Services division of the Carl Vinson Institute of Government at the University of Georgia.

Currently, the database contains information on 18,560 structures, of which 13,109 are state-owned, 2,375 are state-leased structures, and 3,076 are other assets. (See Table 2.52) Figure 2.70 shows the location of these state facilities. The greatest liability to the state is from state-owned facilities. Figure 2.71 provides the average composite hazard risk for state-owned properties by county. The state-owned facilities located in coastal counties are at the highest risk to hazard events.

TABLE 2.52 STATE ASSET TOTALS ACCORDING TO BLLIP DATA BY YEAR OF DATA

State Asset Type	2007	2010	2013	2017
Owned	13,222	20,574	14,360	13,109
Leased	1,665	2,391	2,367	2,375
Other	N/A	1,800	2,899	3,076
Total	**14,887**	**24,765**	**19,626**	**18,560**

FIGURE 2.70 LOCATION OF STATE ASSETS, AS OF SEPTEMBER 2017

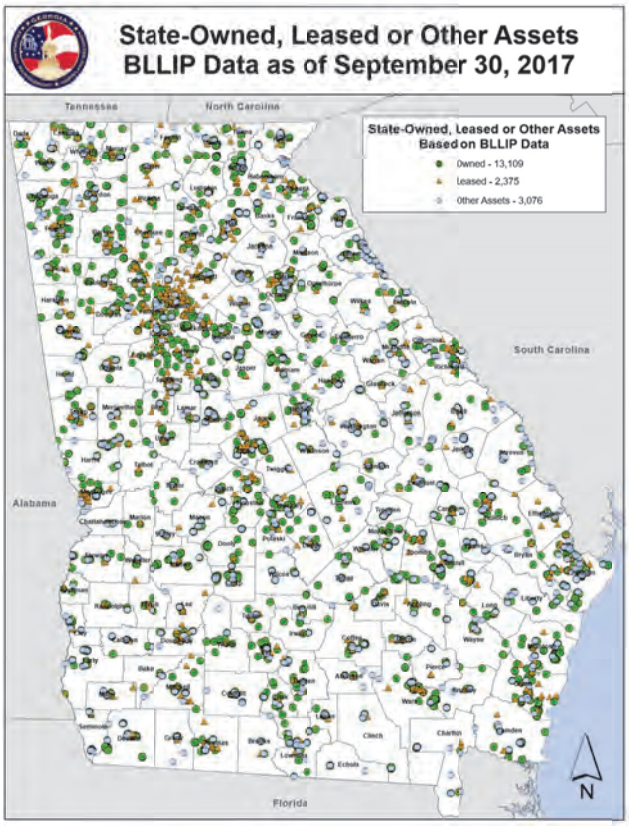
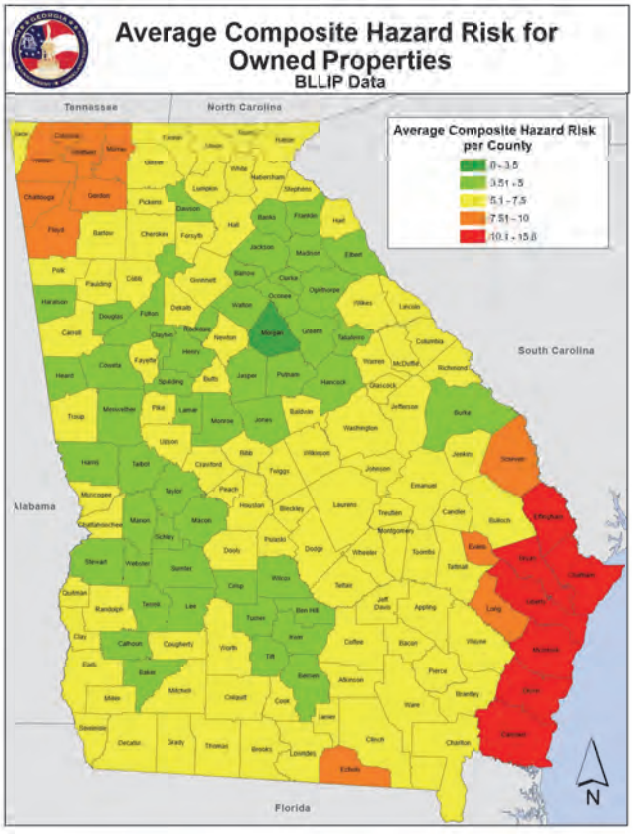


FIGURE 2.71 RISK TO STATE-OWNED PROPERTY



The BLLIP database is designed to include a plethora of information regarding state-owned and leased facilities (See Table 2.53). The authorities listed above continue to improve the database so that all the attribute data are complete.

TABLE 2.53 BLLIP FACILITY ATTRIBUTES

Location information	Insured value
Occupying entity	Estimated value
Owning entity	Fire code compliance
Total floors	Historic value
Square footage	Contents value
Percentage occupied	Contact information
Construction year	

Some state-owned and leased facilities qualify as critical (such as state hospitals or prisons); however, all state-owned and leased facilities are included in the BLLIP database. The most consistently complete attribute is the estimated value. Table 2.54 shows the percentage of state-owned and leased properties broken down by hazard category. Table 2.55 shows the estimated value at risk by hazard category.

TABLE 2.54 STATE FACILITY PERCENTAGES IN HAZARD CATEGORIES

Hazard Category	Hazard Score Range	% Owned	% Leased	2014 % Total Facilities	2019 % Total Facilities
High	18-25	0.78%	0.17%	0.5%	0.71%
Moderate	9-17	8.98%	4.80%	6.2%	9.85%
Low	0-8	82.99%	58.36%	80.2%	72.58%
None	Undetermined	7.25%	36.67%	13.1%	16.86%

TABLE 2.55 STATE FACILITY VALUE AT RISK ACCORDING TO HAZARD CATEGORIES

Hazard Category	Hazard Score Range	2014 Estimated Value at Risk	2019 Estimated Value at Risk	2014 % Total Value	2019 % Total Value
High	18-25	$15,870,561	$89,527,056	0.1%	0.40%
Moderate	9-17	$1,178,706,274	$1,373,269,954	6.1%	6.11%
Low	0-8	$17,010,654,127	$19,735,105,056	87.8%	87.85%
None	Undetermined	$1,158,429,485	$1,265,633,231	6.0%	5.63%

Including the BLLIP data in GMIS allows for the spatial joining of the structure data with the composite hazard assessment. In other words, each point spatial feature (BLLIP structure) is assigned the attribute information of the raster cell (composite hazard score) in which the point falls. For example, the spatial joining assigns GEMA/HS's Building 5 a hazard score of 6 (on a scale of 1–25).

As Table 2.53 illustrates, the majority of structures in BLLIP are located in the low hazard areas. Likewise, Table 2.54 shows that more than 85% of the estimated value at risk comes from state-owned structures located in the low hazard areas of the state. Some records had invalid coordinates, and these structures were labeled "undetermined." Most likely, the facilities that are located in the highest hazard areas are located in the counties with the highest average composite risk: the coastal counties in eastern Georgia and the mountainous counties in northern Georgia.

TABLE 2.56 STATE FACILITY EXPOSURE TO 100 YEAR FLOOD AND WIND EVENTS BY AGENCY

Agency	Flooding		Wind	
	Facilities exposed	$ Losses	Facilities exposed	$ Losses
BOR	160	$180,593,038	52	$4,984,944
DBHDD	16	$51,140,205	11	$349,317
DNR	549	$146,922,204	73	$468,141
DOAg	2	$734,554	1	$37,453
DOC	28	$8,350,718	37	$1,183,339
DOD	13	$107,843,394	5	$150,222
DOE	1	$143,850	0	$7,645
DOJJ	1	$4,844,840	10	$135,601
DPS	2	$4,794,715	1	$17,313
GDOT	28	$10,399,737	13	$122,283
GFC	16	$2,648,513	8	$42,771
GPA	27	$35,558,938	2	$130,700
TCSGA	1	$3,649,194	10	$1,265,081
Other	7	$5,717,865	9	$480,518
Total	**851**	**$563,341,765**	**232**	**$9,375,328**

Note that the value and facility totals are based on the BLLIP data, which are not complete. In terms of the state facility percentages in the various hazard categories, 7.3% of the state-owned structures and 36.7% of the state-leased structures are not represented due to invalid coordinate information. In terms of the estimated value of structures at risk, 11.8% of the structures are not represented due to incomplete value information. Therefore, one may assume that the estimated value at risk in each category is substantially underrepresented.

TABLE 2.57 STATE FACILITY EXPOSURE TO 100 YEAR FLOOD AND WIND EVENTS BY GEMA/HS AREA

GEMA/HS Area	Description	Flooding		Wind	
		Facilities exposed	$ Losses	Facilities exposed	$ Losses
1	Northeast GA	91	$13,444,232	0	$0
2	Southwest GA	100	$103,579,808	0	$0
3	East Central GA	46	$9,070,368	1	$79,249
4	West Central GA	32	$4,516,386	0	$0
5	Coastal GA	491	$302,253,405	243	$9,673,788
6	Northwest GA	45	$20,552,609	0	$0
7	Metro Atlanta	12	$4,232,355	0	$0
8	South Central GA	34	$8,633,603	2	$21,238
Total		**851**	**$466,282,765**	**246**	**$9,774,275**

In addition to the current analysis of the BLLIP data, HAZUS-MH was used to estimate the buildings that could be damaged during a 100YR storm event with winds and a 1% annual chance flood, as well as the losses potentially seen from those events. Tables 2.56 and 2.57 show the results of the Hazus analysis by agency and by GEMA/HS area.

2.8.3 Repetitive Loss Properties

The State of Georgia utilizes several federal hazard mitigation programs to mitigate repetitive and severe repetitive loss properties. Repetitive Loss Properties are properties that have two or more claims greater than $1,000 each for flood losses paid by National Flood Insurance Program (NFIP). Severe Repetitive Loss Properties are properties that have at least 4 claims greater than $5,000 each paid through the NFIP or two or more claims where the cumulative total is greater than the current market value. These programs include the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance (FMA), and the Pre-Disaster Mitigation Competitive (PDM-C) program. The various federal programs have the ability to provide funds to assist states and communities in reducing flood damages to insured properties that have multiple claims paid by the National Flood Insurance Fund. Eligible mitigation activities include property acquisition (includes either demolition or relocation, where the property is deed-restricted for open space in perpetuity), structural elevation, dry flood proofing of nonresidential structures, and minor localized flood control projects.

In order for this strategy to target repetitive loss properties, including severe repetitive loss properties, those properties must be documented and mapped for further analysis. In 2012, the Federal Register was updated with new definitions for repetitive loss (RL) and severe repetitive loss (SRL) properties. For the purposes of comparison to 2014 data, the figures presented in this section are based on the definition used in the 2012 Federal Register.

To assess the risk associated with repetitive loss properties, the point location of every property was aligned with the inland flood hazard score previously discussed in Section 2.7. The results are provided in Table 2.56. The numbers include both mitigated and non-mitigated repetitive loss properties. The significant increases in RLPs between 2004 - 2007, 2007 – 2010, and 2013 - 2017 are a result of major flood events during those timeframes. Between 2010 and 2013, there were no major flood events in Georgia; therefore, the change in property totals was negligible. Analyzing location of RLPs in relation to special flood hazard

areas did not begin until 2007; therefore, the 2004 data does not have the number of properties located within each flood hazard category.

TABLE 2.58 TOTAL REPETITIVE LOSS PROPERTIES IN FLOOD HAZARD ZONES BY YEAR OF DATA WITH HAZARD SCORES

Flood Hazard Category	Hazard Score	2004	2007	2010	2013	2017
Floodway / 1% Annual Chance of Flood with Velocity	4	N/A	168	135	157	155
1% Annual Chance of Flood	3	N/A	450	688	739	794
0.2% Annual Chance of Flood	2	N/A	82	106	126	160
Undetermined/Possible	1	N/A	518	701	604	684
Total		**811**	**1218**	**1610**	**1626**	**1793**

The first column in Table 2.58 corresponds with the "Descriptions" column in Table 2.41 in Section 2.7, which details the flood hazard scores. Table 2.58 reveals that between 2013 and 2017 there was an increase in RLPs in identified flood hazard areas and an increase in RLPs whose location in relation to a flood hazard area was not known or is beyond the boundaries of the 500yr floodplain. Figure 2.72 shows the general location of mitigated and non-mitigated RLPs.

Figures 2.72 through 2.76 illustrate various aspects of the RLPs in Georgia and are helpful in identifying opportunities to reduce risk. Figure 2.73 shows the total number of losses per property using graduated symbols. Clusters of RLPs are located in Metro Atlanta, Augusta–Richmond County, Lee and Dougherty counties, and Savannah–Chatham County. Properties with frequent flood claim losses are possible locations for mitigation actions.

Figure 2.74 illustrates the municipalities with the highest totals of RLPs. Figure 2.75 shows the communities with the highest sums of insurance claim payments to the RLPs. Communities with high numbers of RLPs or high total losses from flood claims are ideal targets for outreach to reduce risk and implement mitigation actions. More information on the number of RLPs and total losses by community can be found in Chapter 4, Section 4.4.3.

Table 2.59 lists the number of validated SRLPs by jurisdiction, and Figure 2.76 visually illustrates this data. The number of validated SRLPs decreased from 62 to 51 between 2010 and 2013. As the number of validated SRLPs varies from month to month, most of this decrease is likely due to changes in flood insurance on the properties. Additional information on RL and SRLPs by jurisdiction can be found in Chapter 4, Section 4.4.3.

FIGURE 2.72 REPETITIVE LOSS PROPERTIES IN GEORGIA

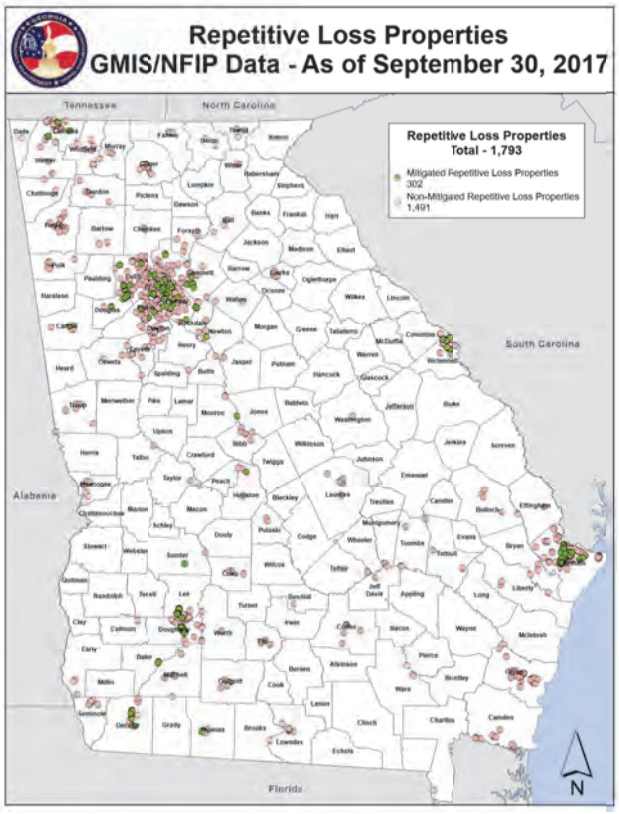


FIGURE 2.73 NUMBER OF LOSSES PER REPETITIVE LOSS PROPERTY

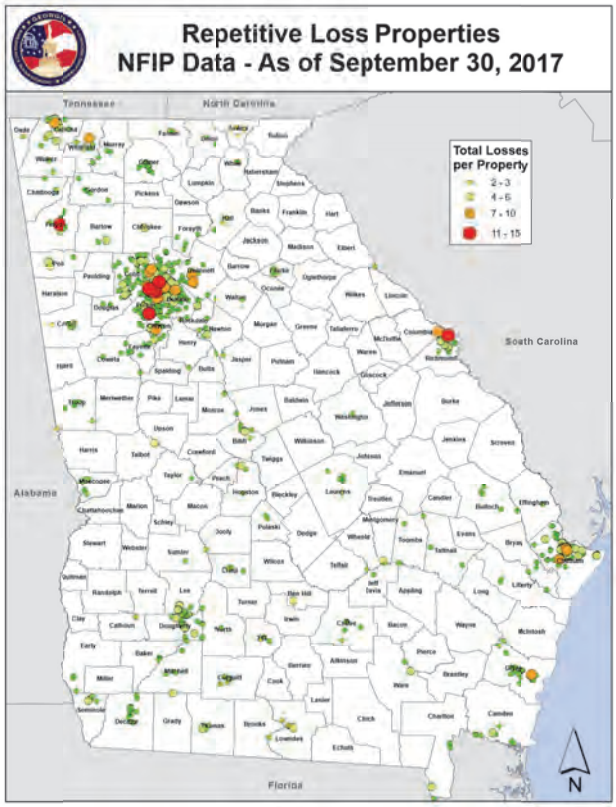


FIGURE 2.74 TOP 10 COMMUNITIES BY TOTAL RL PROPERTIES

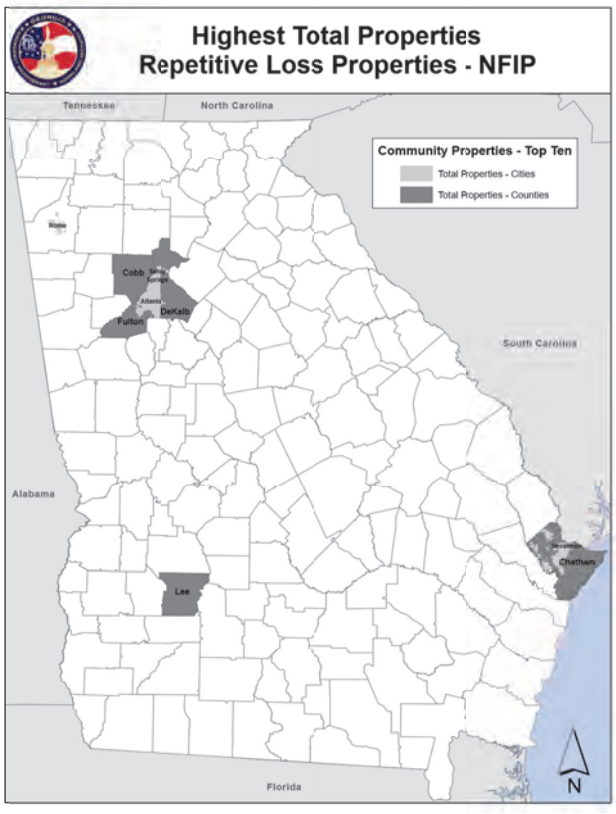


FIGURE 2.75 TOP 10 COMMUNITIES BY TOTAL RLP LOSSES

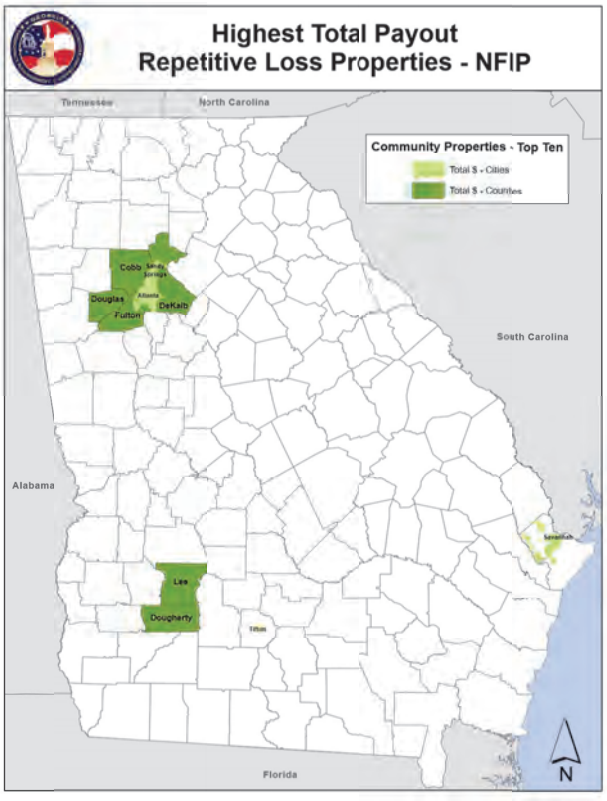


FIGURE 2.76 COMMUNITIES WITH SRL PROPERTIES, AS OF SEPTEMBER 30, 2017

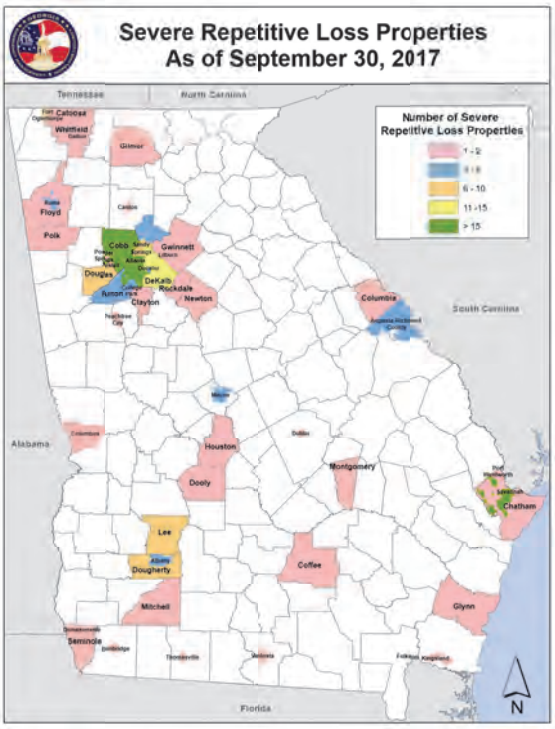


TABLE 2.59 VALIDATED SEVERE REPETITIVE LOSS (SRL), PROPERTIES BY JURISDICTION

Jurisdiction	2007	2010	2013	2017
Albany, City of	5	3	2	5
Atlanta, City of	14	21	14	36
Augusta-Richmond County, City of	0	0	0	4
Austell, City of	2	0	0	2
Bainbridge, City of	0	0	0	1
Canton, City of	0	0	0	1
Catoosa County	1	1	0	1
Chatham County	0	0	0	1
Clayton County	1	0	0	1
Cobb County	4	5	3	16
Coffee County	0	0	0	1
College Park, City of	0	2	2	3
Columbia County	0	1	1	1
Columbus, City of	0	0	0	1
Dalton, City of	1	0	0	1
Decatur County	2	0	0	0
Decatur, City of	3	2	2	3
DeKalb County	5	5	6	13
Donalsonville, City of	0	0	0	1
Dooly County	0	0	0	1
Dougherty County	3	3	1	6
Douglas County	1	2	1	9
Dublin, City of	0	0	0	1
Floyd County	0	0	0	1
Folkston, City of	0	0	0	1
Fort Oglethorpe, City of	1	2	6	7
Fulton County	1	0	1	4
Gilmer County	0	0	0	2
Glynn County	1	1	1	1
Gwinnett County	1	0	0	2
Houston County	1	0	0	1
Kingsland, City of	0	0	0	1

Jurisdiction	2007	2010	2013	2017
Lee County	2	2	1	8
Lilburn, City of	0	1	1	2
Macon, City of	2	2	2	3
Mitchell County	0	0	0	1
Montgomery County	0	0	0	1
Newton County	0	0	0	1
Peachtree City, City of	0	0	0	1
Polk County	0	0	0	1
Port Wentworth, City of	0	0	0	1
Powder Springs, City of	0	1	0	1
Rockdale County	0	1	0	1
Rome, City of	1	0	0	4
Sandy Springs, City of	0	2	3	8
Savannah, City of	6	3	3	16
Seminole County	0	1	0	2
Thomasville, City of	0	0	0	1
Troup County	1	0	0	0
Valdosta, City of	0	0	0	1
Whitfield County	0	1	1	1
Total	**59**	**62**	**51**	**183**

Chapter 3: State Mitigation Strategy

3.1 OVERVIEW

The summary of changes to Chapter 3 of Georgia's Hazard Mitigation Strategy (GHMS) since the 2014 approval is provided in Table 3.1.

Table 3.1 Summary of Changes to Chapter 3

Chapter 3 Section	Updates to Section
3.1 Overview	• Updated table of changes. • Updated text
3.2 Georgia Mitigation Strategy	• Updated text and tables • Added details describing additional status details and contribution to mitigation for each action item.
3.3 State Capability Assessment	• Updated text and tables
3.4 Local Capability Assessment	• Updated text and tables
3.5 State and Local Funding Sources	• Updated text and tables

Chapter 3 of the plan was reviewed and updated by GEMA/HS's Hazard Mitigation Planners. The planning staff revised each section based on accomplishments, current activities, and the integration of current local multi-jurisdictional hazard mitigation plans and state agency inputs.

This chapter provides the State of Georgia's strategy toward resilience. Based on the findings of the risk assessment and a state-level capability assessment, the goals and actions that follow are intended to guide state agencies, counties, cities, towns, and nongovernmental organizations toward resilience in regard to the many hazards that plague the state. This section is separated into the following components:

- Goals and Actions
- State Capability Assessment
- Local Capability Assessment
- State and Local Funding Sources

This chapter discusses the concept of and approaches to mitigation in order to clarify the state's mitigation strategy. Mitigation is a combination of sustained measures and actions that attempt to reduce or eliminate the long-term risk to people and property from hazards. The main methods of mitigation are (1) modifying the hazard event, (2) reducing human vulnerability, and (3) reducing losses.

The State of Georgia's mitigation strategy is an ongoing effort to identify the goals and actions that will reduce or eliminate losses from natural hazard events.

3.2 GEORGIA MITIGATION STRATEGY

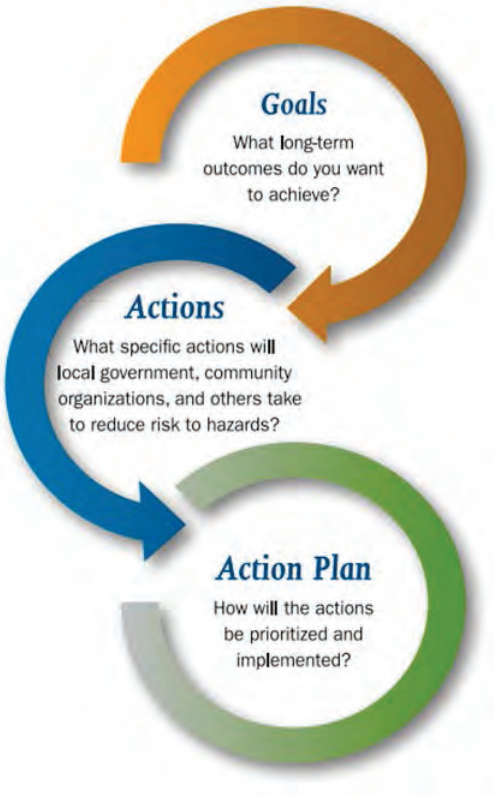
3.2.1 Overview

The GHMS serves as the blueprint for how Georgia will reduce vulnerability to and risk from the hazards identified in Chapter 2. The mitigation strategy is made up of three main components: mitigation goals, mitigation actions, and an action plan for implementation. These provide the framework for identifying, prioritizing, and implementing actions to reduce risk to hazards. For the purposes of this mitigation strategy, the following FEMA definitions were used.

> **Mitigation goals** are general guidelines that explain what the state wants to achieve with the plan (see Figure 3.1). They are usually broad policy-type statements that are long-term, and they represent visions for reducing or avoiding losses from the identified hazards.
>
> **Mitigation actions** are specific projects and activities that help achieve the goals.
>
> The **Action Plan** describes how the mitigation actions will be implemented, including how those actions will be prioritized, administered, and incorporated into the state's existing planning mechanisms, policies, and programs.

Mitigation actions fall into four categories: planning and regulation, structure and infrastructure protection, natural resources system protection, and public awareness and education. Table 3.2 provides descriptions and examples of each category.

Figure 3.1 Mitigation Strategy.



3.2.2 Review and Assessment of 2014 GHMS Goals

The 2014 GHMS included the following three goals:

1. Reduce human vulnerability to hazard events.
2. Reduce the losses associated with hazard events.
3. Reduce overall exposure to hazard events for Georgia citizens and their property.

A review of these goals determined that they are consistent with state priorities and remain valid. The state's priorities have not changed since the completion of the 2014 GHMS. Thus, the goals remain unchanged.

3.2.3 Updating the Mitigation Action Plan

The State of Georgia used a combination of tools and processes to create the updated mitigation action plan. These include the updated risk assessment, review of the mitigation actions from the 2014 plan, review of mitigation actions from local plans, review of practices from other state plans, and input from multiple state and nongovernmental agencies throughout Georgia.

For a mitigation plan to be effective, the mitigation goals and actions must address the hazards identified in the risk assessment. Once the State had completed updating the risk assessment, this information was used to ensure that the updated goals and actions addressed the updated risks and vulnerabilities posed by the identified hazards. One tool used to do this was a workshop held in April 2018 that included representatives from various state agencies and nongovernmental partnering agencies. The participants reviewed the updated risk assessment and determined the types of projects and actions they would like to see within four mitigation action categories: planning and regulations, structure and infrastructure projects, natural resource protection, and education and awareness programs. Multiple agencies participated in the workshop, including but not limited the Georgia Department of Natural Resources (DNR), Georgia Forestry Commission (GFC), Technical College System of Georgia (TCSG), DNR Environmental Protection Division Safe Dams, the University System of Georgia Board of Regents, the Georgia Transmission Corporation and the University of Georgia Information Technology Outreach Service. For a full list of participants, see Appendix B. One key finding of the workshop was that the majority (63%) of the chosen actions fall within the "planning and regulation" and "education and awareness" categories. Notably, the top action chosen, receiving 12% of the votes was related to building and development regulations. While this is a slight decrease from the 2014 plan, it remains the top choice among the agencies participating in the update workshops. For details on the chosen categories, please see Figure 3.2.

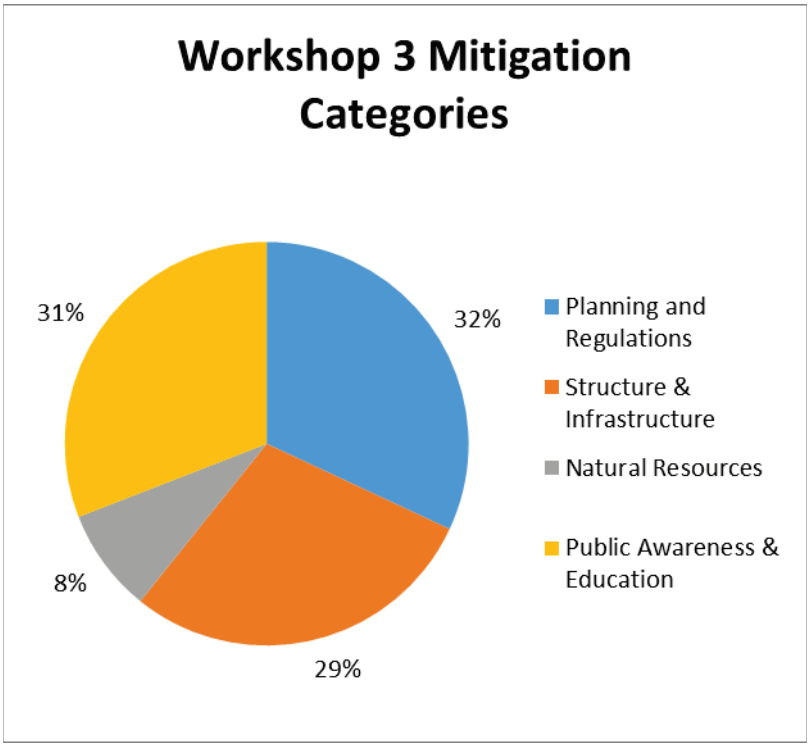
Table 3.2 Categories of Mitigation Actions

Mitigation Category	Description	Examples
Local Plans and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Subdivision regulations • Development review • Building codes and enforcement • NFIP Community Rating System • Capital improvement programs • Open space preservation • Stormwater management regulations and master plans
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct man-made structures to reduce the impact of hazards. Many of these types of actions are projects eligible for funding through the FEMA Hazard Mitigation Assistance program. *Task 9 – Create a Safe and Resilient Community* provides more information on these programs.	• Acquisition and elevation of structures in flood-prone areas, including Repetitive Loss Properties • Utility undergrounding • Structural retrofits • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation

Mitigation Category	Description	Examples
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.	• Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard prone areas • StormReady • Firewise Communities

Source: FEMA Local Mitigation Planning Handbook.

Figure 3.2 Mitigation Actions Chosen by the Georgia State Hazard Mitigation Planning Team Meeting Held in April 2018, by Mitigation Type



While the majority of workshop participants favored "planning and regulation" and "education and awareness," there are two notable exceptions. While the top chosen action fits within the planning and regulation category, the 2nd and 3rd most chosen actions fall within the Natural Resources Protection and Structure and Infrastructure categories. Tree and vegetation trimming and maintenance programs received 8% of votes while generators for critical facilities received 6%. The Georgia Forestry Commission manages the "Tree City USA" program for the State of Georgia, which encourages the preservation and proper maintenance of trees and recognizes those communities that do so. "Generators for critical facilities" is a recent addition to the list of projects fundable through hazard mitigation grants. Beginning with the 2014 ice

storm event, the State has applied for and passed HMGP funds through to numerous local communities for emergency power supplies for their critical facilities. For full details on the workshop tallies, please see Appendix E.

Another tool used for updating the mitigation actions was surveys sent to multiple state agencies requesting status updates on existing mitigation actions, as well as information on any mitigation related activities they are doing that were not in the 2014 strategy. The purpose was to identify specific projects and activities other agencies in the state are planning or conducting. This process identified many new planned actions as well as many that are currently in progress and were not included in the 2014 strategy. Thus, they are "new" to the updated mitigation action plan.

During the update process for the 2014 GHMS, the state noted several gaps and obstacles. Since that time, the State has made significant progress in overcoming these issues:

1. The 2011 and 2014 versions of the GHMS noted that Georgia would benefit from incorporating more GIS and other technical information into the hazard mitigation planning process. One major area the State has worked to improve upon is the quality and amount of technical and GIS data available and used in both local and state mitigation planning. The previous strategy specified multiple actions to address this issue, including the following:

    a. Action item 9 included development of Community Wildfire Protection Plans (CWPP), which provide greater detail than previously available on local risks of wildfire hazards. These CWPPs are now complete. The State now requires local plans to include relevant data and maps from these CWPPs in risk assessments. The GIS data developed from this project are also included in the state risk assessment for wildfires. Notably, the Georgia Forestry Commission is currently in the process of updating all of these plans. When that process is complete the updated plans will be available for incorporation into each community's local hazard mitigation plan.

    b. Action item 22 related to Risk MAP studies the Georgia Department of Natural Resources (DNR) has initiated in various locations in Georgia. Since the 2014 strategy was completed, the State completed the pilot phase in Metro Atlanta and has made progress along the entire coast of Georgia, as well as the following 8 watersheds:
        Upper Savannah
        Middle Savannah
        Lower Savannah
        Withlacoochee/Little
        Lower Flint
        Upper Oconee
        Upper Chattahoochee
        Etowah

        Each watershed is in a different stage of the process, with some at the very beginning and others at the end, having received their updated data. This information includes site-specific flood studies with GIS and technical data that will be available for inclusion in the next updates of the studied counties' local mitigation plans.

        One additional gap that has been identified since the 2014 strategy was completed is the data being provided to the communities is in GIS format. However, many of Georgia's more rural communities do not have GIS capabilities. GEMA/HS and DNR staffs have been

working recently on ways to overcome this issue by making the data more accessible to all communities throughout the State.

c. The 2014 strategy noted The State of Georgia was in the process of upgrading the GMIS system to make it more user-friendly, as well as making it possible to include future datasets as they become available. This process is complete and the State continues to use this system to provide basic hazard mapping and risk assessment services to each community to use as part of the local hazard mitigation plan updates.

d. Both the 2011 and 2014 strategies had actions related to including and updating data on NFIP repetitive loss properties in GMIS. This helps local planners meet a specific requirement in their local mitigation plans. The State continues to update this data as it becomes available.

2. Many state residents did not realize hazard mitigation planning activities were occurring in their communities. This part of the process is primarily up to local planners as they update their local mitigation plans. GEMA/HS's Mitigation Planning staff, however, works closely with local planners and encourages multiple forms of public participation. GEMA/HS continues to encourage local communities to use the FEMA template for news releases and public notices during the planning process.

3. The 2011 and 2014 versions of the GHMS both noted Local communities in the state were unaware of the types of assistance available to them for hazard mitigation planning. Both plans included actions and strategies to address this, such as the following:

   a. Staff deploying to affected areas in the aftermath of disasters to discuss potential funding for planning and projects,

   b. Hosting training for new emergency managers

   c. Reaching out to counties before their plans expire to let them know of the need to update their plans and the potential for funding assistance.

   In addition, as a result of partnerships with other state agencies, GEMA/HS Hazard Mitigation staff has had many other opportunities to discuss hazard mitigation program funding sources for both planning and projects with state agencies and local communities. As a result of these activities, more and more communities and agencies are becoming aware of hazard mitigation and the funding opportunities available. However, the state recognizes the need to continue to pursue these strategies, as well as seek out new opportunities going forward.

4. The 2014 GHMS noted the plan would benefit from improved methods of incorporating state and local mitigation actions. The State Mitigation Planning staff has done several things to address this issue. The workshops described in Chapter 1 were developed during the 2014 State Plan update process. They provided a way to better capture input from multiple state agencies and nongovernmental organizations. Second, the staff reached out to each state agency that was invited to the workshop, asking them to provide updates on the mitigation actions assigned to them in the 2014 plan and provide information on new actions to include in the 2019 plan. Through these two processes, the Mitigation Planning staff was able to incorporate the types of mitigation actions the workshop participants perceived as a high priority into the GHMS as well as projects various state agencies have planned or have in progress that have a mitigation effect. Finally, the revision process

included an effort to ensure that the mitigation actions noted in the local plans were adequately included in the State's Action Plan.

During the 2019 update process, the State realized there was no clear description or record of how the potential mitigation actions gathered during the workshops for the 2014 update translated into mitigation actions in the 2014 strategy. The workshops did not provide a method for gathering the details necessary for including the new action items into the mitigation strategy. One way the staff sought to address this is to compare the action items identified in the workshops to, both the existing mitigation actions and the new ones identified by specific state agencies in the review and update process described above. For high priority items that do not match either an existing action step or one provided specifically by a State agency, the planning staff developed an action step to research the feasibility and practicality of the higher priority action items identified in the workshop for future inclusion in the mitigation strategy.

The State of Georgia first reviewed the 2014 Action Plan to ensure that the goals continued to address the updated risk assessment. The next step was to review the action steps according to the following criteria:

1. Assess their progress.
2. Determine their validity based on the State's capabilities and the current risk assessment.
3. Ensure they contribute to the identified goals.
4. Ensure the actions are cost-effective, technically feasible, and environmentally sound.
5. Identify actions that could be refined, expanded, or deleted.
6. Ensure that the updated Action Plan accurately and completely describes what the State of Georgia, including all agencies, is currently doing or plans to do over the coming years.
7. Ensure that the updated Action Plan addresses all relevant needs as identified by state agencies and local mitigation plans.
8. Determine whether the Action Plan is presented in the most effective, concise manner.

The majority of the actions from the 2014 GHMS were listed as ongoing. Upon review, the State found that these actions were still ongoing. One key finding with the 2014 strategy was the mitigation actions could be improved by re-ordering them based on the responsible lead agency. This would allow specific state agencies to locate their assigned mitigation actions much easier. This change was made internally in 2015 and made it much simpler to reach out to each state agency for updates to their mitigation actions.

3.2.4 Local Plan Review

GEMA/HS staff reviewed all local hazard mitigation plans to identify mitigation actions proposed by communities to reduce their identified risks and vulnerabilities to natural hazards. Results of this analysis are provided in Tables 3.3 and 3.4. This information was considered in the development of the updated 2019 Action Plan. The two tables are color coded such that the mitigation types in Table 3.3 are colored to match the FEMA mitigation categories they apply to in Table 3.4. Mitigation types that have no color do not fall within the FEMA mitigation categories and are response and preparedness actions that have consistently been included in local mitigation plans. Examples of state mitigation actions related to local plans include, but are not limited to, the following:

- Continue supporting the use of state-of-the-art warning technology and local warning projects with available initiative funds.

- Support local government cost-effective requests through available grant opportunities to mitigate

repetitive loss properties, with priority given to severe repetitive loss properties and removal of repetitive loss properties from the regulatory floodway.

- Support cost effective mitigation activities that minimize damages and or provide uninterrupted operational capabilities to critical facilities, utilities and property.

Table 3.3 shows changes from the 2014 to 2019 GHMS in the percentage of counties identifying each action. During the 2014 update, staff observed significant decreases from the 2011 plan in counties identifying “planning and zoning” and “additional analysis” as mitigation actions, going from 88% and 64% to 76% and 47%, respectively. In addition, the percentage of counties identifying “Emergency Response Operations” actions had increased from 62% to 75%. Staff noted at the time further analysis was necessary to determine whether these trends are indicative of concerns that will require modification to the Action Plan. Notably, this trend appears to have ended. Likely, the changes leading up to 2014 were a reflection of counties updating their plans to more accurately reflect their needs and capabilities.

Table 3.3 Local Identification by Mitigation Type

Mitigation Type	Percentage of counties identifying Action		Change from 2014
	2019 GHMS	2014 GHMS	
Warning / Communications	94%	93%	1%
Public Outreach	93%	94%	-1%
Flood Programs	92%	92%	0%
Preparedness Efforts	88%	87%	1%
Flood Control / Drainage	84%	82%	2%
Planning / Codes	79%	75%	4%
Emergency Response Operations	77%	77%	0%
Structural Retrofit	76%	75%	1%
Equipment Acquisition	75%	71%	4%
Fire Programs (Firewise, etc.)	64%	62%	2%
Drought Management	64%	62%	2%
Broad Cooperation	59%	62%	-3%
Additional Analysis	51%	48%	3%
Property Acquisition	36%	35%	1%
Dam Management	30%	30%	0%
Property Relocation / Elevation	29%	26%	3%
Wetland Protection	22%	23%	-1%
Greenspace Preservation	14%	14%	0%

Table 3.4 Mitigation Categories from Local Plans

Mitigation Categories	% of counties identifying Action		Change from 2014
	2019 GHMS	2014 GHMS	
Planning and Regulation	98%	98%	0%
Natural Resources	22%	23%	-1%
Structure and Infrastructure Projects	100%	100%	0%
Education and Awareness	98%	99%	-1%
Non-Mitigation Categories	94%	94%	0%

3.2.5 Action Plan

As described in the previous sections, the State of Georgia undertook a robust process to update the Action Plan from the 2014 GHMS, incorporating input from several state agencies and outside organizations, as well as data from the local hazard mitigation plans of all 159 Georgia counties. The current Action Plan was updated to provide a comprehensive, achievable set of actions for the State of Georgia to pursue over the coming years in order to reduce losses, both human and property, due to natural hazards. All actions either directly reduce losses to the identified hazards or obtain better, more current information for understanding the risks and vulnerabilities Georgia faces from all natural hazards.

