Georgia Hazard Mitigation Strategy

Standard and Enhanced Plan

Effective March 4, 2024 – March 3, 2029

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

2024 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 2024 edition of the standard plan represents its sixth update, and fifth 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 2019. 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 Social Vulnerability Outreach	• New Section with details on Social Vulnerability Outreach
1.6 Program Integration	• Text updated as necessary

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 18, 2019. 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, both, natural and non-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 10,711,908 as of the 2020 Decennial Census, a 10.6% increase since the 2010 U.S. Census. This was an increase of 282,529 from the 2017 estimate, and an increase of 1,024,255 since 2010. According to the 2021 Census estimates, Georgia is the eighth most populous state in the United States and ranks 17th in population density, with 192 people per square mile.

According to 2021 Census estimates, 85.6% (8,479,946) of Georgia residents age 5 and older spoke English at home as a primary language, while 7.8% (795,646) spoke Spanish, .57% (57,795) Vietnamese, .54% (55,024) Chinese (including Mandarin and Cantonese), .52% (52,742) Korean, .37% (37,536) Western African languages (Yoruba, Twi, Igbo, other), .35% (35,318) Afro-Asiatic languages (Amharic, Somali, other), .33% (33,248) French (Including Cajun), .31% (31,531) Hindi, .25% (25,881) German, .25% (25,032) Haitian, and 3.07% (312,742) other non-English. In total, 14.38% (1,462,495) of Georgia's population age 5 and older spoke a mother language other than English, up from 12.65% in 2010. This represents an increase of 352,607 people 5 years of age or older who primarily spoke a language other than English.

Georgia's 2022 total gross state product was $778.3 billion, and the per capita personal income for 2020 puts it 38th in the nation at $49,392. There are 19 Fortune 500 companies and 27 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. Crisp County, in Southwest Georgia, touted as the Watermelon Capital of the World, is the number 4 watermelon growing county in the U.S. Bacon County, in South Central GA, known as the Blueberry Capital of Georgia has over 8,000 acres of blueberries, more than the 2019 7th ranked state (California) which had 7,300 harvested acres. 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 second (tied with a location in North Carolina) largest wood pellet plant in the world located in Waycross. Finally, Georgia is the number 1 exporter of pulp, paper, and other forest products in the nation. The timber industry has a greater than $35 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: 2 sea ports - the Port of Savannah and the Port of Brunswick – and 2 inland ports - Port of Bainbridge and the Appalachian Regional Port. The Port of Savannah is the fourth largest seaport in the United States, importing and exporting a total of 3.8 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. Georgia is also exposed to a wide range of non-natural hazards, from active shooter to cyber-attack to radiological release. 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 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 three post-disaster reviews of the 2019 GHMS in the aftermath of the three severe weather / tornado outbreaks (DRs 4579, 4600 and 4685). The details of these post-disaster review meetings are described in Section 1.3.4.

Beginning in the Summer 2022, the GEMA/HS Hazard Mitigation Planning staff began a more active update phase by conducting a summary review of the 2019 plan and update process. The staff also reviewed the new state plan guidance, which would be effective before the completion of the update. 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:

- Work more closely with other relevant departments to better incorporate non-natural hazards.
- Conduct targeted outreach to organizations that work with underserved and socially vulnerable populations to identify needs.
- 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.

Four workshops were utilized: Understanding Risks, Underserved and Socially Vulnerable Populations, 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 workshops 1, 3 and 4 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. Workshop 2 was a targeted meeting designed to meet and hear from organizations that work with socially vulnerable and underserved populations throughout the State in order to learn about the issues faced by the portions of the population they work with.

The first workshop, Understanding Risks, was held on January 26, 2023 and included 29 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 13 natural and six non-natural hazards identified in the 2019 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 hazards. After these presentations, the participants were divided into three 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, no new natural hazards were identified, although climate change was identified as a priority. Climate change is discussed in Chapter 2 as an element having impacts on the individual natural hazards. While 4 new non-natural hazards were discussed, these new non-natural hazards are not being added to this plan at this time. The updated hazards were provided to the GEMA/HS staff responsible for the overall Hazard Identification and Risk Assessment (HIRA) for consideration.

TABLE 1.2: STATE PLAN UPDATE WORKSHOPS

Workshop	Date	Information Presented	Results
1: Understanding Risks	January 26, 2023	13 natural and 6 non-natural hazards in 2019 GHMS and profiles; Hazard risk ranking methodology	Breakout group discussion on hazards; hazards scored and ranked based on profile
2: Understanding Georgia's Vulnerable Populations' Vulnerability to Disasters	March 20, 2023	Information about GEMA/HS and Hazard Mitigation; 13 natural and 6 non-natural hazards from Workshop 1	Identified who the socially vulnerable and underserved populations are, including the issues they face in times of disasters.
3: Understanding Vulnerability	March 30, 2023	Vulnerability definition; historical and potential impacts of 13 natural and 6 non-natural hazards	Breakout group discussion on hazard vulnerabilities; hazards scored and ranked based on vulnerability and total risk
4: Developing Georgia's Mitigation Strategy	April 26, 2023	Risk summary from first 2 workshops; types of mitigation actions	Lists of potential mitigation actions for each hazard with prioritization

The second workshop, Understanding Georgia's Vulnerable Populations' Vulnerability to Disasters, was an addition to the state's plan update process. The workshop was held March 20, 2023 and included 12 participants. The purpose of the workshop was to serve as first step in understanding the vulnerability of Georgia's socially vulnerable and underserved populations. A presentation was given on Hazard Mitigation in general, the State Hazard Mitigation Strategy and the ongoing update process. A handout was provided to the participants asking them to provide some information on their agency, including what segments of the population they serve, how they serve them, and how they believed the State could help fill gaps they have observed as they served their communities. As part of the discussion participants provided insights on who the socially vulnerable and underserved populations are and the issues they face in times of disaster.

The third workshop, Understanding Vulnerability, was held on March 30, 2023 and included 17 participants. GEMA/HS staff gave the definition of vulnerability and presented information on impacts from the 13 natural and 6 non-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 19 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, 2023 and included 24 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 2024 update was to broaden participation by involving more federal and state agencies and nongovernmental organizations.

The development of the 2024 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 2024 update to the GHMS was led by the GEMA/HS Hazard Mitigation Planning staff, which consists of five 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.

Beginning with 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. With the 2024 update, GEMA/HS added a fourth workshop to invite agencies that work with social vulnerable and underserved communities in order to better understand the vulnerabilities and specific problems those communities face in times of disaster. 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 2019 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 2024 plan, as well as meeting the new review guidance that became effective April 2023. While the review did not reveal the need for significant changes to the formatting of the document, it did reveal the following needs:

- Current FEMA guidance emphasizes involving and working to meet the needs of socially vulnerable populations and underserved communities. The planning process was updated by adding a separate workshop specifically to meet with organizations that serve socially vulnerable and underserved populations with the purpose of identifying who these populations are and begin to identify the unmet needs.
- The hazard history needed to be updated. This was done, including the most recent events, Presidential Declarations, etc.
- FEMA guidance now requires the plan to specifically address the impacts of climate change on the identified hazards. While the 2019 plan did, additional and updated resources were sought to identify climate change impacts on the identified hazards. Relevant 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. Due to time and staff constraints, staff was not able to follow up on this idea. It remains as an action step for the 2024 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 2019, three major hazard events have resulted in disaster declarations in the State of Georgia. DRs 4579, 4600, and 4685 have resulted from hurricanes, severe storms, and tornadoes primarily in the northern and western portions of 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 2019 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, four plan update workshops held between January 2023 and April 2023, and individual agency emails and interviews held between April and September 2023. Tables 1.3 through 1.5 identify and describe the participation of state and federal agencies and Non-Governmental Organizations (NGO) in the 2024 plan update. Tables 1.3 – 1.5 further identify 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. Also, of note, the workshops included a dedicated outreach to organizations that are known to serve socially vulnerable and underserved populations. The results of this effort are discussed in greater detail in Section 1.5 below. The 2024 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 2024 GHMS UPDATE

Agency	Related Sector	Participation
Georgia Administrative Office of the Courts	Judicial	Annual/Post Disaster Updates
Georgia Department of Administrative Services	General Government	Annual/Post Disaster Updates, Workshops
Georgia Department of Administrative Services/Risk Management	General Government	Annual/Post Disaster Updates
Georgia Department of Agriculture	Agriculture (Food, Economic Development)	Annual/Post Disaster Updates, Workshops

Agency	Related Sector	Participation
Georgia Department of Banking and Finance	Financial	Email
Georgia Department of Community Affairs	Economic Development, Housing, Land Use and Development, Building Codes, Recovery	Annual/Post Disaster Updates, Workshops
Georgia Department of Community Affairs CDBGDR	Recovery	Annual/Post Disaster Updates
Georgia Department of Economic Development	Economic Development	Annual/Post Disaster Updates, Workshops
Georgia Department of Education	Education	Annual/Post Disaster Updates
Georgia Department of Natural Resources	Natural and Cultural Resources, Land Use and Development	Annual/Post Disaster Updates, Workshops
Georgia Department of Natural Resources Coastal Resources	Natural and Cultural Resources, Land Use and Development, Recovery	Annual/Post Disaster Updates
Georgia Department of Natural Resources Environmental Protection Division	Natural and Cultural Resources	Annual/Post Disaster Updates
Georgia Department of Natural Resources Floodplain Management Unit	Natural and Cultural Resources, Land Use and Development	Annual/Post Disaster Updates, Workshops, Email review of flooding section, provision floodplain programmatic information.
Georgia Department of Natural Resources Non-Point Source Pollution	Natural and Cultural Resources	Annual/Post Disaster Updates
Georgia Department of Natural Resources Safe Dams	Critical Infrastructure/Natural & Cultural Resources	Annual/Post Disaster Updates, Workshops, Email review of Dam Failure risk assessment, provision of data regarding high hazard dams
Georgia Department of Natural Resources Watershed Protection Branch	Natural and Cultural Resources, Land Use and Development	Annual/Post Disaster Updates
Georgia Department of Public Health Emergency Preparedness and Response	Health and Social Services	Annual/Post Disaster Updates, Workshops
Georgia Department of Public Health Planning and Preparedness	Health and Social Services	Annual/Post Disaster Updates
Georgia Department of Public Safety State Patrol Air Ops	Law Enforcement / Emergency Management	Workshops
Georgia Department of Transportation	Infrastructure	Annual/Post Disaster Updates, Workshops
Georgia Department of Transportation Emergency Operations	Critical Infrastructure/Homeland Security	Annual/Post Disaster Updates, Workshops
Georgia Emergency Management and Homeland Security Agency	Recovery, Mitigation, Emergency Management	Annual/Post Disaster Updates, Workshops
Georgia Emergency Management and Homeland Security Agency Community Recovery	Recovery, Emergency Management	Annual/Post Disaster Updates, Workshops