During the Plan maintenance process, between the 2014 adoption and the beginning of the update process, Staff noted the mitigation actions were ordered in such a way that it was both tedious and time consuming to add or update mitigation actions for participating agencies. In 2016, the Planning Staff re-ordered the mitigation actions by lead agency. This allowed the list of actions to be more easily searched by agency. This also streamlined the update process by allowing the Planning Staff to easily create separate lists of mitigation actions for each agency in order to obtain updated information.

Table 3.5 shows the updated 2014 State of Georgia Action Plan. Each action item includes the following details:

A. A statement describing the action item.

B. The timeline within which the action is proposed to be completed.

C. The current status of the action, whether new, ongoing, or deferred. Those activities that have not reached *Complete* status are not fully implemented due to a variety of reasons. *Ongoing* indicates that continued small actions have been implemented that leave room for more mitigation activity under that objective or action step. Where possible, *ongoing* is further described by details regarding funding resources, times when the item is done, etc. Several, however are listed as *ongoing continually*. This refers to mitigation actions that are continually worked on, whether it be part of daily activities, as the opportunity arises, the need demands, etc. A *New* activity has been recently included by the planning team in the updated Standard Plan. *Deferred* actions mean no activity has occurred, due to limited funding or staff resources, but the action was reviewed and continues to be valid. *Deleted* and *Completed* actions are listed separately in Tables 3.7 and 3.8, respectively. *Deleted* means no action was taken or the action was not completed and was deemed no longer valid.

D. The priority of the action. Part of the prioritization includes a general assessment according to the STAPLEE criteria, which stands for social, technical, administrative, political, legal, economic, and environmental. Also, most items that require grant funding must undergo a full benefit-cost analysis, described in Section 4.4.2, to determine cost-effectiveness prior to funding.

E. The applicable state goal. The Goals identified in Section 3.2.2 are broad, high level statements of what the State is attempting to accomplish. The goals, stated simply, are to protect life (Goals 1 & 3), protect property (Goals 2&3) and reduce exposure to the hazards (Goal 3). Every mitigation action in Table 3.6 below is a step toward meeting all 3 goals.

F. The specific hazard being addressed, if applicable. Many of the actions are applicable to all hazards, though some are directly applicable to specific hazards. For example, technical

assistance for local mitigation plans is applicable to all hazards, whereas acquisition of flood-prone properties is applicable to the flood hazard.

G. The lead agency. The lead agency is the agency responsible for accomplishing the action.

H. Supporting agencies. Supporting agencies are agencies that are not responsible for the completion of the action but that provide assistance in various ways.

I. The applicable resources (staffing, funding, etc.) necessary to complete the action. The State of Georgia currently uses several funding sources to implement hazard mitigation activities. Primarily, these funds stem from federal, state, and local sources, which include the programs discussed in Section 3.3's assessment of state mitigation policies, programs, and funding and Section 3.5's description of funding sources. The State of Georgia is interested in continuing to pursue these federal, state, and local funding sources throughout the implementation of the mitigation strategy as well as seeking additional private sources.

J. The item number, if applicable, from the 2014 GHMS.

K. Contribution to Mitigation. Each mitigation action includes a description of how it contributes to the goals of reducing losses of life, limiting or preventing damages and reducing the State's overall vulnerability to disasters.

L. The applicable FEMA mitigation category (See Table 3.4).

TABLE 3.5 MITIGATION ACTION TABLE

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
1	Formulate policy to have saferooms placed in all new university buildings	2019 - 2024	Ongoing as applicable	High	1 - 3	Severe Weather, Tornadoes	BOR	GBA	Agency Budget	84	Protects People during tornadoes	Structure & Infrastructure
2	The Board of Regents will establish a policy to not develop high profile buildings due to wind hazards	2019 - 2024	Ongoing as applicable	High	1 - 3	Severe Weather, Wind, Hurricane Winds, Tornadoes	BOR	BOR	Agency Budget	85	Creates more wind resistant structures	Structure & Infrastructure
5	Backup all IT systems in multiple locations throughout the state	2019 - 2024	Ongoing Continually	High	1 - 3	All Hazards	BOR	TBA	Agency Budget	88	Provides redundancy in IT systems	Structure & Infrastructure
6	Increase hazard vulnerability identification training throughout the university system	2019 - 2024	Ongoing as applicable	High	1 - 3	All Hazards	BOR	GEMA/HS	Agency Budget	89	Improves risk analysis	Structure & Infrastructure
7	Complete DRU plans for remaining 12 universities	2019 - 2024	Ongoing as funding and other resources allow	High	1 - 3	All Hazards	BOR	GEMA/HS	Agency Budget	90	Expands mitigation planning	Structure & Infrastructure
8	Plot all financial institution locations on a map to determine the probability and impact of various hazards that they may face	2019 - 2024	Ongoing as applicable	Medium	1 - 3	All Hazards	DBF	DBF	FDIC	67	Improves understanding of vulnerability	Planning & Regulation
9	Explore the possibility of establishing some sort of protocol/credentialing system with GEMA/HS to allow our Commissioner or Senior Deputy Commissioner to be able to quickly get a re-entry pass in the event that the Department or a financial institution needs to get to their data center and/or critical documents	2019 - 2024	Ongoing as staff and time resources allow	Medium	1 - 3	All Hazards	DBF	DBF	FDIC	68	Improves access to critical data and information after a disaster	Planning & Regulation
10	Provide training, webinars, workshops on integration of local mitigation plans into local Comprehensive Plans	2019 - 2024	Ongoing as plans are created/updated	High	1 - 3	All Hazards	DCA	GEMA/HS	Agency Budget	14	Improves integration of local mitigation plans	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
11	DCA will continue to pursue its vision of helping to build strong and vibrant communities through administration of the programs that mitigate future natural and man-made disasters.	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	DCA	DCA	Agency Budget	25	Improves resiliency of communities	Planning & Regulation
12	As a part of DCA's ongoing Disaster Recovery/Business Continuity planning efforts, a cloud storage system is used to back up all critical data and business processes.	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	DCA	DCA	Agency Budget	100	Provides redundancy in IT systems	Structure & Infrastructure
13	Review DCS disaster plans for securing sensitive files during disasters	2019 - 2024	New	High	1 - 3	All Hazards	DCS	DCS	Agency Budget	New	Protects critical data and files	Planning & Regulation
14	DCS will conduct annual reviews of disaster plans and participate in GEMA/HS exercises.	2019 - 2024	New	High	1 - 3	All Hazards	DCS	DCS	Agency Budget	New	Improves disaster preparedness	Planning & Regulation
15	DCS has a Memorandum of Understanding with Savannah/Chatham to assist in evacuation and re-entry during disaster situations	2019 - 2024	New	High	1 - 3	All Hazards	DCS	DCS	Agency Budget	New	Assists with evacuation of Chatham County	Planning & Regulation
16	Disaster response and preparedness through agency Matrix that correlates with GEMA/HS timeline Matrix.	2019 - 2024	New	High	1 - 3	All Hazards	DCS	DCS	Agency Budget	New	Improves disaster preparedness	Planning & Regulation
17	Assess the current plan to track sex offenders during the evacuation and re-entry process.	2019 - 2024	New	High	1 - 3	All Hazards	DCS	DCS	Agency Budget	New	Improves the ability to keep track of registered sex-offenders	Planning & Regulation
18	Improve radio communications with other law enforcement agencies.	2019 - 2024	New	High	1 - 3	All Hazards	DCS	DCS	Agency Budget	New	Improves emergency communications	Planning & Regulation
19	Identify offices/buildings that may be vulnerable to natural hazards (State owned and leased)	2019 - 2024	New	High	1 - 3	All Hazards	DCS	DCS	Agency Budget	New	Improves understanding of agency vulnerability	Planning & Regulation
20	Develop a plan to provide saferooms for all Department of Human Services offices throughout the state	2019 - 2024	Ongoing as funding resources and opportunities allow.	High	1 - 3	Tornadoes	DHS	GEMA/HS	Agency Budget	51	Protects people during tornadoes	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
21	Develop plan to backup all computer files for the Department of Human Services in the event of a hazard event.	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	DHS	GEMA/HS	Agency Budget	52	Improves redundancy of IT systems.	Planning & Regulation
22	Develop and adopt a strategy to encourage participation in the NFIP by the 86 communities with Special Flood Hazard Areas that are not currently participating. This will add to the 561 communities that are already participating.	2019 - 2024	Ongoing as opportunities allow	High	1 - 3	Flood	DNR Floodplain Mgt	GEMA/HS	Agency Budget	21	Improves the communities' resiliency to flooding	Planning & Regulation
23	Develop and conduct Risk MAP meetings in various watersheds throughout Georgia, including Discovery and Resilience meetings.	2019 - 2024	Ongoing as funding allows	High	1 - 3	Flood	DNR Floodplain Mgt	GEMA/HS, FEMA	Agency Budget	22	Improves understanding of risks	Planning & Regulation
24	Develop flood risk products, including Changes Since Last FIRM, flood depth and probability grids for selected flood frequencies, Areas of Mitigation Interest and HAZUS loss estimates for watersheds funded by FEMA for Risk MAP projects	2019 - 2024	Ongoing as funding allows	Medium	1 - 3	Flood	DNR Floodplain Mgt	GEMA/HS, DCA	HMA & Agency Budget	34	Improves understanding of risks	Planning & Regulation
25	Review state definition of loss categories in dam failure	2019 - 2024	Ongoing continually	Low	1 - 3	Flood & Dam Failure	DNR Safe Dams	DNR	Agency Budget	46	Improves the assessment of dams	Planning & Regulation
26	Adopt applicable recommendations from the publication Emergency Action Planning for High Hazard Potential Dams: Findings, Recommendations, and Strategies (FEMA 608) into the State Plan	2019 - 2024	Ongoing as State Plan is updated	Low	1 - 3	Flood & Dam Failure	DNR Safe Dams	GEMA/HS	Agency Budget	48	Improves awareness, preparedness and resiliency to dam failures	Planning & Regulation
27	Minimize damage to natural resources through the use of and compliance with greenspace, stream buffers, zoning ordinances as actions to protect Georgia communities	2019 - 2024	Ongoing continually	Low	1 - 3	All Hazards	DNR Floodplain Mgt, Coastal Resources Division	GEMA/HS	HMA & Agency Budget	104	Protects development from flooding and provides natural storage areas for flood waters.	Natural & Cultural Protection

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
28	Create and maintain state wide map layer that identifies important natural and cultural resources	2019 - 2024	Ongoing continually	Medium	1 - 3	All Hazards	DNR GIS	GEMA/HS	Agency Budget	105	Helps protect natural and cultural resources	Natural & Cultural Protection
29	Develop flood information outreach resources, such as fact sheets and web pages that summarize flood hydrology for emergency managers and planners	2019 - 2024	Ongoing as resources allow	High	1 - 3	Flood	DNR Floodplain Mgt, Coastal Resources Division	FEMA	Agency Budget	117	Helps improve preparedness by improving awareness of flood related issues.	Public Awareness
30	Provide technical assistance to local governments in order to improve the enforcement of floodplain management requirements	2019 - 2024	Ongoing as needed	High	1 - 3	Flood	DNR Floodplain Mgt	GEMA/HS	Agency Budget	134	Helps reduce vulnerability of development in the floodplain	Public Awareness
31	Develop and maintain map inundation zones for dam failure	2019 - 2024	Ongoing continually	Low	1 - 3	Flood & Dam Failure	DNR Safe Dams & USACE	GEMA/HS	HMA	24	Helps improve awareness of vulnerability to dam failures.	Planning & Regulation
32	EPD will conduct periodic reviews of all their natural disaster plans and participate in disaster exercises	2019 - 2024	New	Medium	1 - 3	All Hazards	DNR EPD	GEMA/HS	Agency Budget	New	Improves planning and preparedness for disaster events.	Planning & Regulation
33	Continue to provide technical assistance to facilities submitting TierII reports	2019 - 2024	New	Medium	1 - 3	All Hazards	DNR EPD	GEMA/HS	Agency Budget	New	Improves awareness and understanding of risks.	Planning and Regulation
34	Continue to provide Georgia counties with assistance in predetermination of temporary storm debris staging areas	2019 - 2024	New	Medium	1 - 3	All Hazards	DNR EPD	GEMA/HS	Agency Budget	New	Improves preparedness for future disasters.	Planning and Regulation
35	On EPD website, provide link to GEMA/HS website for hurricane and severe weather emergency preparedness data.	2019 - 2024	New	Low	1 - 3	All Hazards	DNR EPD	GEMA/HS	Agency Budget	New	Helps prevent losses and damages by Increasing public awareness	Public Awareness
36	Review and updating annually the Department of Transportation Hurricane Plans, Snow and Ice Plans and ensuring that emergency response personnel are properly trained to ensure the Department is NIMS compliant	2019 - 2024	Ongoing annually	High	1 - 3	All Hazards	DOT	DOT	FDOT	69	Improves training and preparedness for such events.	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
37	Schedule and conduct dry run exercises on contra-flow and snow and ice operations annually	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	DOT	DOT	FDOT	70	Improves training and preparedness for such events.	Planning & Regulation
38	Evaluate and update current plans and continues to research any additional resources that may be available to improve DOT's role and response to any hazard that may arise	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	DOT	DOT	FDOT	71	Improves training and preparedness for such events.	Planning & Regulation
39	DPS will conduct annual reviews of all their natural disaster plans and participation in disaster exercises	2019 - 2024	Ongoing annually	Medium	1 - 3	All Hazards	DPS	GEMA/HS	Agency Budget	26	Improves training and preparedness for such events.	Planning & Regulation
40	Provide a link to the GEMA/HS website for hurricane and severe weather emergency preparedness data on the DPS website	2019 - 2024	Ongoing continually	Medium	1 - 3	All Hazards	DPS	GEMA/HS	Agency Budget	29	Helps prevent losses and damages by Increasing public awareness	Planning & Regulation
41	Strengthen and add support to Radio Towers at DPS buildings to prevent wind damage to a critical structure	2019 - 2024	Ongoing as funding and opportunities allow	Medium	1 - 3	All Hazards	DPS	GEMA/HS	Agency Budget	30	Reduces damages to critical equipment	Planning & Regulation
42	Purchase and install storm shutters for coastal DPS facilities	2019 - 2024	Ongoing as funding and opportunities allow	Medium	1 - 3	All Hazards	DPS	GEMA/HS	Agency Budget	New	Reduces damages to agency facilities	Planning & Regulation
43	The Department of Agriculture will conduct an annual review of all its natural disaster plans and participate in fully functional food emergency exercises annually	2019 - 2024	Ongoing annually	High	1 - 3	All Hazards	GDAg	GDAg	Ag Grant	39	Improves training and preparedness for such events.	Planning & Regulation
44	To activate the Agricultural Information Sharing and Analysis Center (AGISAC) to serve as a clearinghouse for information impacting agriculture	2019 - 2024	Ongoing as needed	High	1 - 3	All Hazards	GDAg	GDAg	Ag Grant	40	Helps make critical information available during disaster.	Planning & Regulation
45	To establish a system of pet friendly shelters in times of disaster	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GDAg	GDAg	Ag Grant	41	Provides families with pets a place to go during evacuations.	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
46	To continue strengthening the foundation of the All Hazards State Agriculture Response Team	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GDAg	GDAg	Ag Grant	43	Improves training and preparedness for such events.	Planning & Regulation
47	To set up an electronic, web-based Reportable Animal Diseases System to incorporate into AGISAC; to train veterinarians and agricultural specialists to be a part of the reporting and response networks, and to plan additional animal and food safety response training exercises	2019 - 2024	Ongoing continually	Medium	1 - 3	All Hazards	GDAg	GDAg	Ag Grant	50	Helps make critical information available during disaster.	Planning & Regulation
48	Identify new funding sources to update local mitigation plans	2019 - 2024	Ongoing as funding opportunities allow.	High	1 - 3	All Hazards	GEMA/HS	FEMA	HMA	1	Helps improve mitigation planning	Planning & Regulation
49	Provide assistance to Georgia counties in obtaining grant funding to update local mitigation plans	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	FEMA,	HMA	2	Helps improve mitigation planning	Planning & Regulation
50	Conduct plan kickoff meetings with local mitigation planning committees to provide overview of the mitigation planning process	2019 - 2024	Ongoing as needed	High	1 - 3	All Hazards	GEMA/HS	Local Communities	Local Budget	3	Helps improve mitigation planning	Planning & Regulation
51	Provide tools, such as fillable charts and templates to assist local planners with data collection for the completion of local mitigation plan documents	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	4	Helps improve mitigation planning Risk Assessments	Planning & Regulation
52	Provide updated mapping to local communities through GMIS for the Flood, Wildfire, Landslide, Seismic, SLOSH and Wind hazards	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	5	Helps improve mitigation planning Risk Assessments	Planning & Regulation
53	Provide and encourage the use of the best available historic, risk and vulnerability data and resources to counties for use in local mitigation plans.	2019 - 2024	New	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS, GFC, DNR, NWC, USGS, Other applicable	HMA, Agency and Local budgets	New	Helps improve mitigation planning Risk Assessments	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
54	Provide training to local county EMA Directors, planners and state users on entering data into the Georgia Mitigation Information System (GMIS)	2019 - 2024	Ongoing as needed	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	6	Helps improve mitigation planning Risk Assessments	Planning & Regulation
55	Collect, quantify and integrate the local data, such as risk assessment, vulnerability, loss estimates, capability assessment, and mitigation actions, from mitigation plans as they are developed into a standardize matrix for use in the State plan	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	7	Helps improve integration of local plans into the State Plan	Planning & Regulation
56	Review local mitigation plans for compliance with Federal regulations prior to submittal to FEMA	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	FEMA	HMA	8	Helps improve mitigation planning	Planning & Regulation
57	Georgia will maintain Enhanced State Mitigation Plan status throughout SYF 2024	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	10	Encourages continued high quality program management and allows additional funding for mitigation projects.	Planning & Regulation
58	Identify potential funding assistance to implement mitigation measures for state agencies and local governments	2019 - 2024	Ongoing continually and as funding opportunities allow	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	11	Helps improve Hazard Mitigation throughout the State.	Planning & Regulation
59	During disaster operations, deploy staff to ensure continued working relationships with local, state and federal agencies in the implementation of all available hazard mitigation programs	2019 - 2024	Ongoing after every major disaster.	High	1 - 3	All Hazards	GEMA/HS	FEMA	HMA	12	Helps improve Hazard Mitigation throughout the State.	Planning & Regulation
60	Provide State Plan risk assessment data on GEMA/HS's Hazard Mitigation Website for local communities to utilize in their local mitigation planning processes	2019 - 2024	Ongoing continually	Medium	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	15	Helps improve integration of State and local plan data	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
61	Georgia will achieve 80% federal approval for the second update of all 159 local mitigation plans by SFY 2024	2019 - 2024	New	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	New	Helps increase awareness of risk to natural hazards and benefits of mitigation and helps ensure continued eligibility for mitigation funding	Planning & Regulation
62	Georgia will achieve 25% federal approval for the third update of all 159 local mitigation plans by SFY 2024	2019 - 2024	New	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	New	Helps increase awareness of risk to natural hazards and benefits of mitigation and helps ensure continued eligibility for mitigation funding	Planning & Regulation
63	Update GMIS with the most current flood maps available from FEMA	2019 - 2024	Ongoing continually	High	1 - 3	Flooding	GEMA/HS	DNR & FEMA	HMA	17	Helps improve awareness of risk to flood hazards.	Planning & Regulation
64	Add and maintain tax parcel data to GMIS	2019 - 2024	Ongoing continually as parcel data is updated	Medium	1 - 3	All Hazards	GEMA/HS	DCA	HMA	18	Provide access to better data for better risk analysis	Planning & Regulation
65	Update GMIS with the most current Wildfire maps available from the Georgia Forestry Commission	2019 - 2024	Ongoing as maps are updated	High	1 - 3	Wildfire	GEMA/HS	GFC	HMA	19	Provide access to better data for better risk analysis	Planning & Regulation
66	Determine effectiveness of mitigation programs through loss avoidance studies	2019 - 2024	Ongoing after major disasters	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	32	Helps ensure the most effective use of mitigation funding.	Planning & Regulation
67	Reduce flood loss claims against NFIP through the mitigation of repetitive loss properties	2019 - 2024	Ongoing as funding opportunities allow	High	1 - 3	Flood	GEMA/HS	DNR & FEMA	Agency Budget	37	Reduce damages to flood prone structures.	Planning & Regulation
68	Update repetitive loss data in GMIS and maintain database to track mitigation activities including mitigated properties and repetitive loss structures	2019 - 2024	Ongoing continually	High	1 - 3	Flood	GEMA/HS	GEMA/HS	HMA & Agency Budget	38	Helps provide the best information available for flood risk assessment.	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
69	Conduct post disaster review of state and local hazard mitigation plans for evaluation and updating as appropriate	2019 - 2024	Ongoing after major disasters	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	42	Helps ensure risk assessments remain relevant as times change.	Planning & Regulation
70	Collect category one and two data from the Safe Dams Program	2019 - 2024	Ongoing continually	Low	1 - 3	Flood & Dam Failure	GEMA/HS	DNR	Agency Budget	44	Ensure the use of the most up to date data in risk assessments.	Planning & Regulation
71	Develop update a map for dams in the risk evaluation portion of the state hazard mitigation plan	2019 - 2024	Ongoing continually	Low	1 - 3	Flood & Dam Failure	GEMA/HS	DNR	Agency Budget	45	Ensure the use of the most up to date data in risk assessments.	Planning & Regulation
72	Determine non-human loss from dam failures	2019 - 2024	Deferred due to staffing and time constraints	Low	1 - 3	Flood & Dam Failure	GEMA/HS	DNR	Agency Budget	47	Helps improve understanding of risks to dam failures.	Planning & Regulation
73	Provide technical assistance to local communities in identifying and developing hazard mitigation projects	2019 - 2024	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	55	Helps improve Hazard Mitigation throughout the State.	Planning & Regulation
74	Support cost effective mitigation activities that minimize damages and or provide uninterrupted operational capabilities to critical facilities, utilities and property	2019 - 2024	Ongoing as funding opportunities allow	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	56	Reduces damages and ensures continued operability of essential services.	Planning & Regulation
75	Support local government cost-effective requests through available grant opportunities to mitigate repetitive loss properties with priority given to severe repetitive loss properties and removal of repetitive loss properties from regulatory floodway	2019 - 2024	Ongoing as funding opportunities allow	Medium	1-3	Inland Flooding	GEMA/HS	Local Communities, DNR	HMA	57	Reduces damages and losses to flood prone properties and helps restore floodplains to a natural state.	Planning & Regulation
76	Utilize and share information on lessons learned from analysis of the mitigated properties database	2019 - 2024	Ongoing continually	Medium	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	58	Helps ensure the effective use of future mitigation funding.	Planning & Regulation
77	Investigate mitigation grant opportunities with Department of Agriculture	2019 - 2024	Ongoing as staff and funding resources allow	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	61	Help reduce losses to agricultural areas.	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
78	Develop and maintain matrix of all local capabilities for next state strategy update	2019 - 2024	Deferred due to staffing and time constraints	Low	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	62	Helps improve integration of local plan information into the State Plan.	Planning & Regulation
79	Research feasibility and practicality of additional high priority projects identified in mitigation strategy workshop.	2019 – 2024	New	Medium	1-3	All Hazards	GEMA/HS	Various	HMA and Agency Budget	New	Will help reduce future damages and losses from multiple hazards.	Planning and Regulation
80	Integrate hazard mitigation into other state and local processes such as THIRA, Long-Term Recovery Plan, local comprehensive plans, CWPPs, and capital improvement plans	2019 - 2024	Ongoing as various plans are updated	High	1 - 3	All Hazards	GEMA/HS	DCA, GFC, Local Communities	HMA & Agency Budget	76	Helps improve the full integration of hazard mitigation into other operations.	Planning & Regulation
81	Require communities to remain in good standing in the NFIP to be eligible for hazard mitigation funding, as well as continue to give mitigation funding priority to CRS communities	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	78	Help reduce damages to flood prone properties and to improve access to flood insurance.	Planning and Regulation
82	Assist local communities with eligible acquisition/elevation, floodproofing, and storm water projects	2019 - 2024	Ongoing continually	High	1 - 3	Inland Flooding	GEMA/HS	GEMA/HS	HMA & Agency Budget	91	Help reduce damages resulting from flooding.	Structure & Infrastructure
83	Promote the development of safe areas in public and private schools	2019 - 2024	Ongoing as opportunities allow	High	1 - 3	Tornadoes	GEMA/HS	BOR, DOE & Local Communities	HMA & Agency Budget	92	Protect people from tornadoes.	Structure & Infrastructure
84	Expand the use of safe rooms throughout Georgia communities	2019 - 2024	Ongoing as funding and opportunities allow	High	1 - 3	Tornadoes	GEMA/HS	GEMA/HS & GFC	HMA & Agency Budget	93	Protect people from tornadoes	Structure & Infrastructure
85	Identify state assets at highest risk and list appropriate mitigation actions to reduce these risk and identify opportunities for structural protections (ie. safe rooms) in buildings	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	94	Reduce damages to state owned and operated facilities.	Structure & Infrastructure
86	Coordinate with local emergency management agencies to predesignate safe areas for at-risk population	2019 - 2024	Ongoing continually	High	1 - 3	Tornadoes	GEMA/HS	GEMA/HS	EMPG & Agency Budget	95	Protect people from tornadoes and severe weather.	Structure & Infrastructure

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
87	Identify historic sites that may be vulnerable to natural hazards	2019 - 2024	Ongoing continually	Medium	1 - 3	All Hazards	GEMA/HS	SHPO	HMA & Agency Budget	101	Improve understanding of risks to historic sites.	Natural & Cultural Protection
88	Ensure there are no adverse effects of any proposed mitigation projects on Georgia's natural resources and/or threatened or endangered species	2019 - 2024	Ongoing with each mitigation project	Low	1 - 3	All Hazards	GEMA/HS	FEMA, US Fish Wildlife	HMA & Agency Budget	102	Protect natural resources and endangered or threatened species.	Natural & Cultural Protection
89	Educate and promote the prevention of development in places such as flood plains, steep ravines, lands with underground caves, through news letters and workshops	2019 - 2024	Ongoing continually	Low	1 - 3	All Hazards	GEMA/HS	DCA	HMA & Agency Budget	103	Protect natural resources and endangered or threatened species.	Natural & Cultural Protection
90	Develop a list of public and private sector incentives such as CRS & NFIP, that encourage the implementation of hazard mitigation measures for publication on GEMA/HS's website.	2019 - 2024	Ongoing continually	Medium	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	106	Improve public awareness of and encourage practices that help improve resilience to natural hazards.	Public Awareness
91	Support the use of state of the art warning technology and local warning projects with available initiative funds	2019 - 2024	Ongoing as funding allows	Medium	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	107	Help protect people by warning of incoming severe weather.	Public Awareness
92	Expand NOAA weather alert system by applying for grants to distribute radios to local communities	2019 - 2024	Ongoing as funding allows	Medium	1 - 3	All Hazards	GEMA/HS	Local Communities	HMA, Agency Budget	108	Help reduce loss of life by warning of incoming severe weather.	Public Awareness
93	Determine percentage of population coverage by current alert systems	2019 - 2024	Deferred due to time and staffing resources	Medium	1 - 3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	110	Help reduce loss of life by warning of incoming severe weather.	Public Awareness

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
94	Support the StormReady Program in Georgia in partnership with the National Weather Service, promoting the increase in the number of StormReady counties, communities, governments, universities and commercial sites from the current number of 113 as of 8/2018	2019 - 2024	Ongoing continually	Medium	1 - 3	All Hazards	GEMA/HS	GEMA/HS, NWS	Agency Budget	111	Improve public awareness of and encourage practices that help improve resilience to natural hazards.	Public Awareness
95	Promote and share Mitigation Ideas Guide (Jan 2013) with local communities and planners	2019 - 2024	Ongoing continually and as local plan updates are started.	High	1 - 3	All Hazards	GEMA/HS	FEMA	Agency Budget	112	Help improve mitigation throughout the State	Public Awareness
96	Make Georgia hazard data available on GEMA/HS webpage	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	113	Help improve awareness of natural hazards.	Public Awareness
97	Conduct post-disaster workshops for affected local communities	2019 - 2024	Ongoing after major disasters	High	1 - 3	All Hazards	GEMA/HS	NRCS	HMA, Agency Budget	115	Help encourage effective use of mitigation opportunities.	Public Awareness
98	Share mitigation project/plan success stories via media such as websites and newsletters	2019 - 2024	Ongoing as opportunities allow	Medium	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	116	Help improve awareness of the benefits of mitigation.	Public Awareness
99	Develop workshops and webinars to facilitate the update of the state plan risk assessment	2019 - 2024	Ongoing prior to the beginning of the State Plan major update process.	High	1 - 3	All Hazards	GEMA/HS	FEMA	HMA, Agency Budget	120	Help obtain the best available information for future updates to the State Plan.	Public Awareness
100	Increase local participation in flood hazard mitigation programs such as NFIP and CRS, through workshops and posted information on GEMA/HS and DNR websites	2019 - 2024	Ongoing as opportunities arise	High	1 - 3	Flood	GEMA/HS	DNR & FEMA	Agency Budget	121	Improve public awareness of and encourage practices that help improve resilience to natural hazards	Public Awareness
101	Increase local participation in hazard mitigation programs such as Firewise and Storm Ready Communities, through workshops and posted information on GEMA/HS website	2019 - 2024	Ongoing as opportunities arise.	High	1 - 3	All Hazards	GEMA/HS	FEMA & NWS	Agency Budget	122	Improve public awareness of and encourage practices that help improve resilience to natural hazards	Public Awareness

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
102	Distribute information via brochures, websites, webinars and workshops on community and household saferooms to Georgia communities	2019 - 2024	Ongoing as opportunities arise.	Medium	1 - 3	Tornadoes	GEMA/HS	GEMA/HS	Agency Budget	124	Help protect people from tornadoes.	Public Awareness
103	Support the Severe Weather Awareness Week and the Prescribed Fire Awareness Week campaigns in partnership with the Office of the Governor	2019 - 2024	Ongoing as applicable	High	1 - 3	Severe Weather, Wildfire	GEMA/HS	GEMA/HS	HMA, Agency Budget	133	Improve public awareness of and encourage practices that help improve resilience to natural hazards	Public Awareness
104	Increase community awareness of the negative impacts of repetitive loss properties and the benefits of mitigation actions	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GEMA/HS	DNR	HMA, Agency Budget	135	Improve public awareness of and encourage practices that help improve resilience to flooding	Public Awareness
105	Lead and direct the Georgia Silver Jackets Team to promote flood risk management programs throughout the state.	2019 - 2024	Ongoing continually	High	1 - 3	Flood	GEMA/HS	USGS, NWS, USACE, FEMA, EPA, NRCS, FHA, USEDA	HMA, Agency Budgets	136	Bring together multiple agencies and funding sources to reduce the potential for losses from flooding	Planning & Regulation
106	Promote and support mitigation allied programs, such as the Community Rating System (CRS) and Storm Ready by giving application incentive points for communities applying for HMA assistance.	2019 - 2024	Ongoing as HMA assistance opportunities become available	Low	1 - 3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	137	Encourage practices that help improve resilience to natural hazards	Planning & Regulation
107	Promote safe room construction at all levels i.e. (individual residents, local governments and local school districts, and private industry).	2019 - 2024	Ongoing continually as opportunities arise	Low	1 - 3	Tornadoes	GEMA/HS	GEMA/HS	Agency Budget	138	Protect people from tornadoes.	Planning & Regulation
108	Continue education of local emergency managers on various mitigation activities and funding opportunities	2019 - 2024	Ongoing continually	Low	1 - 3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	139	Encourage practices that help improve resilience to natural hazards	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
109	Promote mitigation activities on properties that are located in areas vulnerable to hazards	2019 - 2024	Ongoing continually	Low	1 - 3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	140	Encourage practices that help improve resilience to natural hazards	Planning & Regulation
110	Promote structural retrofits for structures that are vulnerable to wind events	2019 - 2024	Ongoing continually	Low	1 - 3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	141	Encourage practices that help improve resilience to wind related hazards.	Planning & Regulation
111	Develop working relationship with local floodplain managers to educate them on the FEMA's Flood Mitigation Assistance program	2019 - 2024	Ongoing continually	Low	1 - 3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	142	Improve awareness of flood mitigation programs	Planning & Regulation
112	Identify properties that might be eligible for cost effective mitigation measures and coordinate results with local governments	2019 - 2024	Ongoing continually	Low	1 - 3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	143	Encourage practices that help improve resilience to flooding	Planning & Regulation
113	Facebook Fans – Increase total number of fans by 20 percent over 2014 number	2019 - 2024	New	High	1 - 3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	New	Improve the awareness of the importance of individual resilience	Public Awareness
114	Twitter Followers – increase total number of followers by 20 percent over 2014 number	2019 - 2024	New	High	1 - 3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	New	Improve the awareness of the importance of individual resilience	Public Awareness
115	Distribute quarterly publication – The Dispatch	2019 - 2024	New	High	1 - 3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	New	Improve the awareness of the importance of individual resilience	Public Awareness
116	Dispatch Readers – increase total number of readers by 20 percent over 2014 number	2019 - 2024	New	High	1 - 3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	New	Improve the awareness of the importance of individual resilience	Public Awareness
117	Ready Georgia – increase total number of app users by 20 percent over 2014 number	2019 - 2024	New	High	1 - 3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	New	Improve the awareness of the importance of individual resilience	Public Awareness

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
118	Develop and update Wildfire Protection Plans throughout the State	2019 - 2024	Ongoing continually as needed	High	1 - 3	Wildfire	GFC	GEMA/HS	Agency Budget	9	Improve assessment of wildfire hazard.	Planning & Regulation
119	Update Community Wildfire Protection (CWPP) in conjunction with Local Hazard Mitigation Plan (LHMP) update	2019 - 2024	Ongoing as LHMPs are updated	High	1 - 3	Wildfire	GFC	GEMA/HS	Agency Budget	28	Improve assessment of wildfire hazard.	Planning & Regulation
120	Continue developing the hazard, risk, and vulnerability assessments for CWPP and SWRA by utilizing updated technology and improved data	2019 - 2024	Ongoing continually	High	1 - 3	Wildfire	GFC	GEMA/HS	Agency Budget	49	Improve assessment of wildfire hazard.	Planning & Regulation
121	Support prescribed burning in CWPP plans	2019 - 2024	Ongoing continually	High	1 - 3	Wildfire	GFC	GFC	EMPG	53	Reduce risk of fires.	Planning & Regulation
122	Build future buildings to withstand high winds and other hazards	2019 - 2024	Ongoing as applicable	High	1 - 3	All Hazards	GFC	GBA	Agency Budget	98	Reduce damages to future GFC facilities	Structure & Infrastructure
123	Increase local participation in fire hazard mitigation programs such as FireWise, through workshops and posted information on GEMA/HS and GFC websites	2019 - 2024	Ongoing continually	High	1 - 3	Wildfire	GFC	GEMA/HS	Agency Budget	123	Improve public awareness of and encourage practices that help improve resilience to wildfires	Public Awareness
124	Encourage local communities to review related planning processes such as CWPPs and Comprehensive Plans, when updating LHMPs	2019 - 2024	Ongoing when LHMPs are updated.	High	1 - 3	All Hazards	GFC & DCA	GEMA/HS	Agency Budget	13	Improve integration and consideration of wildfire hazard in other operations.	Planning & Regulation
125	Purchase 2 Single Engine Air Tankers for wildfire mitigation	2019 - 2024	New	High	1 - 3	Wildfire	GFC	GFC	Agency Budget	New	Improve preparedness for wildfire events.	Planning and Regulation
126	Wildfire Response fire dispatch system wtih equipment tracking	2019 - 2024	New	High	1 - 3	Wildfire	GFC	GFC	Agency Budget	New	Improve preparedness for wildfire events.	Planning and Regulation
127	Update Hurricane Procedure Manual and Preparedness Guide for the Georgia Port Authority	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GPA	GPA	Agency Budget	80	Improve preparedness for hurricane events.	Structure & Infrastructure
128	The Georgia Port Authority will participate in the development of Coastal County Hazard Mitigation Plan updates	2019 - 2024	Ongoing as hazard mitigation plans are updated.	High	1 - 3	All Hazards	GPA	GPA	HMA & Agency Budget	81	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
129	The Georgia Port Authority has begun the procedure of stacking containers three high and tying the ends together to prevent property damage	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	GPA	GPA	Agency Budget	83	Reduce risk of damages from hurricanes.	Structure & Infrastructure
130	Elevate flood prone areas at the Georgia Ports Authority Colonel's Island facility in Brunswick, GA	2019 - 2024	New	High	3-Jan	Flooding	GPA	GEMA/HS	HMGP/HMA, Agency Budget	New	Reduce risk of damages from storm surge.	Structure & Infrastructure
131	GPA has established relationship for weather reporting with Meteorologist John Weatherby and also subscribes to a weather monitoring service and uses local and state EMA weather updates	2019 - 2024	New	High		All Hazards	GPA	GPA	Agency Budget	New	Improve preparedness for severe weather type events.	Planning and Regulation
132	Develop breach zone studies to mitigate potential loss of life in the event of dam failure	2019 - 2024	Ongoing as funding and opportunities allow.	Medium	1 - 3	Dam Failure	GSWCC	GSWCC	NRCS	59	Improve awareness of risks from dam failures.	Planning & Regulation
133	Education and the possible prevention of the installation of structures (i.e. houses) within the breach zone of flood control dams will be dependent on the willingness of local government entities to zone these areas	2019 - 2024	Ongoing as opportunities allow	Medium	1 - 3	Dam Failure	GSWCC	GSWCC	NRCS	63	Reduce potential for damages from future dam failure events.	Planning & Regulation
134	The Commission will continue to work closely with the Districts and the NRCS in the preparation of breach zone studies necessary for development of EAPs	2019 - 2024	Ongoing continually	Medium	1 - 3	Dam Failure	GSWCC	GSWCC	NRCS	64	Improve awareness of risks from dam failures.	Planning & Regulation
135	Establish a procedure for District personnel to work with county EMGs in practice drills or preparedness during a dam failure simulation	2019 - 2024	Ongoing continually	Medium	1 - 3	Dam Failure	GSWCC	GSWCC	NRCS	65	Improve preparedness for dam failure events.	Planning & Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
136	Seek funding that will allow the modification of existing NRCS constructed flood control dams in order to comply with state safe dam criteria for high hazard dams	2019 - 2024	Ongoing as funding opportunities allow.	Medium	1 - 3	Dam Failure	GSWCC	GSWCC	NRCS	66	Reduce potential for future dam failure events.	Planning & Regulation
137	Update GMIS database	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	ITOS	GEMA/HS	HMA	33	Provide best available data for risk assessments.	Planning & Regulation
138	The Archives will provide training on disaster preparedness to local governments and other not-for-profit cultural organizations in Georgia	2019 - 2024	Ongoing continually as needed	High	1 - 3	All Hazards	SOS	SOS	IMLS	72	Improve preparedness for natural hazard events.	Planning & Regulation
139	The Archives will collect GIS information for all collection holding organizations in Georgia in a database to determine their level of emergency preparedness	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	SOS	SOS	IMLS	73	Improve preparedness for natural hazard events.	Planning & Regulation
140	Issue and get approval for a statewide contract for document recovery services to ensure that local governments and state agencies contract with the most qualified vendors for document restoration after a disaster	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	SOS	SOS, FEMA	IMLS	74	Improve resiliency to natural hazard events.	Planning & Regulation
141	Expand the current Georgia Archives emergency plan to include provisions for business continuity and for water conservation	2019 - 2024	Ongoing continually	High	1 - 3	All Hazards	SOS	SOS	IMLS	75	Improve resiliency to natural hazard events.	Planning & Regulation
142	Annual revision of Hazard Vulnerability Assessments (System & 22 Individual colleges)	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency 'Budget	New	Help prevent damages to facilities by ensuring risk assessments remain up to date.	Planning and Regulation
143	Annual revision of Critical Mission Functions (System & 22 Individual colleges)	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve preparedness for future hazard events.	Planning and Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
144	Develop & implement orientation and training for Emergency Operations Coordinators	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve preparedness for future hazard events.	Planning and Regulation
145	Develop & implement orientation and training for Business Continuity Coordinators	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve preparedness for future hazard events.	Planning and Regulation
146	NIMS training & credentialing all College (22) Emergency Operations Coordinators	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve preparedness for future hazard events.	Planning and Regulation
147	NIMS training & credentialing all College (22) Business Continuity Coordinators	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve preparedness for future hazard events.	Planning and Regulation
148	Biannual training and peer review Emergency Operations Coordinators	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve preparedness for future hazard events.	Planning and Regulation
149	Biannual training and peer review Business Continuity Coordinators	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve preparedness for future hazard events.	Planning and Regulation
150	Coordination with Local Hazard Mitigation Plan Groups across 22 Colleges' Service Delivery Areas (90+ counties)	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation
151	Re-establishment of College Safety Committees and Community Safety Advisory Boards	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve preparedness for future hazard events.	Planning and Regulation
152	Coordination of Mitigation Planning with TCSG System Office Facilities Management	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation
153	Coordination of Mitigation Planning with Colleges' (22) Facilities Management Peer Group	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation
154	Coordination of Mitigation Planning with TCSG System Office Strategic Planning	2019 - 2024	New	High	1 - 3	All Hazards	TCSG	GEMA/HS	Agency Budget	New	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation

2019 MITIGATION ACTIONS												
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
155	Expand the number of Flood Tracking Chart Projects to other river basins, ensuring greater availability of information to the emergency management community and public	2019 - 2024	Ongoing as funding and opportunities allow	Medium	1-3	Inland Flooding	USGS	GEMA/HS, DNR, NOAA	USGS, DNR, Local	54	Improve understanding for flood risks	Planning and Regulation
156	Improve statewide Digital Elevation Models	2019 - 2024	Ongoing continually	High	1-3	All Hazards	USGS	DNR	USGS	60	Improve understanding for flood risks	Planning and Regulation
157	Share and promote stream gauge historic crests database to local communities	2019 - 2024	Ongoing continually	High	1 - 3	Flood	USGS	GEMA/HS & NWS	HMA, Agency Budget	118	Provide best available information for awareness and local planning and preparedness.	Public Awareness
158	Increase the number of stream gauges in Georgia	2019 - 2024	Ongoing as funding allows	High	1 - 3	Flood	USGS	GEMA/HS	HMA, Agency Budget	119	Provide best available information for awareness and planning and preparedness	Public Awareness

TABLE 3.6 COMBINED OR DELETED MITIGATION ACTION TABLE

2019 DELETED MITIGATION ACTIONS										
2014 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	FEMA Category
35	Provide watertight document storage for assets in SLOSH and Floodway/Velocity Zones	2014 - 2019	Deleted	Medium	1 - 3	All Hazards	DPS	GEMA/HS	Agency Budget	Planning & Regulation
36	Place brochures and documents in DPS facilities for public and employee awareness of mitigation steps they can take for their own and family protection	2014 - 2019	Deleted	Medium	1 - 3	All Hazards	DPS	GEMA/HS	Agency Budget	Planning & Regulation
79	Chatham and Glynn Counties to team up with GPA and DOAS to develop a maximum loss study in the event of various levels of cyclonic events	2014 - 2019	Deleted	High	1 - 3	All Hazards	GPA	DOAS	Agency Budget	Structure & Infrastructure
82	Develop private weather center for the Georgia Port Authority, staffed with a meteorologist	2014 - 2019	Deleted	High	1 - 3	All Hazards	GPA	GPA	Agency Budget	Structure & Infrastructure
114	Develop webinars and workshops for local communities to increase public awareness of disaster risks and mitigation actions that protect life and decrease property damages	2014 - 2019	Deleted	Medium	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	Public Awareness
125	Meet or exceed 2012 media impressions for Ready Georgia (74 million)	2014 - 2019	Deleted	High	1 - 3	All Hazards	GEMA/HS PIO	GEMA/HS	Agency Budget	Public Awareness
126	Increase Ready profile registrations by 50 percent over 2012 goal	2014 - 2019	Deleted	High	1 - 3	All Hazards	GEMA/HS PIO	GEMA/HS	Agency Budget	Public Awareness
127	Meet or exceed 2012 levels of website traffic Ready Georgia App – 58,000 website visits	2014 - 2019	Deleted	High	1 - 3	All Hazards	GEMA/HS PIO	GEMA/HS	Agency Budget	Public Awareness
128	Meet or exceed 2012 mobile app downloads for Ready Georgia App (14,477)	2014 - 2019	Deleted	High	1 - 3	All Hazards	GEMA/HS PIO	GEMA/HS	Agency Budget	Public Awareness
N/A	Maintain average of 500 monthly app users (6,000 total)	2014 - 2019	Deleted	High	1 - 3	All Hazards	GEMA/HS PIO	GEMA/HS	Agency Budget	Public Awareness
131	Blog/Podcast – Meet or exceed 2012 traffic for Ready Georgia App (10,622 visits)	2014 - 2019	Deleted	High	1 - 3	All Hazards	GEMA/HS PIO	GEMA/HS	Agency Budget	Public Awareness
148	You Tube – Meet or exceed 2012 views for Ready Georgia App (4,771)	2014 – 2019	Deleted	High	1-3	All Hazards	GEMA/HS PIO	GEMA/HS	Agency Budget	Public Awareness

TABLE 3.7 COMPLETED MITIGATION ACTION TABLE

2019 COMPLETED MITIGATION ACTIONS										
2014 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	FEMA Category
16	Georgia will achieve 100% federal approval for the initial update of all 159 local mitigation plans by SFY 2019	2014 - 2019	Complete	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	Planning and Regulations
20	Georgia will contract with 40 % of counties to update their local hazard mitigation plans in the second update cycle by SFY 2019	2014 - 2019	Complete	High	1 - 3	All Hazards	GEMA/HS	GEMA/HS	HMA	Planning and Regulations
23	DCA is currently in the process of developing a Business Impact Analysis Survey to be completed by the management of each DCA program. This survey will identify strengths, weaknesses, opportunities, and threats (SWOT). The information from these surveys will be incorporated into the existing DCA Management RecoveryTeam Action Plan.	2014 - 2019	Complete	High	1 - 3	All Hazards	DCA	DCA	Agency Budget	Planning & Regulation
31	Provide lightning suppression protection to all DPS facilities	2014 - 2019	Complete	Medium	1 - 3	All Hazards	DPS	GEMA/HS	Agency Budget	Planning & Regulation
77	DCA will conduct training building inspector workshops on the disaster resilient building codes	2014 - 2019	Complete	High	1 - 3	All Hazards	DCA	DCA	Agency Budget	Planning & Regulation
86	Develop a university system wide communications plan	2014 - 2019	Complete	High	1 - 3	All Hazards	BOR	TBA	Agency Budget	Structure & Infrastructure
87	Develop Emergency Planning Group to plan for all hazards facing the university system	2014 - 2019	Complete	High	1 - 3	All Hazards	BOR	BOR	Agency Budget	Structure & Infrastructure
96	Rebuild Dade County Georgia Forrestry Office in Trenton, GA destroyed by tornados in 2011 to higher building standards to withstand high winds	2014 - 2019	Complete	High	1 - 3	All Hazards	GFC	GBA	Agency Budget	Structure & Infrastructure
97	Purchase 6 Masficccutters (Brush Cutters) to mitigate underbrush and reduce fuel loads	2014 - 2019	Complete	High	1 - 3	All Hazards	GFC	GEMA/HS	Agency Budget	Structure & Infrastructure
99	Install generator to keep electricity available to the server in the Macon office (Drybranch)	2014 - 2019	Complete	High	1 - 3	All Hazards	GFC	GFC	Agency Budget	Structure & Infrastructure
118	Facebook Fans – Increase total number of fans by 20 percent over 2011 (2,245) – 2,700	2014 - 2019	Complete	High	1 - 3	All Hazards	GEMA/HS PIO	GEMA/HS	Agency Budget	Public Awareness
132	Create new "Southwrap" web-based program to display Southern Wildfire Risk Assessment data electronically	2013 - 2014	Complete	High	1 - 3	All Hazards	GFC	GFC	Agency Budget	Public Awareness

3.3 STATE CAPABILITY ASSESSMENT

The state capability assessment includes evaluation of Georgia's pre- and post-disaster hazard management infrastructure, including policies, programs, and funding. Subsection 3.3.1 focuses on the role of various state agencies in relation to pre- and post-disaster hazard management within Georgia. This includes mitigation-related policies, programs, and available funding. Next is a discussion of federal agency roles, including policies, programs, and funding opportunities.

Contacts within the Georgia General Assembly initiate legislation that is of direct interest to GEMA/HS while also tracking and supporting legislation that is of interest to the public safety, homeland security, and emergency management communities. GEMA/HS also works closely with other agencies and organizations such as the Association County Commissioners of Georgia, the Georgia Municipal Association, the Georgia Fire Chiefs Association, the Georgia Sheriffs' Association, the Georgia Police Chiefs Association, and the Departments of Public Safety and Natural Resources to support legislation of common interest.

The Official Code of Georgia Annotated (O.C.G.A.) is the compendium of all laws enacted in Georgia. The O.C.G.A. contains numerous legislative rules supporting mitigation. The following legislation relates to hazard mitigation in the State of Georgia:

- Georgia Coastal Management Act, O.C.G.A. §12-5-320
- Georgia Coastal Marshland Protection Act, O.C.G.A. §12-5-280
- Georgia River Corridor Protection Act, O.C.G.A. §12-2-1
- Georgia Shore Protection Act, O.C.G.A. §12-5-230
- Georgia Safe Dams Act of 1978, O.C.G.A. §12-5-370 to 385
- Georgia Planning Act of 1989, O.C.G.A. §50-8-1
- Erosion and Sedimentation Act, O.C.G.A. §12-7-1
- Georgia Emergency Management Act of 1981, as amended, O.C.G.A. §38-3-1
- Soil and Water Conservation Districts Law, O.C.G.A. §2-6-20 and §2-6-27
- Georgia Environmental Policy Act, O.C.G.A. §12-16-1
- Metropolitan North Georgia Water Planning District Act, O.C.G.A. §12-5-570
- Georgia Building Codes, O.C.G.A. §8
- Georgia Records Act, O.C.G.A. §50-18-90
- Georgia Forest Fire Protection Act, O.C.G.A. §12-6-80 to §12-6-93
- Georgia Prescribed Burning Act, O.C.G.A. §12-6-145

Several of the acts are discussed elsewhere in the plan under the corresponding state or federal agency and under the state capability summary. The Georgia General Assembly has passed no relevant legislation or regulations since the approval of the last Hazard Mitigation Plan in March of 2014.

Another example of state capability as it relates to GEMA/HS is the use of the Georgia Mitigation Information System (GMIS). GEMA/HS contracts with the University of Georgia's Information Technology Outreach Services to develop an online data entry and display system for local planning efforts that evolved into GMIS. The web-based GMIS provides easy access and maintenance without requiring extensive knowledge of GIS applications and software. Only authorized users can access the application through a log-in process. Users can manipulate critical facility data (depending on access level), view maps, and download data and reports for analysis. Authorized users have two options in which to enter critical facility data. Most communities use a bulk upload option in which the user downloads a blank spreadsheet from the system,

fills it in with up to date data on all critical facilities and uploads it to the system. GEMA/HS planners and ITOS staff then review the data and ITOS integrates it into the system. Users can also enter facility information directly online. The authorized user fills out a web-based form that includes drop-down boxes and other methods of validating user input, which minimizes training and improves data quality. As new data is entered, the database updates to provide the most recent information available. In addition to critical facilities, other layers are available within GMIS, including transportation corridors, political boundaries, hydrology, and hurricane surge zones.

3.3.1 State Policies and Programs

Table 3.9 identifies state programs and policies related to mitigation. Each program was evaluated to determine relevance to mitigation and whether it affects repetitive loss and severe repetitive loss properties.

3.3.2 State Capability Related to Development

Table 3.8 details the State of Georgia's mitigation policies, programs, and funding in relation to specific state and federal agencies. These agencies include the Georgia Department of Natural Resources, the Georgia Department of Community Affairs, GEMA/HS, the Georgia Forestry Commission, the Georgia Department of Transportation, FEMA, the Department of Defense Army Corps of Engineers, the Natural Resource Conservation Service, the Department of Transportation, the Department of Agriculture, the Small Business Administration, the Department of Housing and Urban Development, the U.S. Geological Survey, the Department of Commerce National Weather Service and National Oceanic and Atmospheric Administration, and the National Park Service. The previous section also outlined hazard mitigation–related legislation produced by the Georgia General Assembly that is found in the Official Code of Georgia Annotated.

Of the legislation listed, several policies relate to the development of hazard-prone areas, including the Georgia Planning Act of 1989, Coastal Management Act, Coastal Marshland Protection Act, Erosion and Sedimentation Act, River Corridor Protection Act, and Shore Protection Act. Table 3.9 describes each policy in relation to the issue of development.

The State of Georgia's policies regarding development in hazard-prone areas specifically cover the areas likely to face inland and coastal flooding hazards. These policies neglect to cover development in areas prone to other hazards such as wind and seismic hazards. However, Georgia does have legislation regarding building code standards that regulates the actual structure instead of the development of the area. These policies are discussed in Section 3.4. Other Georgia legislation concerns wildfire management but does not address development in wildfire prone areas. Other hazards such as tornadoes, severe weather, winter storms, and drought are not addressed by development-regulating legislation because these hazards are not spatially definable. In other words, all areas of the State of Georgia could be considered prone to tornadoes, severe weather, winter storms, and drought; therefore, the general development policy (Georgia Planning Act of 1989) applies statewide. When the statewide Planning Act of 1989 and additional legislation that addresses development in flood-prone areas is looked at comprehensively, the State of Georgia's policies related to development in hazard-prone areas are effective and increase the state's hazard mitigation capabilities.

Table 3.8 Mitigation-Related State and Federal Programs

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
Georgia Department of Natural Resources	The Georgia Community Greenspace Program	The Georgia Community Greenspace Program establishes a framework in which developed and rapidly developing counties and their municipalities can preserve community greenspace. This bill promotes the adoption of policies and rules that enable the preservation of at least 20% of county or municipal land area as connected and open greenspace usable for informal recreation and natural resource protection.	X
	The Georgia Land Conservation Act	The Georgia Land Conservation Act, initiative to encourage the long-term conservation and protection of the state's natural resources. The legislation establishes the Georgia Land Conservation Trust Fund and the Georgia Land Conservation Revolving Loan Fund that provides up to $100 million in state, federal and private funding to local governments and the Georgia DNR for the purchase of conservation lands. The responsibilities of the Georgia DNR under this legislation include establishing a state land geographic information system database for conservation activities and providing technical support to local governments.	
	The River Basin Management Planning Program	The Environmental Protection Division (EPD) of Georgia DNR implements a river basin management planning approach for the 14 major river basins in Georgia. A written plan is required and updated on a five-year cycle to coincide with National Pollutant Discharge Elimination (NPDES) permitting.	
	The Coastal Resources Division (CRD)	The Coastal Resources Division (CRD) implements provisions of the Coastal Marshlands Protection Act of 1970, the Shore Protection Act, the Revocable Licenses Program, the Coastal Zone Management Act and others. These existing	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
		authorities provide protection for critical marshes, water bottoms, beaches, sand dunes, and submerged lands. Members of the CRD staff are also available to assist hazard response and damage assessments. Also available for disaster resilience projects is the Coastal Incentive Grants.	
Georgia Department of Community Affairs	Federal Community Development Block Grant Program	Georgia's Department of Community Affairs (DCA) has the ability to fund certain hazard mitigation projects (with appropriate federal waivers and authorizations) using the Federal Community Development Block grant program. DCA administers portions of these grants to repair public facilities, to repair public and private housing, to provide relocation assistance for displaced households, to provide for public infrastructure improvements, and to assist in business loans to support threatened jobs.	X
	Immediate Threat and Danger (ITD) Program	The DCA administers the Immediate Threat and Danger (ITD) program available through the Community Development Block Grant Program of Housing and Urban Development (HUD). These grants (usually limited to $20,000) are available to qualifying local governments with a 50% provision of funding for activities designed to meet community development needs.	
	GA Planning Act	With the passing of the 1989 Georgia Planning Act, DCA created the State Comprehensive and Coordinated Planning Program to encourage effective growth management by local governments throughout the state. This program includes the development and updating of minimum standards for local and regional planning and provides technical assistance to local governments and Regional Commissions to carry out these standards. Many opportunities exist with this program for local government hazard mitigation programs or measures in connection with the state-required preparation and	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
		implementation of local comprehensive plans. This comprehensive planning approach is especially applicable to floodplain management and construction standards (mitigation approaches).	
Georgia Department of Community Affairs	Uniform Codes Act	The Construction Codes and Industrialized Buildings section of DCA maintains and updates Georgia's state minimum standard codes for construction. These codes are designed to help protect the life, health, and property of all Georgians from faulty design and unsafe construction. The Uniform Codes Act is codified in Chapter 2 of Title 8 of The Official Code of Georgia Annotated. O.C.G.A. Section 8-2-20(9)(B) identifies the "state minimum standard codes". Each of these separate codes typically consists of a base code and a set of state amendments to the base code. Georgia law further dictates that nine of these codes are mandatory (effective throughout the entire state of Georgia regardless of whether a county or municipality adopts them) and the remaining are permissive (effective only in those counties and municipalities that choose to adopt the permissive code through local ordinance). DCA periodically reviews, amends, and updates the state minimum standard code.	
	Office of Mapping and Decision Support Systems	Within DCA exists the Office of Mapping and Decision Support Systems that provides support and training to local governments for comprehensive planning activities.	
		DCA programs that support mitigation include Housing Choice Voucher, Home Buyer Mortgage Revenue Bond, Homeless and Special Needs	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
		Housing, HOME Investment Partnership, Georgia Housing Search, Immediate Threat and Danger, Redevelopment Fund, Environmental Educational and Assistance, and Construction Codes, and Planning. DCA administers over 70 state and federal programs and serves as the state's lead agency in housing finance and development and low income rental housing assistance; promulgates building codes to be adopted by local governments; and provides comprehensive planning, technical and research assistance to local governments.	
Georgia Emergency Management and Homeland Security Agency	Public Assistance Grant Program	Authorizes funding for cost-effective hazard mitigation measures on facilities damaged by disaster events	
	Pre-Disaster Mitigation Program	The PDM program provides funds to states, territories, Indian tribal governments, and communities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.	X
	Hazard Mitigation Grant Program	The Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.	X

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
Georgia Emergency Management and Homeland Security Agency	Flood Mitigation Assistance Program	Created as part of the National Flood Insurance Reform Act of 1994, 42 U.S.C. 4101, attempts to reduce or eliminate claims under the NFIP by assisting states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to structures insurable by NFIP. Elements of Repetive Flood Claims and Severe Repetitive Loss programs have been integrated into the FMA program.	X
The Georgia Forestry Commission	Forest Protection Program	Supports many mitigation and preparedness activities through the Forest Protection Programs to reduce the number of wildfires and acres burned. These programs include Pre-Suppression Firebreak Plowing, Burning Assistance, and Fire Prevention and Firewise, Rural Fire Defense Program, Volunteer Fire Assistance Grants, and Burn Permit System.	
	Southern Wildfire Risk Assessment (SWRA)	The SWRA is a regional project completed by the 13 southern states included in the USDA-Forest Service Region 8. It is a GIS project, illustrated in an Arc View product that documents and maps forest fuels, historical wildfire occurrence, values at risk from wildfires, communities at risk, wildfire susceptibility index, and levels of concern for damage from wildfires. The program also allows for illustration of mitigation treatments and the corresponding affect on wildfire susceptibility and level of concern. Working with GEMA/HS, GFC is providing SWRA information to be included in county EMA plans statewide.	
	Community Wildfire Protection Plans (CWPP)	A community wildfire protection plan outlines wildfire history and risk (SWRA), lists preparedness resources available for wildfire suppression, provides maps to illustrate the wildfire situation, and makes suggestions on how to prepare for, respond to and mitigate wildfires. The Georgia Forestry Commission will facilitate CWPP's on a county level for each Georgia	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
		County. Appropriate state, county, and community leaders will work in teams to provide wildfire planning that has buy in from all. The SWRA will be utilized not only to identify risk for CWPP's but will be used to help set priorities for getting started to insure that high risk counties are priority. GEMA/HS and local fire departments will be important partners in completion of CWPP's for the entire state. Georgia has currently 138 completed CWPPs and will continue to focus on completing each county focusing this year on the metro counties of Atlanta, Savannah, Columbus, Macon, and Augusta. http://www.gfc.state.ga.us/forest-fire/CWPP/index.cfm	
Georgia Forestry Commission	Firewise Communities	The Georgia Forestry Commission embraces the Firewise Communities USA concept and employees one full time position to conduct Firewise workshops and encourage communities to become nationally recognized. There are currently 38 nationally recognized Firewise Communities in Georgia with several nearing recognition. Communities are recognized for developing wildfire mitigation teams, funding Firewise practices, completing mitigation projects, and promoting Firewise practices. National Fire Plan grants are used to fund this program. Communities showing special interest may receive small grants for projects. The Georgia Forestry Commission currently has a special focus project to address Northeast and Southeast Georgia whom have the greatest numbers of wildfires and fast growing populations in a high risk wildland urban interface area.	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
Georgia Forestry Commission	Wildfire Prevention	Wildfire Prevention efforts are an integral part of Georgia Forestry Commission routine efforts. Approximately $250,000 is granted through National Fire Plan to the Georgia Forestry Commission for fire prevention efforts each year. Georgia Forestry Commission has a special project named “50 County Wildfire Prevention” that targets specific wildfire causes in Georgia’s top 50 wildfire occurrence counties. A scientific method for measuring success of this program compares reductions in the number of wildfires in this part of the state to reductions realized in the part of the state that is not served by this special program. Numbers of wildfires have been reduced 5% to 10% where $2,500.00 dollars have been applied to address prevention in individual counties. Georgia has just recently added 4 additional staff to battle current wildfire trends nationwide. These folks will assist the state program manager with outreach and mitigation to Communities at Risk statewide.	
	Rural Fire Defense	Since 1975 the Rural Fire Defense program operated by the Georgia Forestry Commission has provided planning advice and firefighting equipment to rural fire departments across the state. Today there are some 1375 fire engines leased or on loan to 143 Georgia counties. The program currently provides about 25 fire apparatus, at cost, per year to fire departments. Signed agreements provide for cooperation between state and local efforts for community protection from wildfires. Recent additions to the program include provision of wildfire personal protective gear and specialized wildfire training allowing fire departments to participate more fully and safely in wildfire suppression.	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
Georgia Forestry Commission	Prescribed Burning	Georgia law, Georgia Prescribed Burning Act 12-6-145, makes provisions to protect prescribed burning as a forest management and wildfire mitigation tool and assigns Georgia Forestry Commission as the agency for promoting prescribed burning and certifying practitioners. Since 1992 nearly 3190 practitioners have received certification through the Georgia Prescribed Fire Manager Certification Program. Georgia law protects those who prescribe burn under this program by requiring that gross negligence be proven against any liability suits resulting from prescribed burning. Georgia's governor proclaims Prescribed Fire Awareness Week the first full week in February each year. Nearly one million acres of Georgia forestland are treated with prescribed fire each year. Georgia averages over 79,000 prescribed fires a year covering 1.4 million ac.	
	Burn Authorizations	One of the most effective wildfire mitigation tools is the Georgia Burn Permit System. Enacted in 1988, Georgia code 12-6-90, requires a permit to be obtained from the Georgia Forestry Commission for most outdoor burning. This allows management of outdoor burning for wildfire control and for air quality concerns. Since outdoor burning is the number one cause of wildfires, the system allows for some control over wildfire occurrences, especially on the highest fire danger days. The GFC issues some 900,000 permits per year for leaf burning, brush pile burning, land clearing, and prescribed burning. Wildfire suppression costs are charged to Georgians who have escaped fires when burning illegally, without a permit. Although the GFC law enforcement program is very small, burning without a permit is a misdemeanor, punishable by up to $1,000 fine or 1 year imprisonment.	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
Georgia Forestry Commission	Fire Weather Forecasting	In support of wildfire suppression readiness planning, burn permitting, prescribed burning and other forestry activities, the Georgia Forestry Commission employs a full time meteorologist who manages the National Fire Danger Rating System for Georgia and several fire weather stations across the state. Starting Oct. 1 2018 the GFC will start using the fire weather forecast produced by the NWS to manage smoke related issues and issue permits.	
	Urban Forestry Strike Team	Arborists can provide disaster planning assistance to communities, risk assessment, and FEMA debris identification following storms. Risk assessment helps communities identify trees that are an unacceptable risk, and trees suitable for retention and management during disaster recovery.	
The Georgia Department of Transportation		The Georgia Department of Transportation (DOT) plans, constructs, maintains, and improves the state's road and bridge network; provides planning and financial support for other modes of transportation such as mass transit and airports; provides airport and air safety planning; and provides air travel to state departments. Georgia's DOT also provides administrative support to the State Tollway Authority and the Georgia Rail Passenger Authority. Since Hurricane Floyd in 1999, extensive evacuation planning has been completed by the state in response to the large influx of evacuees on the interstate system. When tropical systems threaten neighboring states, Georgia's DOT is prepared for potential influx of evacuees as well as the potential hazard events associated with the tropical system. Georgia DOT also plans and prepares for contra-flow interstates, including planning crossovers, ramp entrance closings, and	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
		regular flow exchanges. Georgia's DOT website provides a host of information concerning preparation for emergency evacuation including evacuation routes, emergency supply lists, emergency shelter locations, and contact information for the Georgia NaviGAtor Transportation Management Center.	
United State Geological Survey (USGS)	Georgia HydroWatch	**Georgia HydroWatch** is your portal to the USGS hydrologic data and information for Georgia and links to other sources of water information. The USGS operates the most extensive satellite network of stream-gaging stations in the state, many of which form the backbone of flood-warning systems. The USGS currently operates about 318 data collection sites in Georgia for acquiring information on surface-water, ground-water, water-quality, and precipitation. 226 of the sites are equipped with satellite telemetry, which provides real-time data via GOES satellites and downlinks, which enables the posting of data to the Web for public dissemination. Real-time and historical surface-water, ground-water, and water-quality data are available, as well as project information about floods, droughts, and bacterial studies of the Chattahoochee River. Links are provided to weather, river, lake, and hurricane forecast sites.	
United State Geological Survey (USGS)	Georgia Water Information Network (GWIN)	A county-based system that offers water information for thousands of surface-water, ground-water, and water-quality measurement sites in Georgia. Other information includes water-use data and annual hydrologic summaries.	
	StreaMail	StreaMail is a new USGS initiative for emergency management officials to obtain the latest stream flow and river level information via text message on cell phones or other PDAs.	
	Storm Surge Determination	.Storm Surge Determination is a new USGS initiative to monitor the real extent and timing of hurricane surge along the coast of the Southeast United States to provide more accurate surge data for calibration of SLOSH models and flood studies.	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
		Flood inundation modeling and visualization study has been completed along a 4.8 mile reach of the Flint River in Albany-Dougherty County. USGS updates the regional flood frequency equations every 10 years which is critical in ensuring the statistical return periods are based on the latest hydrologic data. Recent initiatives also include ensuring consistency for estimating the magnitude and frequency of floods in rural basins that are near or cross State borders. USGS seeks to partner with State/local/other federa agencies in the acquisition of high resolution LiDAR derived elevation data for the entire Coastal area of Georgia. Acquisition of the data will support NSDI and advance efforts related to the National Map. Similar to the LiDAR effort, updating the DEMs in flood-prone river reaches across Georgia will provide for more accurate elevation contours for more accurate flood forecasting. USGS has partnered with State/local/other federal agencies in the development of flood tracking charts. Three charts have been produced in Georgia. Other agency initiatives and capabilities include hydrologic alarm notification system, BacteriAlert, real-time bridge scour monitoring, real-time evacuation route monitoring, and toxic spill extent determination.	
Natural Resource Conservation Service (NRCS)	Conservation Planning and Technical Consultation	Provides data, information, or technical expertise that helps people collect and analyze information to identify natural resource problems and opportunities, clarify their objectives, and formulate and evaluate alternatives.	
	Conservation Implementation	NRCS helps customers install on their land conservation practices and systems that meet established technical standards and specifications.	
	Natural Resource Inventory and Assessment	NRCS assesses, acquires, develops, interprets, analyzes, and delivers natural resource data and information to enable knowledge-based natural resource planning and decision making at all landscape scales.	
	Natural Resource Technology Transfer	NRCS develops, documents, and distributes a wide array of technology pertaining to resource assessment, conservation planning, and conservation system installation and evaluation.	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
Natural Resource Conservation Service (NRCS)	Financial Assistance	NRCS provides financial assistance to encourage the adoption of land treatment practices that have been proven to provide significant benefits to the public. Financial assistance is awarded to participants who voluntarily enter into contracts, easements, and agreements to conserve natural resources. Through the Emergency Watershed Protection Program (EWP), more than $30 million has been invested since 1996 in this program to assist sponsors in implementing emergency measures to relieve imminent hazards to life and property created by natural disaster.	
	Construction Codes and Industrialized Buildings	NRCS helps customers install on their land conservation practices and systems that meet established technical standards and specifications.	
	Natural Resource Inventory and Assessment	NRCS assesses, acquires, develops, interprets, analyzes, and delivers natural resource data and information to enable knowledge-based natural resource planning and decision making at all landscape scales.	
National Weather Service (NWS)	Georgia Mesonet	provided a statewide network of automated, real-time, high-quality, high-density weather sensors. Some of the benefits of the program include improved severe weather warnings, greater detail and success in winter weather forecasting, more effective drought monitoring and water resource management, better real-time weather information, and better monitoring and forecasting of forest management controlled and uncontrolled burns.	
National Weather Service (NWS)	Storm Ready	Allows for recognition of communities who have taken steps to increase their preparedness for severe weather.	
	Incident Command Response and Support	Involves planning, training and support for local emergency incident responses where weather plays a critical role.	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
National Weather Service (NWS)	Integrated Warning Team Workshop (IWT)	IWT are workshops to bring media, EM's and the NWS to encourage cooperation among these organizations and to better understand each other's programs and capabilities. The IWT concentrates on the social impacts of severe weather events and uses best practices from previous events to be better prepared. Also they concentrate on communicating the correct message to the public. One that they can understand.	
Soil and Water Conservation Commission (GSWCC) .		GSWCC is charged with coordinating the operation and maintenance of the Districts' 357 USDA/SCS watershed dams, 150 of which are rated as Category 1 dams and regulated by the Georgia Safe Dams Act. GSWCC provided a database with pertinent information on all watershed dams. Development of emergency action plans and breach zone maps will be shared with emergency management personnel and local officials.	
Department of Public Safety (DPS)		DPS staff provide law enforcement and security support in responding to natural and manmade disasters Plan integration includes Hurricane Evacuation Plans for both the Atlantic and Gulf Coast and Hurricane re-entry plans.	
Georgia Department of Banking and Finance (DBF)		DBF promotes safe, sound, competitive financial services in Georgia through innovative, responsive regulation and supervision. DBF's motto is "Safeguarding Georgia's financial services. DBF requires that financial institutions have disaster recovery/business resumption plans to support their operations in the event of an emergency/disaster situation.	
Georgia Department of Juvenile Justice (DJJ)		DJJ has the primary responsibility of providing supervision, detention and services (treatment and educational) of court adjudicated juveniles.. DJJ created an Emergency Operations Unit to handle mitigation activities with a focus on safety and security of the facilities and staff. The Emergency Operations Unit is actively working towards developing a comprehensive strategy for the agency as well as for each individual facility. These strategies are being incorporated into	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
		departmental policy and local operating procedures	
Georgia Department of Technical and Adult Education (DTAE)		DTAE is responsible for overseeing the Technical College System of Georgia, the adult literacy program, and a host of economic and workforce development programs. Established campus security as a top priority and implemented program to improve security at each college. This specific agency initiative supports Objective – 3.8 DTAE is actively working towards developing a Mitigation Program at Savannah Technical College.	
Department of Audits and Accounts (DAA)		DAA provides decision-makers with credible management information to promote improvements in accountability and stewardship in state and local government. DAA is a support agency to other state agencies DAA has completed activities to minimize impacts of hazard events and specific agency initiatives	
Board of Regents (BOR)		BOR is responsible for overseeing the governance and management of 35 colleges and universities. BOR created an Emergency Operations Initiative to complete a system wide review of emergency operations plans with a focus on best practices. BOR supported the ongoing Disaster Resistant University Initiative that requires each campus to have a mitigation plan meeting DMA2K requirements. BOR established the Hazard Mitigation Awareness Program. Specific agency initiatives support Objectives – 1.1, 2.1 & 3.3. Opportunities for plan integration include campus mitigation plans, emergency operations plans and a system-wide mitigation plan.	

State Agencies			
Department	**Program**	**Description**	**Affected Repetitive Flood Loss / SRL**
Office of Secretary of State (SOS)		SOS supports CoSA **Intergovernmental Preparedness for Essential Records (IPER)** project grant to develop Web- and CD-based training for state and local governments on vital records identification and management related emergency preparedness. The training initiative will provide the knowledge and skills needed to secure essential records and recover those damaged by natural or human-caused disasters. SOS created the Heritage Emergency Response Alliance to mitigate loss of cultural heritage materials in the event of a disaster. SOS is actively pursuing a grant to conduct preservation and emergency preparedness planning. This project will produce survey instruments used to develop a comprehensive database of emergency contact information for all cultural institutions in Georgia..	
Georgia Ports Authority (GPA)		GPA develops, maintains and operates ocean and inland river ports within Georgia; fosters international trade and new industry for state and local communities; promotes Georgia's agricultural, industrial and natural resources; and maintains the natural quality of the environment. GPA has identified numerous strategies to protect physical and intangible assets in the environment. GPA agency specific goals complement the State Mitigation Strategy. Specific initiatives include developing and maintaining a hurricane plan.	
Office of Insurance and Safety Fire Commissioner (GADOI)		GADOI facilitates regulation, coordination and uniformity among state regulators and provides public access to services and fire safety information that results in a consumer friendly and competitive market place.	

Table 3.9 Georgia Legislation Related to Development

Legislation	Policy Purpose	Methods	Administration
GA Planning Act of 1989	Encourage better growth management and smart growth	Local long-range comprehensive planning	Local governments must maintain designation of "Qualified" in order to remain eligible for assistance programs
GA Coastal Management Act	Encourage sustainable development and protection of coastal resources	GA DNR able to receive and disburse federal grant monies	Coastal Resources Division and GA DNR established as governing bodies for developing a coastal management program
GA Coastal Marshland Protection Act	Protect tidal wetlands	Limit certain activities and structures in marsh areas through permitting	Coastal Resources Division grants permits for activities in protected tidal wetlands.
GA Erosion and Sedimentation Act	Limit land-disturbing activities near state waters	Local adoption of comprehensive ordinances governing land-disturbing activities based on minimum requirements	GA DNR EPD and local governments administer ordinances' requirements for land-disturbing activities near state waters
GA River Corridor Protection Act	Protect river corridors	Major provisions include minimum vegetative buffers and local identification of river corridors in land use planning	GA DNR EPD administers the act's minimum standards to all rivers in GA with at least 400 ft^3/s average annual flow
GA Shore Protection Act	Protect and manage GA's shoreline features (sand-sharing system)	Limits certain activities and structures in sand—sharing system	Coastal Resources Division grants permits for activities and structures consistent with the GA Coastal Management Program

3.4 LOCAL CAPABILITY ASSESSMENT

The local capability assessment includes a discussion of local policies governing building codes, zoning, and floodplain management that relate to hazard mitigation. This is followed by a discussion about the history and purpose of local mitigation planning, which increases local capability. Chapter 4 provides additional details on the current progress in regard to local planning as well as the status of each Georgia county.

3.4.1 Local Mitigation Policies: Building Codes, Zoning, Floodplain Development Regulations, and Mitigation Planning

Several policies instituted by the Georgia General Assembly relate to the construction standards or building codes enforced at the local level. The State provides guidance to the communities by offering model ordinances and available grant opportunities to communities interested in adopting hazard mitigation actions. These policies include Georgia's state minimum standard codes for construction (the Uniform Codes Act) and the Uniform Standards Code for Manufactured Homes and Installation of Manufactured and Mobile Homes Act. The State encourages local communities to formally adopt the latest Georgia state minimum codes to be uniformly applied and consistently enforced in the community. The Georgia Department of Community Affairs (DCA) updates these model codes whenever new international codes are released in order to stay current with best practices.

Georgia's state minimum standard codes for construction are designed to help protect the life and property of citizens from faulty design and construction; unsafe, unsound, and unhealthy structures and conditions; and the financial hardship resulting from rebuilding after a hazard event. In other words, these codes require a minimum standard of construction that minimally mitigates certain hazards (e.g., high winds, severe thunderstorms, etc.). The Uniform Codes Act identifies the 14 "state minimum standard codes," with each code typically consisting of a base code and a set of state amendments. Georgia law dictates that nine of the 14 codes are mandatory (applicable to all construction regardless of local enforcement) and five are permissive (only applicable if the local government chooses to adopt and enforce them). The codes are as follows:

Mandatory Codes:

- International Building Code, 2012 Edition, with Georgia Amendments (2014) (2015) (2017)(2018)
- International Residential Code, 2012 Edition, with Georgia Amendments (2014) (2015)(2018)
- International Fire Code, 2012 Edition, with Georgia Amendments (2014)
- International Plumbing Code, 2012 Edition, with Georgia Amendments (2014) (2015)
- International Mechanical Code, 2012 Edition, with Georgia Amendments (2014) (2015)
- International Fuel Gas Code, 2012 Edition, with Georgia Amendments (2014) (2015)
- National Electrical Code, 2017 Edition (No Georgia Amendments)
- International Energy Conservation Code, 2009 Edition, with Georgia Supplements and Amendments (2011) (2012)
- International Swimming Pool and Spa Code, 2012 Edition, with Georgia Amendments (2014)

Permissive Codes:

- Disaster Resilient Building Code IBC Appendix(2013)

- Disaster Resilient Building Code IRC Appendix (2013)
- International Property Maintenance Code, 2012 Edition, with Georgia Amendments (2015)
- International Existing Building Code, 2012 Edition, with Georgia Amendments (2015)
- National Green Building Standard, 2008 Edition, with Georgia Amendments (2011)

As noted above, the building, one and two family dwelling residential, fire, plumbing, mechanical, gas, electrical, energy, and swimming pool codes are mandatory codes, meaning that under Georgia law, any structure built in Georgia must comply with these codes, whether or not the local government chooses to locally enforce these codes.

In addition, since Georgia law gives the enumerated codes statewide applicability, it is not required that local governments have to adopt the mandatory codes. Local governments must, however, adopt administrative procedures in order to enforce them (O.C.G.A. Section 8-2-25(a)). However, the local government can choose which of the mandatory codes it wishes to locally enforce.

The remaining codes are referred to as permissive codes. Unlike the mandatory codes, in order for a local government to enforce one or more of these permissive codes, that code or codes must be adopted, either by ordinance or resolution, by the local jurisdiction. A copy of the ordinance or resolution adopted must be forwarded to DCA (O.C.G.A. Section 8-2-25 (b)).

Administration and Enforcement of the State Minimum Standard Codes

In order to properly administer and enforce the state minimum standard codes, local governments must adopt reasonable administrative provisions. The power to adopt these administrative procedures is set forth in O.C.G.A. Section 8-2-26(a)(1). These provisions should include procedural requirements for the enforcement of the codes, provisions for hearings, provisions for appeals from decisions of local inspectors, and any other procedures necessary for the proper local administration and enforcement of the state minimum standard codes. These powers include:

- Inspecting buildings and other structures to ensure compliance with the code;
- Employing inspectors and other personnel necessary for the proper enforcement of codes;
- Requiring permits and to establishment charges for said permits; and
- Contracting with other local governments for code enforcement.

DCA periodically reviews, amends and/or updates the state minimum standard codes. If a local government chooses to locally enforce any of these codes, it must enforce the latest editions and the amendments adopted by DCA.

DCA has developed a sample resolution/ordinance that may be used as a guide for local governments in the development of their administrative procedures. Please contact DCA for a copy of this sample resolution/ordinance and for any technical assistance needed in the development of a local code enforcement program.

Appendices

It should be noted that The Uniform Codes Act states that the appendices of the codes are not enforceable unless referenced in the body of the code, adopted by DCA, or specifically adopted by a municipality or county. If any appendices have been adopted by DCA, they will be noted in the Georgia amendments as such.

Local Amendments

The Uniform Codes Act provides that local governments may, under certain conditions, adopt local amendments to the state minimum standard codes. Please note that DCA does not approve or disapprove any local amendment. The department provides a recommendation only. However, in order to enforce any local amendment, the local government must submit the proposed amendment to DCA for review (O.C.G.A. Section 8-2-25(c)).

There are several requirements local governments must meet in order to enact a local code amendment. These requirements are as follows:

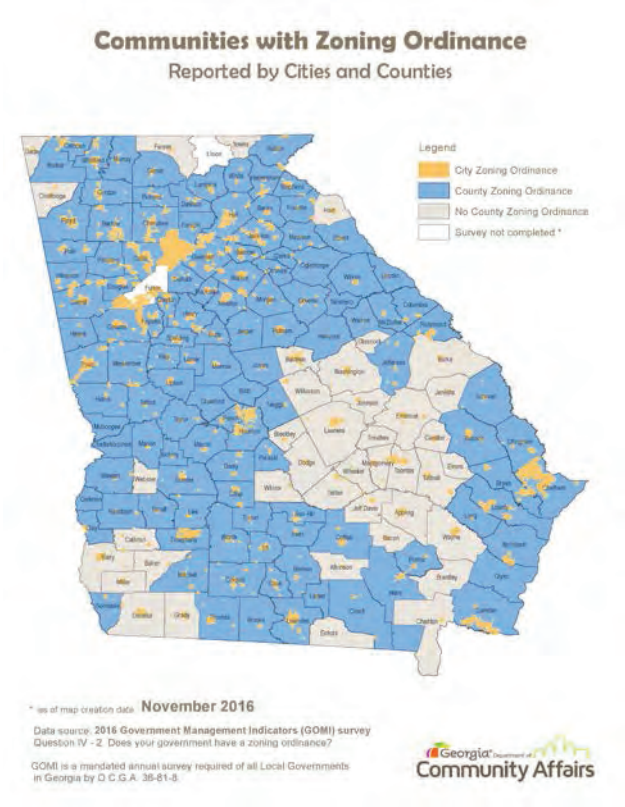
- The requirements in the proposed local amendment cannot be less stringent than the requirements in the state minimum standard code.
- The local requirements must be based on local climatic, geologic, topographic, or public safety factors;
- The legislative findings of the local governing body must identify the need for the more stringent requirements; and
- The local government must submit the proposed amendment to DCA 60 days prior to the proposed adoption of such an amendment.

After submittal of the proposed local amendment, DCA has 60 days in which to forward its recommendations to the local government. DCA may respond in three ways: recommend adoption of the amendment, recommend the amendment not be adopted, or have no comment on the proposal. If DCA recommends against the adoption of the proposed amendment, the local governing body must vote specifically to reject DCA's recommendation before the local amendment can be adopted and enforced. If DCA fails to respond within the 60-day time frame, the local government may adopt the proposed local amendment.

Figure 3.3 is a DCA map showing Georgia communities' enforcement of construction codes as of 2016. As the map illustrates, 112 of Georgia's 159 counties issue permits and enforce the state minimum construction codes.

Figure 3.3. Construction Codes in Georgia as of November 2016

Figure 3.4. Communities in Georgia with Zoning, as of November 2016



Theoretically, the primary purpose of zoning is to segregate incompatible land uses. Practically, zoning consists of locally produced laws and ordinances that regulate development by dividing a community into zones that are regulated by development criteria. For example, zoning can regulate which activities are acceptable in a certain zone such as open space, residential, agricultural, commercial, or industrial. Zoning has the potential to inhibit inappropriate development in hazard-prone areas as well as designating certain areas for conservation, open space, and public use. Zoning laws vary immensely by jurisdiction and, in the State of Georgia, have no standard basis like the construction codes. Enforcement of zoning ordinances can, at times and depending on the particular situation, be highly political. Given that, a true statewide analysis of the effectiveness of zoning ordinances is impractical. Nevertheless, zoning ordinances have the potential to help protect the community from development in hazard-prone areas.