Agency	Related Sector	Participation
Georgia Emergency Management and Homeland Security Agency Critical Infrastructure	Critical Infrastructure/Homeland Security	Workshops
Georgia Emergency Management and Homeland Security Agency Hazard Mitigation	Mitigation, Emergency Management	Annual/Post Disaster Updates, Workshops
Georgia Emergency Management and Homeland Security Agency Planning	Emergency Management	Annual/Post Disaster Updates
Georgia Emergency Management and Homeland Security Agency Public Assistance	Recovery, Emergency Management	Annual/Post Disaster Updates
Georgia Emergency Management and Homeland Security Agency Radiological Emergency Preparedness	Radiological, Emergency Management	Workshops, Email
Georgia Environmental Finance Authority	Economic Development, Natural and Cultural Resources	Workshops
Georgia Forestry Commission	Natural and Cultural Resources	Annual/Post Disaster Updates, Workshops
Georgia Office of Planning and Budget	General Government	Annual/Post Disaster Updates
Georgia Ports Authority	Economic Development, Infrastructure	Workshops
Georgia Rural Water Authority	Critical Infrastructure/Homeland Security	Annual/Post Disaster Updates
Georgia World Congress Center	Economic Development	Annual/Post Disaster Updates
Jekyll Island Authority	Natural and Cultural Resources, Economic Development, Land Use and Development, Housing	Annual/Post Disaster Updates, Email
Tech College System of Georgia	Education	Annual/Post Disaster Updates, Workshops, Email
Tennessee Emergency Management Agency	Neighboring State EMA	Annual/Post Disaster Updates
University of Georgia Information Technology Outreach Service	Contractor	Annual/Post Disaster Updates, Workshops
University System of Georgia Board of Regents	Education	Annual/Post Disaster Updates

TABLE 1.4: FEDERAL AGENCY PARTICIPATION IN 2024 GHMS UPDATE

Federal Agency	Related Sector	Participation
FEMA	Emergency Management, Mitigation	Annual/Post Disaster Updates
FEMA RIV HMA	Emergency Management, Mitigation	Annual/Post Disaster Updates
FEMA RIV Planning	Emergency Management, Mitigation	Annual/Post Disaster Updates, Workshops
FEMA RIV Planning	Emergency Management, Mitigation	Workshops
USACE	Natural and Cultural Resources, Critical Infrastructure	Annual/Post Disaster Updates
USDA	Health and Social Services - Food, Water, Medicines	Annual/Post Disaster Updates

Federal Agency	Related Sector	Participation
USDA NRCS	Natural and Cultural Resources, Critical Infrastructure	Email

*Information provided related to flooding and dam safety

TABLE 1.5: NON-GOVERNMENTAL ORGANIZATIONS PARTICIPATION IN THE 2024 GHMS UPDATE

NGO	Related Sector	Participation
Amicalola EMC	Infrastructure	Annual/Post Disaster Updates
Blue Ridge Mountain EMC	Infrastructure	Annual/Post Disaster Updates
Friends of Disabled Adults and Children	Vulnerable/Underserved Populations	Workshops
Ga Heirs Property Law Center	Legal, Vulnerable/Underserved Populations	Workshops
Ga. Municipal Association	Economic Development/General Government	Annual/Post Disaster Updates
Greystone Power Corp	Infrastructure	Annual/Post Disaster Updates
Gullah Geechee Peoples	Underserved Population	Workshops
Jackson EMC	Infrastructure	Annual/Post Disaster Updates
One Hundred Mile	Natural and Cultural Resources, Vulnerable/Underserved Populations	Workshops
Red Cross	Housing, Sheltering, Food, Vulnerable/Underserved Populations	Workshops
Red Cross	Housing, Sheltering, Food, Vulnerable/Underserved Populations	Workshops
Salvation Army	Food, Sheltering, Vulnerable/Underserved Populations	Workshops
Southwest GA COAD	Recovery, Vulnerable/Underserved Populations	Workshops
Tri-State EMC	Infrastructure	Annual/Post Disaster Updates

1.5 SOCIAL VULNERABILITY OUTREACH

1.5.1 Outreach to agencies that work with Socially Vulnerable Populations

A new part of the planning process for the 2024 Georgia State Hazard Mitigation Strategy was a specific outreach to include agencies that work with socially vulnerable populations throughout the State. Table 1.6 below shows the agencies that participated and the information provided

TABLE 1.6: SOCIAL VULNERABILITY OUTREACH AND PARTICIPATION

Agency	Population(s) Served	Desired State Assistance
Southwest Ga Community Organizations Active in Disasters	Under Educated Precariously Housed (at risk of losing housing) Vision Impaired Hearing Impaired Mental Health Disorders Indigent/Low Income Minorities Non-English Speaking	More Support for Local COADS to advocate and support vulnerable populations
American Red Cross	Anyone Impacted by Disaster	Encourage local leaders and representatives to develop plans for preparedness training and support
Friends of Disabled Adults and Children	Physically Disabled Psychologically Disabled Mentally Disabled Indigent/Low Income	Build trust in local isolated and vulnerable communities that consider themselves semi-independent Place relevant materials for all needs in residential buildings and disaster prone and impoverished areas Pre-disaster identification of disabled populations, including specific disabilities
One Hundred Mile	Indigent/Low Income Minorities Communities facing development threats communities facing threats from sea level rise Communities facing septic/sewage issues Racially fractured populations	N/A
Save Our Legacy Ourselves (Sapelo Island)	Indigent/Low Income Minorities	Provide technical assistance for grant applications, including Benefit Cost Analysis Assistance with flooding concerns Assistance with ditch cleaning
Georgia Heirs Property Law Center	Citizens on verge of losing homes or not receiving post-disaster assistance due to heirs property issues	Funding for direct legal services to resolve, prevent, and educate citizens regarding inherited property

1.6 PROGRAM INTEGRATION

1.6.1 State Planning Programs

GEMA/HS Hazard Mitigation Planning staff has identified multiple 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.

1.6.2 FEMA Mitigation Programs

The 2024 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 1.7: INTEGRATION OF STATE PROGRAMS INTO THE 2024 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, risk assessment, mitigation strategy
Coastal Management	State capability assessment, Mitigation Strategy
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, Risk Assessment, Mitigation Strategy
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
DNR Coastal Resources Division Sea Level	Risk Assessment

State Planning Efforts	GHMS Integration
Rise Study	

TABLE 1.8: INTEGRATION OF FEMA MITIGATION PROGRAMS INTO THE 2024 GHMS

FEMA Program	GHMS Integration
HMA (BRIC, FMA and HMGP)	Funding sources for Mitigation Grants
NFIP	State risk assessment, mitigation strategy, Local capability assessment
CRS	State risk assessment, mitigation strategy, Local capability assessment
Risk MAP	Activity being conducted in the State of Georgia.
FMAG	Funding Source for Post-Disaster Fire Mitigation Grants
HHPD	State Risk Assessment, Mitigation Strategy, Local capability assessment

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, both, the 13 natural and 6 non-natural hazards affecting Georgia. The specific hazards are discussed by recounting each hazard's event, loss, and PDD history. Also, this section includes hazard-specific occurrence probabilities (risk), as well as discussions on potential impacts.

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 2019 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, 2022.

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 revised methodology.
2.4 Overview of Natural Hazards in Georgia	• Updated dates to section to reflect the dates as they pertain to the plan update • Updated text and data
2.5 Social Vulnerability Assessment	• Moved from Section 2.6. • Updated text and data • Added CDC Social Vulnerability data.
2.6 Composite Assessment	• Moved from Section 2.7. • Updated tables, text, and maps to reflect the current available data for composite assessment
2.7 Loss Potential	• Moved from Section 2.8 • Updated tables, text, and maps to reflect the current available data for hazard risk • Updated SVI with Current CDC data • Added section on Community Lifelines
2.8 Hazard-Specific Assessments	• Moved from Section 2.5 • Added maps and figures • Updated tables, text, and maps to reflect the current available data for hazards • Added information on Social Vulnerability for each hazard • Added information on State assets for each hazard. • Added information on community lifelines for each hazard. • Added information from local risk assessment data for each hazard.

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.