DCA monitors the communities in Georgia that produce zoning ordinances. Figure 3.4 shows which Georgia communities have zoning ordinances. As the map illustrates, 117 of Georgia's 159 counties have local zoning ordinances.

A third type of code that is prevalent throughout the state is floodplain development regulation. As of February 2018, 561 of Georgia's 678 cities and counties participate in the National Flood Insurance Program (NFIP). As a prerequisite for participation in NFIP, the community must adopt and enforce a floodplain development ordinance that meets certain minimum standards, such as minimum finished floor elevations for buildings built in floodplains. These regulations, while they do allow development in the floodplains, are designed to ensure that the development causes no or minimal negative flood impact on any other properties. In addition, any buildings must be constructed so that floodwaters from a 100 year/1% chance per year flood will flow freely and will not enter and cause damage to the enclosed livable or workable spaces of a structure. While the ordinances do not directly address Repetitive Loss or Severe Repetitive Loss properties, they do address substantially damaged structures, which are those where cumulative damage have exceeded 50% of the pre-damage market value of the structure, requiring the entire structure to be built to current codes. This reduces the possibility of a structure meeting one of the Severe Repetitive Loss structure definitions – where two or more claims exceed the market value of the structure. While the link between NFIP regulations and Repetitive Loss and Severe Repetitive Loss properties is indirect, a complete understanding of the effect of these regulations on RL and SRL properties would require additional analysis.

As stated above, all communities participating in the NFIP must adopt minimum floodplain development regulations. Therefore, at least 82% of the State's cities and counties have floodplain development regulations. It is possible, though not very likely, that some communities, unbeknownst to GEMA/HS, have adopted floodplain regulations, but, for one reason or another, do not participate in the NFIP. Many communities have adopted higher regulatory standards, including many of the communities in the Metro North Georgia Water Planning District, further limiting development within the Special Flood Hazard Areas. That being said, the majority of Georgia appears to be fairly well protected from improper development within the floodplain areas.

Between January 2002 and June 2013, all 159 of Georgia's counties, along with the participating municipalities, completed local multi-jurisdictional hazard mitigation plans. As of March, 2018, all 159 counties had completed the first update to their local hazard mitigation plans and 55 counties had completed their second update. The quality and effectiveness of the plans has improved over time and continues to do so. For a more detailed description of the local planning process, including historical, current, and future activities as well as GEMA/HS's assistance and coordination of the local process, see Chapter 4.

3.4.2 Community Rating System (CRS)

The CRS is a voluntary program through which NFIP communities are rewarded for beneficial floodplain management that exceeds minimum NFIP requirements, including higher regulatory standards. Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet the three goals of CRS: reducing flood losses, facilitating accurate insurance ratings, and promoting the awareness of flood insurance. The CRS classifies communities based on a point system, with the first class (Class 1) receiving the largest premium reduction and the last class (Class 10) receiving no reduction. CRS recognizes 18 credible flood mitigation activities that fall under four broad categories: public information, mapping and regulations, flood damage reduction, and flood preparedness. Table 3.10 provides further information about the CRS classes and associated flood insurance reductions.

Table 3.11 lists all CRS communities in Georgia as of October 1, 2017. The table also provides the CRS class for each community for previous selected years. If no class is provided, that community had not yet joined the CRS program. The number of CRS communities in Georgia has steadily increased, with many improving on their CRS class.

Participating in the CRS program benefits communities by providing enhanced public safety, reducing damage to public and private property, avoiding economic losses and disruption, and protecting the local environment. The program also allows the evaluation of local programs in comparison to a nationally recognized benchmark.

Table 3.10 Community Rating System and Associated Flood Insurance Reductions

		Premium Reduction	
Credit Points	Class	SFHA*	Non-SFHA**
4,500 +	1	45%	10%
4,000 – 4,499	2	40%	10%
3,500 – 3,999	3	35%	10%
3,000 – 3,499	4	30%	10%
2,500 – 2,999	5	25%	10%
2,000 – 2,499	6	20%	10%
1,500 – 1,999	7	15%	5%
1,000 – 1,499	8	10%	5%
500 – 999	9	5%	5%
0 – 499	10	0	0

* Special Flood Hazard Area

** Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. The CRS credit for AR and A99 Zones are based on non-Special Flood Hazard Areas (non-SFHAs) (B, C, and X Zones). Credits are: classes 1-6, 10% and classes 7-9, 5%. Premium reductions are subject to change.

Table 3.11 Georgia CRS Communities and Rankings

CRS Class by Year of Data					
Community Name	2004	2007	2010	2013	2017
Albany, City of	9	9	8	8	7
Atlanta, City of					7
Austell, City of				8	8
Bloomingdale, City of					8
Brunswick, City of	9	9	9	9	9
Bryan County					6
Camden County				8	6
Cartersville, City of		9	9	9	7
Catoosa County				8	8
Chatham County	7	7	6	6	5

CRS Class by Year of Data					
Community Name	2004	2007	2010	2013	2017
Cherokee County		8	8	8	8
Cobb County	8	8	8	8	8
College Park, City of	6	6	6	6	6
Columbia County	8	8	7	7	7
Columbus, City of	8	8	8	8	8
Covington, City of	9	9	9	9	9
Coweta County				8	8
Crisp County		9	9	9	9
Decatur, City of	8	7	6	6	7
DeKalb County	8	8	7	7	7
Dougherty County	7	7	6	6	6
Douglas, City of				9	9
Douglas County	8	8	8	8	7
Duluth, City of	9	9	8	8	8
East Point, City of					7
Effingham County				7	7
Fayette County	7	7	6	6	6
Fayetteville, City of		8	8	7	7
Forest Park, City of				9	9
Fulton County	9	9	9	8	8
Garden City, City of					8
Glynn County	8	8	8	7	7
Griffin, City of			6	5	5
Gwinnett County	8	8	8	8	7
Henry County				8	8
Hinesville, City of				7	7
Jekyll Island, State Park Authority	7	6	6	6	5
Johns Creek, City of					8
Lake City, City of				9	9
Marietta, City of					8
Morrow, City of				9	9
Paulding County	10	10	10	10	10
Peachtree City, City of	7	7	7	7	7
Pembroke, City of					9
Pooler, Town of	8	8	8	7	6
Powder Springs, City of					6

CRS Class by Year of Data					
Community Name	**2004**	**2007**	**2010**	**2013**	**2017**
Richmond Hill, City of					7
Roswell, City of	7	7	7	7	7
Savannah, City of	8	8	8	6	5
St. Marys, City of					7
Thunderbolt, Town of					6
Tifton, City of			8	8	8
Tybee Island, City of	8	8	7	7	5
Waynesboro, City of	10	10	10	10	10
Worth County	9	9	9	9	9
Total Participating	**26**	**30**	**32**	**43**	**55**

3.5 STATE AND LOCAL FUNDING SOURCES

The State of Georgia currently uses several funding sources to implement hazard mitigation activities. Primarily, these funds stem from federal, state, and local sources. The State of Georgia is interested in continuing to pursue these federal, state, and local funding sources throughout the future implementation of the mitigation strategy as well as in pursuing additional private sources.

Table 3.12 Current Funding Sources

Program	Source	Description	Estimated Annual Funding	How It Is Used
Hazard Mitigation Grant Program (HMGP)	FEMA	The funds provided to states, territories, Indian Tribal governments, local governments, and eligible private non-profits (PNPs) following a Presidential major disaster declaration.	Only available after disaster declaration and varies depending on size and scope of disaster	State and local planning, state and local projects
Community Development Block Grant (CDBG)	HUD, DCA	Provides communities with resources to address a wide range of unique community development needs.	In Georgia: 2018 approximately $42 million	Housing, economic development, disaster recovery
Assistance to Firefighters Grant	FEMA	Meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical service organizations	Prescribed by Congress; $310 million in FY2017 Nationwide	Funding Community Wildfire Protection Planning (CWPP) for GA
Pre Disaster Mitigation (PDM)	FEMA	Annual, nationally competitive grant program for hazard mitigation	Prescribed by Congress each year: $100 million for FY2017 Nationwide	State and local planning, state and local mitigation projects
Flood Mitigation Assistance (FMA)	FEMA	Provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP).	Prescribed by Congress; $160 million allocated in FY2017 Nationwide	Flood mitigation projects, flood mitigation planning

Table 3.13 Potential Funding Sources

Program	Source	Description	Estimated Annual Funding	Potential Uses
Pre Disaster Mitigation (PDM)	FEMA	Annual, nationally competitive grant program for hazard mitigation	Prescribed by Congress each year: $100 million for FY2017 Nationwide	State and local planning, state and local mitigation projects
Assistance to Firefighters Grant	FEMA	Meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical service	Prescribed by Congress; $310 million in FY2017 Nationwide	Fire mitigation projects, community wildfire protection planning
Community Development Block Grant (CDBG)	HUD, DCA	Provides communities with resources to address a wide range of unique community development needs	Approximately $42 million in 2018 in Georgia	Housing, economic development, disaster recovery
Flood Mitigation Assistance (FMA)	FEMA	Provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP).	Prescribed by Congress; $160 million allocated in FY2017 Nationwide	Flood mitigation projects, flood mitigation planning
Hazard Mitigation Grant Program (HMGP)	FEMA	The funds provided to states, territories, Indian Tribal governments, local governments, and eligible private non-profits (PNPs) following a Presidential major disaster declaration.	Only available after disaster declaration and varies depending on size and scope of disaster	State and local planning, state and local projects

Chapter 4: Coordination of Local Mitigation Assistance

As discussed in Chapter 3, the local mitigation planning requirements are an attempt to accumulate greater knowledge of local hazard exposure, available critical facilities (especially those with high hazard exposure), and potential mitigation policies, programs, and projects. The following three sections in this chapter detail the approval and update process of local mitigation planning. This is followed by a discussion in Section 4.4 about the State's prioritization of local assistance.

Each section in this chapter was reviewed and updated by GEMA/HS Hazard Mitigation staff. Each section was revised as necessary to reflect previous, current, and future planned activities to assist Georgia's 159 counties, their municipalities, University System campuses, and authorities in the completion and updating of their local hazard mitigation plans and projects. Table 4.1 lists the changes to Chapter 4 that have occurred since the 2014 approval.

Table 4.1: Summary of Changes to Chapter 4

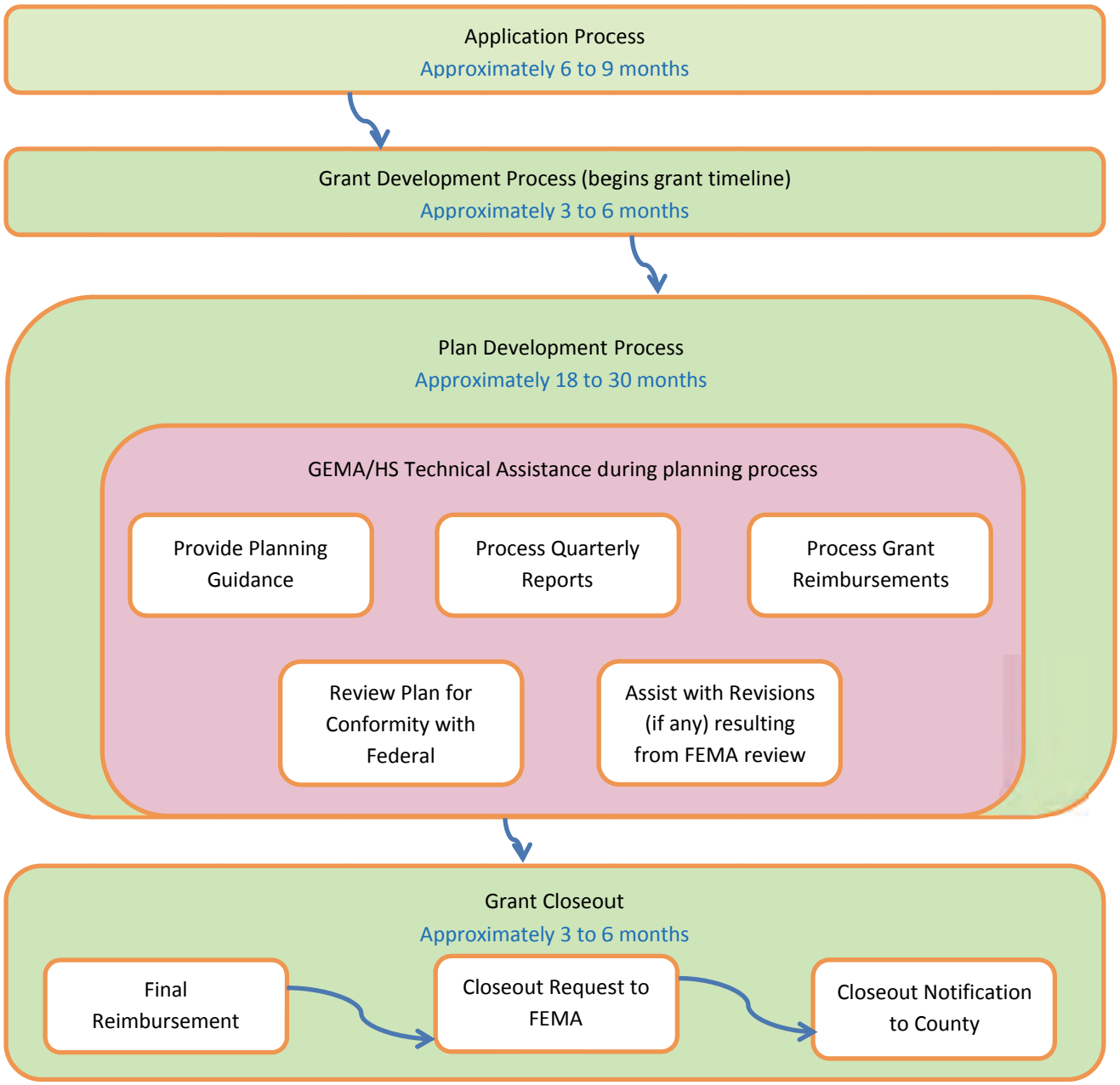
Chapter 4 Section	Updates to Section
Title	• Change chapter title from "Coordination of Local Mitigation Planning" to "Coordination of Local Mitigation Assistance."
4.1 Local Technical Assistance	• Updated Text. • Updated Figure 4.4
4.2 Local Funding	• Updated text and figures.
4.3 Local Plan Integration	• Updated text
4.4 Prioritizing Local Assistance	• Combined 4.4.1 "Prioritization of Local Plan Updates" and 4.4.2 "Prioritization of Local Plan Funding" into 4.4.1 "Prioritization of Local Plan Update Funding." • Updated tables

4.1 LOCAL TECHNICAL ASSISTANCE

The GEMA/HS Hazard Mitigation staff proactively works to meet the requirements of the Disaster Mitigation Act of 2000 for local hazard mitigation planning activities. The following sections describe the staff's process for assisting local plan development and grant management.

4.1.1 PLAN DEVELOPMENT PROCESS

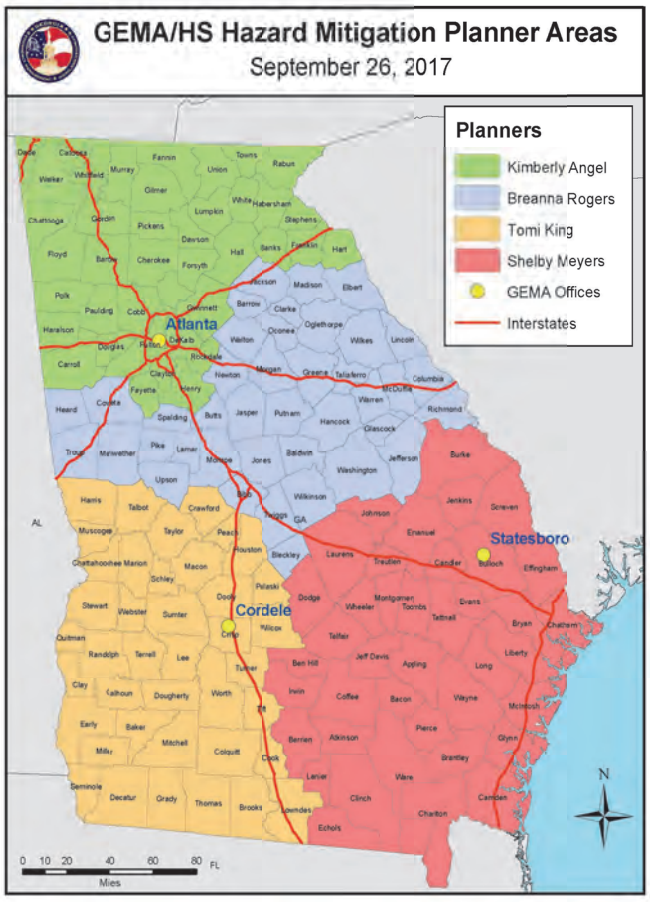
Figure 4.1 Grant Process Flow Chart



The development process is captured in Figure 4.1. This flowchart details the process the State of Georgia and local jurisdictions typically follow during the funding of planning projects. Embedded in this flowchart is

the timeline associated with the mitigation plan development process. First is the application period, which lasts 6–9 months. For HMGP grants, this timeframe can be longer, depending on the time necessary to lock in the overall amount available for grants. This lock-in time often overlaps with the beginning of the State's outreach to affected communities to discuss needs and possibilities for mitigation grants. The application period includes outreach, calls for applications, GEMA/HS assistance with application development, submittal to FEMA, and FEMA's review and response, which ultimately ends in the project receiving or not receiving funding. The second period, the grant development process, lasts 3–6 months and includes the development and signing of grantee-subgrantee agreements and the distribution of guidance packages, usually accomplished at the local kickoff meeting. The third period, the plan development process, lasts around 18–30 months. During this phase, GEMA/HS provides technical assistance with plan development as needed, receives and processes quarterly reports and payment requests, and reviews draft copies of the plan. The third period also includes FEMA review, plan adoption, FEMA approval, and the approval notifications by GEMA/HS and FEMA. Overall, the third period lasts between 1½ and 3 years, though extensions are available if needed. The fourth and final period lasts 3–6 months and includes all final payments to the county and close out of the grant. After the local mitigation plan has been completed, the county continues to monitor its plan annually, as described in the maintenance section of each plan.

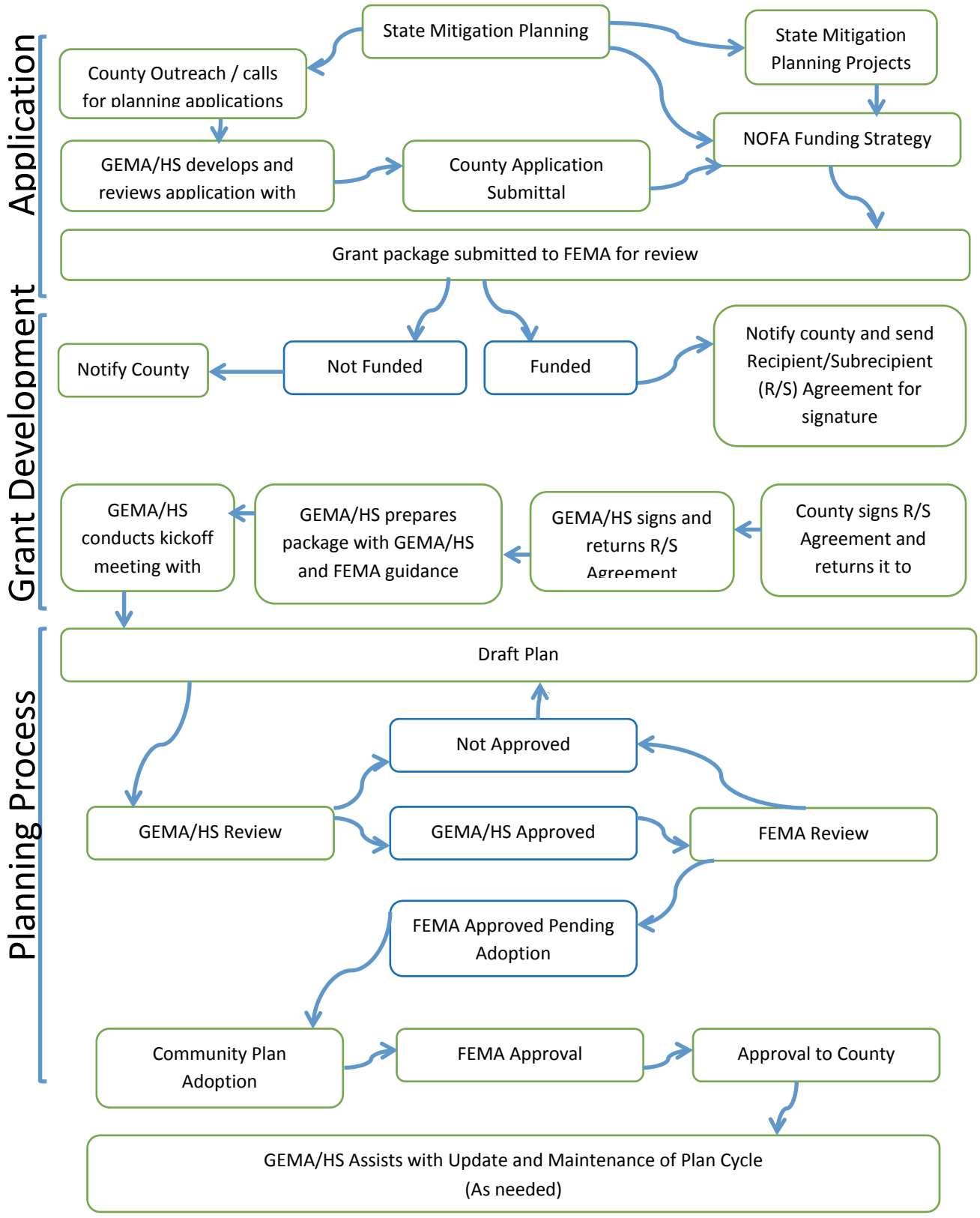
Figure 4.2 GEMA/HS Mitigation Planner Areas, 2017



GEMA/HS's Mitigation Planners conduct local kickoff meetings with each county and its invited mitigation planning teams. This will include the leadership of all municipalities, emergency management agencies, private businesses, and interested citizens. The purpose of these kickoff meetings is to give the entire planning team an overview of the program and some basic guidance to help them get started with the mitigation planning process.

During the plan development, review, and approval stages, every county follows the same basic process whereby the planning committee meets on a regular basis to discuss findings of research and related activity conducted outside of the meetings. Most counties use contractors, such as their regional commission or a private consultant, to coordinate their planning process, but others have used existing emergency management or planning staff. GEMA/HS Planners avail themselves to the counties through phone calls, emails, site visits, and/or attendance at planning committee meetings as necessary. When new planning tools are developed or new consultants or planners are brought into the process, the GEMA/HS Mitigation Planners conduct training and workshops with the necessary parties to teach them how to use the tools available to them and to inform them about what is expected of local mitigation plans.

Figure 4.3 Local Hazard Mitigation Planning Process Flow Chart



The final phase of the plan development process begins when a county submits a draft plan to its assigned GEMA/HS Hazard Mitigation Planner for review. GEMA/HS currently has four planners that cover four geographic areas in the state, as shown in Figure 4.2. Two planners are located in the Atlanta office and work with counties in the northern half of Georgia; one planner is located in Cordele to assist counties in Southwest Georgia; and one planner is located in Statesboro to assist counties in Southeast Georgia. Each planner works with counties to help ensure that plans are updated and reviewed prior to the plan expiration date.

GEMA/HS utilizes the Local Plan Review Tool to review local plans for compliance with FEMA requirements (44 CFR 201.6). In addition to the FEMA requirements, GEMA/HS has developed additional state requirements that must be met for approval. These are included in Element F of the Regulation Checklist, as shown in Figure 4.4.

Figure 4.4 Local Plan Review Tool Element F: State Requirements

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1. Does the plan document opportunities for participation by neighboring communities, businesses and other interested parties? (Invitation letters, sign in sheets, etc.)			
F2. Does the plan document opportunities for public input and participation? (copies of meeting notices, sign in sheets, or other applicable documentation)			
F3. Does the plan discuss the review of the following planning mechanisms, at a minimum, for incorporation as applicable? • Comprehensive Plan • Flood Mitigation Assistance Plan (if one exists) • Flood Insurance Study (If one exists) • Community Wildfire Protection Plan • Local Emergency Operations Plan • State Hazard Mitigation Strategy			
F4. Has the Critical Facilities Inventory been completed online?			
F5. Have the GMIS Critical Facilities reports and maps, or maps from a superior system, been provided?			
F6: Has the county included/incorporated their state-provided Hazus-MH report (if available).			
ELEMENT F: REQUIRED REVISIONS			

Once GEMA/HS's Mitigation Planners determine that the plan meets the federal mitigation planning requirements (except for final public comment and adoption, which come later), the local governments prepare a final draft and send it to the GEMA/HS Hazard Mitigation Division for submittal to FEMA Region IV

for federal review. Once FEMA determines the plan meets all requirements, they will issue an approval pending adoption for the plan. The local governments then conduct their final public comment process, adopt the plan, and forward this documentation and a copy of the final plan to GEMA/HS, who then forwards it to FEMA. During the state and federal review processes, if revisions become necessary as a result of the reviews, GEMA/HS's Mitigation Planners will suggest and assist with revisions to the plan in order to meet the requirements. Once FEMA has determined that the plan meets the local mitigation planning requirements, all the necessary notifications of plan approval are made and the county then implements and monitors the plan over the next five years.

4.1.2 LOCAL PLANNING TOOLS

The GEMA/HS Hazard Mitigation staff continues to provide an array of tools to assist local communities with local hazard mitigation planning activities. These include participating in local plan kickoff meetings, disseminating planning guides and documents via CDs and email, sharing information on available training, and hosting planning workshops.

Since the 2014 GHMS, the GEMA/HS Hazard Mitigation website has been updated to provide information and resources on local hazard mitigation planning. Information found on the website includes the current State Hazard Mitigation Strategy; FEMA planning guides, including but not limited to the how-to guides, the Disaster Mitigation Act of 2000, FEMA Mitigation Ideas, and the Local Mitigation Planning Guidance with GEMA/HS highlights (recently replaced by the Local Mitigation Planning Handbook); GEMA/HS planning documents; and links to other useful resources. This website can be accessed through the GEMA/HS webpage at http://www.GEMA/HS.ga.gov/.

Beginning with the 2014 local plan update cycle, the State began providing a Level 2 Hazus Analysis for each county as they conducted their mitigation plan updates. Initially, the State contracted with the Polis Center at Indiana University, as there was nobody in the State able to provide this service on a large scale. As part of this contract, the Polis Center trained the University of Georgia Information Technology Outreach Service (ITOS) and several Regional Commissions to use Hazus-MH. Beginning with the 2015 local plan update cycle, the State contracted with ITOS to provide the analyses. ITOS utilizes a combination of in-house staff and students and some of the larger Regional Commissions to do the analyses and provide the reports, which the State then provides to the counties for inclusion in their plan updates. The State has utilized funding from, both the Pre-Disaster Mitigation (PDM) and Hazard Mitigation Grant Program (HMGP) funding sources (both described below), including providing the entire non-Federal share, to provide the analyses.

Training is a vital resource to ensure that GEMA/HS staff possesses the most effective capabilities to guide local communities in their planning efforts. Staying current on regulations, FEMA programs, and best practices with appropriate FEMA mitigation training allows GEMA/HS staff to advise local communities on maintaining regulatory compliance, maximizing funding opportunities, and improving local hazard mitigation planning.

4.1.3 LOCAL PLANNING ROADBLOCKS

Since the 2014 plan was completed, the GEMA/HS planning staff has identified two roadblocks, or hindrances, to effective local mitigation planning. These roadblocks are primarily hindrances to the State's ability to provide the best products and services possible. In that time, the State has worked to overcome both of these issues.

As noted in Section 4.1.1, GEMA/HS uses a team of four planners, stationed throughout the state, to provide

technical assistance to local communities in the development and update of their local hazard mitigation plans. Between 2016 and 2017, GEMA/HS went through a year and a half period where the entire team either retired or took other jobs, requiring all four planner positions to be filled with new team members. This required planners to take on additional responsibilities while positions were vacant and while newer team members were learning the job. By planners covering other areas, the state was able able to continue to provide the same services as always, even if they were sometimes temporarily delayed to a degree.

As described in Section 4.1.2, the state provides several tools to local communities to use in the development and update of their local hazard mitigation plans. One additional tool the State is looking into providing is the ability to include RiskMap data in their local mitigation plans. The Georgia Department of Natural Resources is in the process of conducting RiskMap studies throughout the State and providing updated flood mapping and flood risk products to the affected communities. The data is being provided in GIS format. One problem has been, however, that many smaller communities do not have sufficient access to GIS software. The State is, therefore, looking into ways to include RiskMap products into its GMIS website, where communities can then incorporate the maps and some of the data into their local mitigation plans.

4.2 LOCAL FUNDING

Since the inception of the federal government's local mitigation planning requirements, GEMA/HS has assisted Georgia communities in locating and obtaining funding for plan development and updates. The planning team continues to use a grant application that addresses and provides examples of responses for both pre- and post-disaster grants. Completed grant applications should have sufficient information for both of FEMA's NEMIS and eGrants systems, and should be found acceptable by FEMA. Appendix F contains a copy of the application. Each planning team member works closely with the counties in his or her territory when developing these applications. The applications approved by FEMA are made part of the agreement between county, state, and federal agencies; therefore, they are prepared with great detail and forethought.

In the 16 years Georgia has been involved in mitigation planning, the state has made use of two categories of mitigation grant sources provided by FEMA. These are Disaster-Related Mitigation Programs and Non-Disaster-Related Mitigation Programs. The primary difference between the two categories is when and where they are available. Non-disaster-related is available nationwide on a regular basis, regardless of the occurrence of disasters. Disaster-related mitigation is only available in the aftermath of a declared disaster and is only available to the affected state.

4.2.1 DISASTER-RELATED MITIGATION PROGRAMS

Table 4.2 Plan Updates Included in Recent Disasters (2007 through 2016)

Disaster #	Month/Year	# Counties	Total Project Costs	Federal Share Approved
1686	3/2007	28	630,950	473,211
1750	3/2008	1	109,213	81,909
1761	6/2008	9	189,095	141,820
1833	5/2009	23	413,142	309,856
1858	9/2009	74	1,711,150	1,283,358
1973	4/2011	20	474,633	345,306

Disaster #	Month/Year	# Counties	Total Project Costs	Federal Share Approved
4165	3/2014	8	320,098	146,810
4215	4/2015	5	173,844	130,383
4259	2/2016	11	357,000	267,750
Total		**179**	**4,379,125**	**3,180,403**

Table 4.3 Future Plan Updates Included in Recent Disasters (2016 - Present)

Disaster #	Month/Year	# Counties	Total Project Costs	Federal Share
4284	10/2016	44	1,612,933	1,209,700
4294*	1/2017	Available	254,715	191,036
4297*	1/2017	Available	511,917	383,938
4338**	9/2017	Available	N/A	N/A
Total		**44**	**2,379,565**	**1,784,674**

*DR 4294 and 4297 figures based on 6 month lock in estimate
**DR 4338 figures not available as of September 30, 2017.

Due to a series of natural disasters that have affected Georgia in various forms and locations, Georgia has utilized the Hazard Mitigation Grant Program (HMGP grants), awarded by the President, provided by FEMA, and administered by GEMA/HS to fund the development and update of multiple plans. Beginning with FYs 2002 and 2005, the State utilized DRs 1311 and 1560, respectively, to fund the initial plan development for 20 of Georgia's 159 counties. Then, from 2007 to 2011, Georgia used HMGP grants, solely, to fund 155 plan updates (DRs 1686 – 1973). Seven disasters, DRs4165, 4215, 4259, 4284, 4294, 4297 and 4338, have occurred since the 2014 approval. In that timeframe, Georgia has utilized funding from 3 of these disasters (DRs 4165 – 4259) to fund an additional 25 plan updates, including this update to the State Hazard Mitigation Strategy. In addition, Georgia is pursuing funding for an additional 48 local plan updates from DRs 4284 and 4294. At this time, Georgia is not targeting any local plan updates through DR 4297, but is considering options for funding State or local plans through DR 4338.

For counties involved in a disaster, Governor Deal has authorized payment of 10% of the total grant amount, leaving the local government responsible for only 15% of the total grant amount. In addition, the State has developed an incentive program where, counties that meet all of the following criteria will receive an additional 2% State match for disaster related grants:

- The County is a current participant in the Emergency Management Performance Grant Program.

- The County has a current FEMA approved FEMA approved and adopted Hazard Mitigation Plan.
- The County is a current participant in the National Flood Insurance Program (NFIP).
- The County has a currently locally approved and adopted Point of Distribution (POD) Plan
- The County has a current locally approved and adopted Disaster Volunteer Assistance and Management Plan
- The County has a current trained Local Damage Assessment Team.
- The County is a certified Storm Ready Community by the National Weather Service.
- The County has adopted model emergency power ordinances available through the Association of County Commissioners of Georgia.

In many cases this takes a large burden off the counties struck by disaster and whose assets have been depleted in their recovery.

4.2.2 NON-DISASTER-RELATED MITIGATION PROGRAMS

Table 4.4 Plan Updates Included in Non-Disaster Grants (2013 - Present)

Grant Cycle #	# Counties	Total Project Costs	Federal Share Approved
PDMC 2013*	24	961,780	721,335
PDMC 2014*	20	762,169	571,627
PDMC 2015*	30	1,155,525	866,647
PDMC 2016	34	1,182,300	886,725
Total	108	4,061,774	3,046,334

*PDMCs 2013 – 2015 include one GMIS management application each.

Historically, Georgia has used two non-disaster-related mitigation programs to help local communities develop and update their mitigation plans. These are the Pre-Disaster Mitigation (PDM) grant program and the Flood Mitigation Assistance (FMA) grant program. FMA is specifically for flood mitigation planning, and, prior to October 2008, the FMA planning requirements were much more stringent.

Notably, Georgia used a combination of PDM and FMA funding to fund 139 of the State's 159 original local plans between FYs 2002 and 2005. In 2007, the State used PDMC 2008 funding for three local plan updates. However, due to a large number of disasters that occurred in Georgia between 2007 and 2011, it was not necessary to utilize PDM between the 2008 and 2013 grant cycles to fund mitigation plans. Once again, due to DRs 4284 and 4294, it is not necessary to use PDM funding for the next two plan update cycles, which are currently in the application process.

In 2008, Georgia used FMA funds for a limited number of FMA stand-alone plans. One of these (Glynn County) was only recently completed in 2012. Prior to October 2008, FMA planning requirements were more stringent than local multi-hazard planning requirements. However, in 2008, FMA planning requirements were incorporated into the local multi-hazard planning requirements. Therefore, FEMA will no longer fund a stand-alone plan using FMA funds.

If the State of Georgia finds itself in the fortunate position of not incurring any disasters over the next five years, the local applications will require funding from PDM or other available grant programs.

4.2.3 OTHER MITIGATION FUNDING PROGRAMS

In addition to the multi-jurisdictional hazard mitigation plans discussed in Sections 4.2.1 and 4.2.2, GEMA/HS has worked with various agencies on two other mitigation planning programs: the Disaster Resistant University (DRU) program for college and university campuses and the FMA planning program for local governments.

The Board of Regents of the University System of Georgia (USG), through a federal PDM grant and GEMA/HS, initialized the DRU program for fiscal year 2003. The PDM grant allowed all 35 public institutions within the USG to develop a hazard mitigation plan to meet the federal requirements of the Disaster Mitigation Act of 2000 and of the FEMA planning criteria promulgated in Title 44 of the Code of Federal (CFR) Regulations, 201.6 on Federal Register, 2-26-2002. Though the grant is no longer in effect, GEMA/HS has continued to work with various campuses, as requested, in developing and updating their plans.

As of December 2010, 25 of the 36 universities successfully completed hazard mitigation plans. Each of the universities has been instructed to submit its plans to the county in which it is located. They are also encouraged to participate in the update of that county's local hazard mitigation plan during its next update. The inclusion of the university's plan in the approved local plan makes the university eligible for federal funds in the event it is affected by a presidentially approved hazardous event.

All universities are headed by the Board of Regents, which is a state agency, and are covered by the State Hazard Mitigation Plan. Therefore, state universities can apply for federal aid as a state entity in the event they are affected by a presidentially declared hazard event. Universities that participate in the update of a local hazard mitigation plan and whose plans are included in that approved local plan can apply for federal funding if they are subject to a Presidential Declared Disaster event.

Each DRU hazard mitigation plan includes a hazard, risk, and vulnerability assessment based on data and hazard maps provided by GEMA/HS. The institutional-level risk-based, data-driven mitigation plans were created with clearly identified future mitigation goals and objectives that will ultimately lead to mitigation projects. This process and the provided data allow for accurate risk and loss estimates, which lead to more cost-effective mitigation actions. The DRU program is an integral part of bridging non-traditional local and state partnerships within the context of emergency management.

4.3 LOCAL PLAN INTEGRATION

Chapters 2 and 3 describe how the State reviews the hazards and mitigation actions included in local plans. The GEMA/HS Hazard Mitigation staff integrates information gleaned from this review into the state plan. GEMA/HS uses a local plan integration matrix to compile information from the local plans for analysis and inclusion in the State Plan. Table 4.5 below shows the relationship between the hazards identified in the State Plan and the hazards gleaned from review of the local plans.

Table 4.5 Hazards Identified in Local Plans.

State Plan Hazard	Hazards in Local Plans	% of Counties identifying
Tornadoes	Tornadoes	99%
Inland Flooding	Inland Flooding	99%
Drought	Drought	90%
Wildfire	Wildfire	82%
Severe Winter Weather	Winter Storms	79%
Wind	Wind	73%
Severe Weather	Severe Weather	73%
	Hailstorm	61%
	Lightning	58%
Hurricane Wind	Hurricane/Tropical Storm	55%
Dam Failures	Dam Failure	36%
Earthquake	Earthquake	27%
Coastal Hazards	Coastal Flooding	6%
Geologic Hazards	Landslide	4%
	Sinkhole	3%
	Heat	28%

In addition to the above, the matrix also analyzes the mitigation strategies of all local mitigation plans. Review of the data indicates greater than 95% of all local plans include mitigation actions that fall into 3 of the 4 basic mitigation categories. 98% of plans include mitigation actions that fall within the “Planning and Regulation” and “Education and Awareness” categories while 100% of all plans include mitigation actions

that fall under the “Structure and Infrastructure Projects” category. 22% of local plans include mitigation actions in the “Natural Resources Protection” category. The State Hazard Mitigation Strategy includes mitigation actions representing all 4 categories and includes mitigation actions to support local communities in their efforts to reduce their vulnerability to their identified hazards.

In addition to the above, a state requirement in the Local Plan Review Tool asks if the plan references specific planning mechanisms, including the Georgia State Hazard Mitigation Strategy. Specifically, it requires the local planning committee to review the current State Plan as part of their update process.

4.4 PRIORITIZING LOCAL ASSISTANCE

The State of Georgia must utilize analytical methods for prioritizing the distribution of available funding to communities and local jurisdictions. Section 4.4.1 discusses the methods the State uses for prioritizing the funding for local mitigation planning. Section 4.4.2 discusses the prioritization of mitigation grant program funding based on repetitive losses.

4.4.1 PRIORITIZATION OF LOCAL PLAN UPDATE FUNDING

Georgia has been working in local hazard mitigation planning since 2002. Since then, all of Georgia’s 159 counties have completed and adopted their initial mitigation plans. One stipulation to local plans is they are only effective for five years and must be updated to maintain their community-approved status. Georgia has developed an evolving spreadsheet that tracks local plans. Georgia uses this spreadsheet to prioritize local plan funding according to the expiration dates of each county’s local plan. The focus is on maintaining eligibility for each community to pursue mitigation grant funding as the need and opportunity arises. The goal is to fund the local plan updates so that they are completed before the current plan has expired.

In the summer of 2008, GEMA/HS’s Mitigation Planning team developed a list of counties that at that time had received plan approval. Using this list, the staff divided the counties into 12 levels of priority using six-month timeframes. The priority levels were assigned based on each county’s plan expiration date and the date that the plan updates were due, with priority 1 being the highest priority and priority 12 being the lowest. This list is updated on an ongoing basis as plans are approved.

Since summer 2008, GEMA/HS has assisted 157 counties in obtaining funding assistance through HMGP and PDM to update their mitigation plans. As of September 2017, 156 of those counties have completed their updated plans. GEMA/HS anticipates that the remainder will be completed by the end of 2018.

In addition, as of September, 2017, GEMA/HS is pursuing funding assistance for the next 47 counties on the priority list. For some of these counties, this would be the third update to their plans. GEMA/HS anticipates receiving approval and holding kickoff meetings to initiate the planning processes for these counties in the winter and spring of 2018.

GEMA/HS will continue to adhere to this priority system of updating local hazard mitigation plans when distributing funding and assistance for the planning process. Table 4.6 gives the priority of the various counties in terms of plan updates by six-month period beginning in July of 2015. In each five-year update cycle, the factor driving the priority listings will be the counties’ plan expiration dates.

Table 4.6 Local Plan Priority Update Schedule by Expiration Date

County	Plan Expiration	Priority
Pulaski	7/14/2015	1
Houston	8/2/2015	1
Gwinnett	8/19/2015	1
Jones	8/19/2015	1
Fayette	9/2/2015	1
Monroe	10/14/2015	1
Lamar	11/4/2015	1
Camden	11/9/2015	1
Chatham	11/9/2015	1
Upson	11/10/2015	1
Crisp	1/3/2016	2
Lee	2/4/2016	2
White	2/4/2016	2
Bibb	3/22/2016	2
Dougherty	3/29/2016	2
DeKalb	3/31/2016	2
Floyd	4/19/2016	2
Douglas	5/5/2016	2
Hall	5/9/2016	2
Chattooga	6/17/2016	2
Union	7/12/2016	3
Miller	7/26/2016	3
Carroll	8/18/2016	3
Baker	8/22/2016	3
Cobb	9/16/2016	3
Laurens	9/22/2016	3
Fulton	9/23/2016	3
Lumpkin	10/21/2016	3
Liberty	11/15/2016	3
Worth	1/5/2017	4
Bartow	1/10/2017	4
Clayton	1/18/2017	4
Mitchell	1/26/2017	4

County	Plan Expiration	Priority
Lowndes	2/10/2017	4
Cherokee	2/17/2017	4
Calhoun	2/22/2017	4
Quitman	3/19/2017	4
Glynn	4/4/2017	4
Paulding	4/13/2017	4
McDuffie	4/27/2017	4
Decatur	5/2/2017	4
Baldwin	6/15/2017	4
Gordon	6/15/2017	4
Putnam	6/21/2017	4
Richmond	6/28/2017	4
Catoosa	7/5/2017	5
Elbert	7/6/2017	5
Walker	7/10/2017	5
Long	8/30/2017	5
Forsyth	9/5/2017	5
Heard	9/6/2017	5
Muscogee	9/6/2017	5
Morgan	9/14/2017	5
Whitfield	9/18/2017	5
Tift	9/21/2017	5
Fannin	10/12/2017	5
Wayne	10/12/2017	5
Spalding	10/19/2017	5
Columbia	10/192017	5
Early	10/24/2017	5
Polk	11/14/2017	5
Murray	1/16/2018	6
Seminole	2/5/2018	6
Clarke	3/26/2018	6
Gilmer	4/1/2018	6
Clay	5/23/2018	6

County	Plan Expiration	Priority
Haralson	6/7/2018	6
Banks	6/19/2018	6
Johnson	6/26/2018	6
Crawford	7/25/2018	7
Dawson	7/30/2018	7
Coweta	8/20/2018	7
Thomas	8/26/2018	7
Rabun	8/29/2018	7
Brantley	9/24/2018	7
Taylor	9/30/2018	7
McIntosh	10/1/2018	7
Charlton	10/7/2018	7
Effingham	10/30/2018	7
Turner	11/4/2018	7
Warren	11/6/2018	7
Wilkes	11/25/2018	7
Terrell	12/2/2018	7
Macon	12/3/2018	7
Ware	12/10/2018	7
Bacon	12/11/2018	7
Pierce	12/11/2018	7
Glascock	12/15/2018	7
Washington	12/17/2018	7
Henry	1/23/2019	8
Cook	2/18/2019	8
Rockdale	2/20/2019	8
Greene	2/27/2019	8
Jackson	2/27/2019	8
Bleckley	3/11/2019	8
Echols	3/18/2019	8
Brooks	3/19/2019	8
Lanier	3/19/2019	8
Franklin	3/20/2019	8
Towns	3/25/2019	8
Atkinson	4/16/2019	8

County	Plan Expiration	Priority
Irwin	4/17/2019	8
Bryan	4/28/2019	8
Peach	5/1/2019	8
Coffee	5/6/2019	8
Oconee	5/6/2019	8
Stephens	5/6/2019	8
Pickens	5/12/2019	8
Madison	5/26/2019	8
Twiggs	6/5/2019	8
Appling	6/10/2019	8
Berrien	6/10/2019	8
Ben Hill	6/16/2019	8
Wilkinson	7/1/2019	9
Telfair	7/24/2019	9
Grady	8/6/2019	9
Toombs	8/6/2019	9
Dodge	8/11/2019	9
Troup	8/19/2019	9
Randolph	8/22/2019	9
Stewart	9/3/2019	9
Habersham	9/8/2019	9
Oglethorpe	10/28/2019	9
Wheeler	11/3/2019	9
Jeff Davis	11/18/2019	9
Candler	12/8/2019	9
Jefferson	12/29/2019	9
Burke	1/4/2020	10
Jenkins	1/7/2020	10
Butts	3/9/2020	10
Hancock	4/6/2020	10
Clinch	4/7/2020	10
Dade	4/10/2020	10
Wilcox	4/15/2020	10
Sumter	4/20/2020	10
Pike	5/6/2020	10

County	Plan Expiration	Priority
Jasper	5/25/2020	10
Taliaferro	6/7/2020	10
Colquitt	6/7/2020	10
Screven	6/8/2020	10
Tattnall	6/14/2020	10
Marion	6/18/2020	10
Lincoln	7/13/2020	11
Newton	7/14/2020	11
Bulloch	7/19/2020	11
Meriwether	7/27/2020	11
Gwinnett	8/18/2020	11
Dooly	8/26/2020	11
Montgomery	8/26/2020	11
Fayette	9/2/2020	11
Webster	9/7/2020	11
Barrow	9/9/2020	11
Evans	10/14/2020	11
Emanuel	10/19/2020	11
Treutlen	12/14/2020	11
Lamar	1/5/2021	12
Harris	1/7/2021	12
Houston	1/10/2021	12
Pulaski	1/11/2021	12
Lee	2/3/2021	12
Chatham	2/16/2021	12
Crisp	2/22/2021	12
Jones	2/23/2021	12
Dougherty	3/2/2021	12
Walton	5/9/2021	12
Talbot	6/8/2021	12
Douglas	6/12/2021	12
Union	7/12/2021	13
Hart	7/21/2021	13
White	7/21/2021	13
Miller	7/25/2021	13

County	Plan Expiration	Priority
Carroll	7/31/2021	13
Baker	8/22/2021	13
Bibb	8/30/2021	13
Upson	9/6/2021	13
Laurens	9/21/2021	13
Schley	10/16/2021	13
Camden	11/9/2021	13
Columbia	11/10/2021	13
Liberty	11/14/2021	13
Lumpkin	11/16/2021	13
Cobb	12/11/2021	13
Worth	1/3/2022	14
Floyd	1/4/2022	14
Bartow	1/9/2022	14
Mitchell	1/26/2022	14
Lowndes	2/8/2022	14
Chattooga	2/13/2022	14
Cherokee	2/15/2022	14
Calhoun	2/21/2022	14
Spalding	2/22/2022	14
DeKalb	2/28/2022	14
Fulton	2/28/2022	14
Decatur	5/1/2022	14
Paulding	5/1/2022	14
Early	6/14/2022	14
Elbert	7/5/2022	15
Clayton	8/2/2022	15
Monroe	8/9/2022	15
Hall	8/24/2022	15
Long	8/29/2022	15
Forsyth	9/4/2022	15
Heard	9/5/2022	15
Morgan	9/13/2022	15
Tift	9/23/2022	15
McDuffie	10/10/2022	15

County	Plan Expiration	Priority
Richmond	10/10/2022	15
Wayne	10/11/2022	15
Catoosa	10/17/2022	15
Putnam	11/21/2022	15
Fannin	12/17/2022	15
Gordon	12/20/2022	15
Whitfield	1/7/2023	16
Chattahoochee	03/23/2023	16
Seminole	04/08/2023	16
Haralson	6/5/2023	16
Banks	6/17/2023	16
Murray	7-10-23	17
Athens-Clarke	7/24/2023	17
Baldwin	8/22/2023	17
Rabun	8/27/2023	17
Quitman	10/2/2023	17
Glynn	10/9/2023	17

County	Plan Expiration	Priority
Polk	10/21/2023	17
Charlton	10/21/2023	17
Columbus-Muscogee	10/28/2023	17
Effingham	10/28/2023	17
Turner	11/3/2023	17
Pierce	12/10/2023	17
Bacon	12/11/2023	17
Ware	12/12/2023	17
Brantley	12/16/2023	17
Warren	12/18/2023	17
Glascock	12/20/2023	17
Taylor	1/16/2024	18
Greene	2/26/2024	18
Atkinson	4/14/2024	18
Irwin	4/16/2024	18
Pickens	5/11/2024	18

4.4.2 PRIORITIZATION OF PROJECT FUNDING

To maximize the amount of federal and state funding available, GEMA/HS employs an application prioritization system. In the event that submitted pre-applications exceed the available funds for the disaster allocation, GEMA/HS reviews, scores, and ranks submitted pre- applications and applications using criteria on GEMA/HS's Hazard Mitigation Assistance Score Sheet. The criteria include natural hazard exposure, history of damages, type of mitigation, potential impact on the community, impact on the environment, community commitment to mitigation, and the benefits of mitigation. Generally, pre-applications and applications for acquisition and demolition projects receive the highest ranking. See Appendix H for a copy of the GEMA/HS Hazard Mitigation Assistance Score Sheet.

When a hazard mitigation assistance application cycle is opened, GEMA/HS uses a two-tiered review process. Initially, communities are directed to submit pre-applications that allow GEMA/HS staff to determine whether a proposed mitigation project meets FEMA funding criteria. Completed pre-applications received by the publicly stated deadline are scored using criteria on GEMA/HS's Hazard Mitigation Assistance Score Sheet. In addition to the above criteria, for post-disaster grants (HMGP), pre-applications are prioritized under two categories: within the declared area and outside of the declared area. Projects that mitigate the impacts of the specific declaration event such as a flood or a tornado in the declared areas have the highest priority for the State of Georgia.

Applicants whose pre-applications receive the highest score and meet minimum project criteria will be invited to complete and submit a full grant application. Risk Reduction Specialists and Hazard Mitigation Planning Specialists will assist in completing the applications and will conduct an initial review in accordance with the GEMA/HS Hazard Mitigation Assistance Score Sheet. The State Hazard Mitigation Division Manager will review the results of the staff scoring and the prioritization of applications. The recommendations are presented to the GEMA/HS Agency Director for final determination.

For DR4165 application process, GEMA/HS prioritization for the declared counties was for generators for critical facilities. As this was the first application cycle for generators being an approvable project type, the State received many more requests for funding than was available in the allocation. Additional analysis beyond the standard scoring sheet was required to prioritize and rank the generator sites within the applications. In FEMA's BCA tool, a value of service per day is computed based on the critical facility type. Each of the generator sites were ranked using the value of service per day per dollar invested. This allowed GEMA/HS to select the generator sites that provided the most impact on reducing future losses.

Benefit-cost analyses (BCA) incorporate various data to determine the cost-effectiveness of a project or activity. Essentially, the BCA determines whether the current cost of investing in a project will result in sufficiently reduced damages in the future. Only projects with a benefit-cost ratio (BCR) exceeding 1.0 are ranked for further review and forwarded to FEMA for funding consideration. GEMA/HS Hazard Mitigation staff work closely with project applicants to determine each project's cost-effectiveness. The basic information the State obtains to conduct accurate BCAs includes, but is not limited to, the following:

- Flood Insurance Study data or historical flood data (flood frequency, discharge, and elevation),
- Past damages to the project site or in the project area,
- Well-documented cost estimates for the project,
- Useful life of the project,
- Square footage of the building with replacement and content values,
- Facility function,
- Associated future maintenance costs,
- Displacement costs,
- Temporary relocation costs,
- Loss of use, and
- Elevation certificates or land surveyor certification of finished floor elevation.

All of the projects completed to meet the state's mitigation goals (listed in Table 3.7) must have met the minimum BCR of 1.0 in order to garner funding (where applicable). Georgia's success in all funding rounds to date of the Hazard Mitigation Assistance (HMA) grants, which include the Pre-Disaster Mitigation Competitive Program, FMA program, and the Repetitive Flood Claims Program, demonstrates the ability of the GEMA/HS Hazard Mitigation staff to complete accurate BCAs. The State of Georgia has submitted a total of 80 projects since 2003 that have been reviewed at the national level in the competitive grant program. A total of 66 of these projects have been selected and awarded. Of the non-awarded projects, 10 were deemed eligible but not selected due to funding constraints.

Finally, not only do projects have to meet standards of cost-effectiveness and technical feasibility but they also have to be deemed environmentally sound. The State of Georgia relies on the staff at FEMA Region IV to conduct environmental reviews and prepare the environmental documentation on all submitted mitigation applications. As part of the application process, the State requires documentation from the sub-applicant to comply with all applicable federal, state, and local codes and standards, including the National

Environmental Policy Act (NEPA), PL 91-190, as amended. Georgia provides information to each applicant on the necessary environmental coordination that must be completed as part of the application process. The State reviews each applicant's environmental documentation before forwarding it to FEMA. The State of Georgia has successfully worked with each applicant on obtaining the required environmental documentation to comply with the NEPA process.

4.4.3 REPETITIVE LOSS PROPERTIES

Repetitive loss properties (RLPs) generally consist of older, less-safe properties that were "grandfathered" into the National Flood Insurance Program (NFIP) during its creation. The RLPs have been repaired multiple times to pre-flood conditions with subsidized flood insurance claim payments. According to FEMA, a relatively small number of RLPs account for a relatively large share of paid flood claims. Therefore, identifying and mitigating RLPs and severe repetitive loss properties (SRLPs) leads to a reduction in actual flood insurance claims, which will diminish the pressure to raise flood insurance rates and will stabilize NFIP.

SRLP was defined in the Bunning-Bereuter-Blumenaur Flood Insurance Reform Act of 2004 and an interim rule was published on October 31, 2007 which implemented the SRL grant program. In the FY13 grant funding opportunity announcement for the FMA program, FEMA introduced an increased federal share grant funding to 90% for other repetitive loss properties, subsequently noted as FMA/RL properties.

According to FEMA, data anomalies exist in the NFIP data that was used to create the SRL and FMA/RL data sets. In preparation for the FY17 FMA grant cycle, every repetitive loss property was analyzed to determine whether the property met the definition of SRL or FMA/RL by looking at the flood claims paid on the property and the market value of the structure obtained from the tax assessor website for each Georgia County. Further analysis was conducted to determine properties that were best candidates for grant funding for the FMA program. Best candidates are those that have a current flood policy, are in the Special Flood Hazard Area, and the benefit cost requirement can be met by utilizing the standard benefits for acquisition.

Table 4.7 totals have been updated that lists the total losses and total RLPs, the GEMA/HS analysis to determine the total number of SRLPs, and the total number of mitigated RLPs and total mitigated SRLPs. Table 4.7 also includes additional information and summary of FMA/RL properties and best SRL and FMA/RL candidates for the FMA program. The FEMA SRL indicator code in the repetitive loss data set was utilized to capture historic information on mitigated SRLPs so the updated figures include many more structures than was previously reported.

The repetitive loss information was obtained from DataXchange, and the mitigated property information was obtained from GEMA/HS's mitigated properties database. To be considered an RLP by FEMA, the property must have two or more losses (at least $1,000 per loss) paid within a 10-year period. To be considered an SRLP by FEMA, the property must have four or more losses (at least $5,000 per loss) paid or have two or more losses in which the payments to repair the structure exceed the structure value. To be considered an FMA/RL by FEMA, the property must have two or more losses in which on the average, the payments to repair the structure equaled or exceed 25% of the structure value. As of September 30, 2017, Georgia has 1,786 RLPs totaling more than $149 million in paid claims. Also, Georgia has 191 SRLPs and 187 FMA/RL properties. Of these, 69 SRL and 62 FMA/RL properties are best candidates for the FMA program.

Table 4.7 shows that the City of Savannah contains almost 20% of the RLPs but has a low percentage of SRLPs in the State of Georgia. Savannah also accounts for approximately 40% of the completed mitigated activities on RLPs in Georgia. The City of Atlanta accounts for approximately 17% of the SRLPs. This is

driven largely by the losses from Hurricane Ivan in 2004 and record-breaking flooding in the Metro Atlanta region in September of 2009. The number of repetitive loss properties has also increased over the past few years due to flood claims from Hurricanes Matthew and Irma.

Table 4.7 Repetitive and Severe Repetitive Loss Properties by NFIP Community

Community	2017 Data Losses ($)	RL	GEMA/HS Analysis		SRL Best Cand.	FMA/RL Best Cand.	# Mit. RLPs (GMS)	# Mit. SRLPs
			SRL	FMA/RL				
Albany, City Of	1,821,779	43	9	10	5	2	1	
Alpharetta, City Of	100,312	3					1	
Ambrose, City of	18,071	1						
Aragon,City Of	11,702	1						
Athens-Clarke County	54,702	5						
Atlanta, City Of	35,492,629	228	34	27	7	2	8	5
Augusta-Richmond County	2,051,798	56	1	2			17	4
Austell, City Of	1,019,923	8	1		1		5	3
Baconton,City Of	280,663	2		2		2		
Bainbridge, City Of	117,239	2						
Baker County *	104,551	2						
Bartow County *	3,604	1						
Brookhaven, City of	3,005,071	19	2	2				
Brooklet, Town Of	52,989	1						
Brooks County*	140,513	1	1		1			
Brunswick,City Of	1,141,794	16	10	2				
Bryan County*	47,132	2						
Bulloch County*	105,964	4						
Butts County*	29,664	1	1					
Calhoun, City Of	187,739	**2**						
Camden County*	140,626	3		1		1		
Camilla, City of	120,182	3		2				
Canton, City Of	609,960	2	1					
Carroll County*	13,617	1						
Carrollton, City Of	1,802,107	3						
Cartersville, City Of	80,412	1						
Catoosa County*	566,789	13	2	4		3	3	
Cedartown, City Of	22,456	3						
Chamblee, City Of	412,319	10					1	
Charlton County*	142,456	3	1					
Chatham County*	1,508,904	44	1	1	1	1	3	
Chatsworth,City Of	165,000	4		1				
Chattooga County*	149,600	3	2		2			
Chickamauga, City Of	147,116	4	3	1	1		3	2

Community	2017 Data Losses ($)	RL	GEMA/HS Analysis		SRL Best Cand.	FMA/RL Best Cand.	# Mit. RLPs (GMS)	# Mit. SRLPs
			SRL	FMA/RL				
Clayton County*	554,682	16	3	3	1			
Cobb County*	19,953,355	128	13	14	1	2	11	5
Coffee County*	483,042	6	4	1	3			
College Park, City Of	1,291,621	7					2	
Colquitt County*	50,489	1						
Columbia County*	173,007	4	1		1			
Columbus Consolated Government	455,727	7	1	1		1		
Coweta County *	53,623	1	1					
Crisp County*	29,555	3	1					
Dalton, City Of	618,290	2	1					
Decatur County*	1,970,306	20		4			8	
Decatur, City Of	702,726	11	4		1		3	
Dekalb County *	7,051,117	123	9	5	4	3	37	8
Donalsonville, City Of	127,917	4		2				
Dooly County*	130,483	1	1					
Doraville, City Of	126,523	1						
Dougherty County *	3,790,638	42	12	10	7	6	7	
Douglas County *	2,024,887	21					16	6
Douglas, City Of	9,045	1						
Douglasville, City Of	241,130	2		1			2	
Dublin, City Of	603,366	6	3	1	1	1		
Duluth, City Of	94,120	2						
Dunwoody, City of	555,163	7						
Early County*	206,717	2		1		1		
East Dublin, Town Of	233,079	2		1				
East Ellijay, City Of	1,207,496	5		5		5		
East Point, City Of	317,673	11	2	2	1			
Effingham County *	3,644	1						
Elberton, City Of	13,683	1						
Ellijay, City Of	19,178	2						
Fannin County*	30,090	4						
Fayette County *	13,645	1						
Fayetteville, City Of	20,684	2						
Fitzgerald, City Of	37,010	1						
Floyd County*	180,594	7	1					

Community	2017 Data Losses ($)	RL	GEMA/HS Analysis		SRL Best Cand.	FMA/RL Best Cand.	# Mit. RLPs (GMS)	# Mit. SRLPs
			SRL	FMA/RL				
Folkston, City Of	162,467	1	1					
Forsyth County *	155,802	4						
Fort Oglethorpe, City Of	2,136,081	18						
Fulton County *	609,454	12	1	5		5	3	1
Gainesville, City Of	3,651	1						
Garden City, City Of	197,318	2						
Gilmer County*	1,376,757	12	5	2	4			
Glennville, City Of	33,492	1						
Glynn County *	1,765,861	33	5	5	2	1		
Gordon County*	75,848	3						
Grady County*	17,557	1						
Gwinnett County *	1,446,330	18		2		2	3	3
Hall County *	36,779	2						
Hawkinsville, City of	29,371	1						
Helen, City Of	37,837	2						
Henry County *	114,326	2						
Hinesville,City Of	18,526	2						
Houston County *	161,466	3	1					
Jakin, City of	17,149	1		1				
Jasper County*	27,818	1						
Johns Creek, City of	30,636	1						
Kennesaw, City Of	49,937	1						
Kingsland, City Of	166,922	4	1					
Lafayette, City Of	256,842	1						
Lagrange, City Of	319,915	3	1		1			
Lee County *	7,703,055	99	15	15	14	10	20	8
Lilburn, City Of	140,238	2					3	1
Lowndes County *	285,303	2	1		1			
Lumber City, City Of	80,966	2						
Macon, City Of	661,904	6	3		1			1
Marietta, City Of	55,294	2						
Millen, City Of	8,963	1						
Mitchell County *	165,521	2	1		1			
Monroe County*	245,220	3		2		1	1	
Montgomery County*	186,708	3	2		2			
Morrow, City of	10,984	1						

Community	2017 Data Losses ($)	RL	GEMA/HS Analysis SRL	GEMA/HS Analysis FMA/RL	SRL Best Cand.	FMA/RL Best Cand.	# Mit. RLPs (GMS)	# Mit. SRLPs
Moultrie, City Of	511,678	4						
Newnan, City Of	79,391	2	1		1			
Newton County *	129,175	3					1	1
Newton, City Of	114,708	2		1		1	1	
Peachtree City, City Of	406,747	7	1	2	1	1		
Pine Lake, City Of	100,219	1						
Polk County *	179,121	9		1		1	1	
Pooler, City Of	193,351	5		1				
Port Wentworth, City Of	332,612	8	2		1			
Powder Springs, City Of	1,167,830	11					9	8
Pulaski County*	35,347	1		1				
Reynolds, Town of	7,004	1						
Richmond Hill, City Of	7,934	2		1		1		
Ringgold, City Of	119,717	4					2	
Riverdale, City Of	79,131	3	1					
Rockdale County *	435,689	7	1	1	1		1	1
Rome, City Of	1,034,957	32	4	6				
Rossville, City Of	70,616	4	1					
Roswell, City Of	164,490	6		1		1		
Sandersville, City Of	6,154	1						
Sandy Springs, City Of	4,683,624	49	3				8	7
Savannah, City Of	19,056,425	328	6	20	1	4	119	10
Seminole County*	754,626	7	2	3	1			
Smyrna, City Of	107,504	5						
St. Marys, City Of	144,566	2						
Statesboro, City Of	18,165	1						
Stone Mountain, City Of	367,513	4	2	1	1			
Sylvester, City Of	53,032	1						
Tattnall County *	99,497	2		1				
Thomasville, City Of	919,308	5	2	1			1	
Thunderbolt, Town Of	13,110	2						
Tift County *	114,336	1						
Tifton, City Of	1,978,394	4		1				
Toombs County*	39,716	3						
Towns County*	61,681	3		1				
Trenton, City Of	86,072	1		1				

Community	2017 Data Losses ($)	RL	GEMA/HS Analysis		SRL Best Cand.	FMA/RL Best Cand.	# Mit. RLPs (GMS)	# Mit. SRLPs
			SRL	FMA/RL				
Troup County *	116,697	2	1					
Tybee Island, City Of	482,528	17		2		2		
Tyrone, Town Of	137,578	1						
Union County*	67,463	2						
Upson County *	30,697	1						
Uvalda, City Of	15,505	1						
Valdosta, City Of	580,176	6	2	2	2	2		
Vidalia, City Of	134,971	1						
Walker County *	196,225	4		1				
Walton County *	66,794	2						
Ware County *	11,369	1						
Warner Robins, City Of	35,566	1					1	
Waycross, City Of	18,763	2						
West Point, City of	21,741	1						
Wheeler County*	16,982	1						
Whitfield County*	175,175	6	1					
Woodbine, City Of	3,459	1						
Worth County*	99,678	2	1					
Totals	149,720,786.95	1,786	194	187	73	62	302	74

4.4.4 COORDINATION WITH REPETITIVE LOSS JURISDICTIONS

GEMA/HS has utilized multiple programs to mitigate RLPs. Table 4.8 lists the program years for the FMA program and the Pre-Disaster Mitigation Competitive (PDM-C) Program as well as the disaster numbers for the HMGP along with the corresponding mitigation activities enacted upon RLPs. For the program years or disasters that have yet to be closed out, the State of Georgia and GEMA/HS will continue to utilize available programs to mitigate RLPs and SRLPs. Note the RFC program is no longer available.

Table 4.8 Mitigated Repetitive Loss Properties by Program Year or Disaster from GMIS

Program	Year/Disaster	Acquisitions	Elevations	Relocations	Drainage
FMA	1997	4	0	0	0
FMA	2001	1	2	0	0
FMA	2002	2	0	0	0
FMA	2003	2	0	0	0
FMA	2004	1	0	0	0
FMA	2005	1	0	0	0

Program	Year/Disaster	Acquisitions	Elevations	Relocations	Drainage
FMA	2006	3	0	0	1
FMA	2007	4	0	0	0
FMA	2008	1	0	0	0
FMA	2009	1	0	0	0
FMA	2013	3	0	0	0
FMA	2014	4	0	0	0
HMGP	1020	0	1	0	0
HMGP	1033	84	2	0	0
HMGP	1042	21	0	0	0
HMGP	1071	12	5	1	0
HMGP	1209	12	0	0	2
HMGP	1271	5	0	0	0
HMGP	1311	36	0	0	0
HMGP	1554	4	0	0	0
HMGP	1560	1	0	0	0
HMGP	1686	4	0	0	0
HMGP	1761	2	0	0	0
HMGP	1833	6	0	0	0
HMGP	1858	38	0	0	0
HMGP	1973	4	0	0	0
PDM-C	2003	4	0	0	0
PDM-C	2005	8	0	0	7
PDM-C	2006	1	0	0	0
PDM-C	2007	6	0	0	0
PDM-C	2011	2	0	0	0
PDM-C	2012	1	0	0	0
RFC	2007	3	0	0	0
DRI	1998	1	0	0	0
Totals		**282**	**10**	**1**	**10**

After reviewing and analyzing Georgia's RLP and SRLP data, GEMA/HS formed a mitigation strategy to reduce or eliminate the negative impacts of repetitive losses on NFIP as well as on Georgia's citizens and economy. This strategy aligns with the existing goals and objectives discussed in Chapter 3 of this mitigation strategy. Chapter 3 lists the specific tasks and action steps related to repetitive losses. The State of Georgia continues to prioritize the mitigation of RLPs and SRLPs through all available mitigation grant programs.

Chapter 5: Plan Maintenance

The purpose of Chapter 5 is to identify and evaluate the process used to monitor, evaluate, and update the 2014 Georgia Hazard Mitigation Strategy (GHMS) over the previous five years, as well as to outline the mechanism for updating the 2019 strategy over the next five years. This chapter establishes both the methodology and schedule for monitoring, evaluating, and updating the plan. Table 5.1 documents the changes to Chapter 5 that have occurred since the 2014 approval.

Table 5.1 Changes to Chapter 5

Chapter 5 Section	Updates to Section
5.1 Monitoring, Evaluating, and Updating Methods	• Includes table of changes. • Revised to include new schedule for future updates. • Updated text
5.2 Mitigation Activity Monitoring	• Updated tables • Updated Text

The review of Chapter 5 of the GHMS was coordinated by the GEMA/HS Hazard Mitigation Division. Each section was reviewed by the staff and revised as necessary to reflect the monitoring, evaluation, and update process used over the previous five years. In addition, state planning stakeholders were presented opportunities to review each section in the plan, as described in Chapter 1. This included placing draft sections of the plan on the GEMA/HS website for public review and comment.

The planning team followed the GHMS update process outlined in Chapter 1. The planning team will continue to use this process over the next five years for the next plan update. The next plan update is anticipated to begin in the summer of 2022 and to be completed and approved in 2024.

5.1 MONITORING, EVALUATING, AND UPDATING THE PLAN

Previously, the State of Georgia has reviewed and updated the GHMS and submitted it for gubernatorial and federal approval once every three years. Since the 2014 plan's approval, FEMA has extended the effective period for state mitigation plans from three to five years. Therefore, the State of Georgia will continue to review and update the GHMS as it has done in the past, but will do so at a minimum of once every five years. The State may update the plan more frequently under the following conditions: a state declaration without federal assistance; a Presidential Disaster Declaration; changes in state policy; significant updates to the hazard, risk, and vulnerability assessment based on new data; or a need deemed by the governor or state hazard mitigation planning group.

GEMA/HS's Hazard Mitigation Division is responsible for coordinating the monitoring, evaluation, and update of the GHMS. Within this division, the Mitigation Planning Supervisor is responsible for the oversight

of this process, including the coordination of local, state, and federal agencies. Participants in this process are listed in Chapter 1 and include state government agencies participating in mitigation programs and federal government agency representatives with general interest or legislative authority on items presented in the mitigation strategy.

The GEMA/HS Hazard Mitigation staff performed an analysis of the 2014 GHMS methodology and schedule for monitoring, evaluating, and updating and concluded that these items adequately meet the planning requirements. Specifically, the planning staff concluded the workshops added to the process for the 2014 update were successful in including a wider variety of stakeholders in the process. Therefore, GEMA/HS will continue to use the described update process. The update process includes a scheduled annual review, a post-disaster review, and the five-year plan review and update. The planning staff anticipates using the workshops, or a similar process, again in 2022 and 2023.

The scheduled annual review occurs each calendar year. This process includes an analysis of the goals, objectives, and actions identified in the state mitigation strategy for current applicability by the SHMPT. In addition to monitoring and evaluating plan implementation reflecting the progress and success of mitigation actions, the annual review also identifies whether any updates are necessary, with special regard to updating the hazard, risk, and vulnerability assessment to reflect the best available data.

A post-disaster review occurs whenever there is a federal disaster declaration within the State of Georgia in order to determine if any updates are necessary to accommodate the impacts of the disaster and any new data. Following disaster events, GEMA/HS staff will coordinate with local officials to document how mitigation measures instituted in the affected areas might have reduced the amount of damages or loss of life that could have resulted from those events. GEMA/HS will continue to identify and develop opportunities to analyze successes. GEMA/HS staff, together with state stakeholders, reviews the disaster-related strategies within the hazard mitigation plan to determine if any adjustments are necessary. This post-disaster review may replace an annual review, depending on the severity of the disaster event. Depending on the timing of the event, the post disaster and annual reviews are combined into one process for efficiency.

The comprehensive five-year plan review and update of the state plan occurs prior to federal submission for approval. This review process begins more than 18 months prior to the federal approval deadline (March 2024), and the first submission occurs six months prior (September 2023) to the federal approval deadline in order to allow sufficient time for FEMA review. The review and any necessary revisions are guided by GEMA/HS's Hazard Mitigation Division and the SHMPT.

The 2014 plan included a monitoring and evaluation strategy using a process of annual review meetings and post-disaster review meetings, as applicable. Since the approval of the 2014 GHMS, the SHMPT has used the process described in Table 5.2. The plan was approved in March 2014.

Since the approval of the 2014 GHMS, the State has received seven disaster declarations, including two severe ice storms, flooding, two hurricanes and two severe weather / tornado events. After each event, the SHMPT conducted post-disaster reviews of the 2014 plan. In addition, 2014, 2015, 2016, 2017 and 2018 each included a scheduled annual review. In September, 2017, the Mitigation Planning staff began the process of reviewing the 2014 plan to kick off the five-year update process. The next mandatory five-year update is currently scheduled for final approval in March 2024. A schedule of each task leading up to final approval of the 2024 update is found in Table 5.3. The process is scheduled to begin more than 18 months prior to the approval deadline. Therefore, the notice to proceed and the interagency planning group's initial meeting will occur in the summer of 2022. GEMA/HS intends the next updated plan to incorporate the

newest data and methods into the hazard, vulnerability, and risk assessments as well as updated data from all approved local hazard mitigation plans.

Table 5.2 2014 Plan Review and Update Schedule

Update Event	Timeframe
Presidential Disaster Declaration Severe Ice Storms	January, February 2014
State Plan Approval	March 2014
Annual Review / Post Disaster Review	May 2014
Annual Review	March 2015
Presidential Disaster Declaration Severe Ice Storms	February 2015
Post Disaster Review	June, 2015
Presidential Disaster Declaration Severe Storms, Flooding	December 2015
Annual Review / Post Disaster Review	May 2016
Presidential Disaster Declaration Hurricane Matthew	October 2016
Post Disaster Review	January 2017
2 Presidential Disaster Declarations Severe Storms and Tornadoes	January 2017
Annual Review / Post Disaster Review	May 2017
Presidential Disaster Declaration Hurricane Irma	September 2017
Post Disaster Review	December, 2017
Workshop 1	January 2018
Workshop 2	February 20188
Workshop 3	March 2018
Plan Review and Update	Fall 2017–September 2018
Plan Submission to FEMA	September 2018
State Plan expires	March 2019

Table 5.3 2019 Plan Review and Update Schedule

Update Event	Timeframe
State Plan Approval	March 2019
Annual Review	May 2019
Annual Review	May 2020
Annual Review	May 2021

Update Event	Timeframe
Annual Review	May 2022
Post Disaster Review	As needed after each major disaster
Begin State Plan Update	Summer 2022
Plan Review and Update	Fall 2022-September 2023
Risk Assessment and Mitigation Workshops	December 2022 – April 2023
Plan Submission to FEMA	September 2023
State Plan expires	March 2024

5.2 MONITORING PROGRESS OF MITIGATION ACTIVITIES

GEMA/HS's Hazard Mitigation Division is responsible for monitoring implementation of projects and activities identified in the state mitigation strategy. The Mitigation Division Director oversees this function. Consistent with the annual and post-disaster plan review processes, progress toward these projects and activities are reviewed and updated at least once per year. The review and status of the activities (or "action steps") are discussed in Section 3.2.5, titled "Action Plan." Actions and projects listed in Chapter 3 contribute to achieving State goals.

The GEMA/HS Mitigation staff hosts annual meetings with the SHMPT to provide a forum to share information on hazard mitigation news and activities in the state. During these meetings, state stakeholders are given opportunities to present updates on mitigation projects and activities within their organizations.

GEMA/HS is currently using a software program specifically developed to manage all grant projects called the Grants Management System (GMS). The Hazard Mitigation Division uses the GMS to manage all aspects of project grants, including monitoring mitigation measures and closeouts. The system is also used to prepare and email blank quarterly reports to be completed and returned by the local grant recipients, as well as to submit its quarterly reports to FEMA. The system was in full use when the 2014 plan was approved. Notably, the State is in the process of migrating to a new software program. However, this process is only in the very beginning stages. Modules will have to be built to meet the State's needs. Until that process is complete, GMS will continue to be used to monitor all grant funded mitigation activities.

In addition, the State uses GMIS to track the status of mitigated properties and losses avoided due to completed mitigation projects. This information is shared with local officials as well as with FEMA as a way to track the effectiveness and success of mitigation efforts. GEMA/HS is in the process of upgrading this system in order to improve its tracking and evaluation capabilities.

Chapter 6: Enhanced Plan

6.1 INTEGRATION WITH OTHER PLANNING INITIATIVES

44 CFR 201.5(b)(1) states that a state's Enhanced Plan must demonstrate that the plan is integrated, to the extent practicable, with other state and/or regional planning initiatives (comprehensive, growth management, economic development, capital improvement, land development, and/or emergency management plans) and FEMA mitigation programs and initiatives that provide guidance to state and regional agencies. In the following sections, we will demonstrate how Georgia has continued to meet this requirement.

Table 6.1 Changes to Chapter 6

Chapter 6 Section	Updates to Section
6.1 Integration With Other Panning Initiatives	• Updated the other state and regional planning initiatives the State Plan is integrated with and the description of how the State Plan is and will be integrated into those initiatives • Updated all tables
6.2 Project Implementation Capability	• Updated the description and history showing the State's capability for successful project implementation. • Updated all Tables
6.3 Program Management Capability	• Updated the description and history showing the State's capability to manage the Hazard Mitigation Program. • Updated all Tables
6.4 Assessment of Mitigation Actions	• Updated the description of the State's methods for assessment of completed mitigation actions • Record of actual cost avoidance updated for new events
6.5 Effective Use of Available Mitigation Funding	• Updated the description and history of the State's effective use of available mitigation funding • Updated all tables
6.6 Commitment to a Comprehensive Mitigation Program	• Updated the description of the State's commitment to a comprehensive mitigation program. • Updated all tables

6.1.1 INTEGRATION WITH OTHER PLANNING INITIATIVES

GEMA/HS's Hazard Mitigation Division has taken the lead in integrating and incorporating the state mitigation planning process with other ongoing federal, state, and regional planning efforts. A discussion on the integration with other state and regional planning initiatives is introduced in Chapters 1 and 3.

This section of the plan details the steps Georgia has taken to integrate the GHMS into other state, regional, and FEMA initiatives. As noted in Chapter 1, the State Hazard Mitigation Planning Team (SHMPT) involves numerous state and federal agencies that meet on a regular basis throughout the planning period. The purpose of these meetings is twofold. First, they allow for the input of these various agencies into the planning process. Second, they facilitate the dissemination of mitigation-related information, including current activities, available programs, and plan-related information to the participating agencies.

Information provided by each agency has been collectively reviewed to accomplish the following objectives:

- Incorporate mitigation data or resources into emergency management plans and activities;
- Link program and planning initiatives to support specific hazard mitigation strategies;
- Check for planning initiatives that promote mitigation as part of authorities and responsibilities; and
- Coordinate with other state and regional agencies to incorporate hazard mitigation into their own programs, regulations, and activities.

SHMPT meetings allow for various agencies to give input on the planning process. In addition, they also provide the opportunity for interaction between the participating agencies, who can then take the information from the meetings and the plan document back to their respective agencies for incorporation, as applicable, into their various short- and long-term plans and programs.

This section includes information from the state agencies and their programs in the effort to accomplish the State's mitigation goals. Throughout the planning process, GEMA/HS utilized information provided by the agencies. State agencies were also valuable contributors to the review and update of the goals and actions provided in Chapter 3. Many of these agencies provided GEMA/HS with information on how they planned to achieve the goals and actions that are specific to their program areas.

Table 6.2 has been updated to provide examples of how the GHMS is integrated and incorporated into other agencies' activities and their programs and the relevant public sectors, including emergency management, economic development, land use development, housing, health and social services, infrastructure, natural and cultural resources, and law enforcement. The table also includes information on how each of these programs effectively contributes to the states hazard mitigation goals.

Table 6.2 GHMS Integration into Other State Initiatives

Agency	Initiative	Public Sector	Description of GHMS Integration into Initiative	Contribution to Hazard Mitigation Goals
GFC	Community Wildfire Protection Plans (CWPPs)	Land Use Development, Natural and Cultural Resources	- CWPPS to be updated during local hazard mitigation plan (LHMP) updates - CWPPs to include information to meet FEMA hazard profile requirements - CWPPs integrated with LHMPs	Contributes to the preservation of life and prevention of damages and losses by identifying hazard prone areas and proposing actions to reduce the potential for losses.
DCA	Disaster Resilient Building Codes (DRBC)	Land Use Development, Economic Development Housing	The State Mitigation Officer and Floodplain Coordinator served on the DRBC Task Force to establish and implement the DRBC appendices to the IBC and IRC. DCA developed and conducted a comprehensive training program for code enforcement officials on the importance, implementation and enforcement of DRBC appendices.	Contributes to the preservation of life and prevention of damages and losses by requiring structures in the relevant areas to be built to a higher standard, better able to withstand the potential hazards of the areas.
GEMA/HS	HAZUS-MH	Emergency Management, Land Use Development, Infrastructure	In 2014, GEMA/HS contracted with Polis to develop translators for all Computer Aided Mass Appraisal (CAMA) systems in use throughout the State in order to develop a way to utilize local assessor's data as part of a Hazus Analysis for each local mitigation Plan update. GEMA/HS now contracts with ITOS for continued use of these translators for every county as they update their local mitigation plans.	Contributes to the preservation of life and prevention of damages and losses by assessing the vulnerability of local communities to hurricanes, flooding and tornadoes.
GEMA/HS	GMIS	Emergency Management, Land Use Development, Infrastructure	GMIS supports the documentation and implementation of mitigation activities through mapping and reporting of Critical Facilities, Mitigated Properties, and National Flood Insurance Program (NFIP) Properties. Exploring opportunities to include RiskMAP products into GMIS to give ease of access.	Contributes to the preservation of life and prevention of damages and losses by providing a tool for assessing the vulnerability of a community to various hazards, including flooding, winds, earthquakes, landslides and wildfires.

Agency	Initiative	Public Sector	Description of GHMS Integration into Initiative	Contribution to Hazard Mitigation Goals
GEMA/HS	Disaster Recovery Program Workshops	Emergency Management	GEMA/HS mitigation staff provided training to local government officials on HMA programs.	Contributes to the preservation of life and prevention of damages and losses by helping communities identify areas of potential mitigation projects, which would reduce future damages and losses.
DNR	Risk MAP	Land Use Development, Natural and Cultural Resources	GEMA/HS mitigation staff provided data to support discovery maps and presented mitigation information at the RiskMAP Discovery & Resilience Workshops.	Contributes to the preservation of life and prevention of damages and losses by identifying hazard prone areas and proposing actions to reduce the potential for losses.
Board of Regents (BOR)	Mitigation Plans	Education, Land Use Development	BOR encourages each campus to have a hazard mitigation plan and that they work with the counties in the update of their local hazard mitigation plans.	Contributes to the preservation of life and prevention of damages and losses by identifying hazard prone areas and proposing actions to reduce the potential for losses.
EMAG	Mitigation planning workshops	Emergency Management	Mitigation Planning workshops provided during annual EMAG conference.	Contributes to the preservation of life and prevention of damages and losses by increasing awareness of mitigation programs throughout the State.
DPH	Emergency Power Program	Health and Social Services	Worked with Department of Public Health to provide emergency power to nursing homes.	Contributes to the preservation of life by supplying backup power to particularly vulnerable members of the population living in nursing homes.

6.1.2 INTEGRATION WITH REGIONAL PLANNING INITIATIVES

GEMA/HS has been working very closely with numerous state agencies and nongovernmental organizations over the past five years to pass along the benefits and concepts of hazard mitigation and how to incorporate these ideas into their own programs, regulations, and activities. Georgia is

fortunate to have positive relationships among all state agencies and nongovernmental organizations. Each organization and its individual representatives have been proactive in their ideas and efforts to work together to help the citizens of Georgia. The following are lists of opportunities the state took advantage of to integrate hazard mitigation into other organizations' programs.

Georgia Department of Community Affairs (DCA) HUD Disaster Recovery Enhancement Fund Grant

Because of three Presidential Disaster declarations in 2017, Georgia has been allocated $64,904,000 in disaster recovery funding from HUD. These funds will fund necessary expenses related to disaster relief, long-term recovery, restoration of infrastructure and housing, and economic revitalization in the "most impacted and distressed" areas as identified by HUD. Given the extent of damage to housing in the eligible disaster areas, the funding will require each grantee to primarily consider and address its unmet housing recovery needs.