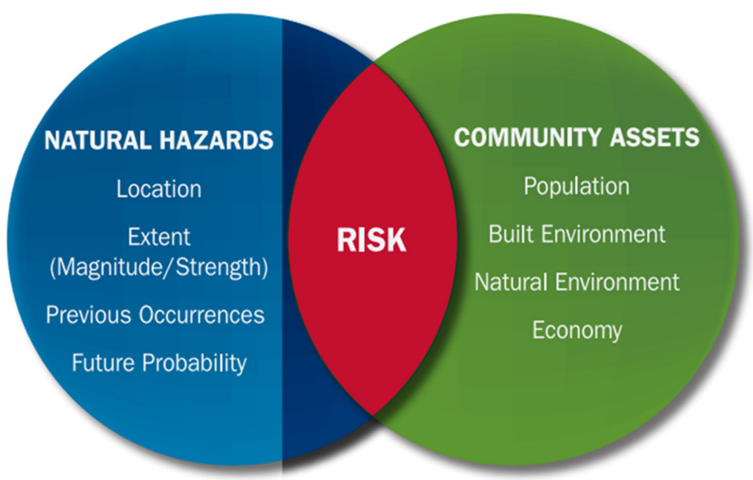
Risk: The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of 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 2024 Risk Assessment

Updating the risk assessment began with a review of the 13 natural and six non-natural hazards identified in the 2019 GHMS. For the purposes of the GHMS, identifying hazards in Georgia is a process involving review of the latest Georgia Hazard Identification and Risk Assessment (HIRA), 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.

Programmatically, the Hazard Mitigation Program is focused on natural hazards only. This is due to funding capabilities of FEMA's Hazard Mitigation grant programs and Federal hazard mitigation planning requirements. Because of this, prior to 2020 all previous versions of the GHMS, including the initially approved 2019 update, focused only on natural hazards. In 2020, due to the State's efforts for certification in the Emergency Management Accreditation Program (EMAP), and in effort to improve on overall state hazard mitigation planning efforts, the State expanded the GMHS to include non-natural hazards based on information from the 2018 HIRA, as well as statewide ongoing efforts to mitigate those hazards.

During the State Plan Update workshops, participants were given the opportunity to review the hazards identified in the 2019 GHMS. Several comments were given on additional hazards to consider, including coastal erosion, terrorism, biological hazards, domestic unrest, and commerce interruption. After the workshops, GEMA/HS staff analyzed each of these hazards to determine if the definition and data were sufficient to meet hazard profile requirements.

The updated list of hazards were compared against the 2022 HIRA. Notably, the HIRA is the responsibility of the GEMA/HS Emergency Management (EM) Planning Department and the GHMS is the responsibility of the GEMA/HS Hazard Mitigation Department. Due to these differing responsibilities, and the differences in requirements for natural vs non-hazards for the GHMS, it was decided to only include non-natural hazards that were consistent with the 2022 HIRA. The workshop results for terrorism, biological hazards, domestic unrest, and commerce interruption were provided to the EM Department for consideration in future HIRA updates. Coastal Erosion, while natural in nature, was determined to not be a profilable hazard by itself. Instead, it is considered both an effect of coastal flooding, as well as an element affecting impacts from future coastal flooding events. Finally, GEMA/HS staff reviewed all 159 local hazard mitigation plans to determine consistency with local risk assessments. 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. Notably, again due to the nature of the Hazard Mitigation program as discussed above, historic statistical data was only researched for natural hazards.

After the hazard identification process, the assessments for all 19 previously identified hazards, were reviewed to identify new sources of information and updated data. This included hazard events that have occurred since the 2019 GHMS adoption, hazard maps, potential risk areas, and potential vulnerability. All hazard assessments have been updated to reflect the best available descriptions and data.

With the new State Planning guidance, released in 2022 and effective 2023, the State has added several additional risk assessment details and analyses, including the following:

- Social Vulnerability. This element is not entirely new to the SHMS, but is now done in greater detail and based on each individual hazard, in addition to the overall vulnerability assessment as has been done for the previous several plans.

- Vulnerability of structures, infrastructure, community lifelines and population for each hazard including the following:

    - Cell Service failures
    - Power Outage Reports
    - Road Surface data
    - Local Hazus Reports
    - Local Critical Facility data from the Georgia Mitigation Information System (GMIS)
    - BLLIP data through GMIS

- Future Changing Conditions Assessment. This is not entirely new, as the previous plan including information on climate change. The 2024 plan now includes discussions on the effects of population changes and migration and changing development patterns, as well as climate change.

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 HISTORY:

Historic Frequency	Number of recorded incidents per year from 2002 - 2021
Annualized Losses	Adjusted losses per year, in dollars, based on historic data from 2002-2021
Injures and Deaths per year	Injuries and deaths per year based on historic data from 2002-2021

POTENTIAL HAZARD:

Area Impacted	Potential number of counties impacted by a single event
Duration	Potential duration (number of days) of a single event

POTENTIAL VULNERABILITY:

Fatalities	Potential fatalities from a single occurrence
Injuries	Potential injuries from a single occurrence
Evacuation	Potential evacuation needs from a single occurrence
Property Damage	Potential property damage from a single occurrence
Critical Infrastructure	Potential impacts to critical infrastructure, including water, power, communications, transportation, etc.
Environmental	Potential environmental impacts from a single occurrence
Economic	Potential for businesses to be impacted from a single occurrence.
Psychosocial	Potential impacts from public reaction, including panic, self-evacuation, hoarding, etc.

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. There are several notable changes in the ranking since the 2019 GHMS. Notably, the 2024 ranking process included additional elements of evacuation and psychosocial impacts as part of the “potential vulnerability” portions of the ranking methodology. This appears to have resulted in a few changes in the overall natural hazard rankings, with Severe Winter Weather and Dam Failure rising three spots in the rankings, while Severe Weather, Coastal Hazards, Wildfire and Wind all fell 2 spots since the 2019 plan. Further information on these events is included in Section 2.5.1.

TABLE 2.2: NATURAL HAZARD HISTORIC IMPACT RANKING

Hazard	Annualized Losses	Injuries and Deaths	Historical Frequency	Historical Score
Dam Failure	0	0	0	0
Drought	5	0	4	9
Inland Flooding	5	1	4	10
Seismic Hazards	0	0	0	0
Severe Weather	5	3	5	13
Severe Winter Weather	5	1	1	7
Geologic Hazards	0	0	0	0
Coastal Hazards	1	1	1	3
Tornadoes	5	5	2	12
Hurricane Wind	3	1	4	8
Wildfire	2	1	1	4
Wind	3	1	3	7
Extreme Heat	1	1	3	5

TABLE 2.3: WORKSHOP 1 NATURAL HAZARD POTENTIAL HAZARD RANKING

Hazard	Natural Hazard Potential Hazard Average Group Ranking	Historic + Potential Natural Hazard Score
Dam Failure	6	6
Drought	8	17
Inland Flooding	6	16
Seismic Hazards	3	3
Severe Weather	5	18
Severe Winter Weather	7	14
Geologic Hazards	3	3
Coastal Hazards	4	7
Tornadoes	4	16
Hurricane Wind	6	14
Wildfire	5	9
Wind	4	11
Extreme Heat	8	13

TABLE 2.4: WORKSHOP 2 NATURAL HAZARD POTENTIAL VULNERABILITY RANKING

Hazard	Natural Hazard Potential Vulnerability Group Ranking	Natural Hazard Total Risk Score (History + Hazard + Vulnerability)
Dam Failure	17	**22**
Drought	9	**26**
Inland Flooding	18	**34**
Seismic Hazards	8	**11**
Severe Weather	7	**25**
Severe Winter Weather	14	**28**
Geologic Hazards	8	**11**
Coastal Hazards	16	**23**
Tornadoes	17	**33**
Hurricane Wind	18	**32**
Wildfire	10	**19**
Wind	7	**18**
Extreme Heat	7	**20**

TABLE 2.5: WORKSHOP 1 NON-NATURAL HAZARD POTENTIAL HAZARD RANKING

Hazard	Non Natural Hazard Potential Hazard Average Group Ranking
Infrastructure Failure	7
Cyberattack	8
HazMat Spills / Release	3
Active Shooter	2
Infectious Disease	8
Radiological Release	7
Terrorism (New)	6
Biological Hazards (New	8
Domestic Unrest (New)	3
Commerce Interruption (New)	7

TABLE 2.6: WORKSHOP 2 NON-NATURAL HAZARD POTENTIAL VULNERABILITY RANKING

Hazard	Non-Natural Hazard Potential Vulnerability Group Ranking	Non-Natural Hazard Total Risk Score (Hazard + Vulnerability)
Infrastructure Failure	10	**17**
Cyberattack	7	**14**
HazMat Spills / Release	15	**18**
Active Shooter	9	**11**
Infectious Disease	17	**25**
Radiological Release	18	**25**
Terrorism (New)	17	**23**
Biological Hazards (New	8	**16**
Domestic Unrest (New)	11	**14**
Commerce Interruption (New)	7	**14**

TABLE 2.7: WORKSHOP 2 NATURAL HAZARD TOTAL RISK RANKING

Total Risk Ranking

Rank	Hazard	Score	Priority
1	Inland Flooding	34	High
2	Tornadoes	33	High
3	Hurricane Wind	32	High
4	Severe Winter Weather	28	High
5	Drought	26	High
6	Severe Weather	25	High
7	Coastal Hazards	23	Medium
8	Dam Failure	22	Medium
9	Extreme Heat	20	Medium
10	Wildfire	19	Medium
11	Wind	18	Medium
12	Seismic Hazards	11	Low
13	Geologic Hazards	11	Low

Priority Level
High = >24
Medium = 16–24
Low = <16

TABLE 2.8: WORKSHOP 2 NON-NATURAL HAZARD TOTAL RISK RANKING

Total Risk Ranking

Rank	Hazard	Score	Priority
1	Infectious Disease	25	High
2	Radiological Release	25	High
3	Terrorism	23	Medium
4	HazMat Spills / Release	18	Medium
5	Infrastructure Failure	17	Medium
6	Biological Hazards	16	Medium
7	Cyberattack	14	Low
8	Domestic Unrest	14	Low
9	Commerce Interruption	14	Low
10	Active Shooter	11	Low

Priority Level
High = >24
Medium = 16–24
Low = <16

2.4 OVERVIEW OF NATURAL HAZARDS IN GEORGIA

2.4.1 Introduction

The 2019 GHMS contains 13 natural and 6 non-natural hazards. The 2024 plan retains the 19 hazards profiled in the 2019 GHMS.