Georgia's allocation will affect 15 counties, but primarily funding will address unmet housing needs in three identified zip codes in these 'most impacted areas'. Outreach has included meeting with each affected county to discuss the program's directives and to solicit local data for unmet housing needs. This data will be used for the State's Disaster Action Plan required prior to receipt of grant funding.

Georgia's Coastal Zone Management Program

DNR Coastal Resource Division (CRD) has worked over the past few years to determine the effects of sea level rise on our coastal areas and their natural assets. Sea level rise is not an immediate natural hazard; however, over the next 100 years, its effects on Georgia's coastline and natural habitats could be detrimental. Increased sea level can affect the amount of tidal surge during hazard events such as a hurricane or tropical wind event.

Georgia's coast has experienced some effects of rising sea levels and changing inland waterways, the extent of which is still being determined. Current studies estimate that Georgia's sea level has risen approximately 3mm/year over the past 70 years. Also, during that time, rates of residential and infrastructure development along Coastal Georgia's waterways have increased significantly, resulting in more persons and property at risk. Scientists predict that the rate of global mean sea level rise during the 21st century will exceed the rate observed from 1971 thru 2010. CRD, in conjunction with Indiana University's Polis Center, has completed a Hazus analysis of the impacts of a 3' rise in sea levels along the Georgia coast using several hurricane scenarios. ITOS has also completed a Hazus analysis of state owned and operated facilities based on CRD's study. Details of the studies, and their findings, are located in several individual hazard profiles in Chapter 2, as well as in Appendix D. If these predictions materialize, the state will need to develop plans and actions to counter the effects.

Post-Disaster Redevelopment Plans

Prior to 2016, Georgia's coast had not been hit directly by a major hurricane in over 100 years. In 2016, Hurricane Matthew hit Georgia's coast with a glancing blow from the Florida line to the South Carolina line. While the eye came ashore just north of Charleston, S.C., the entire Georgia coast experienced strong tropical storm to hurricane force winds. The following year, the entire state experienced severe impacts from Hurricane Irma, with the coast experiencing significant flooding from storm surge. It is important that the state and local communities not become complacent and that they diligently create disaster resiliency plans and incorporate long-term planning for natural disasters into both their state and local management processes. It is important that preparations be initiated to reduce our vulnerabilities to probable coastal-related natural disasters and potential changes from sea level rise. GEMA/HS, in conjunction with DCA and DNR, developed a plan to guide coastal communities in their redevelopment after a major natural disaster. The plan revised state policies on the post-disaster repair and rebuilding of homes, businesses, permitted piers,

docks, marinas, etc. This model plan is used as a guidance document to prepare post-disaster redevelopment plans for coastal and inland communities throughout the state. As of September 2017, three communities, Brantley, Chatham and Glynn Counties, have developed post-disaster recovery and redevelopment plans. Two of the primary benefits for local communities that accept and implement these plans is the possible reduction in insurance rates and the reduction in probable future loss of life and property. In addition, the State of Georgia is in the process of developing the Georgia Disaster Recovery and Redevelopment Plan (GaDRRP), which will guide the State in its efforts to assist local communities in their recovery and redevelopment processes in the aftermath of major incidents.

Regional Commissions

A regional commission (RC) is a multicounty planning and development organization that partners with local governments in their planning and development efforts and can also serve as a service delivery organization. RCs often embody the local and regional layers of Georgia's "bottom-up" planning philosophy. RCs are owned and operated by the local governments that they serve. The RCs help counties plan and secure funding for development with projects such as construction, repair or upgrade of roads, repair or upgrade of bridges and water and sewer lines, and industrial park development as well as projects related to community services, education, and workforce development.

DCA contracts with the RCs to provide a variety of services mandated in the Georgia Planning Act. These services include assisting local governments with comprehensive planning, regional transportation plans, and specific plan implementation activities such as developing new zoning ordinances or putting a GIS system in place.

A comprehensive plan outlines a framework for the development of an area, recognizing the physical, economic, social, political, aesthetic, and related factors of a community. A comprehensive plan typically results from lengthy and intensive analysis, includes a long-range scope (usually 20 years or more), and provides the overall guiding principles for growth and development of a community.

Regional transportation plans (RTP) are integral parts of the Statewide Transportation Improvement Plan, Georgia's four-year transportation and capital improvements program. The RTP examines regional and county transportation needs over the next 20+ years and provides a framework to address anticipated growth through systems and policies. It contains both short- and long-term transportation strategies to improve mobility and investments to improve the region's transportation system.

A significant number of counties contracted with the RCs in the development of their multi-jurisdictional hazard mitigation plans. While there is no formal programmatic working relationship through which GEMA/HS has a direct agreement with the RCs, because many of Georgia's counties contract with RCs to develop and update their local mitigation plans, the GEMA/HS Mitigation staff continues to work closely with each of the state's 12 RCs on this planning effort.

In addition to assisting local communities with their local planning efforts, RCs also conduct regional planning initiatives to help guide local planning efforts and to encourage cooperation among counties where such cooperation would be beneficial to the region. The regional planning efforts include, but are not limited to, items such as economic development, natural and cultural resources, land use, and transportation. On cursory review, hazard mitigation is included, even if mostly indirectly, in regional planning efforts. As stated part of natural resources protection is maintaining a river or stream's capacity to handle increased water levels, which otherwise would result in flooded areas. Another part of natural resources protection is shielding these areas from incompatible development. In the case of rivers and streams, it includes protecting the banks and floodplains.

In addition, local governments are required to remain consistent with their RC's Regional Plan in order to maintain their Qualified Local Government status with the State of Georgia. Some regional plans include updating and adopting a hazard mitigation plan as part of the minimum requirements for a local government to remain consistent. This is consistent with the State Plan's strategy of maintaining approved status for all 159 counties and their municipalities.

The State will continue to work with DCA and the RCs to develop GIS capabilities that can provide communities with a better understanding of hazards that could affect economic development. The GEMA/HS Mitigation staff and the RCs will continue to work closely to keep the counties informed of mitigation initiatives in their region. GEMA/HS plans to keep a close working relationship with the RCs in developing local plan updates as they become due.

HAZUS-MH Training

During 2012–2013, DCA was the recipient of a special competitive grant from HUD. The HUD Disaster Recovery Enhancement Fund was a one-time supplement to the Community Development Block Grant Program for states with Presidential Declared Disasters during 2008. DCA used part of its award to partner with FEMA, GEMA/HS, and the Georgia RCs to educate a cadre of Georgia planning and mitigation professionals in the use of FEMA's HAZUS-MH risk assessment software.

DCA, in partnership with the Polis Center at Indiana University–Purdue University Indianapolis and FEMA's Emergency Management Institute, provided a basic series of HAZUS-MH training courses to GEMA/HS Hazard Mitigation Planners, University of Georgia Internet Technology Outreach Service (ITOS), regional commission personnel, county planners, and others for learning how to use and benefit from this software program.

HAZUS-MH is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. Government planners, GIS specialists, and emergency managers use HAZUS-MH to determine possible future losses and the most beneficial mitigation approaches to take to minimize them.

HAZUS-MH has several benefits for state and local planners, including the following: updated 2010 demographics in the HAZUS inventory can be used to estimate losses; GEMA/HS Georgia Mitigation Information System (GMIS) Essential Facilities (fire, police, schools, hospitals) have been embedded into the HAZUS inventory; it includes custom tools to import Georgia parcel maps and WinGAP assessor data to create countywide building inventory maps and to update the general building stock maps used to estimate losses; custom tools and documented workflow can be used to produce multi-hazard risk assessments and reports; and it allows for better coordinated interagency, inter-governmental hazard mitigation planning partnerships.

They also developed a workflow to translate local government computer-aided mass appraisal (CAMA) information into a parcel-based building inventory map for HAZUS analysis, producing detailed exposure and loss estimates for the modeled disaster scenarios. Augusta–Richmond County was selected as one of the four pilot counties to develop procedures for running the model and incorporating the data into their Hazard Mitigation Plan. GEMA/HS then contracted with the Polis Center to develop translators for all other known CAMA systems in use throughout Georgia and to complete HAZUS analyses for each county starting their local Hazard Mitigation Update process in the FY 2014 planning cycle. Since that time, ITOS has become fully trained on the use of HAZUS-MH and is working to get more RCs trained. Therefore, since FY 2015, GEMA/HS has contracted with ITOS for all new HAZUS reports to be included in local plan updates. By November of 2017, the Polis Center and ITOS had completed HAZUS reports for 50 counties. It is GEMA/HSs goal to produce these reports in timely manner so this information can be included in each of the local Hazard Mitigation Plan updates. As part of this process, as mentioned earlier, some Regional Commissions were trained in the use of Hazus MH. Since ITOS began running the analyses, they

have sub-contracted with capable RCs for completion of the local Hazus analyses. As RCs' capabilities increase, ITOS has worked to train them on the program. One of GEMA/HS's goals is to eventually have all RCs trained in the use of Hazus MH.

Georgia Association of Floodplain Management

The Georgia Association of Floodplain Management (GAFM) promotes advances in floodplain management. As a chapter of the national organization, the Association of State Floodplain Managers (ASFPM), opportunities exist to link to a nationwide network with similar aims. GAFM facilitates opportunities for the presence, thoughts, and actions of its members to affect and integrate within public policy the best known management practices expressing collective intent and experience. It thereby initiates within the general populace the recognition toward and resonance with sound floodplain, stormwater, wetlands, river corridor, and coastline management as an imperative duty of environmental stewardship, described by the actions, examples, and contributions of its members.

The GAFM provides educational opportunities, allowing dissemination of general and technical information, in order to keep its members abreast with the advancement of floodplain and stormwater management knowledge. GAFM encourages the exchange of information, ideas, and experiences among the practitioners and advocates of floodplain, stormwater, wetlands, river corridor, and coastline management.

Due to its role as the State Floodplain Coordinator, the Floodplain Management Unit of the Georgia Department of Natural Resources, Environmental Protection Division (DNR-EPD/FM) has a strong working relationship with GAFM and GEMA/HS. The State will continue to work with DNR-EPD/FM on the implementation of mitigation plans and projects. GEMA/HS staff has supported each of GAFM's annual and regional workshops to provide mitigation information to its members. GEMA/HS Mitigation staff will continue to coordinate with DNR-EPD/FM and GAFM to inform them of mitigation initiatives in their region.

Metropolitan North Georgia Water Planning District

The Metropolitan North Georgia Water Planning District (District) was created by the Georgia General Assembly in 2001 (O.C.G.A. 12-5-570) and is currently composed of 15 counties, 95 cities, and 7 water authorities in the Metro Atlanta area. Per this legislation, the District developed three water management plans and five model ordinances, including the Model Floodplain Management/ Flood Damage Prevention Ordinance. Each year the District surveys the jurisdictions to report activities and achievements.

The purpose of the Flood Damage Prevention Ordinance is to protect, maintain, and enhance the public health, safety, environment, and general welfare and to minimize public and private losses due to flood conditions in flood hazard areas. Furthermore, the intent of the ordinance is to protect the beneficial uses of floodplain areas for water quality protection, stream bank and stream corridor protection, and wetlands preservation as well as ecological and environmental protection. The model ordinance mandates that local governments adhere to a 3-foot freeboard requirement that will significantly reduce future flood damages and flood insurance premiums on new and substantially improved structures.

All but two of the jurisdictions surveyed in 2014 have adopted the Model Floodplain Management/ Flood Damage Prevention Ordinance or equivalent regulations. This ordinance is intended to minimize future flooding impacts and integrate floodplain management with stormwater management during the land development process by promoting the No Adverse Impact approach. Eighty-seven

of these jurisdictions have incorporated the new floodplain management provisions into their local development review process.

As part of the adoption of the model floodplain ordinance, local jurisdictions are required to delineate the future-conditions hydrology 100-year floodplain within their jurisdictions. The ordinance also requires the local government to regulate floodplains on all streams with a drainage area of 100 acres or greater. Future-conditions flood studies are based on the best estimates of future land use conditions within a watershed. Local governments are responsible, at a minimum, for delineating future-conditions floodplains for all streams with a drainage area of 1 square mile or greater. Fifty-seven communities have responded by providing completed mapping of future-conditions floodplains within their jurisdictions, while another ten have partially completed mapping in their city or county. Three jurisdictions currently have an RFP or contract in place for the mapping of future-conditions floodplains, and/or they have completed some preliminary technical work.

6.1.3 Integration with Federal Programs and Planning Initiatives

This section of the plan lists federal programs that GEMA/HS and the State of Georgia utilize, including regulations that provide local communities with guidance for state and regional agencies. The State integrates several FEMA programs to accomplish its mitigation goals. Table 6.3 summarizes the federal programs or planning initiatives and how GHMS is integrated into them.

Table 6.3 GHMS Integration with Federal Programs and Initiatives

FEDERAL PROGRAM OR PLANNING INITIATIVE	INTEGRATION INTO INITIATIVE
NFIP	Potential applicants must be good standing in NFIP to be eligible for any mitigation project funding.
CRS	Prioritization of mitigation funds for CRS communities. 55 communities have incorporated CRS principles and practices into their local mitigation strategies.
RISK MAP	Mitigation information incorporated into discovery and resilience workshops.
FMA	Projects must be identified in local mitigation plans. More than $15.1 million for planning and projects designed to reduce or eliminate flood hazard caused damages throughout the State.
HMGP	Projects must be identified in local mitigation plans. More than $146.7 million for planning and projects designed to reduce or eliminate hazard caused damages throughout the State.
PDM	Projects must be identified in local mitigation plans. More than $41.4 million for planning and projects designed to reduce or eliminate hazard caused damages throughout the State.
EMPG	More than $1.3 million in EMPG funds utilized to improve warning and communication and provide uninterrupted power for critical facilities throughout the State between 2013 and 2018.
HAZUS-MH	Workflow developed to incorporate available local parcel and tax data from all CAMA systems in use in Georgia. Level two data developed for 50 communities which will be utilized in local plan updates. Process developed to incorporate HAZUS level two data into local plan updates for all of Georgia's 159 counties.
EMAP	Integration of EMAP standards including hazard vulnerability and risk assessments, state and local mitigation plans, grant administration and public education and outreach.

FEDERAL PROGRAM OR PLANNING INITIATIVE	INTEGRATION INTO INITIATIVE
PA	Mitigation information provided to potential applicants at DRP and applicant briefing workshops. State staff supports Section 406 mitigation and State match assistance provided to implement Section 406 mitigation projects.
Silver Jackets	State lead team activities support GHMS and integration of mitigation into recovery actions.
NRCS	State match assistance provided to local sponsors to implement EWP projects for the restoration of impaired watersheds.
NWS	Support of Georgia Storm Ready Program and prioritization of warning grants for Storm Ready communities.
THIRA	Overall assessment of all threats to Georgia including natural hazards, technological hazards, terrorism, etc. Natural hazard information is based on information described in the State Hazard Mitigation Strategy.
National Dam Safety Program	Support EPD in Regulation of and identification of threats from potential failure of classified dams

National Flood Insurance Program (NFIP)

The NFIP was established with the passage of the National Flood Insurance Act of 1968 to:

- Provide flood insurance through a cooperative public–private program with equitable sharing of costs between the public and private sectors as an alternative to disaster relief
- Distribute responsibility for floodplain management to all levels of government and the private sector
- Set a national standard for regulating development in the floodplain
- encourage state and local governments to use land-use adjustments to constrict development of land exposed to flood hazards and guide future development away from such locations;
- Begin a comprehensive mapping program

The State of Georgia, represented by the Georgia Department of Natural Resource, Environmental Protection Division (GADNR-EPD), entered into a Cooperating Technical Partner Agreement with FEMA's Region IV in August 1999. GADNR-EPD is therefore a cooperating technical partner (CTP) with FEMA in the administration of the NFIP. Since project eligibility requirements for mitigation grants depend on NFIP participation, GEMA/HS works closely with the GADNR-EPD floodplain management staff on NFIP issues. Flood insurance, floodplain management, and flood hazard mapping are the three main components of the NFIP. Federally backed flood insurance is available to homeowners, renters, and business owners in communities that voluntarily participate in the NFIP. Increasing participation in the NFIP and encouraging property owners to purchase flood insurance significantly reduces disaster losses.

There are 678 counties and cities in Georgia, 647 of which have mapped Special Flood Hazard Areas (SFHAs). 561 communities (87%) currently participate in the NFIP, including communities in all 159 counties. There are currently 86 communities with mapped Special Flood Hazard Areas (SFHAs) that are not yet participating in the NFIP. Through the NFIP, there are now

86,402 policies in place, $22.5 billion total coverage, $66.3 million total annual premium, 18,287 total # of claims since 1978 and $349.4 million paid since 1978.

In exchange for NFIP participation, communities are required to adopt and enforce flood damage prevention ordinances to manage development within SFHAs. In this regard, model ordinances have been developed which many communities have adopted. These include:

- Coastal model flood ordinance (coastal communities only)
- Riverine model flood ordinance (noncoastal communities)
- Metropolitan North Georgia Water Planning District (for the 15 counties currently comprising the Water Planning District as established in 2001 by Senate Bill 130 and subsequently modified)

In an effort to increase the number of NFIP-participating communities, the State requires NFIP participation to be eligible for mitigation funding. Since the inception of the HMGP, several communities have joined the NFIP in order to get HMGP funds. The majority of these new NFIP entrants can be attributed to this requirement due to the popularity of the warning grants and other statewide mitigation initiatives. Communities that do not participate in the NFIP when a local flood hazard area has been identified through a flood insurance study face the following challenges:

- Flood insurance is not available. No resident is able to purchase a flood insurance policy.
- No federal grants or loans for buildings may be made in identified flood hazard areas. Includes all Federal agencies such as HUD, EPA, SBA, HHR, etc.
- No federal disaster assistance may be provided in identified flood hazard areas for permanent restorative construction and grants.
- No federal mortgage insurance may be provided in identifies flood hazard areas. This includes FHA, VA, FmHA, etc.
- For conventional loans in non-participating communities: Restrictions on conventional loans in non-participating communities require that lenders:
    - Must notify buyer or lessee that property is in a flood hazard area; and
    - Must notify buyer or lessee that property is in the flood hazard area is not eligible for federal disaster relief in a declared disaster.
- The Flood Insurance Rate Map and appropriate actuarial rates go into effect regardless of whether or not a community participates in the program. Lacking a local ordinance, unsafe construction today may result in prohibitively expensive insurance rates tomorrow.

- Local governing body may be susceptible to liability by not participating because their action:
    - Denies the ability of its citizens to purchase flood insurance and;
    - Does not take positive steps to reduce the exposure of life and property in the face of authoritative scientific and technical data.

Community Rating System (CRS)

The NFIP also has a voluntary incentive program known as the Community Rating System (CRS). The CRS program encourages community floodplain management activities that exceed the minimum NFIP requirements and in exchange, insurance premium discounts are offered to residents and businesses in the community. Discounts are tiered based on the CRS classification awarded to the community, and can range from 5% to 45%. Additional information about the CRS is located in Chapter 3, Section 3.4.2. In partnership with GADNR-EPD and Silver Jackets team members, GEMA/HS Mitigation staff promotes the CRS program at mitigation workshops. In an effort to increase the number of CRS participating communities and improve classification, the State incorporates CRS information into the overall ranking of mitigation projects. In August, 2014, Hazard Mitigation staff supported a CRS conference at Armstrong State University (now Georgia Southern University-Armstrong Campus), hosted by the Carl Vinson Institute of Government at the University of Georgia. As of September 2017, there are 55 Participating in the CRS, of which 15 are coastal communities.

Georgia CRS User's Group Activity

The Georgia coastal communities continue to actively participate in a Coastal CRS User's Group consisting of Bryan, Camden, Chatham, Glynn, Effingham, and McIntosh counties. Representatives from local jurisdictions in Bloomingdale, Darien, Garden City, Jekyll Island, Pooler, Richmond Hill, Rincon, Savannah, St. Mary's, Thunderbolt and Tybee Island are also members of the group. The group meets every two (2) months and efforts are currently underway to encourage other coastal communities between Florida and South Carolina to join, including communities in Brantley, Liberty, Long, and Wayne counties.

Several training opportunities are offered by the group such as Elevation Certification Training, How to prepare for your CRS Cycle Visit, and, in conjunction with GADNR-EPD, Managing Floodplain Development through the NFIP. The group was also instrumental in the development of Chatham Emergency Management Agency's (CEMA) All Hazard Plan and provided support in the development of the Elevation Certificate Reference Guide. Future goals of the group include hosting the NFIP/CRS Training (known as L278) and encouraging unified coastal Georgia construction practices.

GADNR-EPD, along with Silver Jackets team members, is currently looking at ways to promote CRS User Groups through the State. It has been reported that through knowledge gained at these meetings, communities such as Camden County have improved their CRS rating a full class just by better understanding the ways they can improve their local program.

Georgia Flood Mapping, Assessing, and Planning (MAP) Program

Prior to 2009, FEMA had embarked on a multi-year effort Map Modernization (a.k.a. Map Mod) to update and transform flood maps into more reliable, easy-to-use, and readily available digital

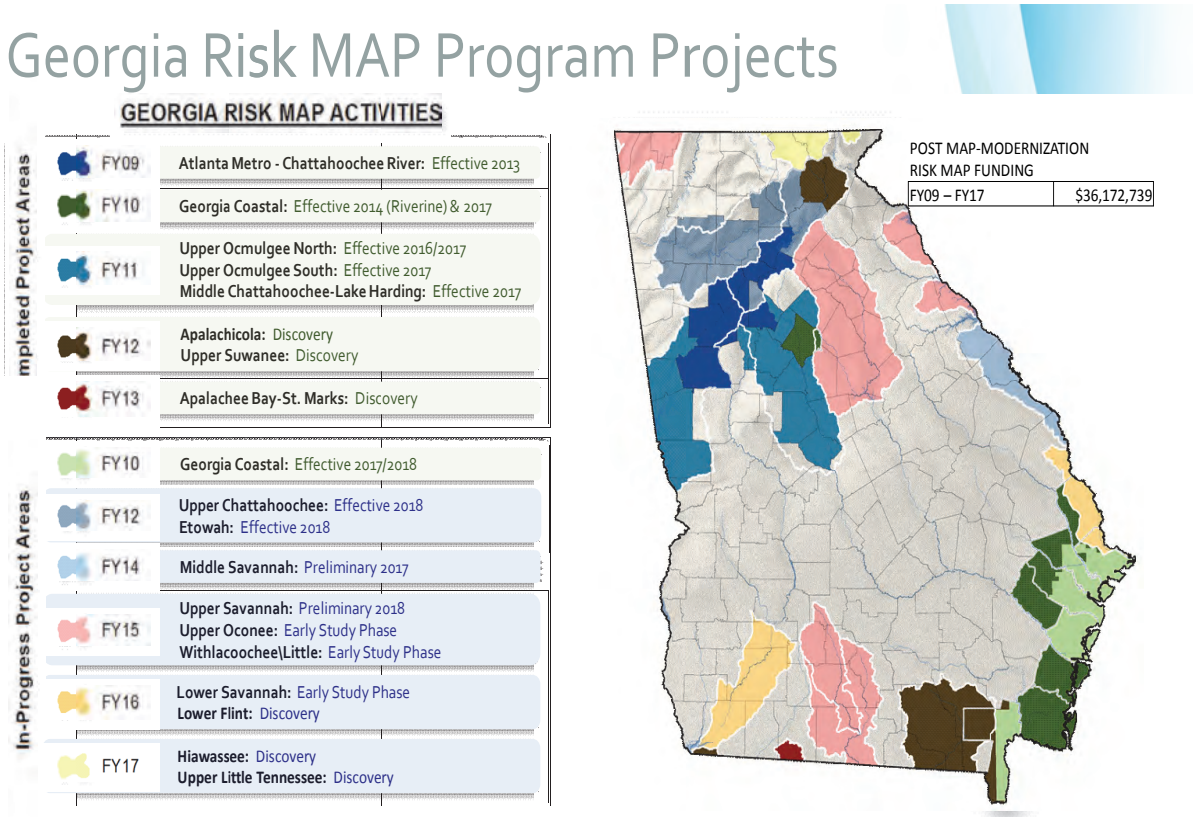
products. Map Mod enabled communities and citizens across the country to more efficiently obtain flood hazard data, learn about their flood risk, and make informed decisions about development, floodplain management, and mitigation projects

Figure 6.1 RiskMap Diagram

Building upon the goals and commitments of FEMA's Map Mod, FEMA implemented the Risk Mapping Assessment and Planning Process, known as Risk MAP. Risk MAP will produce products and services based on accurate and reliable data delivered through an integrated and collaborative approach. Risk MAP will provide communities, and ultimately individuals, with the information and tools they need to identify, assess, and take action to reduce flood risks.

Since 2009, GADNR-EPD has received about 36.2 Million Dollars in grant funding from FEMA for Risk MAP projects. All of the counties in Georgia benefitted from the Map Modernization effort and, since the Risk Map Process was initiated in 2009, GADNR-EPD has projects ether completed or ongoing in 20 of the 48 HUC-8 watersheds in Georgia, including Metropolitan Atlanta and Coastal communities. Figure 6.2 following summarizes GADNR-EPD's Risk MAP activities.

FIGURE 6.2 Georgia RiskMap Program Projects



A Risk MAP project can take up to 5 years to complete and involves the following:

- Acquisition of Topographic Data: Topographic information is the foundation for watershed modeling and flood hazard analysis. The State currently utilizes the latest digital topographic information, known as Light Detection and Ranging (LiDAR) Data, to support the identification of flood risks. LiDAR data is capable of delivering 1-foot equivalent contour accuracy for ground conditions in study areas. Through partnerships with NOAA, USGS, NRCS and the State's Geospatial Information Office, State LiDAR coverage is about 70% with full coverage anticipated in the next 3 years or so.
- Discovery: The objectives of Discovery are to engage watershed stakeholders, understand the needs of the communities in a watershed, introduce or enhance flood risk discussions, and balance FEMA's resources with a plan for a possible Risk Mapping Assessment & Planning (MAP) project.
- Multi-agency Project Kick-off Meetings
- Perform Field Survey along stream channels and at hydraulic structures for detailed studies
- Develop Topography from LiDAR data
- Hydrologic modeling to estimate the amount of rainfall and peak discharges from different storm events, such as the 1% annual chance flood (commonly referred to as the 100-year flood).
- Hydraulic modeling to determine where flood waters will flow using computed peak flow values resulting from hydrologic modeling
- Delineate floodplain boundaries (flood hazard areas) against the topographic data
- Develop Flood Risk Products such as Changes Since Last FIRM, Depth Grids and Areas of Mitigation Interest
- Flood Risk Communication & Outreach in the form of Flood Risk Reviews or Draft Map meetings where local officials have an opportunity to review draft products and provide feedback.
- Develop DFIRM Database based on community feedback
- Develop DFIRM Maps & Reports and issue Preliminary Maps
- Public Risk Communication & Outreach where Preliminary Maps are presented to community officials and open houses held for the public. At open houses, members of the public are able to determine their flood risk and can discuss their circumstances with State, FEMA and local officials.
- Formal 90-day Appeal Period
- Issue of Letters of Final Determination after resolution of appeals and completion of a thorough quality review process
- Resilience meetings: To focus use of flood risk products to inform hazard mitigation and planning
- Local communities ensure that their flood damage prevention ordinances are compliant
- Maps become effective 6 months after Letters of Final Determination

Georgia communities and citizens will benefit in a number of ways:

- The updated study data will provide more accurate information for Georgia communities to help with design decisions when rebuilding after flood disasters, when building new

structures and infrastructure, and when retrofitting existing structures.

- DFIRMs will more accurately depict flood risk information.
- Users will be able to make more precise flood risk determinations.
- Builders and developers can use the updated map data to determine where and how to build structures more safely and how high to build to reduce the risk of flood damage.
- Real estate agents will be better able to inform clients of the risk factors that could affect the property they are buying or selling as well as any flood insurance requirements.
- Insurance agents will know their clients' current flood risk and can provide more informed recommendations regarding flood insurance coverage options.
- Residents and business owners will understand their current flood risk and be able to make better decisions about insuring and protecting their property against floods.
- Community officials will be able to develop a more comprehensive approach to disaster mitigation planning, economic development, and emergency response, resulting in a safer Georgia in which to live and work.
- The flood risk products will provide substantially more information and more details to communities to enable them to identify mitigation activities and to use in local plan updates. These products can further identify where flooding might take place within a community. Identifying the additional locations could help prioritize potential mitigation actions within the community. These products include changes since the last DFIRM such as depth and probability grids, HAZUS-MH loss estimates, and areas of mitigation interest.

Community Assistance Program

GADNR-EPD also provides community outreach and assistance through a structured Community Assistance Program State Support Services Element (CAP SSSE) funded by FEMA. Among the activities supported by the CAP SSSE Program are:

- Community Assistance Visits and Contacts
- Assistance with reviewing local flood ordinances to verify with NFIP requirements and adoption prior to effective date of Flood Insurance Rate Maps (FIRMs).
- Promote participation in the NFIP and CRS.
- Continue to build local capability, increase knowledge of the NFIP and understanding of floodplain management among local officials and stakeholders through workshops and training.
- Provides General Technical Assistance to communities, individuals and State agencies (i.e., Department of Transportation, Department of Education and Board of Regents).
- Upon issuance of Preliminary Digital Flood Insurance Rate Maps (DFIRMs) to a community, participate in Preliminary DFIRM Community Coordination (PDCC) meetings and Flood Risk Information Open Houses as well as provide guidance to local officials regarding ordinance update/adoption.
- Provide post-disaster assistance and support to NFIP communities including technical assistance and training to implement and enforce Substantial Damage requirements

Other Floodplain Management Information

The Floodplain unit also maintains a website, www.georgiadfirm.com that provides technical and outreach information for community officials and the public, including a "look up" tool that

allows the public to enter their address and determine their flood risk. The website also offers a host of outreach material for the community material, including:

- Acronym and Abbreviation Table
- Risk MAP Process Overviews
- Floodplain Management Quick Guide

- Georgia DNR Outreach Planning Guidebook
    - Fact Sheets
    - Public Talking Points
    - Press Release Templates
    - Sample Property Owner Letters
    - Mapping Project Brochure Template
    - Example Mapping Web Page
    - Sample notification letters
    - Informational brochures/fact sheets
    - Phased suggested outreach schedule
- Greenspace and Flood Protection Guidebook
- Flood Response Toolkit
- Media Packets
- Newsletters to help keep stakeholders informed
- Model Ordinances
- Community Contact Database
- Risk MAP Project Status
- Educational Videos
    - An Outreach Guide for Community Officials
    - A Georgia Property Owner's Guide to Assessing Flood Risks

GEMA/HS worked closely with state floodplain management staff to advance the Map Modernization and continues to actively participate in Risk MAP initiatives. Mitigation staff supports GADNR-EPD's community and public outreach interventions, with particular emphasis on discovery and resilience meetings. Improved flood maps and flood risk products will lead to a much more refined risk assessment in the ongoing efforts to reduce Georgia's flood vulnerability. GEMA/HS has been working with some of the communities in the Risk MAP study areas to utilize the flood risk products to select future flood mitigation projects.

Flood Mitigation Assistance (FMA)

FEMA provides FMA funds to help states and communities implement measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. Georgia has utilized planning, project, and technical assistance grants through the FMA program. As noted in Section 6.5, FMA funds are used to develop flood mitigation plans and implement projects that reduce or eliminate claims against the NFIP, primarily through property acquisition. Since the HMA13 application cycle, the State has focused our efforts on FMA application development for the mitigation of Severe Repetitive Loss and Repetitive Loss properties, primarily through property acquisition.

Hazard Mitigation Grant Program (HMGP)

The HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The HMGP is designed to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

The Disaster Mitigation Act of 2000 (DMA2K) placed a much greater emphasis on risk-based data-driven mitigation plans. Georgia used primarily Pre-Disaster Mitigation Program (PDM) funds to meet the initial development of state and local mitigation planning requirements of DMA2K. For the initial plan development, 20 of the state's 159 counties received HMGP planning assistance, with the remainder receiving assistance through the PDM program. Through the Enhanced Plan, the State has received a 33% increase in mitigation funds in the aftermath of the following disasters: DR1833, DR1858, DR1973, DR4165, DR4215, DR4259, DR4284, DR4294, DR4297, and DR4338. This has made additional funds available to meet the plan update funding needs in Georgia. HMGP grants are a major component of funding Georgia will use to not only update plans but also to implement state and local projects identified in these plans. With the increase in HMGP funds due to the 13 Presidential Disaster Declarations since 2007, many local plan updates have been funded through the HMGP 7% allocation. HMGP funds have been used to fund the completion of the first local plan update cycle and the third and fourth State Mitigation Plan updates. Since the completion of the 2014 GHMS, the State has funded 24, or approximately 1/5th of all local mitigation plan updates using HMGP funding. Going forward, the State is applying for all local plan updates for the FY 17 and 18 cycles using HMGP funding from DRs 4284 and 4294.

Pre-Disaster Mitigation Program (PDM)

The PDM program provides funds to states, territories, Indian tribal governments, and communities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures while also reducing reliance on funding from actual disaster declarations. PDM grants are awarded on a competitive basis, without reference to state allocations, quotas, or other formula-based allocations of funds.

The 44CFR Part 201, Hazard Mitigation Planning, established criteria for state and local hazard mitigation planning authorized by Section 322 of the Stafford Act, as amended by Section 104 of the Disaster Mitigation Act of 2000. State and local mitigation plans meeting these criteria must be approved in order to receive PDM funds for state and local mitigation projects. Therefore, the development and update of state and local mitigation plans is essential to maintain eligibility for future PDM funding.

The State has utilized the PDM program to fund the initial development of multi-jurisdictional planning grants for 136 counties and plan updates in 108 counties. The State has utilized PDM funds through the FY13, FY14, FY15, and FY16 application cycles to fund the majority of second local plan updates. Section 6.5 includes further discussion on the use of the PDM program since its inception in 2002. The GEMA/HS Mitigation staff works closely with local governments to develop and submit projects and plans for funding consideration. Mitigation staff has also served on the national review panel, and GEMA/HS will continue to support the development of plans and projects for future PDM funding.

HAZUS-MH

HAZUS-MH is a nationally applicable standardized methodology and software program that contains models for estimating potential losses from earthquakes, floods, and hurricane winds. HAZUS-MH was developed by FEMA under contract with the National Institute of Building Sciences. Loss estimates produced by HAZUS-MH are based on current scientific and engineering knowledge of the effects of hurricane winds, floods, and earthquakes. Estimating losses is essential to decision-making at all levels of government, providing a basis for developing mitigation plans and policies, emergency preparedness, and response and recovery planning.

HAZUS-MH uses ArcGIS software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. It also allows users to estimate the impacts of hurricane winds, floods, and earthquakes on built environments and populations. HAZUS-MH is fast-running to facilitate use in real time to support response and recovery following a natural disaster.

HAZUS User Groups (HUGs) have been in existence since 1997. These public-private partnerships between public, private, and academic organizations use HAZUS-MH software and technology to build enhanced disaster-resistant communities and save lives, time, and dollars. Georgia has its own chapter, which is very active.

In addition, as described in Section 6.1.2, DCA, with support from GEMA/HS, conducted HAZUS-MH training in three locations throughout the state for local communities and interested regional commissions. This training allows more local communities to use the program in their planning efforts. Since 2014, the State has used FEMA mitigation funds to provide HAZUS Level 2 analyses for each county as they have updated their local hazard mitigation plans.

Emergency Management Performance Grants (EMPG)

Concerning the Enhanced Plan element of plan integration, one example of demonstrated integration with FEMA programs and initiatives is how the Enhanced Plan guides activities funded by EMPG.

One activity funded through the EMPG was the Emergency Management Accreditation Program (EMAP) certification. EMAP is a standard-based voluntary assessment and accreditation process for state and local government programs responsible for coordinating prevention, mitigation, preparedness, response, and recovery activities for natural and human-caused disasters. Accreditation is based on compliance with collaboratively developed national standards, the EMAP Standard. (The EMAP Standard is based on the National Fire Protection Association 1600 Standard on Disaster/Emergency Management and Business Continuity Programs, 2004).

Georgia went through EMAP reaccreditation in March 2013. Georgia received full reaccreditation on the 64 standards in May 2013. The Georgia programs continue to meet national standards for disaster preparedness and response. The Georgia Mitigation Information System was noted as a best practice in our exit interview. As of August 2018, Georgia is currently undergoing reassessment with the goal of maintaining EMAP accreditation for the next 5 years.

Starting in fiscal year 2008, GEMA/HS established criteria for local emergency management agencies to be eligible for additional funds above the baseline EMPG allocation. These response and recovery project competitive award criteria demonstrate Enhanced Plan integration. In order to be eligible for these enhancement grants, local governments must have an approved local hazard

mitigation plan or be in the process of updating their plan to meet the five-year recertification. In addition, the local government must be in good standing in the NFIP. Since the time of the last update, an additional $2.8 million has been awarded to 103 local governments for warning and communication enhancements. As a result of this initiative, almost $4.3 million has been awarded to 162 local governments to implement projects to improve warning and communication.

Public Assistance Program

The objective of FEMA's Public Assistance (PA) Grant Program is to provide assistance to state, tribal, and local governments as well as certain types of private nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. Through the PA program, FEMA provides federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain private nonprofit organizations. The PA program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process, which is commonly referred to as Section 406 mitigation.

Local governments are encouraged to pursue Section 406 mitigation. A significant amount of emphasis was placed on public assistance mitigation for each project worksheet written for DR4259 flood disaster. Public Assistance Mitigation Profile reports for DRs 4165, 4215, 4259, 4284, 4294, and 4297, which were pulled from FEMA's EMMI System and FEMA PA Portal, can be viewed in Appendix H. These reports show a significant amount of Section 406 mitigation completed for DRs 4259, 4284, 4294 and 4297.

Silver Jackets

Effective and continuous collaboration between state and federal agencies is critical to successfully reducing the risk of flooding and other natural disasters in the United States and enhancing response and recovery efforts when such events do occur. No single agency has all the answers, but often multiple programs can be leveraged to provide a cohesive solution. The Silver Jackets is an innovative program that provides an opportunity to consistently bring together multiple federal, state, and sometimes local agencies to learn from one another and apply that knowledge to reduce risk.

The Silver Jackets program provides a formal and consistent strategy for an interagency approach to planning and implementing measures to reduce the risks associated with flooding and other natural hazards.

The program is a partnership of the U.S. Army Corps of Engineers (USACE), FEMA, and other federal and state agencies. Silver Jackets programs are developed at the state level with support from USACE, FEMA, and other federal agencies. The program's primary goals are to

- Create or supplement a mechanism to collaboratively address risk management issues, prioritize those issues, and implement solutions;
- Increase and improve risk communication through a unified interagency effort;
- Leverage information and resources, including providing access to such national programs as FEMA's Map Modernization program and RiskMAP programs and USACE's Levee Inventory and Assessment Initiative;
- Provide focused, coordinated hazard mitigation assistance in implementing high-priority actions such as those identified by state mitigation plans; and

- Identify gaps among the various agency programs and/or barriers to implementation, such as conflicting agency policies or authorities, and provide recommendations for addressing these issues.

The program has several desired outcomes.

- Reduced flood risk
- Agencies better understand and leverage each other's programs
- Collaboration between various agencies, coordinated programs, cohesive solutions
- Multi-agency technical resource for state and local agencies
- Mechanism for establishing relationships to facilitate integrated solutions post-disaster

Georgia developed a Silver Jackets team with a signed charter in 2010. The team meets quarterly or as needed to address flood risk reduction strategies. Appendix H contains a copy of the charter along with GEMA/HS's adoption.

Team activities over the past five years have resulted in the development of additional Flood Inundation Maps (FIM) libraries similar to what was completed in Albany, Georgia. FIMs have been completed and are on NWS's Advanced Hydrologic Prediction Service website for Suwanee Creek near Suwanee, Sweetwater Creek near Austell, the Chattahoochee River at Vinings, and Ocmulgee River at Macon. A proposal is pending for the Flint River at Bainbridge FFIM product. Additional FIM's have been completed and are available on the USGS Flood Inundation Mapper website for the Withlacoochee River at Skipper Bridge Road near Bemiss (Valdosta), Big Creek near Alpharetta, South Fork Peachtree Creek at Casa Drive near Clarkston, and Peachtree Creek at Atlanta.

Two FIM libraries are currently in development by USGS at Yellow River near Snellville, and Yellow River at GA 124, near Lithonia. Two FIM libraries are nearing completion by USACE at Chattahoochee at Helen and Etowah River near Canton.

The FIMs assist federal, state, and local officials as well as property owners by enabling them to take action long before a flood actually occurs, which saves lives and reduces property damages. This online tool helps identify where the potential threat of floodwaters is greatest, enabling federal, state, and local officials to better plan for flood response and resource recovery and to assess evacuation routes at various flood levels before the rain falls.

Pilot funds were awarded to assist Augusta–Richmond County with the identification of flood risks for the Hyde Park area. That project resulted in a new FEMA FIRM.

Emergency Watershed Protection (EWP)

Funding has been committed on each Presidential Declared Disaster to provide or assist with the non-federal match for locally sponsored projects under this program. Since 1994, almost $25 million has been approved on Emergency Watershed Protection (EWP) measures, and the State has provided $5.7 million as a match for this program. Since the last plan update, all work has been completed on NRCS-EWP projects for DR1973. GEMA/HS and the NRCS continue to promote the EWP at HMGP applicant workshops and Disaster Recovery Program workshops. All work has been completed on -for DR1973.

National Weather Service (NWS)

GEMA/HS has continued its partnership with NWS on the StormReady program. This NWS program recognizes counties that have reached a high level of severe weather preparedness. StormReady counties have increased by 15 since the completion of the 2014 GHMS, presently reaching 94 total counties. Also, one county is a designated TsunamiReady county. In addition, GEMA/HS supports the Atlanta Integrated Warning Team. This team is made up of staff from the National Weather Service, emergency management, the media, the private sector and social scientists to look for ways to improve the warning system and reduce weather-related fatalities and injuries.

Threat and Hazard Identification and Risk Assessment

GEMA/HS prepares a Threat and Hazard Identification and Risk Assessment (THIRA), which identifies the top five natural and human-caused hazards to impact the state. The THIRA assesses one natural and four human caused hazards. The assessment is based on the potential physical impact of an event on the population, economy, infrastructure and development, as well as the impact on State operations for response, recovery and mitigation, as well as continued day-to-day responsibilities. Information on natural hazards is based on hazard profile information provided by the State Hazard Mitigation Strategy.

National Dam Safety Program

Georgia's Department of Natural Resources Environmental Protection Division manages the Georgia Safe Dams program. The program regulates dams meeting a certain size, capacity and threat to downstream population. The program studies inundation zones for dam failures and, when it determines failure of a dam would potentially cause loss of life if it fails, that dam is classified as a high hazard dam, which carries stricter regulations.

6.2 PROJECT IMPLEMENTATION CAPABILITY

44 CFR 201.5(b)(2) (i) and (ii) states that the Enhanced Plan must document the State's project implementation capability, identifying and demonstrating the ability to implement the plan, including:

- Established eligibility criteria for multi-hazard mitigation measures, and
- A system to determine the cost-effectiveness of mitigation measures, consistent with OMB Circular A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs, and
- [A system] to rank the measures according to the State's eligibility criteria.

GEMA/HS's Hazard Mitigation Division staff has overall responsibility for implementation of the Hazard Mitigation Assistance programs. These programs include the HMGP, FMA, and PDM programs. The Biggert-Waters Flood Insurance Reform Act of 2012 incorporated elements of the Repetitive Flood Claims and Severe Repetitive Loss programs into the FMA program, so the implementation of these two programs have been incorporated into the FMA program. State criteria have been developed for determining eligibility for all types of proposed multi-hazard mitigation measures for these programs.

The State utilizes the procedures outlined in the HMGP Administrative Plan for the administration of all of the programs mentioned above. The State submitted its last update to the HMGP Administrative Plan in October 2017 for the DR4338 disaster. The HMGP Administrative Plan was approved by FEMA in October 2017. See Appendix H for the HMGP Administrative Plan.

6.2.1 ELIGIBILITY CRITERIA

Applications that are received by the Hazard Mitigation Division for funding consideration through the HMGP, FMA, and PDM programs are reviewed for the following eligibility criteria:

- Conforms to the goals and actions of the State Hazard Mitigation Plan,
- Meets applicant eligibility requirements,
- Meets project type requirements which include but are not limited to:
    - Voluntary acquisition or relocation of hazard-prone structures for conversion to open space in perpetuity;
    - Retrofitting of existing buildings and facilities for wildfire, seismic, wind, or flood hazards (i.e., elevation, storm shutters, hurricane clips), including designs and feasibility studies when included as part of the proposed project;
    - Construction of "safe rooms"(i.e., tornado and severe wind shelters) that meet the FEMA construction criteria in FEMA 320 "Taking Shelter from the Storm" and FEMA 361 "Design and Construction Guidance for Community Shelters";
    - Minor structural hazard control or protection projects that may include vegetation management, stormwater management (e.g., culverts, floodgates, retention basins), or shoreline/landslide stabilization;
    - Localized flood control projects that are designed specifically to protect critical facilities (defined as hazardous materials facilities, emergency operation centers, power facilities, water facilities, sewer and wastewater treatment facilities, communications facilities, emergency medical care facilities, fire protection, and emergency facilities) and that do not constitute a

section of a larger flood control system;
    - Development of State or local plans that meet DMA2K requirements; and
    - Projects that improve the warning and communication capabilities of local governments for severe weather or emergency events (HMGP Only).
    - Generators for critical facilities
    - Advance Assistance;
    - Technical Assistance;
    - Other community flood mitigation; and
    - Other all-hazard resilient infrastructure projects that may include floodplain and stream restoration, and aquifer storage and recovery.
- Has a beneficial impact upon the project area,
- Conforms to 44 CFR Part 9, Floodplain Management and Protection of Wetlands and 44 CFR Part 10, Environmental Considerations,
- Solves a problem independently or constitute a functional portion of a solution where there is assurance that the project as a whole will be completed (Projects that merely identify or analyze hazards or problems without a funded, scheduled implementation program are not eligible.),
- Addresses a repetitive problem or one that poses a significant risk if left unsolved,
- Is cost-effective: demonstrates that the project will not cost more than the anticipated value of the reduction in both direct damages (property) and subsequent negative impacts (loss of function, deaths, injuries) to the area if future disasters were to occur. Both costs and benefits will be computed on a net present value basis (i.e., expected damage estimates as a function of hazard intensity),
- Has been determined to be the most practical, effective, and environmentally sound alternative after consideration of a range of options, including the “no action” alternative,
- Contributes, to the extent practicable, to a long-term solution to the problem it is intended to address,
- Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements, and
- Has a federally approved hazard mitigation plan.

In addition, GEMA/HS considers the following criteria in evaluating proposed mitigation projects:

- Conformance with the goals and objectives of the Local Hazard Mitigation Plan. For each of the HMA programs, projects must be listed in the plan;
- Mitigation activities that if not taken will have a severe detrimental impact on the community such as the loss of life, loss of essential services, damage to critical facilities, or economic hardship;
- Mitigation activities that have the greatest potential for reducing future disaster losses;
- Mitigation activities that are designed to accomplish multiple objectives, including damage reduction, environmental enhancement, historical preservation, recreational opportunities, and economic recovery;
- The community’s level of interest and demonstrated degree of commitment to mitigation programs and activities;
- Community participation in and compliance with the National Flood Insurance Program (NFIP) (exception for planning grants); GEMA/HS coordinates with the Georgia Department

of Natural Resources in determining a community's compliance with the NFIP.

- The proposed project does not encourage development in a Special Flood Hazard Area;
- The applicant has the ability to provide for the non-federal cost share; and
- The applicant and/or local government that is receiving the mitigation benefit must be in good standing in the NFIP (exception for planning grants).

The eligibility requirements were reviewed and updated to account for additional project types deemed eligible per the 2015 HMA guidance.

6.2.2 COST-EFFECTIVENESS DETERMINATION

As stated in the above criteria, projects have to be cost-effective. Only projects with a benefit-cost ratio of at least 1-to-1 are forwarded to FEMA for funding consideration. The State utilizes a system to determine the cost-effectiveness of all mitigation measures consistent with OMB Circular A-94 for each project application submitted to FEMA for funding with the exception of Planning, TA/Management, and Initiative projects. Prior to mitigation grant applications being scored for competitive ranking, the GEMA/HS Hazard Mitigation staff works closely with each applicant to get sufficient documentation to determine if the proposed applications are cost-effective. Only projects with a benefit-cost ratio exceeding 1.0 are ranked for further funding consideration. Each analysis conducted by GEMA/HS staff utilizes the most recent benefit-cost analysis (BCA) tools (current version is BCA Version 5.3.0) approved and provided by FEMA. State Mitigation staff work very closely with the sub-applicants on proposed grants to ensure they meet the minimum benefit-cost requirements.

Although the State Mitigation staff completes the benefit-cost analysis, GEMA/HS depends on information in the application provided by the community. To help communities develop mitigation projects that are as cost-effective as possible and that have a benefit of one dollar for each dollar of cost, the Mitigation staff developed pre-application and application worksheets for each type of project that are used for all of the mitigation programs. The information requested on the worksheets provides staff with the data necessary for an accurate and complete benefit-cost analysis. Sub-applicants submit the worksheets (pre-applications) for benefit-cost review before completing the full application. The worksheets are updated annually and utilized with every HMA application process.

The State has extensive experience in utilizing the FEMA-developed benefit-cost modules. Since October 1, 1995, the State has utilized FEMA-developed software to complete benefit-cost (BC) reviews for each mitigation project submitted for federal funding. Due to the high number of flood mitigation projects, the State has the most experience in using the FEMA flood BC models (both Full Data and Limited Data).

Table 6.4 provides information on the total number of approved HMA projects that had a BCA submitted with the application. The table also shows the approved projects that had a BCA submitted with the application during this plan update cycle. The table does not show the other 573 approved HMA projects that are exempt from BC review. The exempt projects consist of planning, management cost, advanced assistance, acquisition of substantially damaged properties, and initiative projects.

GEMA/HS's track record for submitting eligible projects for mitigation funding is exceptional, as the overwhelming majority of projects submitted for funding consideration have received FEMA approval.

As part of populating the mitigated properties database, the State Mitigation staff has completed reviewing the BC information on all closed projects to ensure that we have an updated BC analysis for all mitigated properties. This information is critical in documenting future successes of GEMA/HS's completed mitigation activities.

Based on GEMA/HS's review of all approved HMGP mitigation projects that had a property acquisition or elevation component, the State has completed an analysis using either the Full Data or Limited Data FEMA-approved modules on more than 1,874 properties. This number only includes approved grants and not the hundreds of analyses completed on proposed grants that did not meet the minimum benefit-cost requirements, as these data were not tracked in any of GEMA/HS's historical databases. The State does not submit projects to FEMA for funding consideration if minimum federal project criteria are not met.

Table 6.4 HMA Projects with BCA

Project Type	Approved Projects with BCAs	Approved Projects with BCAs Since Last Plan Update
Acquisition w/ (Demolition or Relocation)	122	6
Acquisition and Elevation	3	0
Acquisition and Drainage Improvements	2	0
Elevation	7	0
Retrofit (Wind, Flood, Lightning)	15	0
Drainage Improvement	58	0
Safe Room	10	0
Generator Projects	12	12
Totals	**229**	**18**

Approved projects since last update (October 1,2013 – September 30, 2017)

Based on the review of all approved HMGP mitigation projects that had a wind retrofit or building retrofit component, the State has completed an analysis using either the Hurricane or Tornado FEMA-approved BC modules on 46 properties.

Based on the review all approved HMGP generator projects, the state completed an analysis using the FEMA-approved BC module for 134 sites.

The approval rate of projects submitted in the Pre-Disaster Mitigation—Competitive (PDM-C) program since its inception in 2003 is directly related to the technical accuracy, supporting documentation completeness, and credibility of the data in demonstrating that the projects submitted for funding are cost-effective. FEMA headquarters staff recognized the State's efforts in this area by requesting Georgia share their experience with the rest of the states at the National Hazard Mitigation Assistance (HMA) summit in 2008.

All GEMA/HS Risk Reduction Hazard Mitigation Division staff members receive benefit-cost training from FEMA Region IV or at EMI to fully understand how to utilize the FEMA benefit-cost modules for completing the BCAs. Each new employee, as part of his or her training, is required to attend the next available FEMA-offered BC training courses.

The State has implemented hazard mitigation eligibility criteria reviews in 28 Presidential Declared Disasters on 666 projects since 1990. In addition, similar types of reviews are done for the FMA and PDM-C programs. The projects submitted have been diverse in nature and include drainage improvements, acquisition, elevation, wind retrofit, tornado safe room construction, planning, generators for critical facilities, and many warning initiative projects.

The State's system for determining cost-effectiveness for Hazard Mitigation Assistance grants has been reviewed. The State continues to use the most recent FEMA BCA tools in determining cost-effectiveness for mitigation grants, and the process is updated to incorporate these tools.

6.2.3 SYSTEM TO RANK PROJECTS

GEMA/HS Hazard Mitigation Division staff review all proposed mitigation pre-applications and applications to ensure that the proposed projects are eligible and meet minimum criteria as outlined above. GEMA/HS reviews, ranks, and scores proposed projects. The state review criteria include a scoring sheet to determine potential for funding and overall priority within the application process. There are three basic types of projects: Regular Program Projects, Initiative Projects and Planning Projects. Except for planning projects, each has its own score sheet. The main categories utilized in ranking the Regular Program project submissions are natural hazard, history of damages, type of mitigation, potential impact on community, estimated environmental impact, community commitment to mitigation, and benefits. The ranking categories in the Initiative Project score sheet include history of tornado hazard in county, potential benefit to community, cost-effectiveness, and intangible factors.

Each category on the two score sheets is given a maximum range of points. Point amounts were developed over several years by the Hazard Mitigation staff and are based primarily upon HMGP guidelines. Maximum point possibilities per category range from 5 to 25 points and are listed below. The maximum amount of points any one project can accumulate is 100. The Regular Program score sheet has a possible 10 bonus points that can be used in a tiebreaker situation.

Categories included in the Regular Program score sheet are described here:

Natural Hazard Score: The natural hazard score is dependent upon the type of disaster, its location in regard to the coast, and whether a tornado is involved. A maximum of 25 points is possible in this section, depending upon the following criteria: the total amount of damage, the amount of flooding, proximity to the coast line, and the historic record of tornadoes in that area. In a post-disaster environment, priorities are established by the disaster type(s). In the event of multiple disasters, scoring will be calculated for each event and combined to give an overall score. (In some situations with multiple disasters, the score could exceed 25)

History of Damage in Project Area: Historical records of events in a county/project area and the likelihood of the event happening again will determine the total amount of points issued in this category. Five points are given for every event documented, up to a maximum of five events. The highest amount available in this category is 25 points.

Type of Mitigation: In this category, the reviewer must determine if the mitigative action is non-structural or structural. Examples of non-structural projects are flood proofing,

retrofitting, elevation, acquisition, and the implementation of stricter building codes. Structural projects would entail flood walls and storm water drainage improvements. The most effective type of mitigative action can garner 5 points.

Potential Impact on Community: Projects are prioritized by their ability to eliminate or reduce the effects of a disaster event on the community. The failure to implement a project can have either a severe, moderate, or no potential impact on a community. Depending upon the amount of perceived future impact avoidance, a project can accumulate up to 15 points.

Estimated Environmental Impact: Environmental impact is broken into three categories: major, moderate, and insignificant. A maximum of 5 points is awarded to the project based on its ability to reduce the impact of a disaster on the environment.

Intangible Factors: These factors include whether or not a community is storm ready, its CRS rating, the amount of local cost share paid by the community and the community's experience in successfully completing mitigation projects.

Benefits: One point is awarded per $500,000 in hazard avoidance benefits to a community, with a maximum of 15 points.

Bonus Point Section: (Tiebreaker) The State examines the quality of the data in the application as a tiebreaker if needed. A maximum of 10 points can be given to an application, depending upon the quality of the data in the application, the amount of hazard data, damage history, cost data, and environmental impact analysis. In this section, two applications with very similar scores are compared, and a tiebreaker is issued.

Additional consideration for Generator Projects

For DR4165, the state prioritized generator projects for critical facilities for the HMGP. As this was the first HMGP application process where generators were an eligible regular project type, the State received more requests for generators than available funds. It became necessary to establish additional factors to prioritize generator sites that were not individually cost effective. The FEMA BCA tool for critical facilities establishes a value of service per day for each facility. In order to maximize the effectiveness of the HMGP, project sites were selected based on the value of service per day per dollar invested. This allowed the State to select the generator sites that would provide the most value to the community.

In 2009, the State developed a prioritization schedule for local plan updates. The state uses this schedule to prioritize planning projects based on the expiration dates of each county's local hazard mitigation plan. A complete description of this process is included in Chapter 4, Section 4.4.1.

Initiative projects are noncompetitive; however, they are competitive among one another for the funds available. Categories included in the most recently used Initiative Program score sheet are described below:

History of Tornado Hazard in County: The likelihood that a tornado event will occur determines the amount of points awarded a project. The likelihood is calculated based on the history of tornadoes in that area. The higher the likelihood, the higher the number of points awarded, to a maximum of 25.

Potential Benefit to Community: One-quarter of a point is awarded per 1,000 population warned per device. The maximum award possible is 25 points.

Cost-Effectiveness ($/per capita warned): Cost-effectiveness is broken down into six categories. Points are awarded based on the overall cost per capita warned. The maximum award is 25 points.

Intangible Factors: These factors include whether or not a community is storm ready and the community's experience in successfully completing mitigation projects. A maximum of 25 points can be awarded in this category.

Additional consideration for initiative projects

The state has established additional priorities for initiative projects for the HMGP allocations during this update cycle. Priority has been given to mass alert systems. Once this category is funded, the State utilizes the initiative program score sheet to select projects if the funding requests exceed the available funds.

Based on state priorities, non-structural projects such as acquisition, demolition, and relocation generally receive the highest ranking and the greatest consideration for funding. Planning projects are given priority over structural and non-structural projects because a FEMA-approved hazard mitigation plan is required for a community to be eligible for a federal grant. Therefore, planning projects always receive a higher ranking than a structural or non-structural application. Counties involved in a Presidential Declaration are given priority over non-declared counties.

A copy of the HMA score sheet is located in Appendix H. This score sheet is used to rank all HMA project grants that meet BC and other project eligibility criteria and is used when project applications exceed available funding.

For the FMA program, additional criteria include that the proposed project must address mitigation to an NFIP-insured property, with repetitive loss and severe repetitive loss properties receiving priority.

6.3 PROGRAM MANAGEMENT CAPABILITY

44 CFR 201.5(b)(2) (iii A-D) states that the Enhanced Plan must document that the state has the capability to effectively manage the HMGP as well as other mitigation grant programs and provide a record of the following:

- Meeting HMGP and other mitigation grant application timeframes and submitting complete, technically feasible, and eligible project applications with appropriate supporting documentation;
- Preparing and submitting accurate environmental reviews and benefit-cost analyses;
- Submitting complete and accurate quarterly progress and financial reports on time; and
- Completing HMGP and other mitigation grant projects within established performance periods, including financial reconciliation.

This section of the plan demonstrates the Georgia's abilities to effectively manage the HMGP and other mitigation grant programs.

GEMA/HS's Hazard Mitigation Division has primary responsibility for program management. The Division consists of a Planning Section and a Risk Reduction Section, with staff dedicated to providing technical assistance to state agencies and local governments on the development and implementation of mitigation plans and projects. Each section is supervised by a Program Supervisor who reports to the Hazard Mitigation Manager. The respective program supervisors

review all activities of their program staff for compliance. The number of program staff can vary based on disaster activity. Since the last plan update, the Division has added one additional Risk Reduction Specialist to support state and local project applications. The current HMGP Administrative Plan details how the Hazard Mitigation Division administers the mitigation programs.

Program management is significantly enhanced by the vast experience of the Hazard Mitigation management team and staff. Collectively, the management team has a combined 37 years of experience and the program staff has a combined 8 years.

Table 6.5 summarizes the program management activities for each of the open allocations for this grant update cycle for the period of October 1, 2013 through September 30, 2017. Timelines vary among the different types of grant programs. For example, the PDM program is designed to assist states, territories, Indian tribal governments, and local communities in implementing a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on federal funding in future disasters. These grants are offered annually, with the application period typically starting in June or July and ending in December. Awards for this type of grant typically are announced in January of the following year. PDM grants have a 3.5 year Period of Performance, including the application period. The total amount allocated to PDM grants is determined by Congress. The HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Post-disaster grants are only awarded after Presidential Declared Disasters and are subject to FEMA's determination of loss. These grants are typically structured for three years, and a designated application period is established by FEMA. Timelines for the various grants differ by program.

Sections 6.3.1 through 6.3.4 provide additional detail to document each of the program management capability requirements shown in Table 6.5.

Table 6.5 Program Management Project Summary October 1, 2013 – September 30, 2017

Program	Meet HMA Application Timeframe	Projects Submitted	Projects with Environmental	Projects w/ BCA	Quarterly and Financial Reports	Projects Completed Within POP
DR1686	NA	NA	NA	NA	Yes	6
DR1750	NA	NA	NA	NA	Yes	1
DR1761	NA	NA	NA	NA	Yes	4
DR1833	NA	NA	NA	NA	Yes	12
DR1858	NA	NA	NA	NA	Yes	72
DR1973	Pilot	1	1	1	Yes	42
DR4165	18 months	34	21	12	Yes	9
DR4215	15 months	10	1	1	Yes	1
DR4259	18 months	29	11	7	Yes	0
DR4284	18 months	37	3	0	Yes	0
DR4294	15 months	1	0	0	Yes	0
DR4297	15 months	1	0	0	Yes	0
DR4338	12 months	1	0	0	NA	NA
PDMC09	NA	NA	NA	NA	Yes	1
PDMC10	NA	NA	NA	NA	Yes	2
PDMC11	NA	NA	NA	NA	Yes	4
PDMC12	NA	NA	NA	NA	Yes	2
PDMC13	3 months	5	0	0	Yes	5
PDMC14	33 months	4	0	0	Yes	0
PDMC15	33 months	4	0	0	Yes	0
PDMC16	3 months	5	0	0	Yes	0
PDMC17	3 months	2	1	1	NA	NA
LPDM08	NA	NA	NA	NA	Yes	1
LPDM10	11 months	NA	NA	NA	Yes	2
FMA13	33 months	4	4	4	Yes	2
FMA14	3 months	5	4	4	Yes	NA
FMA15	33 months	3	2	2	NA	NA
FMA16	3 months	3	1	1	Yes	0
FMA17	3 months	3	1	1	NA	NA
Totals		**152**	**50**	**34**		**166**

**NA = No activity during this timeframe.

6.3.1 MEET HMA APPLICATION TIMEFRAME AND SUBMISSION OF ELIGIBLE PROJECT APPLICATIONS

The State continues to meet all mitigation grant application timeframes and submits complete, technically feasible, and eligible project applications with appropriate supporting documentation evidenced through the FEMA approval of all grant applications. Since the completion of the 2014 SHMS, the State has submitted grant applications through the HMGP (DR4165, DR4215, DR4259, DR4284, DR4294, DR4297 and DR4338), PDMC (2013, 2014, 2015, 2016 and 2017) and FMA (2013, 2014, 2015, 2016, and 2017) grant programs. Of the 152 projects submitted, only two were not selected for funding in both the FMA 2014 and 2015 programs due to insufficient funding. Subsequently, these projects were submitted and approved in the HMGP.

Figure 6.3 HMA Application Process.

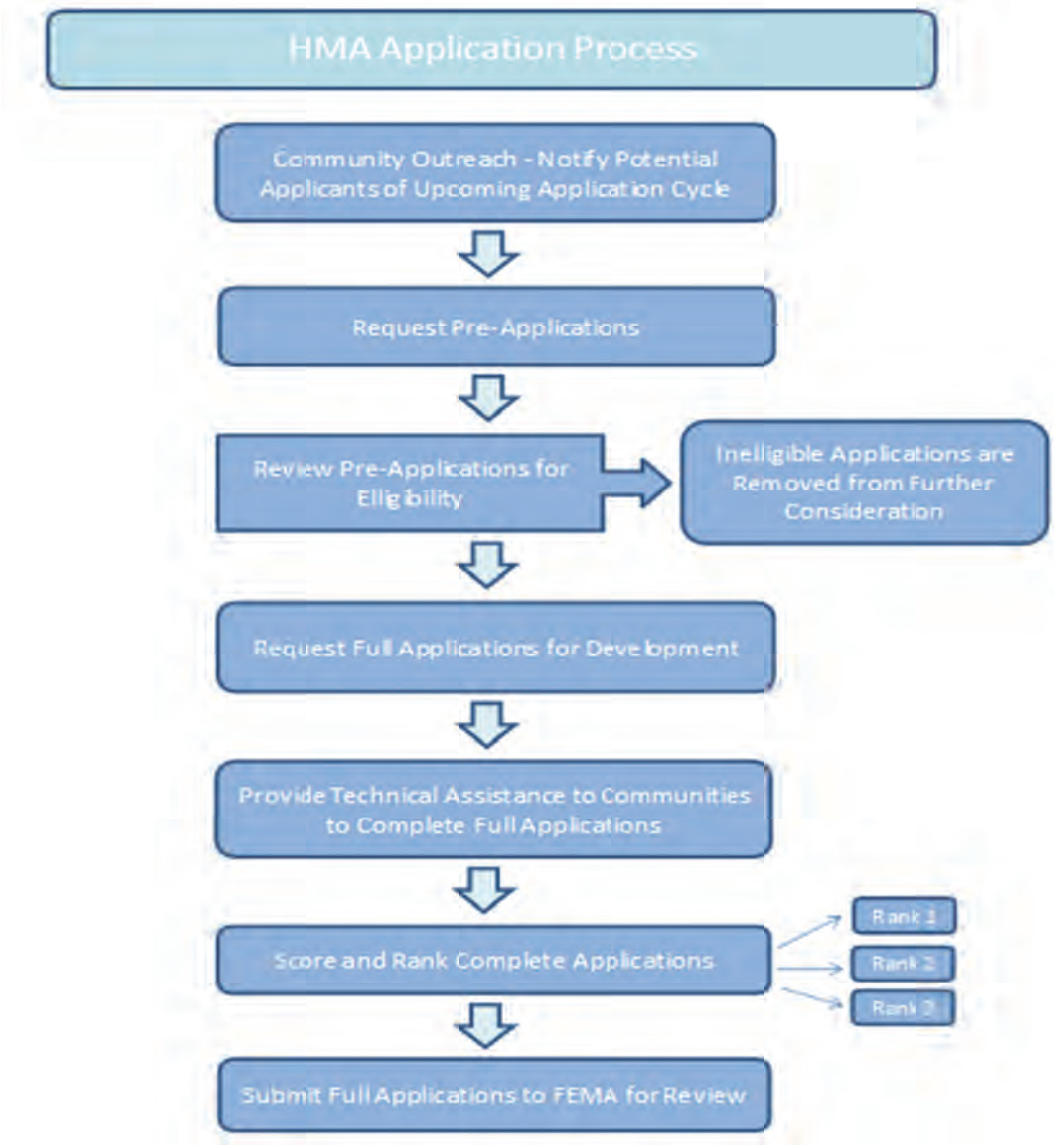


Figure 6.3 shows the steps the State takes in working with potential applicants on the development and submittal of eligible project applications. The application process starts with either a disaster declaration for HMGP or a Notice of Funding Availability for the non-disasters programs (FMA and PDM). Supplemental information is provided on each of the steps.

Outreach: Application information is developed and posted on the GEMA/HS website and distributed through emergency management agency directors as well as through press releases. Appendix H provides information on the DR4338 HMGP application process. For HMGP, applicant briefings are conducted in the declared counties.

Due to the competitive nature of the non-disaster HMA programs, the State does a selected outreach based on priorities established by FEMA. For FMA, outreach focuses toward communities having Severe Repetitive Loss properties. PDM outreach targets communities with the ability to provide the non-Federal share and meet the priorities established for the application cycle.

Pre-Applications: Pre-applications are reviewed for funding potential and pre-screened for HMA eligibility. An initial BCA is completed on all project submittals. Only eligible applications are recommended for full application development. Ineligible applications are removed from further consideration.

Technical Assistance: The State Mitigation staff works closely with potential applicants and provides technical assistance on completing applications. GEMA/HS uses the FEMA application completeness template to ensure that adequate information has been provided to document HMA minimum requirements.

Applications: The BCA is finalized based on data in the full application. Completed applications that meet the minimum program requirements are scored and ranked as described in Section 6.2.3 prior to submission to FEMA. The Hazard Mitigation Manager makes a recommendation to the GEMA/HS Director, who makes the final decision regarding which projects to forward to FEMA for consideration.

GEMA/HS's simplified application process allows the State to react to any grant funding opportunity quickly. In the event of a major disaster declaration, GEMA/HS can provide the needed outreach and technical assistance to its communities. Also, the GMIS database allows GEMA/HS to identify communities that are eligible for a particular program such as the FMA program, which targets SRLPs and RLPs.

HMGP Performance

Within the past four years (since October 1, 2013), the State has implemented the HMGP for seven new Presidential Disaster Declarations and has continued to manage the HMGP for six other disasters. All HMGP applications are submitted through FEMA's NEMIS system, and only projects submitted by the State's deadline are eligible for consideration.

For the disaster designated DR1973, the State took advantage of the Pilot Program offered by FEMA and requested additional time to develop one project to take advantage of the de-obligated funds associated with the disaster. This application was sufficient to expend the allocation.

For DR4165, DR4215, and DR4259, the State completed the grant application process within the approved HMA application timeframe. Based on the 12-month lock-in amounts, a sufficient number of projects were identified through the pre-application process, and the State has completed its work with local governments on their submission of fully developed project applications. Alternate sites were identified in each allocation to take advantage of any de-obligated funds.

For DR4284, DR4294, DR4297, and DR4338, the State is still working with local governments to complete the application process.

Table 6.6 provides a snapshot as of September 30, 2017 for each Presidential Disaster Declaration of the number of HMGP projects approved and managed by the State during this plan update cycle. The State had previously closed out the HMGP for 15 disasters declared prior to 2013. This table provides a good indication of the numbers of grants and amount of federal funding the State has effectively managed or is currently managing in the HMGP programs since October 1, 2013. An asterisk after the disaster number indicates that the disaster is closed. Disasters 1686, 1750, 1761, and 1833 were closed during this update cycle. All work on Disaster 1858 has been completed and the disaster is projected to close in the next federal fiscal year. The federal funds expended column includes grantee and subgrantee administrative funds. Since the last update, the State has received approval on 56 additional projects, closed 144 projects, and processed expenditures of more than$19 million.

Table 6.6 Hazard Mitigation Grant Project Summary October 1, 2013 – September 30, 2017

Disaster	Approved Projects		Open Projects	Closed Projects		Federal Funds Expended	
	Last 4 Years	Total	Total	Last 4 Years	Total	Last 4 Years	Total
DR1686*	0	58	0	6	58	$761,335	$8,877,853
DR1750*	0	7	0	1	7	$0	$932,979
DR1761*	0	17	0	4	17	$32,056	$1,775,988
DR1833*	0	46	0	12	46	$405,828	$5,450,849
DR1858	0	95	3	69	92	$8,729,888	$27,764,486
DR1973	0	49	3	42	46	$2,785,391	$3,806,118
DR4165	34	34	25	9	9	$5,797,069	$5,797,069
DR4215	10	10	9	1	1	$249,330	$249,330
DR4259	9	9	9	0	0	$157,104	$157,104
DR4284	1	1	1	0	0	$67,572	$67,572
DR4294	1	1	1	0	0	$12,940	$12,940
DR4297	1	1	1	0	0	$15,224	$15,224
DR4338	0	0	0	0	0	$0	$0
Subtotal	**56**	**328**	**52**	**144**	**276**	**$19,013,738**	**$54,907,513**

* indicates the disaster is closed.

Non-Disaster Programs Performance

Within the past four years (since October 1, 2013), the State has taken advantage of the non-disaster programs within the Hazard Mitigation Assistance (HMA) Program. The application intake is managed through FEMA's eGrants system, and only projects submitted by the State's deadline are eligible for consideration. The State has submitted a successful grant application(s) for each fiscal

year allocation of HMA. Each of the project applications submitted to FEMA had sub-applications that were reviewed and approved by FEMA Regional/HQ staff.

Tables 6.7 and 6.8 provide snapshots as of September 30, 2017, for each of the non-disaster programs of the number of projects approved and managed by the State during this plan update cycle. The State had previously closed out the FMA program for all 13 allocations prior to 2012, closed out the PDM program for seven allocations prior to 2012, and closed out the RFC program for both allocations. These tables provide a good indication of the numbers of grants and amount of federal funding the State has effectively managed or is currently managing in the various mitigation programs. An asterisk after the program year indicates that the allocation is closed. The Mitigation staff's program management ability is effectively demonstrated by their success in each year of the HMA Program for both the Pre-Disaster Mitigation Competitive Program (including LPDM) and the Flood Mitigation Assistance Program funding cycles.

FMA Project Summary

Over the past four years, the State submitted applications for the FMA program in each year's funding opportunity. All projects were selected in the FMA13, 14, and 16 grants cycles. Projects submitted in the FMA15 grant cycle were deemed eligible but not selected. Grant announcements have not been received for the FMA17 grant cycle. Due to the increased disaster activity in 2014 through 2017, most of the local government projects submitted during this timeframe were handled with HMGP funds. The other projects submitted through the HMA application cycle were submitted through the PDM program. All of the submitted applications for the FMA program have been deemed eligible for funding consideration.

Table 6.7 Flood Hazard Mitigation Assistance Project Summary October 1, 2013 – September 30, 2017

Program Year	Approved Projects		Open Projects	Closed Projects		Federal Funds Expended	
	Last 4 Years	Total	Total	Last 4 Years	Total	Last 4 Years	Total
FMA13	4	4	2	2	2	$770,434	$770,434
FMA14	3	3	3	0	0	$814,814	$814,814
FMA16	3	3	3	0	0	$15,053	$15,053
Subtotal	10	10	8	2	2	$1,600,301	$1,600,301

PDM Project Summary

Over the past 4 years, the State completed the grant submission for the non-disaster grant programs for 2013 PDM-C, 2014 PDM-C, 2015 PDM-C, 2016 PDM-C, and 2017 PDM-C programs. All 18 of the non-disaster applications submitted to FEMA for PDMC13-PDMC16 were complete, technically feasible, and eligible project applications, of which all 18 were approved. FEMA has not completed their review of the PDMC17 applications submitted.

Over the past four years, all work has been completed for the PDMC09 through PDMC13 and LPDM08 and LPM10 programs. All projects have been completed, and these allocations are closed out or going through closeout. The other open program allocations are progressing on schedule. Since the last update, the State has received approval on 18 additional projects, closed 11 projects, and processed expenditures of more than $5.5 million.

The State has submitted a total of 82 competitive applications in the Pre-Disaster Program since its inception in 2002 through the 2016 program year. Eighty-three (83%) of these projects have been selected and awarded federal funds. Table 6.8 also includes information on the legislative directed projects through this program. The State has successfully worked with each of the legislative directed communities to develop projects to meet this directive. Where possible, the State has worked diligently to assist local governments to develop these projects consistent with the goals of the competitive nature of the program.

In summary, the State has been very successful in applying for and receiving approvals for projects submitted through the competitive HMA program. To date, almost 86% of the competitive projects submitted to FEMA have been approved.

Table 6.8 Pre-Disaster Mitigation Program Summary October 1, 2013 – September 30, 2017

Program Year	Approved Projects		Open Projects	Closed Projects		Federal Funds Expended	
	Last 4 Years	Total	Total	Last 4 Years	Total	Last 4 Years	Total
PDMC09*	0	2	0	1	2	$851	$662,606
PDMC10**	0	3	2	1	1	$1,338,541	$1,478,279
PDMC11*	0	4	0	4	4	$2,065,130	$2,287,334
PDMC12*	0	2	0	2	2	$384,115	$384,115
PDMC13**	5	5	5	0	0	$710,055	$710,055
PDMC14	4	4	4	0	0	$467,450	$467,450
PDMC15	4	4	4	0	0	$212,543	$212,543
PDMC16	5	5	5	0	0	$36,906	$36,906
PDMC17	0	0	0	0	0	$0	$0
LPDM08	0	8	0	1	8	$43,788	$966,030
LPDM10	0	2	0	2	2	$275,100	$284,184
Subtotal	**18**	**39**	**20**	**11**	**19**	**$ $5,534,478**	**$7,489,500**

* indicates the allocation is closed.

** indicates all work is completed.

6.3.2 PREPARING AND SUBMITTING ACCURATE ENVIRONMENTAL REVIEWS AND BENEFIT-COST ANALYSIS

Preparing and Submitting Accurate Environmental Reviews

The State of Georgia relies on the FEMA Region IV staff to conduct environmental reviews and prepare the environmental documentation on all submitted mitigation applications.

Preparing and Submitting Accurate Benefit-Cost Analysis (BCA)

As discussed in Section 6.2.2 on project implementation capability, the State has an excellent track record of submitting accurate BCAs that meets FEMA criteria for hazard mitigation projects. For this update cycle, the State completed BCA reviews on 12 HMGP projects for 54 communities and 6 FMA projects.

Basic information the State obtains and uses to conduct accurate BCAs includes, but is not limited to, the following:

- Flood Insurance Study data or historical flood data, including flood frequency, discharge, and elevation;
- Past damages at the project site or in the project area;
- Well-documented cost estimates for the project;
- Useful life of the project;
- Structure type;
- Square footage of the building/s and replacement values along with contents value;
- Function of the facility;
- Associated future maintenance costs;
- Displacement costs;
- Temporary relocation costs;
- Loss of use;
- Elevation certificates or certification from a land surveyor of finished floor elevation; and
- History of power outages caused by natural hazard events.

GEMA/HS Mitigation staff assist in determining the appropriate FEMA-approved BCA module to use for each project. Based on the type of project and the information provided in the pre-application and application, GEMA/HS staff will determine which BCA module will be used to determine the project's cost-effectiveness.

The BCA determines whether the cost of investing in a project today will result in sufficiently reduced damages in the future to justify spending the money on the project. If the benefit is greater than the cost, then the project is cost-effective. Cost-effectiveness is determined by comparing the project cost to the value of damages prevented after the mitigation measure. If the dollar value of the benefits exceeds the cost of funding the project, the project is cost-effective. To arrive at a ratio, the benefits are divided by the costs, resulting in a benefit-cost ratio (BCR). If the result is 1.0 or greater, then the project is cost-effective. If it is less than 1.0, it is not cost-effective. The BCR simply states whether the benefits exceed the project costs and by how much.

A narrative analysis is used when the benefits of a project cannot be easily quantified into specific categories and do not conform to any of the other modules or formats. This analysis allows for a subjective, broad-based approach to quantify the benefits of a project so that all benefits of the project can be recorded and the project objectively assessed. This type of analysis is typically used in the HMGP 5% State Initiative projects.

If the project is cost-effective, it is considered by GEMA/HS for funding consideration and full application development. If the project is not cost-effective, the GEMA/HS Mitigation staff attempts to obtain additional information from the applicant to arrive at a positive BCA. If there is no additional credible data available or all

available data have been used and the project is still not cost-effective, the project is not considered for full application development.

The Mitigation staff's ability to complete accurate BCAs was demonstrated by GEMA/HS's success in all funding rounds to date of the HMA programs. Over the past 4 years, each of the HMGP and FMA projects that were submitted for funding that had BCA's were approved.

6.3.3 QUARTERLY REPORTS

The State of Georgia provides timely, complete, and accurate quarterly progress and financial reports on all funded HMA grants. Separate financial reports are submitted quarterly from the Office of Planning and Budget for each of the open disasters or allocations. For this update cycle, the State submitted all quarterly reports within 30 days of the end of the calendar quarter. Subsequent meetings were held with FEMA staff on each quarterly report submission to discuss any findings or questions. All questions and findings were satisfactorily addressed.

The State provides an enhanced quarterly and financial report on all open mitigation projects. This report includes details on work completed, work remaining, project delays (if any), and all associated financial information. This reporting format has been shared by FEMA at regional meetings with other Region IV states as a model format for other states to follow. The quarterly report submissions also include budget comparison reports on each of the State's open management grants.

GEMA/HS uses an agency-wide computer program to manage all federal grants called the Grants Management System (GMS). Some of the major features included in the system are:

- The ability to view key dates, funding amounts, status, expenditures, itemization of subgrants, and current balances for all federal grant allocations;
- The ability to add/view/track key dates, funding amounts, applications data, status, expenditure history, adjustment history, progress report history, closeout details, correspondence, and current balances on all plans, applications, and subgrants;
- Automated subgrantee Progress Report generation and the creation of FEMA Quarterly Progress Report from the subgrantee reports;
- The ability to generate and track correspondence (paper and email) tailored by subgrants; and
- The ability to generate dozens of standard reports and user-created ad hoc reports.

One of the significant enhancements of this system is the ability to create quarterly reports for FEMA that include additional information on activities completed in the quarter, with all activities tied back to the milestones for the project. This new report format was developed and has been utilized for all quarterly report submissions for this plan update cycle.

Upon project approval notification from FEMA, a State/Local Grantee/Subgrantee Agreement is prepared by GEMA/HS and sent to the subgrantee for signature. Upon receipt of the signed agreement, the GEMA/HS Director signs the agreement and a fully executed agreement is sent to the subgrantee with instructions to start the project. The signed agreement requires the subgrantee to submit quarterly status reports within 15 days of the end of the quarter. Due dates are January 15, April 15, July 15, and October 15. As noted above, GEMA/HS uses GMS to generate the subgrantee quarterly report, which is emailed to the project point of contact. The reports include financial information current as of the end of the quarter as well as grant status information current as of the end of the previous quarter. The counties update the status and return the reports to their assigned planner or specialist, who then inputs the updated information into the GMS system. As an incentive to receiving timely quarterly reports from each subgrantee, the State requires all reports to be current in order to process progress payments.

Quarterly report information was also submitted in FEMA's NEMIS system for HMGP open projects starting on July 1, 2014. This process continued until FEMA discontinued this requirement on September 30, 2016. The NEMIS quarterly report information for HMGP projects is now submitted via an Excel spreadsheet starting with the quarter beginning on October 1, 2016. Also included in the quarterly report submission starting for the quarter beginning on January 1, 2015, is another Excel spreadsheet for reporting properties acquired in the quarter for the HMA Portfolio Manager.

The quarterly report consists of a letter with narrative information regarding each open grant program as well as information on other activities that the Mitigation staff has been involved in for the quarter. In addition, a project summary spreadsheet is completed for each program detailing the status of each funded program, listing both closed and open projects. The GMS printout, budget comparison reports, NEMIS HMGP spreadsheet, and HMA Portfolio Manager complete the quarterly report package.

In addition to the quarterly report submitted for each of the open projects, the Office of Planning and Budget submits the FF 20-10 financial reports and the PMS 272 Federal Cash Transaction Report for each of the open disasters. The submitted reports are consistent with SMARTLINK and based on the approved supplements received from FEMA. When GEMA/HS's internal financial tracking system, based on supplements received, is not in balance with SMARTLINK, the State notifies FEMA program staff to get the missing supplements so the reports will balance at the end of each quarter.

6.3.4 GRANT COMPLETION AND CLOSEOUT

For this update cycle, the State closed 144 HMGP projects in eight disasters and 12 projects in six non-disaster programs. Four disaster and six non-disaster programs were successfully closed.

The following summarizes the process that the Mitigation staff follows in monitoring approved grants and completing project and declaration closeouts within established performance periods, including financial reconciliation.

The State/Local Grantee/subgrantee Agreement now referred to as the Recipient/Subrecipient agreement that is signed by both GEMA/HS and the subgrantee (now subrecipient) requires the subgrantee (subrecipient) to complete the project based on milestones established in the grant application (not to exceed three years from the project obligation date). In addition, for project grants, they are required to submit supporting documentation identified at final inspection within 30 days.

If the subgrantee cannot complete the project within the performance period specified in the grant agreement, a request for a time extension must be submitted to GEMA/HS 90 days prior to the end of the performance period. Requests for time extensions need to explain why the completion date cannot be met, how much of the project work remains, and an estimated date for completion. If an extension request for any project means that the activity period will go beyond the state's performance period (or closeout date for disasters), GEMA/HS will request up to a one-year time performance extension. This request will be submitted to FEMA 60 days prior to the end of the performance period.