Table 2.9 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. Notably, there are several significant changes with many of the hazards being identified by significantly more counties. In contrast, notably, Severe weather was identified by significantly fewer counties.

TABLE 2.9: HAZARDS IN LOCAL PLANS

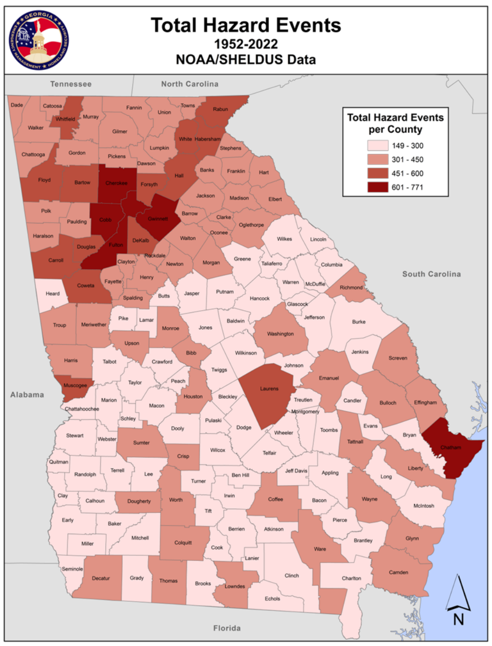
Hazard Type	% of counties identifying Hazard		Change from 2019
	2024 GHMS	2019 GHMS	
Tornadoes	99%	99%	0
Inland Flooding	99%	99%	0
Wildfire	97%	82%	15
Drought	94%	90%	4
Wind	90%	73%	17
Winter Storms	84%	79%	5
Hailstorm	82%	61%	21
Hurricane/Tropical Storm	82%	55%	27
Lightning	79%	58%	21
Dam Failure	65%	36%	29
Severe Weather	49%	73%	-24
Earthquake	47%	27%	20
Heat	42%	28%	14
Landslide	15%	4%	11
Coastal Flooding	9%	6%	3
Sinkhole	5%	3%	2

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

FIGURE 2.2: TOTAL HAZARD EVENTS BY COUNTY



undercounts some events but overall provides an improved tabulation of hazard events. The NCEI database covers events from 1996 to July 31, 2022. 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 SHEL- DUS and NCEI were incomplete. This includes coastal flooding and wildfire.

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 2022, based on SHELDUS data. Areas around Metro Atlanta and Savannah experienced the greatest number of total hazard events during this timeframe.

Figure 2.3 illustrates the total losses resulting from all hazard events by county from 1952 to 2022. These totals take inflation into account; therefore, all amounts are in 2022 dollars. Counties in Southwest Georgia experienced the greatest total losses during this timeframe.

FIGURE 2.3: TOTAL HAZARD LOSSES BY COUNTY, 1952–2022

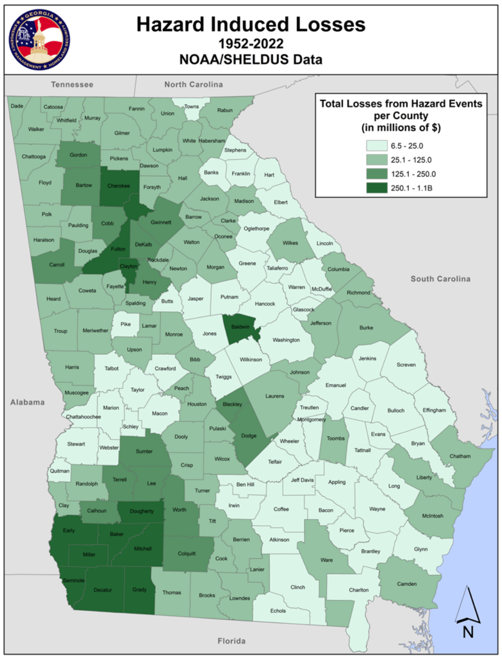


Figure 2.4 depicts the average loss per hazard event for each county. Six counties (Baldwin, Decatur, Dougherty, Early, Miller and Seminole) represent the highest loss per event category with totals between $1.5 million and $4.7 million per event. Notably, five of the six counties are all located in the southwest corner of the State.

Both Figures 2.3 and 2.4 reflect significant shifts in the concentration of highest losses from the 2019 plan. In 2019, the data showed the highest total losses concentrated around the Metro Atlanta area, which the highest losses per event were located around the Metro Atlanta, Central and Southwestern areas. In both cases, the concentration of highest total losses (Figure 2.3)

AND highest losses per event (Figure 2.4) has shifted to the southwestern corner of the state. This shift appears to have been caused by Hurricane Michael in 2018, which affected the southern half of the state, with the greatest impacts concentrated in Southwest Georgia. The two counties with the highest losses from a single event are Decatur and Seminole Counties, both of which exceeded $927 million from Hurricane Michael alone. In total, that one event caused more than $5 billion in damages with the majority of which being located in the southwestern corner.

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.

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 2.4: AVERAGE LOSS PER EVENT BY COUNTY, 1952–2022

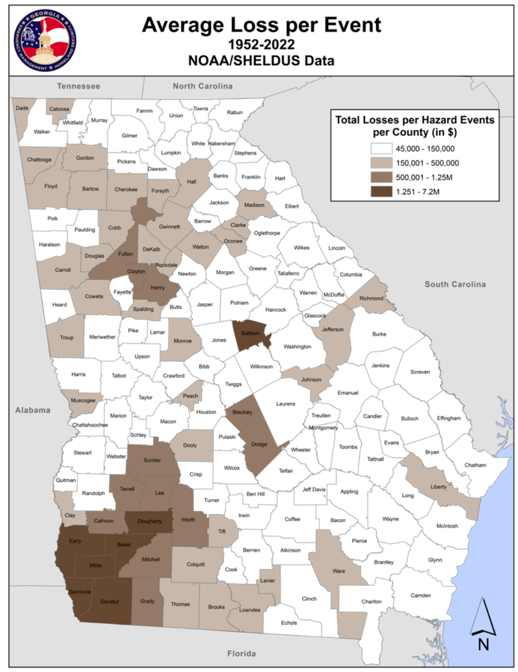


FIGURE 2.5: NOAA HAZARD EVENTS PERCENTAGE, 2002-2021

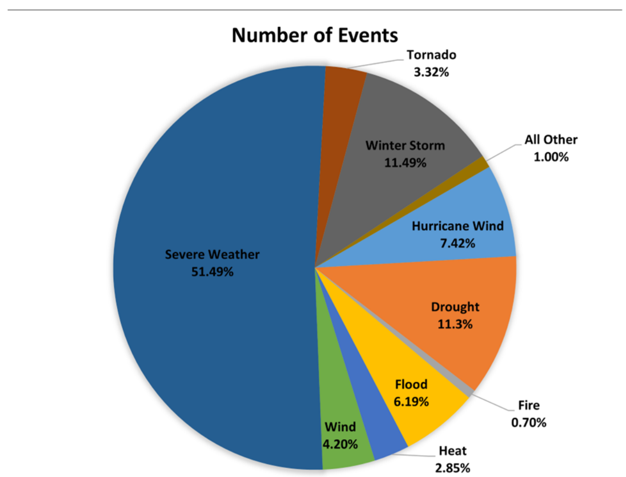


Figure 2.5 illustrates the distributions and the number of events of each hazard type, based on data from NCEI between 2002 and 2021. Since the 2019 plan, Severe Weather dropped from 73.79% while Winter Storm, Hurricane Wind and Drought increased from 3%, 1.44% and 0.8% respectively. Nevertheless, Severe Weather (thunderstorm, lightning and hail) remains the most frequent hazard event that occurs in Georgia. Figure 2.6 illustrates total losses by hazard. Tornadoes and Hurricane Wind 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, Seismic or Geologic hazards; therefore, these hazards are not included in this diagram. Dam failure events are also categorized as a type of flooding in the historic data. Tornado events produced more injuries and fatalities than all the other hazards combined.

FIGURE 2.6: SHELDUS ADJUSTED LOSS PERCENTAGE BY HAZARD, 2002-2021.

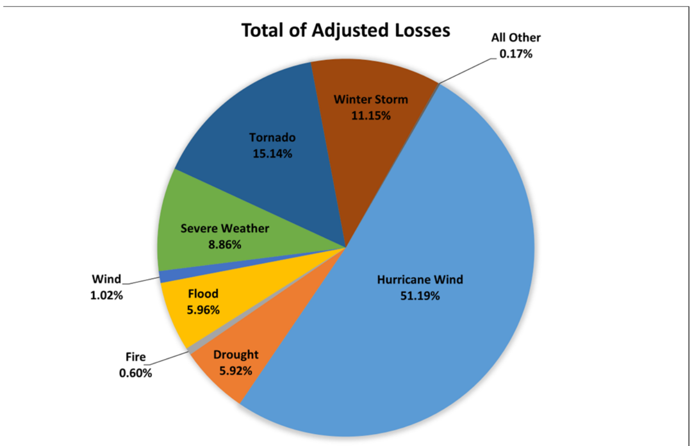
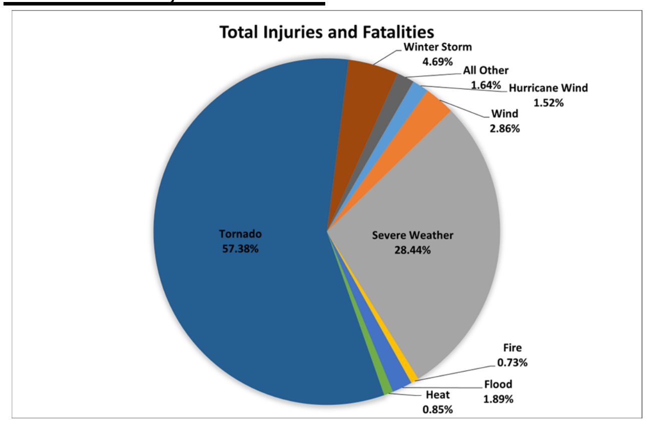


FIGURE 2.7: SHELDUS TOTAL INJURIES AND FATALITIES PERCENTAGE BYHAZARD, 2002-2021.



2.4.3 Presidential Declared Disasters

Four Presidentially Declared Disasters (PDD) have occurred since the 2019 GHMS was adopted. In that time, all of Georgia's 159 counties have been declared as part of at least one disaster. In October 2020, Northwest Georgia, including the Atlanta Metro area, was impacted by Tropical Storm Zeta, resulting in DR 4579. In March 2021, West and Northeast Georgia were impacted by a severe weather outbreak, including an EF-4 tornado impacting the City of Newnan. This resulted in DR 4600. While these previous two events, and their resulting disaster declarations, were occurring, the State of Georgia was also responding to the Covid pandemic, including managing multiple statewide vaccination sites, as well as a multitude of other pandemic related activities. The Covid pandemic resulted in disaster declarations throughout the nation, including Georgia's DR 4501 declaration. Notably, this was the first time the HMGP program was made available for a declaration resulting from a pandemic, or public health, event, which, historically, has not been considered a natural hazard for the purposes of the Hazard Mitigation program. Finally, in January 2023, Georgia experienced another severe weather outbreak affecting a line of communities from Troup County in West Georgia, eastward through Jasper and Newton Counties in the Central Ga and Atlanta Metro areas, as well as Crisp County in Southwest Ga. This included an EF-3 tornado impacting the City of Griffin, and resulted in DR 4685. Table 2.10 below provides 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 2.10: PRESIDENTIAL DECLARATIONS 2019-2023

Federal Declaration	# Counties by Declaration Type			
	Public Assistance Only	Individual Assistance Only	Individual and Public Assistance	Total Declared
DR 4501	0	0	159	159
DR 4579	0	0	21	21
DR 4600	0	0	9	9
DR 4685	1	1	7	9
DR 4738	25	0	3	28

*HMGP funding available statewide after all declarations

2.5 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 CDC Social Vulnerability Index (SVI), which 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. Social vulnerability is also useful as an indicator in determining each county's different capabilities to recover from disasters.

2.5.1 Methods

The index synthesizes 22 socioeconomic variables, listed in Table 2.11, that research literature suggests contribute to a reduction in a community's ability to prepare for, respond to, and recover from hazards. CDC data sources are based solely on the U. S. Census Bureau estimates. The data is compiled and processed by the Centers for Disease Control (CDC) and Agency for Toxic Substances and Disease Registry (ATSDR). The variables in Table 2.11 are grouped together into 8 similar components.

TABLE 2.11: VARIABLES INCLUDED IN THE SOCIAL VULNERABILITY INDEX (SVI) ANALYSIS

	VARIABLE GROUP	VARIABLES
Overall Vulnerability	Socioeconomic Status	Below 150% Poverty
		Unemployed
		Housing Cost Burden
		No High School Diploma
		No Health Insurance
	Household Characteristics	Aged 65 & Older
		Aged 17 & Younger
		Civilian with a Disability
		Single-Parent Households
		English Language Proficiency
	Racial & Ethnic Minority Status	Hispanic or Latino (of any race)
		Black or African American, Not Hispanic or Latino
		Asian, Not Hispanic or Latino
		American Indian or Alaska Native, Not Hispanic or Latino
		Native Hawaiian or Pacific Islander, Not Hispanic or Latino
		Two or More Races, Not Hispanic or Latino
		Other Races, Not Hispanic or Latino
	Housing Type & Transportation	Multi-Unit Structures
		Mobile Home
		Crowding
		No Vehicle
		Group Quarters

2.5.2 Assessing Social Vulnerability by Jurisdiction

After completing the SVI methodology, the results are tabulated and mapped in GIS. Tables 2.12 and 2.13 list the counties with the highest and lowest SVI scores, respectively, for the State of Georgia.

TABLE 2.12: MOST VULNERABLE COUNTIES IN GEORGIA

Highest Vulnerability	SVI Score
Randolph	11.99
Crisp	11.73
Mitchell	11.58
Candler	11.48
Macon	11.29
Terrell	11.05
Early	10.99
Colquitt	10.92
Dougherty	10.87
Emanuel	10.85

TABLE 2.13: LEAST VULNERABLE COUNTIES IN GEORGIA

Lowest Vulnerability	SVI Score
Oconee	3.08
Pike	3.24
Harris	3.54
Forsyth	3.58
Paulding	3.84
Columbia	4.11
Fayette	4.30
Cherokee	4.37
Morgan	4.42
Jones	4.61

The map of relative SVI scores, Figure 2.8, shows the social vulnerability of all counties in the state. Table 2.14 gives the number of counties that fall under each SVI score. The scores are categorized based on standard deviations from the average score for the entire state.

TABLE 2.14: NUMBER OF COUNTIES BY SVI SCORE

SVI Score	Number of Counties
Extremely High	8
High	46
Average	59
Low	31
Extremely Low	15

FIGURE 2.8: SOCIAL VULNERABILITY INDEX BY COUNTY.

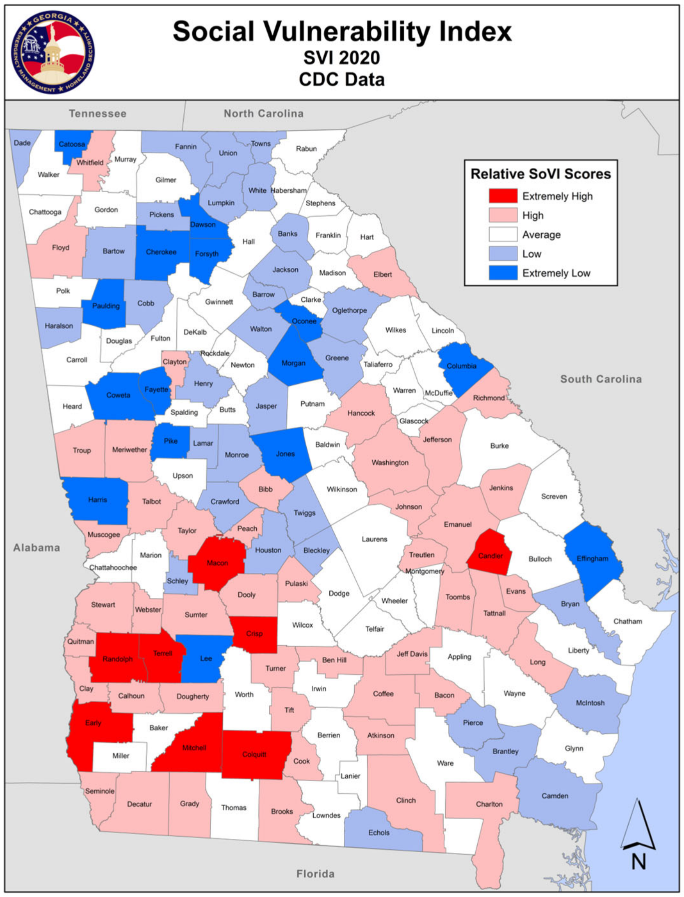
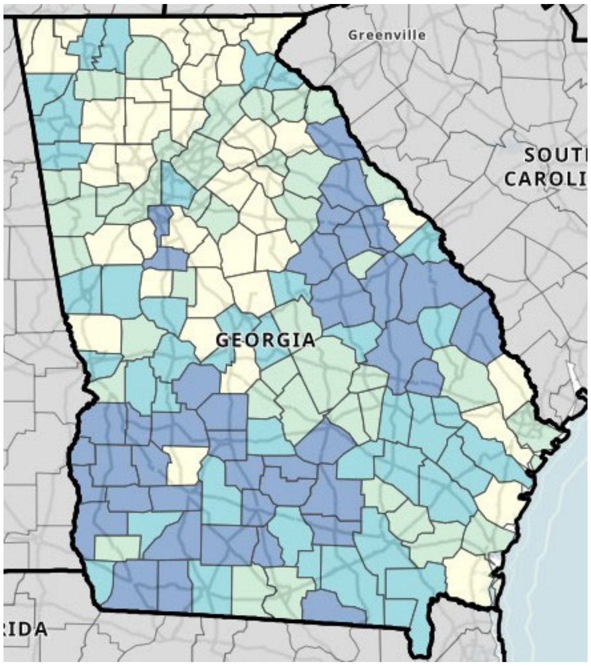
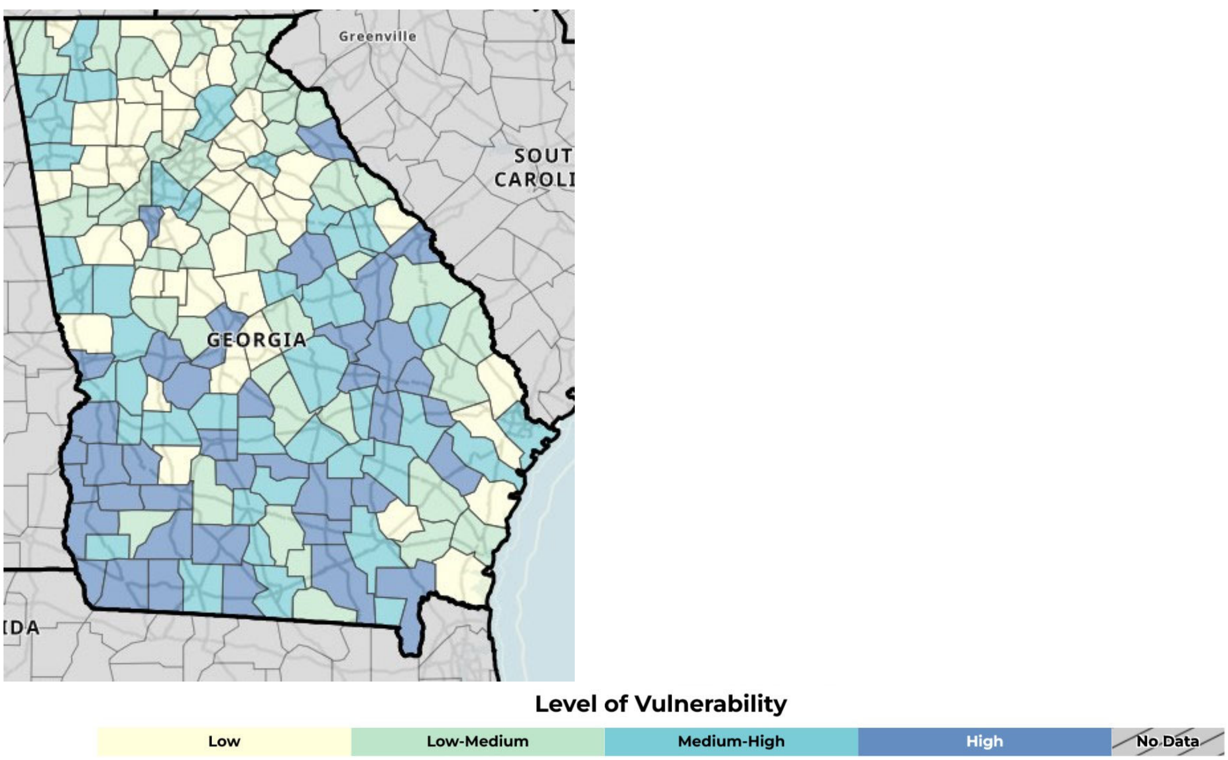