All mitigation projects that receive federal funding go through the same financial reconciliation as part of the closeout process. The State Mitigation staff utilizes the signed grantee-subgrantee agreement with each applicant to monitor progress on the project and ensure that it is on track. Site visits are scheduled as necessary. Upon written notification of project completion, GEMA/HS Hazard Mitigation staff conducts a final inspection to ensure the project is completed per the terms of the agreement, verifies the GPS coordinates, and takes photographs of each mitigated property. For planning grants, GEMA/HS Hazard Mitigation staff conducts a desk audit to verify that the approved scope of work has been completed. As part of the final inspection, all financial documents are reviewed to ensure that only allowable costs are reimbursed consistent with Office of Management and Budget circulars. Project closeout requests are made to FEMA upon completion of final inspection and financial reconciliation on a project-by-project basis. In the project closeout request, GEMA/HS

certifies to FEMA that costs incurred in the performance of eligible work are documented, allowable, and consistent with all Federal requirements, that the approved work was completed, and that the mitigation measure is in compliance with the Federal-State Agreement (for the HMGP) or Agreement Articles (for non-disaster programs) and the State/Local Assistance Agreement. GEMA/HS Mitigation staff will prepare a project closeout worksheet, which is submitted to FEMA Region IV along with a request to close the grant. The financial reconciliation and project closeout requests are completed within 90 days of the final inspection. Upon receipt of final claim amounts from FEMA, any remaining funds are liquidated and a closeout notice is sent to the subgrantee.

When all projects are completed and closed out for the disaster declaration, GEMA/HS prepares the Declaration Closeout Letter and final financial status report, SF425, for the HMGP and forwards it to FEMA.

The subgrantee and grantee closeout reports are valuable for not only historical purposes and in monitoring projects for adherence to certain grant agreements such as open space deed restrictions, but they are also valuable in documenting disaster avoidance and developing success stories. The closeout reports, including those properties that have been acquired, have been shared with the Department of Natural Resources Floodplain Management staff, who uses it during community assistance contacts and visits. In addition, during these visits, floodplain management staff can monitor the acquired sites to ensure that the subgrantees have adhered to the required deed restrictions. This information is also utilized to support Risk MAP Discovery and Resilience workshops.

6.4 ASSESSMENT OF MITIGATION ACTIONS

44 CFR 201.5(b)(2)(iv) states that the Enhanced Plan must document the system and strategy by which the State will conduct an assessment of the completed mitigation actions and include a record of the effectiveness (actual cost avoidance) of each mitigation action.

6.4.1 SYSTEM TO TRACK THE ASSESSMENT OF MITIGATION ACTIONS

The State utilizes the Georgia Mitigation Information System (GMIS) to track the assessment of completed mitigation actions and include the effectiveness or actual losses avoided for each action. The information collected on each site that has had a mitigation action completed includes:

- funding source,
- project number,
- applicant,
- property address,
- parcel number,
- GIS coordinates,
- mitigation action,
- structure size,
- replacement value of property mitigated (structure and contents),
- damage source,
- hazard data,
- elevation data,
- cost,
- benefits,
- repetitive loss number,
- avoided losses,
- last inspection date, and
- project closeout date.

The State Hazard Mitigation Division is currently populating the database for all completed and closed projects within the HMGP and PDM programs. The database is greater than 99% completed, with 2,468 records in the system as of September 30, 2017. The State continues to populate the database with information from older disaster allocations. The database is updated by State Hazard Mitigation Division staff on completed mitigation projects as part of the closeout process.

Repetitive Loss Property Tracking

The State of Georgia targets repetitive loss properties for mitigation through all of FEMA's HMA grants. GEMA/HS's Hazard Mitigation staff utilizes the GMIS to track mitigation actions on repetitive loss properties. When data is entered into GMIS for each mitigated property record, GEMA/HS staff reviews the NFIP repetitive loss data base and adds the repetitive loss property number to the record if the property is in FEMA's database. Authorized users of GMIS can run a report to determine the history of mitigation actions on repetitive loss properties.

Property Monitoring and Reporting

The acquisition of flood-prone structures and conversion of the land to open space is a common mitigation activity utilized by local governments. 44 CFR 80.19(d) outlines the land use and oversight criteria for properties acquired with HMA funds. Section 80.19(d) requires the subgrantee to submit a report every three years certifying that the deed restricted property has been recently inspected and the property continues to be maintained consistent with the deed restrictions. GEMA/HS Hazard Mitigation staff utilizes the GMIS to assist the subgrantee in meeting this requirement.

When a property acquisition project is completed, a record is added to GMIS for each of the acquired and deed-restricted properties. Every three years, GEMA/HS Hazard Mitigation staff utilizes GMIS to pull a list of acquired properties needing certification. This list is sent to the subgrantee (now subrecipient) along with a request to verify the properties are being maintained according to the deed restrictions. Upon receipt of the certification, GEMA/HS submits the certification to FEMA. The most recent three year certification data was submitted to FEMA on September 17, 2017 for the 37 communities in Georgia that have deed restricted properties.

GMIS was migrated to a new platform with enhancements that were completed by December 2014. Enhancements include improvements in the mapping capability, as well as the user interface. Multiple types of maps were included, including, but not limited to basic street maps, aerial photography, and USGS maps. The updated system includes a better interface to the Building Land Lease Inventory of Properties (BLLIP) in order to display state owned and operated facilities. The user interface now includes two methods of updating local critical facility information. The system provides a streamlined, progression of steps where the user can enter data, step by step, to add or update their local critical facilities. If a community has multiple facilities to add or update, the enhanced system now provides a "bulk upload" process by which a community can upload a Microsoft Excel sheet with their updated data without having to manually edit each individual facility, one at a time, online.

6.4.2 STRATEGY TO ASSESS MITIGATION ACTIONS

The following action steps will be taken to effectively assess completed mitigation actions in Georgia:

- Finish the process of populating the Mitigated Properties Database on all completed mitigation projects that are administered by GEMA/HS.
- Incorporate mitigation activities completed by other agencies into the Mitigated Properties database.
- Review Hazard Event information submitted to GEMA/HS to determine the potential for loss reduction as a result of all completed mitigated actions documented in the Mitigated Properties system.
- Upon determination that the completed mitigation action resulted in a reduction of damages, enter data into the Mitigated Properties database and compute the damages avoided for each structure mitigated.

Local governments will be able to access the data in GMIS for their community and pull reports for their counties and municipalities on completed mitigation actions and any avoided losses as a result of hazard events documented in the project area after the projects are completed.

Record of Actual Cost Avoidance

A critical component to estimate the actual avoided losses is having accurate information on the hazard event and information about the exposure of the property to damages. Scenario losses are computed based on established hazard damage relationships such as depth damage curves for wind and flood events provided by FEMA in benefit-cost modules. For flood events, avoided losses can be computed by determining how much flooding would have occurred at the site by comparing the finished floor elevation data with the water surface elevation of the hazard event. Applying the depth damage curves and additional information collected allows one to compute scenario losses at the site that would have occurred if the structure had not been mitigated.

Studies were conducted by FEMA and the State on the effectiveness of completed mitigation actions (acquisitions) in the cities of Newton and Albany and Dougherty County during the 1998 flood event. Additional successes were documented in Douglas and DeKalb counties after the Hurricane Ivan event in 2004. In the previous updates to the Enhanced Plan, the data from the previous studies were added to the Loss Avoidance Section of each mitigated property. For the events for which we had high water marks, a depth of flooding was computed and the scenario losses from the BCA for the depth of flooding were inputted into each record.

In the aftermath of the September 2009 flood event, the State worked with FEMA on a Loss Avoidance Study in the declared counties that had completed mitigated properties. FEMA completed the final study and provided the results to the State in November 2010. The State has populated the “Avoided Losses” section for each mitigated property record in GMIS. In addition, the State has utilized the methodology that is documented in the 2009 Loss Avoidance Study to compute additional losses for all other projects in the counties declared for DR1833 and DR1858. Because high water marks were not available in all projects, the State utilized USGS gauge data to compute the water surface elevation for the declared flood events. The water surface elevation was compared to the base flood elevation. This information was transferred, where practicable, to each of the project sites impacted by DR1833 so that depth of flooding could be computed for properties that had both a finished floor elevation and base flood elevation. Damages have been computed for each of the projects along the main stem of the Flint River for DR1833 declared counties. This information has been incorporated into the “Mitigated Properties” section of GMIS.

A localized flood event in August 2012 impacted an area in Tift County where property acquisition had just been completed. Applying the methodology described above, seven properties that had just been acquired would have received flood damages estimated at $338,765.

Since the last State Plan Update, there have been three Presidential Disaster Declarations for flooding in Georgia. In the aftermath of the Christmas 2015 flooding, the State worked with FEMA on a Loss Avoidance Study in the declared counties that had completed property acquisitions and elevations. FEMA completed the final study (see Appendix H) and provided the results to the State in 2016. For this event, the study showed that nearly $5.2 million in losses were avoided as a result of property acquisitions completed in Baker, Dougherty, and Lee Counties. The study goes on to show that for the 40 properties acquired, the return on investment has exceeded the initial project cost by a factor of 2.83 thus verifying that the acquisition of structures in the flood plain continues to be a very cost-effective mitigation action. The State has populated the “Avoided Losses” section for each of the 40 mitigated property records in GMIS.

In the aftermath of the Hurricane Matthew disaster, the State requested the Individual Assistance Home Inspection Reports that provided information on depth of flooding for structures whose property owners filed for Individual Assistance. GEMA/HS utilized this information to analyze areas that were near or adjacent to these properties. By computing a water surface elevation near these mitigated properties, the State can then utilize the methodology to compute avoided losses to structure, contents and displacement as was done in prior losses avoided studies.

In the aftermath of the Hurricane Irma disaster, the State also requested the Individual Assistance Home Inspection reports to go through the same methodology as was used in Hurricane Matthew. FEMA offered technical support to complete the losses avoided studies for both Hurricanes Matthew and Irma using this information and methodology. The FEMA Loss Avoidance studies for Matthew and Irma (see Appendix H) evaluated 94 properties acquired in five neighborhoods. For Hurricane Matthew, 72 properties acquired by the City of Savannah at a cost of $5.8 million has losses avoided of $6.6 million. For Hurricane Irma, 71 properties acquired by the City of Savannah at a cost of $6.3 million has losses avoided of $5.4 million.

In discussions with FEMA, it was noted that the study was not inclusive of all areas where properties had been acquired in the City of Savannah and Chatham County. The state utilized the methodology by FEMA and expanded the study to all areas in Chatham County where property acquisitions had been completed. For Hurricane Matthew, 64 additional properties in eight neighborhoods mitigated at a cost of $5.5 million has losses avoided of $3.3 million. For Hurricane Irma, 59 additional properties in four neighborhoods mitigated at a cost of $2.4 million has losses avoided of $3.1 million. This information is provided as a supplement to the FEMA Loss Avoidance Study. For Hurricane Matthew, 136 properties acquired by the City of Savannah and Chatham County has losses avoided of $9.9 million. For Hurricane Irma, 130 properties acquired by the City of Savannah and Chatham County had losses avoided of $8.6 million. Table 6.9 has been updated to include losses avoided for these three additional flood events.

Currently, there are 649 records in the database totaling $63.9 million in losses avoided. Table 6.9 provides a record of the actual losses avoided for all HMA applicants. The return on investment (ROI) was calculated for each individual building for each event that was analyzed. The ROI reflects only the damage and project costs related to the buildings in the analysis or just those buildings where actual losses avoided were computed. The mitigation effectiveness reports for each of the three disasters (DR4259, DR4284, and DR4338) are included in Appendix H.

Table 6.9 Actual Losses Avoided Summary

Applicant	Buildings in Analysis	Project Investment	Total Loss Avoided	Return on Investment
Augusta–Richmond County	1	177,948	59,011	0.33
Baker County	3	62,431	218,010	3.49
City of Albany	62	925,582	3,170,028	3.42
City of Chickamauga	49	2,140,887	3,279,171	1.53
City of Newton	25	340,880	864,221	2.54
City of Savannah	1	118,971	89,306	0.75
Cobb County	59	7,315,380	9,495,265	1.30
Decatur County	8	774,276	1,278,799	1.65
DeKalb County	80	26,808,903	12,137,155	0.45
Dougherty County	19	2,827,481	1,317,732	0.47

Applicant	Buildings in Analysis	Project Investment	Total Loss Avoided	Return on Investment
Douglas County	13	704,332	3,396,316	4.82
Douglas County Water and Sewer Authority	4	535,829	429,704	0.80
Gwinnett County	2	261,481	1,677,448	6.42
Lee County	7	398,095	231,890	0.58
Mitchell County	2	109,718	115,310	1.05
Tift County	7	996,830	338,765	0.34
Town of Trion	1	4,465,893	2,138,183	0.48
Lee County*	16	1,317,591	3,262,577	1.97
City of Albany*	16	293,883	1,858,293	6.25
Dougherty County*	3	143,860	481,068	3.24
City of Newton*	3	44,647	168,968	3.78
Baker County*	2	35,229	132,533	3.76
Chatham County*	13	1,395,324	523,430	0.38
City of Savannah*	123	9,989,145	9,397,612	0.94
Chatham County*	12	1,036,492	347,741	0.34
City of Savannah*	118	7,705,519	8,246,384	1.07
Totals	**649**	**70,926,557**	**63,948,563**	**0.90**

* New losses avoided since last plan update.

It is interesting to note that with less than 20 years of history in evaluating projects where mitigation has been completed, there are several areas where the ROI exceeds 1. This suggests that mitigation activities have been completed in areas where hazard events continue to occur.

The GMIS database will be an ongoing tool to capture success stories on future disaster events. By capturing information at the property level, the State can at any time create a report on the effectiveness of any completed mitigation project.

6.5 EFFECTIVE USE OF AVAILABLE MITIGATION FUNDING

44 CFR 201.5(b)(3) states that the Enhanced Plan must demonstrate that the State effectively uses existing mitigation programs to achieve its mitigation goals.

The State of Georgia continues to effectively implement hazard mitigation programs toward achieving its goals to

- Reduce human vulnerability to hazard events,
- Reduce the losses associated with hazard events, and
- Reduce overall exposure to hazard events for Georgia citizens and their property.

The mitigation programs utilized in implementing mitigation measures throughout the state are primarily federally funded and state administered. These programs include the Hazard Mitigation Grant Program (HMGP), the Flood Mitigation Assistance Program (FMA), the Pre-Disaster Mitigation Program (PDM), and the Emergency Management Performance Grants. The state provides financial assistance with the non-federal share on the implementation of the HMGP in declared counties. The state also provides financial assistance with HAZUS analysis and reports for local plan update projects. The Repetitive Flood Claims Program (RFC) data have been incorporated into the FMA program. The projects that have been approved and funded through these programs support the State's hazard mitigation goals and specific program eligibility criteria.

Project effectiveness can be defined as the ability of a mitigation project to reduce or eliminate the possibility of future damage or human suffering. There are three levels of project effectiveness. High effectiveness is given to projects that create the most effective type of mitigation, such as property acquisition or relocation where no damage would occur in the event of a future disaster. Medium effectiveness entails projects that reduce the likelihood of future damage; however, in the event of an uncommonly severe disaster event, property damage and human vulnerability might still occur. Low effectiveness refers to projects that provide relatively low and short-term, limited hazard prevention levels or those projects where benefits are difficult to quantify. Table 6.10 lists potential mitigation projects and their effectiveness.

Program effectiveness can be defined as the ability of a mitigation program to fund the most projects to reduce or eliminate the possibility of future damage or human suffering. There are three levels of program effectiveness. A rating of High is given to programs that fund the most projects (>50% of total funds allocated). Medium effectiveness refers to programs that fund fewer projects that reduce the likelihood of future damage (between 20% and 50% of total funds allocated). A low effectiveness rating is given for programs that fund the fewest number of projects (<20% of total funds allocated).

Table 6.10 Effectiveness of Potential Mitigation Projects

Project Type	Level of Effectiveness	Rationale
Acquisition	High	Removes structure and inhabitants from hazard area
Elevation	Medium	Reduces damages but structure and inhabitants have residual risk
Acquisition/Relocation	High	Removes structure and inhabitants from hazard area
Acquisition/Elevation	Medium/High	Combination of effectiveness as noted in each project type
Acquisition/Drainage	Medium/High	Combination of effectiveness as noted in each project type
Retrofit (Wind, Flood, Safe Rooms Lightning)	Medium	Reduces damages but structure and inhabitants have residual risk
Drainage Improvement	Medium	Reduces damages but structure and inhabitants have residual risk
Warning/Initiative	Low/Medium	Projects are short term and inhabitants have residual risk
Planning	High	Guide for developing and implementing mitigation measures
Safe Room	High	Protects inhabitants from tornadoes
Generators for Critical Facilities	High	Reduces damages by maintaining operational capability of critical infrastructure and resources
Management	High	Technical support for developing and implementing mitigation measures
Advance Assistance	High	Technical support for developing mitigation measures

Table 6.11 provides a summary of FEMA funding programs used for mitigation projects. The list ties each program with the associated State Mitigation Goal, along with a corresponding level of program effectiveness. RFC program information is included with the FMA, and LPDM is included with the PDM information. In addition, the table shows the amount of funds utilized in accomplishing mitigation goals.

Table 6.11 FEMA Funding Programs Used for Mitigation Projects

Program	Number of Projects	Funding (in millions)	% of Total Funds Allocated to GA	Effectiveness	Applicable Goals
HMGP	656	$138.78	69.9%	High	1-3
FMA	60	$14.78	7.4%	Low	1-3
PDM	85	$40.58	20.5%	Medium	1-3
EMPG	152	$4.23	2.2%	Low	1
Total	**962**	**$198.43**	**100**		

Hazard Mitigation Grant Program (HMGP)

Table 6.12 lists information about the HMGP and the funds approved for each federally declared disaster from 1990 through September 30, 2017.The table has been updated to combine information about disasters for which all work was completed prior to this plan update, which includes 19 disasters from DR857 through DR1833. Since 2004, Georgia has provided and made available 10% of all match funds for counties involved in disasters. The State of Georgia will continue to contribute a percentage of the non-federal cost share for all counties included in a Presidential Declaration. GEMA/HS's Hazard Mitigation Division will continue to provide technical assistance to all counties, their municipalities, and state agencies.

Table 6.12 HMGP Funding by Disaster

Disaster	Federal Allocation (NEMIS)	Federal Share Expended	State Share Expended	Local Share Expended	Approved Projects	% of Funds Used
DR857 - DR1833	$110,285,035	$100,421,613	$6,142,387	$35,759,033	456	91.1%
DR1858	$35,438,896	$27,764,486	$3,697,194	$5,169,347	95	78.3%
DR1973	$5,380,886	$4,313,211	$752,603	$785,962	49	80.1%
DR4165	$8,934,568	$5,802,503	$953,648	$1,025,158	34	64.9%
DR4215	$2,309,072	$238,830	$62,305	$14,804	10	10.3%
DR4259	$4,289,893	$146,604	$36,732	$51,277	9	3.4%
DR4284	$19,490,976	$67,572	$22,510	$0	1	0.4%
DR4294	$2,862,541	$12,940	$4,314	$0	1	0.5%
DR4297	$5,753,037	$15,224	$5,075	$0	1	0.3%
DR4338	$21,601,849	$0	$0	$0	0	0%
DR1858 - DR4338	$106,061,718	$38,361,370	$5,534,381	$7,046,548	200	36.2%
Total	**$216,346,753**	**$138,782,984**	**$11,676,769**	**$42,805,581**	**656**	**64.2%**

Any unused mitigation program funding was a result of unavailable non-federal match by counties, uninterested property owners, and/or insufficient program funds to implement prioritized mitigation actions.

Program Highlights

Through the HMGP, local governments have permanently mitigated losses through the acquisition of 1,396 flood-prone properties. Another 89 flood-prone properties have been elevated, 36 retrofits (predominantly wind related) have been completed, and four safe rooms have been constructed. Rounding out the activities, 469 outdoor warning sirens and 24 mass alert systems have been installed 35 drainage improvement projects completed, and 72 generators for critical facilities. The program also funded the initial development of 20 local mitigation plans, 179 local plan updates, and the initial development of and two updates to the State Mitigation Plan. Table 6.13 summarizes the number of projects and project types funded through the HMGP and their associated State Mitigation Goal.

Since the last plan update, the State has effectively utilized initiative funding from the HMGP to improve its warning and communication capabilities. For disasters DR4165 through DR4338, the State prioritized the use of the HMGP funds for projects in the declared counties that reduce or eliminate damages to life and property. The State utilized the 5% initiative category to improve the warning and communication capabilities of local governments in the declared counties and also gave preference to those projects that help local governments maintain or achieve storm-ready status. In addition to projects involving outdoor warning sirens, there was an increased interest in mass alert systems and weather radio projects. The state utilized the 7% planning category to fund local plan updates. The regular project category was utilized to fund generators for critical facilities, safe rooms, drainage improvements, and the acquisition and/or elevation of flood prone properties.

For disasters DR4165 through DR4338, the Enhanced Plan provided an additional $15.3 million to the State of Georgia for HMGP projects. These additional funds were made available to the declared counties to address warning and communication enhancements, generators for critical facilities, community safe room projects, and

the mitigation of substantially damaged and floodprone properties through property acquisition and/or structure elevation.

Table 6.13 Projects Funded with HMGP

Program	Project Type	Number of Projects	Goal
HMGP	Acquisition	90	2
	Elevation	2	2
	Acquisition/Elevation	4	2
	Acquisition/Drainage	2	2
	Retrofit (Wind, Flood, Lightning)	15	1,2
	Drainage Improvement	49	2
	Warning/Initiative	254	1
	Planning	186	1,3
	Safe Room	7	1,2
	Generators	13	2
	Management	28	1,2,3
	Advance Assistance	6	1,2,3

Flood Mitigation Assistance (FMA) Program

The State has facilitated the use of FMA funds by local governments for the development of flood hazard mitigation plans and projects since the program was initiated in 1997. Planning grants were initially targeted to the communities with the largest number of repetitive loss properties identified by FEMA. All communities with 10 or more repetitive loss properties received funding to develop an FMA plan. Project grants have been targeted to the communities with the largest number of repetitive loss properties that meet the planning requirements. The availability of local match funds has hindered many local governments from pursuing project grants. Table 6.14 lists information through September 30, 2017, about the FMA funds approved since the program has been in existence. The table has been updated to combine information about allocations for which all work was completed prior to this plan update, which includes 13 allocations from 1997 through 2009.

Program Highlights

Through the FMA project grants, local governments have permanently mitigated losses through the acquisition of 42 NFIP-insured properties. Another two NFIP-insured properties have been elevated, and another eight properties have been protected through a drainage improvement. The program also funded the development of 11 FMA plans and the initial development of three local mitigation plans. Table 6.15 summarizes the number of projects and project types funded through the FMA and their associated State Mitigation Goal.

Table 6.14 FMA Funding

Fiscal Year	Total Approved	Federal Share	State Share	Local Share	Approved Projects
FMA97-09	$8,797,602	$6,412,469	$138,192	$2,246,941	46
FMA13	$1,373,561	$1,373,561	$0	$0	4
FMA14	$1,198,931	$1,198,931	$0	$0	3
FMA16	$2,745,108	$2,554,163	$32,511	$158,434	3
Total	**$14,115,202**	**$11,539,124**	**$170,703**	**$2,405,375**	**56**

Table 6.15 Projects Funded with FMA

Program	Project Type	Number of Projects	Applicable Goal
FMA	Acquisition	24	2
	Elevation	2	2
	Planning	13	1,3
	Drainage Improvement	2	2
	Management	14	1,2,3
	Technical Assistance	1	1,2,3

Repetitive Flood Claims (RFC) Program

The State has facilitated the use of RFC funds by local governments for the development of acquisition projects to permanently mitigate flood damages to NFIP-insured structures. Table 6.16 lists information about the RFC funding received through September 30, 2013.

Table 6.16 RFC Funding

Fiscal Year	Total Approved	Federal Share	State Share	Local Share	Approved Projects
RFC06 - RFC07	3,243,615	3,243,615	0	0	4

Program Highlights

Through the RFC project grants, local governments have permanently mitigated losses through the acquisition of nine NFIP-insured properties. Table 6.17 summarizes the number of projects and project types funded through the RFC and their associated State Mitigation Goal. The Biggert-Waters Flood Insurance Reform Act of 2012 eliminated the RFC program and future funding to mitigate RFC properties will be accomplished with the other HMA programs.

Table 6.17 Projects Funded with RFC

Program	Project Type	Number of Projects	Goal
RFC	Acquisition	2	2
	Management	2	1,2,3

Severe Repetitive Loss (SRL) Program

Georgia did not submit an application for grants through this program after the program's inception in 2008. In the initial roll out of the SRL program, Georgia had fewer than 40 validated SRLPs and did not qualify for an allocation. An analysis of these properties showed that 50% of the properties previously had mitigation activities pursued by local governments, with the majority determined to be not cost-effective. Based on all of the subsequent alternative determination of benefits provided by FEMA for the validated SRLPs based on the greatest savings to the fund, the State identified potential SRLPs that may meet cost-effectiveness because the savings to the fund exceeds the projected acquisition cost based on current tax value. Our outreach to local governments on these SRLPs did not result in any new SRL applications. However, several SRLPs were included in future HMGP grant program applications.

GEMA/HS continues to give prioritization to the mitigation of SRLPs. Issues related to cost-effectiveness have hindered our ability to mitigate SRLPs. The State will continue to work with local governments that have SRLPs to implement cost-effective hazard mitigation measures. The Biggert-Waters Flood Insurance Reform Act of 2012 eliminated the SRL program, and future funding to mitigate SRLPs will be accomplished with the other HMA programs.

Pre-Disaster Mitigation Competitive (PDM-C) Program

The State has facilitated the use of PDM-C funds by local governments for the development of DMA2K-compliant hazard mitigation plans and the implementation of projects that have been identified or that support goals and actions identified in the local mitigation plans. The State provides technical assistance to local governments in the development of fundable PDM applications. Since the program's inception in 2002, the State has been successful in getting federal approval almost 86% of PDM sub-grant applications. Table 6.18 lists information through September 30, 2017, about the PDM funds approved since the program began. The table has been updated to combine information about allocations for which all work was completed prior to this plan update, which includes fourteen allocations from 2002 through 2012. The legislative directed projects (LPDM) are also in the table.

Table 6.18 PDMC Funding

Fiscal Year	Total Approved	Federal Share	State Share	Local Share	Approved Projects
PDMC02-12*	$51,059,084	$35,937,388	$795,581	$15,326,114	54
LPDM08-10*	1,830,236	1,372,363	30,358	427,516	13
PDMC13**	$1,162,476	$710,055	$274,321	$178,101	5
PDMC14	$838,385	$628,789	$69,096	$140,500	4
PDMC15	$1,271,077	$953,307	$133,269	$184,500	4
PDMC16	$1,300,530	$975,398	$114,533	$210,600	5
PDMC13-16	$4,572,468	$3,267,548	$591,219	$713,701	18
Total	**$57,461,789**	**$40,577,299**	**$1,417,158**	**$16,467,330**	**85**

* Closed Allocations

** Work completed and figures reflect final totals

Table 6.19 Projects Funded with PDMC

Program	Project Type	Number of Projects	Goal
PDMC	Planning	23	1,3
	Acquisition	26	2
	Drainage Improvement	7	2
	Elevation	1	2
	Safe Room	1	1,2
	Management	14	1,2,3
LPDM	Acquisition	1	2
	Warning/Initiative	5	1
	Management	3	1,2,3
	Safe Room	3	1,2
	Drainage Improvement	1	2

Program Highlights

Through the PDM-C and LPDM, local governments have permanently mitigated losses through the acquisition of 126 flood-prone properties. Another 116 flood-prone properties have been mitigated through drainage improvements, and five safe rooms have been constructed. The program also funded the initial development of 136 local mitigation plans and one hundred eleven (111) local plan updates. Since the last plan update, the PDMC program has provided funding for 108 local plan updates. Table 6.19 summarizes the number of projects and project types funded through the PDM-C and their associated State Mitigation Goal.

Conclusion

The GEMA/HS Hazard Mitigation Division has administered 801 hazard mitigation projects since 1990. These activities as well as those described above and throughout the plan demonstrate that Georgia effectively uses existing mitigation programs to achieve its mitigation goals.

The State endeavors to continue to pursue these mitigation programs along with additional programs and funding streams in the future to take advantage of every possible opportunity to accomplish our goals. Table 6.20 summarizes the information for all four of the FEMA mitigation grants programs and the funding received in Georgia through September 30, 2017.

Table 6.20 Total Funding all Grant Progams

Total Approved	Federal Share	State Share	Local Share	Approved Projects
$291,167,359	**$194,143,022**	**$13,264,630**	**$61,678,286**	**801**

The State has given priority to the funding of non-structural mitigation projects to eliminate the damages occurring to flood-prone structures, both insured and uninsured. Through September 30, 2017, 1,573 flood-prone structures have been permanently mitigated through the implementation of acquisition projects through the HMA programs.

The State's mitigated properties database is almost 100% completed. Based on information reported to date, 302 properties on FEMA's repetitive loss list have been mitigated primarily through property acquisition. Over 75% of the State's available mitigation funding has been directed to mitigating repetitively damaged structures through acquisition, elevation, or relocation. The State will continue to target these types of properties in future mitigation projects. In addition, GEMA/HS has provided support to local governments in the development of all hazard mitigation plans and projects through the issuance of guidance, education through workshops, and grants.

6.6 COMMITMENT TO A COMPREHENSIVE MITIGATION PROGRAM

44 CFR 201.5(b)(4)(i-vi) states that the Enhanced Plan must demonstrate that each state is committed to a comprehensive state mitigation program. Georgia has a long-standing commitment to support a comprehensive mitigation program. This commitment has been demonstrated through continued support in multiple areas:

- Local mitigation planning
- Legislation enacted that supports mitigation
- Commitment to mitigation through state funding for mitigation projects
- A commitment to assist state and local jurisdictions in reducing risks posed by each of the hazards identified in Chapter 2, including vulnerability to critical facilities
- The continued practice of integrating mitigation into post-disaster recovery.

This section provides a discussion of each aspect of the State of Georgia's commitment, how each aspect has been implemented, and the State's plan to continue implementation.

6.6.1 LOCAL MITIGATION PLANNING SUPPORT

Georgia is committed to supporting local mitigation planning by providing workshops, training, tools, and technical assistance to meet the planning requirements of the Disaster Mitigation Act of 2000. The Hazard

Mitigation Planning staff supports the development of local mitigation plans with dedicated resources, which includes on-site technical assistance and in-county service through the use of field-stationed planners. Additional details on local plan support are provided in Chapter 4. GEMA/HS has acquired funding for local governments to complete the second local plan update cycle and to begin the third cycle.

6.6.2 STATEWIDE PROGRAM OF HAZARD MITIGATION

GEMA/HS and the Hazard Mitigation Division support the development of legislation and executive actions as well as the formation of public/private partnerships that promote hazard mitigation. GEMA/HS tracks and supports legislation of interest to the public safety, homeland security, and emergency management communities, including bills relevant to hazard mitigation. GEMA/HS also partners with other agencies and organizations to leverage support for legislation of common interest. Those entities include the Association County Commissioners of Georgia, the Georgia Municipal Association, the Georgia Fire Chiefs Association, the Georgia Sheriffs' Association, the Georgia Police Chiefs Association, the Georgia Rural Water Association, the Departments of Public Safety and Natural Resources, and others.

Legislation Supporting Mitigation

The Official Code of Georgia Annotated (O.C.G.A.) is the compendium of all laws in Georgia. Georgia has numerous legislative rules that support the mitigation process in the state. Below is a list of this legislation, which is more thoroughly discussed in Chapter 3 and Appendix J.

- Georgia Emergency Management Act of 1981, as amended, O.C.G.A. §38-3-1
- Soil and Water Conservation Districts Law, O.C.G.A. §§2-6-20 to 23 & §2-6-27
- Coastal Marshlands Protection, O.C.G.A. §12-5-280
- Georgia Safe Dams Act of 1978, O.C.G.A. §§12-5-370 to 385
- Erosion and Sedimentation Act, O.C.G.A. §12-7-1
- Georgia Environmental Policy Act, O.C.G.A. §12-16-1
- Metropolitan North Georgia Water Planning District Act, O.C.G.A. §12-5-570
- Uniform Codes Act, O.C.G.A. §8-2-20
- The Uniform Standards Code for Manufactured Homes Act and Installation of Manufactured and Mobile Homes, O.C.G.A. §8-2-130 and §8-2-160
- Georgia Planning Act of 1989, O.C.G.A. §12-2-8
- Georgia Forest Fire Protection Act, O.C.G.A. §12-6-80 to §12-6-93
- Georgia Prescribed Burning Act, O.C.G.A. §12-6-145
- Georgia Geospatial Advisory Council, O.C.G.A. §12-5-9

Mitigation Councils

Georgia State Interagency Hazard Mitigation Planning Team

In July 2006, the State Hazard Mitigation Task Force, now called the State Hazard Mitigation Planning Team (SHMPT), was convened via letter from GEMA/HS Director Charley English. The team was made up of a number of state agencies and was instrumental in updating the State Mitigation Plan. The SHMPT is introduced in Chapter 1, and meeting details are included in Appendix B.

Other Partnerships

Association County Commissioners of Georgia (ACCG) and Georgia Municipal Association (GMA)

The State of Georgia partners with ACCG and GMA to publicize the availability of mitigation program grant funds for local and county governments. In addition, GEMA/HS provides information to ACCG and GMS at their annual meetings.

Geographical Information Systems Coordinating Committee (GISCC)

The Georgia GISCC's vision is that all levels of government become highly effective and efficient through the coordination and use of geospatially related data, standards, and technologies. The GISCC's mission is to be a valued advisor on sustainable geospatial governance, investments, policies, and data-driven decisions influencing Georgia.

The GISCC, formed by the Information Technology Policy Council in July of 1998, is the officially recognized statewide advisory and coordinating body for geospatially related activities, pending legislative approval. The GISCC provides an efficient and effective framework for the collaboration, communication, planning, budgeting, acquisition, utilization, and archiving of all state, regional, and local geospatial resources.

The GISCC leads and encourages continued development and the use of the Georgia Spatial Data Infrastructure (GaSDI), which feeds the National Spatial Data Infrastructure, defined as the "technology, policies, and people necessary to promote geospatial data sharing throughout all levels of government, the private and nonprofit sectors, and academia." The term "infrastructure" is defined as the "underlying base or the basic facilities, equipment, services, and installations needed for the growth and functioning of a community or organization." In the same manner that roads are vitally important to the state's infrastructure, the data, systems, people, and institutional arrangements that make up the GaSDI provide public and private organizations with the foundation for progress.

GISCC members include representatives from all levels of government, private industry, educational institutions, and nonprofit and private groups. The GISCC leadership positions include chair, vice chair, outgoing chair (new in 2008), and chairs of the following three standing subcommittees: strategic plans and policy, education and outreach, and framework management.

Georgia Geospatial Advisory Council (GGAC)

The 2009 floods that affected Metro Atlanta and North Georgia validated the need for accurate maps and data depicting the risk of flooding. In 2010, the Georgia General Assembly passed HB 169 (O.C.G.A. §12-5-9 (b)(3)), creating the GGAC. The GGAC is charged with auditing Georgia's geospatial capabilities at the county, regional, and state levels.

GGAC has two primary tasks:

1. Using geospatial capabilities to meet FEMA floodplain notification requirements, and
2. Formulating recommendations for advancing governmental data interoperability and enhancing service delivery to the citizens of Georgia through geospatial technologies.

The GGAC is overseen by the EPD director and is composed of 43 representatives from state departments and agencies, local governments, the private sector, universities, regional commissions, and others. Findings from the statewide geospatial audit have been compiled and presented to the General Assembly. The GGAC achieved consensus on the following recommendations:

- Formalize a geospatial advisory council to the General Assembly or state governmental entity with rules making authority.
- Establish the Georgia Geospatial Information Office.
- Execute statewide master agreement(s) for geospatial software/services/resources.
- Develop a digital, statewide parcel GIS database (i.e., "property" database).
- Develop a current (2009 and newer), high-resolution, statewide elevation GIS database.

The GGAC finds these recommendations to be the most viable approach to advancing the use of geospatial technology and assets for the purpose of notification as recommended by FEMA. The GGAC believes that they will produce, for a very modest sum, a significant return on investment.

6.6.3 STATE MATCH ASSISTANCE FOR MITIGATION PROGRAMS

The State provides 40% of the non-federal match for HMGP projects funded in the counties declared for Individual and or Public Assistance. The State also provides the same level of match for mitigation projects funded through the Public Assistance Program and the Emergency Watershed Protection program. Table 6.21 lists for each of the open Presidential Declared Disasters in this plan update cycle the amount of federal, state, and local assistance that has been approved in support of HMGP projects through September 30, 2017.

Table 6.21 HMGP Cost Shares for Open Disaster Declarations

Disaster	Total Approved	Federal Share	State Share	Local Share
DR1858	36,707,925	27,764,486	3,697,194	5,246,245
DR1973	6,002,810	4,331,361	754,546	916,903
DR4165	11,702,777	8,645,327	1,510,670	1,546,780
DR4215	2,560,421	1,892,908	293,664	373,849
DR4259	829,122	619,094	158,385	51,643
DR4284	200,000	150,000	50,000	0
DR4294	150,000	112,500	37,500	0
DR4297	300,000	225,000	75,000	0
Total	58,453,055	43,740,676	6,576,959	8,135,420
Percentage		**74.8%**	**11.3%**	**13.9%**

6.6.4 CONSTRUCTION STANDARDS FOR MITIGATION

DCA's Construction Codes and Industrialized Buildings Program establish minimum building construction standards for all new structures. Local governments that adopt building codes under one of these programs must use these minimum standards. Section 3.4.1 provides a list of building construction codes in the State of Georgia. These include nine mandatory and three permissive codes.

Disaster Resilient Building Code (DRBC) Appendices

DCA was awarded a grant through the U.S. Department of Housing and Urban Development (HUD) to develop new DRBC Appendices for the International Building Code (IBC) and the International Residential Building Code (IRC). A task force of 19 stakeholders was appointed to look for opportunities to improve any provisions relating to hurricane, flood, and tornado disasters. In addition to improving existing provisions in the codes, the task force developed new provisions that address these issues. See Appendix I for the Georgia State International Building Code and Georgia State International Residential Code in regards to disaster resilient construction. The optional appendices contain increased construction requirements (code plus) for disaster resilience that may be adopted in whole or in part and that were available for adoption by local jurisdictions in the State of Georgia as of January 1, 2013. As of 2018, two communities, the Cities of Kennesaw and Saint Marys have adopted the DRBC appendices. DCA is in the process of updating to the 2018 IBC and IRC with the intention of retaining the DRBCs as appendices to the new codes, beginning in January 2020.

6.6.5 MITIGATING RISKS TO CRITICAL AND ESSENTIAL FACILITIES

“Critical facilities” is used to describe all man-made structures or other improvements that because of their function, size, service area, or uniqueness have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed or damaged or if their functionality is impaired. Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers, custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population.

Essential facilities are a subset of critical facilities and include hospitals, fire and police stations, rescue and other emergency service facilities, power stations, water supply facilities, aviation facilities, and other buildings critical for post-disaster response and recovery operations.

Chapter 2 of the Standard Plan addresses both state-owned and operated facilities as well as critical facilities in order to focus on loss potential within the state. Assessing state-owned and operated facilities allows GEMA/HS to prioritize mitigation efforts directed toward other state agencies with more efficiency as well as to aid in protecting the state’s assets. Because critical facilities include any facility or structure that should continue to function and provide necessary services in some capacity (not necessarily normal purpose) to surrounding populations during and after a hazard event, GEMA/HS aims mitigation efforts in this area as well.

As discussed in Section 2.8 of the Standard Plan, an assessment to identify the state-owned and leased facilities has been completed in all 159 Georgia counties. The state has utilized this information to update the hazard, risk, and vulnerability assessment.

Subsequently, future hazard, risk, and vulnerability assessments will include analyses of all spatially defined hazards identified in Chapter 2 of the Standard Plan that have the potential to affect state-owned and operated facilities that are stored in the Building, Land & Lease Inventory of Property (BLLIP) system as well as critical facilities stored in the GMIS system. Efforts are currently under way to develop processes for state agencies to identify critical facilities in the BLLIP system and also to have the GMIS site consume the relevant BLLIP information. Once the risk assessments have been completed for all spatially defined hazards, a formal, comprehensive, multi-year plan to mitigate the risks posed to the identified facilities will be developed.

In addition, through community education and outreach, GEMA/HS has encouraged local jurisdictions to include mitigation activities that would reduce or eliminate the vulnerability to local jurisdictional critical facilities. Section 2.4.2 of the Standard Plan provides a table containing a list of hazards identified by local hazard mitigation plans, and Section 3.2.4 of the Standard Plan provides a table containing a list of mitigation activities addressed in each of the approved or submitted local hazard mitigation plans.

6.6.6 INTEGRATING MITIGATION TO POST-DISASTER RECOVERY OPERATIONS

Hazard mitigation is an integral part of Georgia’s post-disaster recovery operations. Staff from the Mitigation Division support FEMA staff at the Joint Field Office (JFO). State and FEMA staff work together to identify mitigation opportunities through the Human Services, Public Assistance, Small Business Administration, and Floodplain Management programs. Public Assistance staff is proactive in pursuing mitigation activities in the immediate post-disaster recovery effort for repair and restoration projects. GEMA/HS’s Mitigation staff supports the Public Assistance staff at their applicant briefings. GEMA/HS’s Mitigation staff conducts applicant briefings in the declared counties and provides technical assistance to all potential grant applicants on project development.

For DRs 4165, 4215, 4259, 4284, 4294, 4297, and 4338, GEMA/HS Hazard Mitigation staff worked closely with FEMA Mitigation staff at the JFO to develop a Joint Mitigation Implementation Plan for each disaster. The Joint Mitigation Implementation Plan detailed actions taken at the JFO to address the mitigation priorities identified by GEMA/HS and FEMA in response to damage from each of the seven disasters noted above. The priorities were compiled by the State in cooperation with the JFO Mitigation staff to support the State Mitigation Plan for Georgia. Mitigation staff also worked very closely with FEMA's Hazards and Performance Analysis staff on loss avoidance studies for DR4259, DR4284, and DR4338 to document the losses avoided of acquisition projects completed by local governments in the same areas that saw flooding. For the counties impacted by DR4294 and DR4297 tornado declarations, GEMA/HS partnered with the Georgia Board of Regents and FEMA to deliver Safe Room workshops at six colleges, providing information to more than 150 people on guidelines for determining areas of best available refuge within buildings.