FIGURE 2.9: CDC 2010 SOCIAL VULNERABILITY



Source: Centers for Disease Control and Prevention/ Agency for Toxic Substances and Disease Registry/ Geospatial Research, Analysis, and Services Program. CDC/ATSDR Social Vulnerability Index [2010 and 2020] **Database [Georgia] https://www.atsdr.cdc.gov/placeandhealth/svi/data_documentation_download.html. Accessed on July 20, 2023**

FIGURE 2.10: CDC 2020 SOCIAL VULNERABILITY



2.6 COMPOSITE ASSESSMENT

The composite assessment is a compilation of the SVI scores in Section 2.5 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 2.15 to 2.19. For the purposes of this section, this is a composite assessment only. Individual hazard based assessments are included in the hazard profiles in Section 2.8.

TABLE 2.15: 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 2.16: 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 2.17: 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 2.18: 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 2.19: 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 2.11 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 2.12 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 2.20.

FIGURE 2.11: COMPOSITE HAZARD SCORES FOR GEORGIA

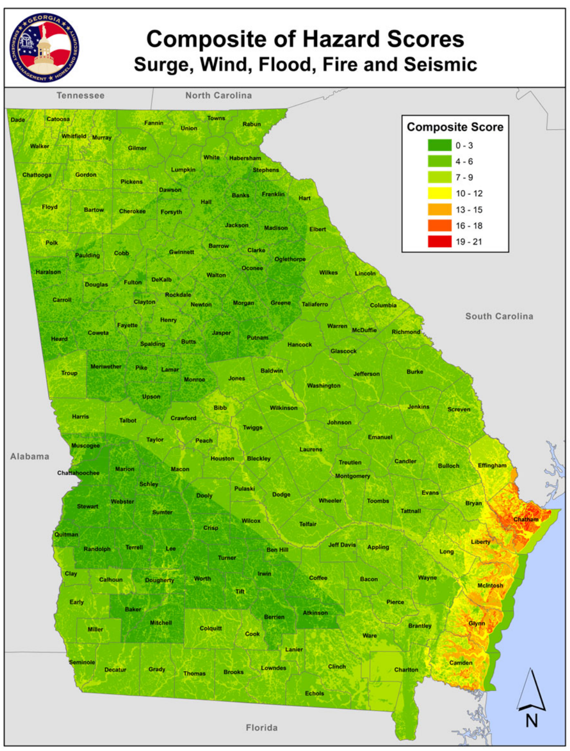


FIGURE 2.12: AVERAGE HAZARD SCORE BY COUNTY

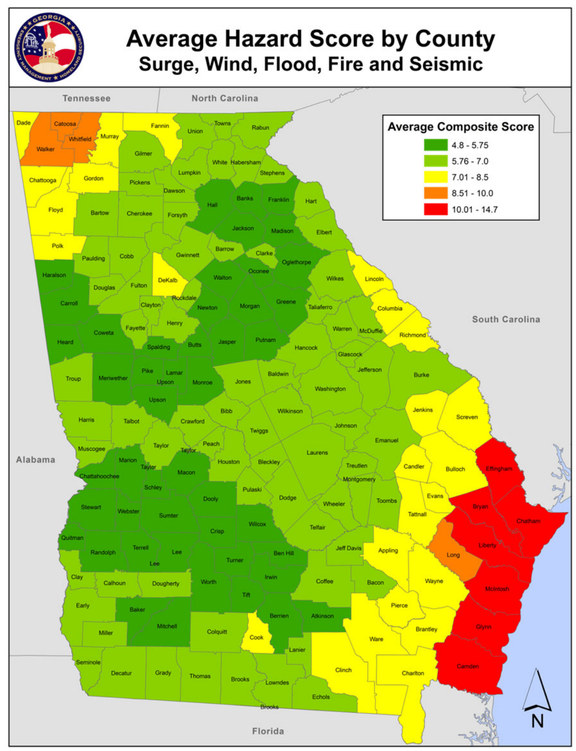


FIGURE 2.13: COMBINED HAZARD SCORE AND SOCIAL VULNERABILITY INDEX SCORE

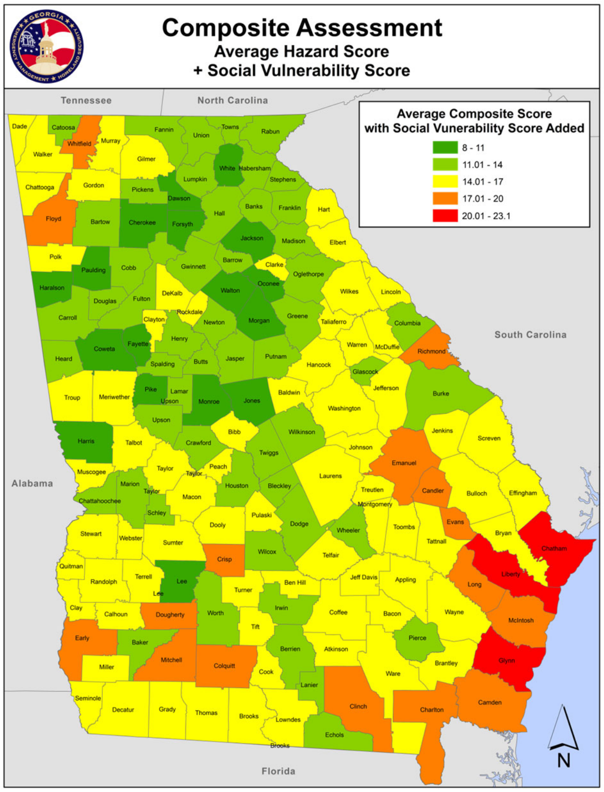


FIGURE 2.14: COMBINED HAZARD RISK AND SOCIAL VULNERABILITY INDEX SCORE, CHANGES TO TOTAL SCORE

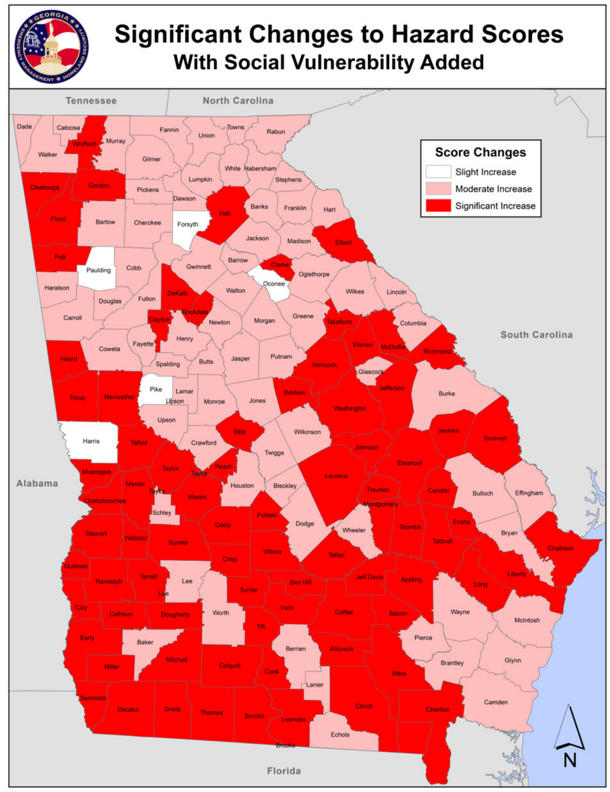


TABLE 2.20: COUNTIES WITH HIGHEST AVERAGE HAZARD SCORES

County	Average Hazard Score
Chatham	14.7
Glynn	13.1
McIntosh	12.2
Camden	12.1
Liberty	11.7
Bryan	11.5
Effingham	10.0
Long	9.4
Catoosa	9.1
Whitfield	8.8

TABLE 2.21: COUNTIES WITH HIGHEST COMPOSITE SCORE

County	Composite Score (Hazard+SVI)
Chatham	23.0
Liberty	20.3
Glynn	20.2
Long	19.6
Candler	18.6
McIntosh	18.5
Camden	18.4
Whitfield	18.1
Evans	18.0
Colquitt	17.4

By combining the hazard scores with social vulnerability scores from Section 2.5, an estimate of total risk can be calculated for each county. Figure 2.13 combines the average hazard score with the SVI 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 2.21.

Adding social vulnerability to the hazard scores changes the risk for several counties, and Figure 2.14 highlights those counties with significant changes. Some counties with less risk have a higher combined score due to high SVI scores. A comparison of Figures 2.8 and 2.14 shows the relationship between the Social Vulnerability (SVI) scores and the changes to the hazard score when SVI is added in as reflected in Table 2.21. Specifically, counties in Figure 2.14 showing an increase in vulnerability after Social Vulnerability is added in are many of the same counties shown in Figure 2.8 to have a high or extremely high SVI scores. Notably, a comparison of Table 2.20, which reflects the top 10 counties with the highest average hazard scores, and Table 2.21, which reflects the top 10 counties combined average hazard and SVI scores shows the effect of including SVI scores in a county's overall risk. Bryan, Effingham and Catoosa Counties in Table 2.20 are replaced by Candler, Evans and Colquitt Counties in Table 2.21 due to these three counties' "high" and "extremely high" SVI scores. This leads to the conclusion that 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 SVI is provided in Section 2.5.1. As Section 2.5 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. Figures 2.9 and 2.10 show the CDC Social Vulnerability Indices from 2010 and 2020. Comparing the overall SVI from Figure 2.8 in Section 2.5 to the Land Use Change Map from Figure 2.15. The data indicates, for example, that growing suburban communities surrounding larger metropolitan statistical areas have lower SVI scores, which relates to an 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 the SVI impact on 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 SVI score. If these changes in development continue, they could affect future risk and vulnerability assessments.

Conversely, the same comparison between Figures 2.8, 2.9, 2.10 and 2.15 reveals an apparent correlation between areas that lost population and areas that are deemed to be more socially vulnerable. However, the relationship between overall population loss and changes in social vulnerability is less clear at the statewide level. For example, within the counties that lost population and have high social vulnerability scores, some saw their social vulnerability scores lowered (indicates less social vulnerability), while others saw their scores raised. Additional analysis will be necessary to determine any correlation.

Note that variables related to growth and development are included in SVI 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.

2.7 LOSS POTENTIAL

At present, the best available method to estimate potential losses is in relation to three types of facilities: state-owned or leased facilities, locally reported critical facilities, and community lifelines. 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 potential losses from the above-mentioned facility types. Information on repetitive loss properties is also presented. This section only analyzes data on an all-hazards composite basis. Where available, individual hazard specific analyses are included in the hazard profiles in Section 2.8.

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 2019 GHMS, at least 38 properties have been acquired by 23 projects, just in the Hazard Mitigation Grant Program (HMGP). 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 - 2020 and increased urbanization from 2015 - 2020. Figure 2.15 below shows population changes from 2010 to 2020. Figure 2.16 shows areas of increased urbanization from 2015 to 2020. 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 2.15 generally correlate to areas of less new urbanization shown on Figure 2.16. 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.

2.7.1 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 December 30, 2022, the GMIS database contains 21,241 locally reported critical facilities. This total represents an increase of 2,723 critical facility records in the database since the last plan was produced.

FIGURE 2.15: POPULATION CHANGES BETWEEN 2010 AND 2020

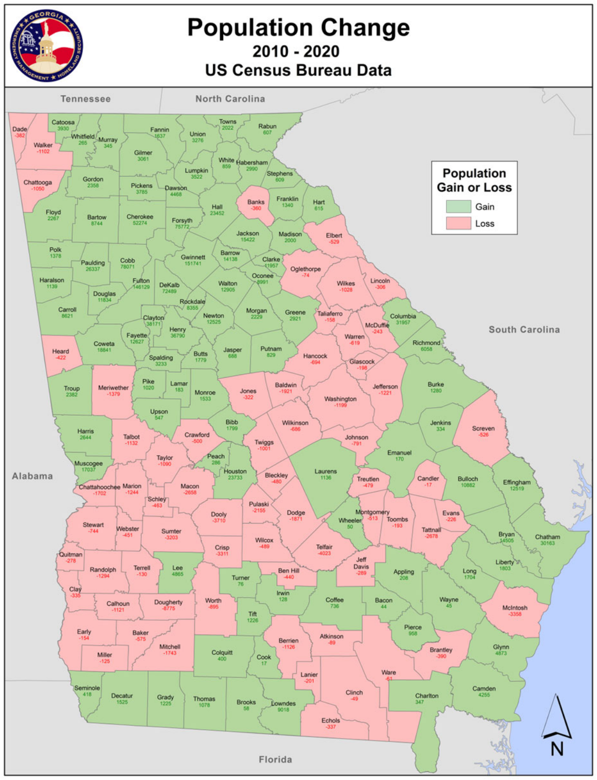
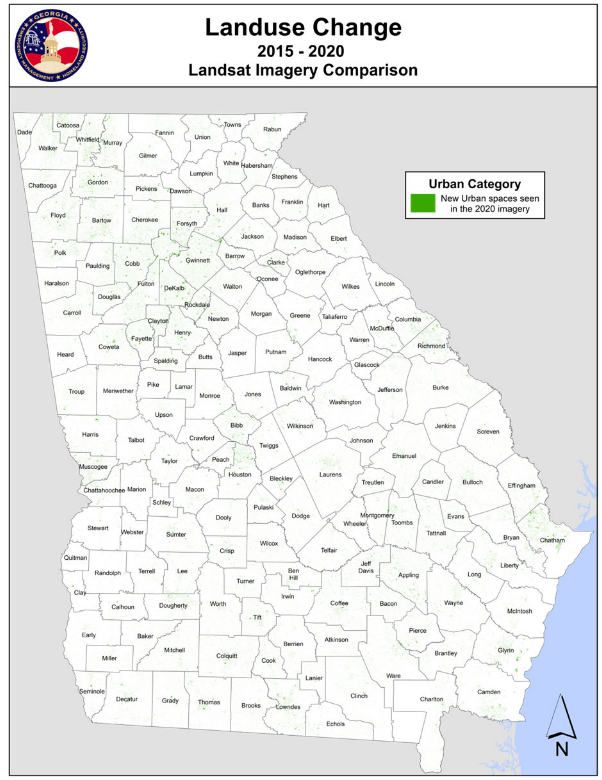


FIGURE 2.16: LAND USE CHANGES FROM INCREASED URBANIZATION



The GMIS database is also designed to include numerous attributes of each locally reported critical facility (See Table 2.22). 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 2.22: 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 2.23 - 2.25.

TABLE 2.23: LOCAL CRITICAL FACILITIES BY HAZARD CATEGORY

Hazard Category	Hazard Score Range	2019 Total Facilities	2024 Total Facilities	2019 % Total Facilities	2024 %Total Facilities
High	18-25	206	65	1.11%	0.31%
Moderate	9-17	2,162	1,936	11.68%	9.11%
Low	0-8	16,150	19,240	87.21%	90.49%
Totals		**18,518**	**21,241**	**100%**	**100%**

TABLE 2.24: LOCAL CRITICAL FACILITY CHANGES, BY HAZARD CATEGORY

Hazard Category	2019 Total Facilities	2024 Total Facilities	Change	2019 % Total Facilities	2024 %Total Facilities	Change
High	206	65	-141	1.11%	0.31%	-.68%
Moderate	2,162	1,936	-226	11.68%	9.11%	-10%
Low	16,150	19,240	3,090	87.21%	90.49%	19%
Totals	**18,518**	**21,241**	**2,773**			**15%**

TABLE 2.25: LOCAL CRITICAL FACILITY VALUE AT RISK, BY HAZARD CATEGORY

Hazard Category	Hazard Score Range	Estimated Value at Risk	% Total Value
High	18-25	$172,103,743.64	0.19%
Moderate	9-17	$6,207,098,240.70	7.0%
Low	0-8	$82,221,713,619.23	92.79%
Totals		**$88,600,915,603.57**	**100%**

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 2.26 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 2.27 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 2.28 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 2.26: CRITICAL FACILITY TYPES: PERCENTAGE OF TOTAL REPORTED

Building Type	Number of Buildings	% of Total
Government,Water/Sewer	4543	21.37%
Education,K - 12	2129	10.01%
Emergency Services,Fire Fighters	1561	7.34%
Government,Government Offices	1063	5.00%
Education,Day Care	988	4.65%
NGO,Private	934	4.39%
Education,Government Offices	923	4.34%
Education,Non-Profit	510	2.40%
Government,Government,Water/Sewer,Water/Sewer	482	2.27%
Education,University	442	2.08%
Emergency Services,Emergency Services,Fire Fighters,Fire Fighters	358	1.68%
Law Enforcement,Police	338	1.59%
Government,Private	335	1.58%
Education,Private	268	1.26%
NGO,Communications	251	1.18%
Government,Non-Profit	240	1.13%
Government,Transportation	212	1.00%
Medical,Hospital	201	0.95%
NGO,Non-Profit	190	0.89%
Law Enforcement,Court House	185	0.87%
Education,Education,K - 12,K - 12	181	0.85%
Government,Communications	178	0.84%
Law Enforcement,Sheriff	164	0.77%
Government,Government,Governm	155	0.73%
ent Offices,Government Offices		
Government,City Hall	154	0.72%
Government,Library	152	0.71%
Education,Library	145	0.68%
Medical,ALF	140	0.66%
Medical,EMS	139	0.65%
Medical,Medical Offices	133	0.63%
NGO,Transportation	131	0.62%
Law Enforcement,Jails	117	0.55%
NGO,Water/Sewer	113	0.53%
Government,Government,Private,Private	107	0.50%
Government,EMA	100	0.47%
Medical,NH	98	0.46%
Emergency Services,EMS	94	0.44%
Emergency Services,Communications	93	0.44%
Education,VoTech	91	0.43%
Government,Court House	91	0.43%
Medical,Private	91	0.43%
NGO,NGO,Private,Private	86	0.40%
Education,Fire Fighters	85	0.40%
Law Enforcement,Law Enforcement,Court House,Court House	80	0.38%
Government,NGO,Water/Sewer	77	0.36%

Building Type	Number of Buildings	% of Total
Education,Jr Colleges	70	0.33%
Emergency Services,EMA	63	0.30%
Law Enforcement,Law Enforcement,Police,Police	63	0.30%
Medical,Clinics	57	0.27%
Law Enforcement,Prisons	53	0.25%
NGO,NGO,Transportation,Transportation	46	0.22%
Education,Education,Library,Library	44	0.21%
Law Enforcement,State Patrol	44	0.21%
Emergency Services,EMS,Fire Fighters	42	0.20%
Government,Landfill	41	0.19%

Building Type	Number of Buildings	% of Total
Law Enforcement,Law Enforcement,Sheriff,Sheriff	38	0.18%
Education,Education,Jr Colleges,Jr Colleges	37	0.17%
Emergency Services,Government,Fire Fighters	36	0.17%
Government,Fire Fighters	36	0.17%
Education,Water/Sewer	34	0.16%
NGO,Government Offices	34	0.16%
Education,Pre K	33	0.16%
Education,Transportation	31	0.15%
Government,Government,Non-Profit,Non-Profit	30	0.14%
Government,Water/Sewer	4543	21.37%

TABLE 2.27: RANKINGS OF POTENTIAL FOR LOSS BY JURISDICTION

Rank	High Avg. Value / Facility	High Avg. Risk / Facility	High Avg. Standardized
1	Madison County	Town of Thunderbolt	Madison County
2	City of Chamblee	City of Tybee Island	City of Chamblee
3	City of Cumming	Glynn County	City of Cumming
4	Heard County	City of Brunswick	Heard County
5	City of Savannah	City of Savannah	Fulton County
6	Jeff Davis County	City of St. Marys	Jeff Davis County
7	Fulton County	City of Bloomingdale	City of Dunwoody
8	Effingham County	City of Port Wentworth	Columbus-Muscogee County
9	City of Dunwoody	City of Garden City	City of Douglasville
10	City of Warner Robins	Camden County	City of Warner Robins

TABLE 2.28: RANKINGS OF TOTAL VALUE OF CRITICAL FACILITIES BY JURISDICTION

Rank	High Value/ Facility
1	Gwinnett County
2	City of Atlanta
3	City of Savannah
4	Athens-Clarke County
5	Columbus-Muscogee County
6	Bartow County
7	City of Cumming
8	City of Douglasville
9	City of Warner Robins
10	City of Rome

2.7.2 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 19,872 structures, of which 13,858 are state-owned, 2,301 are state-leased structures, and 3,713 are other assets. (See Table 2.29) Figure 2.17 shows the location of these state facilities. The greatest liability to the state is from state-owned facilities. Figure 2.18 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 2.29: STATE ASSET TOTALS ACCORDING TO BLLIP DATA BY YEAR OF DATA

State Asset Type	2007	2010	2013	2017	2022
Owned	13,222	20,574	14,360	13,109	13,858
Leased	1,665	2,391	2,367	2,375	2,301
Other	N/A	1,800	2,899	3,076	3,713
Total	**14,887**	**24,765**	**19,626**	**18,560**	**19,872**

FIGURE 2.17: LOCATION OF STATE ASSETS, AS OF NOVEMBER 2022

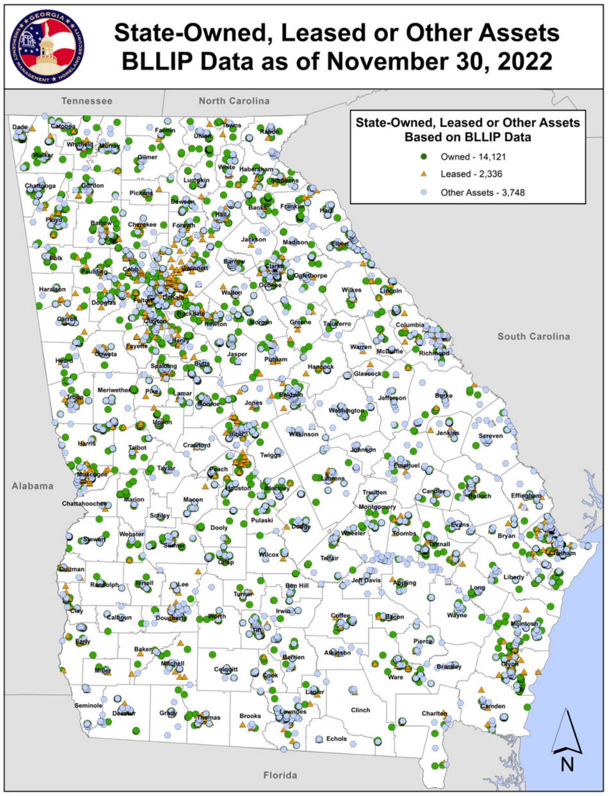
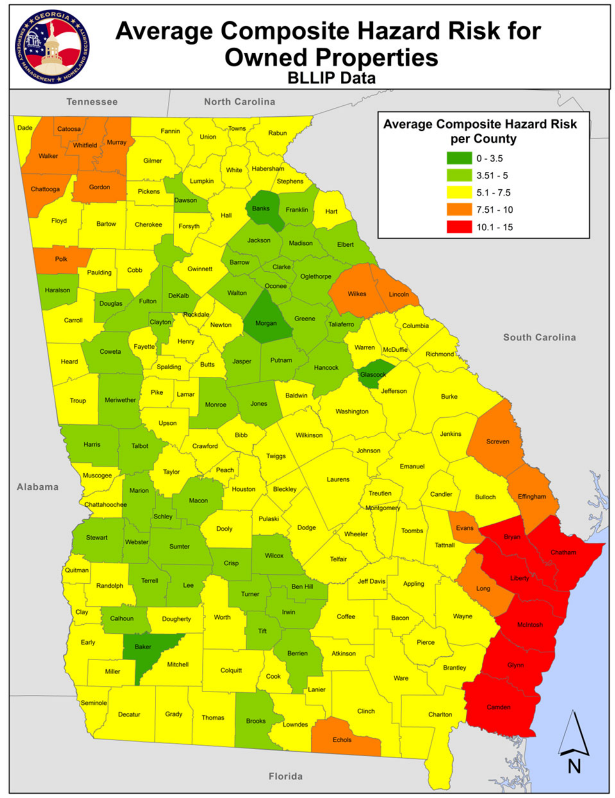


FIGURE 2.18: RISK TO STATE-OWNED PROPERTY



The BLLIP database is designed to include a plethora of information regarding state-owned and leased facilities (See Table 2.30). The authorities listed above continue to improve the database so that all the attribute data are complete.

TABLE 2.30: BLLIP FACILITY ATTRIBUTES

Attribute Name
BLLIPID
ADAComplianceStatus
Address
AsbestosStatus
BuildingFunctionality
BuildingName
BuildingNumber
BuildingOwnerName
CityName
Comments
ConditionedSquareFeet
ConsolidatedCustomerId

Attribute Name
ConsolidatedCustomerLocationId
ConstructionType
ConstructionYear
CountryName
CountyName
DataStatus
ElectricalCondition
ElectricReplacementOrRepairCost
ElevatorEscalatorCondition
ElevatorEscalatorReplRepairCo

Attribute Name
st
ElevatorEscalatorType
EntityContactName
EntityId
EntityName
FacadeCondition
FacadeReplacementOrRepairCost
FacilityType
FireAlarmSystemCondition
FireAlarmSysReplaceOrRepairCost

Attribute Name
FireDetectionStatus
FireProtectionStatus
GeneralObligateBondIssueComment
GrossSquareFeet
HasIndividualElectricityMeter
HasGeneralObligationBonds
HasIndividualNaturalGasMeter
HasIndividualWaterMeter
HistoricStatus
InsuredContentsValue
InsuredValue
InteriorCondition
InteriorReplacementOrRepairCost
IsAvailableForSurplus
IsIndividuallyMetered
IsInFloodPlain
LastUpdated
Latitude
LocalContactName
Location
Longitude
MechanicalSystemCondition

Attribute Name
MechSysReplacementOrRepairCost
NonGACityName
NonUSStateProvince
NumberOfElevatorsEscalators
NumberOfFloors
NumberOfParkingSpaces
OriginalCost
OtherOwnerName
ParkingCondition
ParkingReplacementOrRepairCost
ParkingType
PeopleSoftAssetNumber
PercentOccupied
PlumbingCondition
PlumbingReplacementOrRepairCost
PrimaryUse
PurchaseYear
ReplacementCost
RMSDataStatus
RMSLastUpdated
RoofCondition

Attribute Name
RoofReplacementOrRepairCost
SecuritySystemCondition
SecuritySysReplaceOrRepairCost
State
StructureCondition
StructureReplaceOrRepairCost
SubEntityContactName
SubEntityName
SubLocation
TotalCapacity
TtlPastComponentReplceRepairCst
TotalOccupancy
TtlPrjComponentReplceRepairCst
UsableSquareFeet
VoiceDataCondition
VoiceDataReplaceOrRepairCost
ZipCode
Bldg_Construction
Bldg_Condition
Bldg_Foundation

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 2.31 shows the percentage of state-owned and leased properties broken down by hazard category. Table 2.32 shows the estimated value at risk by hazard category.

TABLE 2.31: STATE FACILITY PERCENTAGES IN HAZARD CATEGORIES

Hazard Category	Hazard Score Range	% Owned	% Leased	2019 % Total Facilities	2024 % Total Facilities
High	18-25	0.68%	0.26%	0.71%	0.62%
Moderate	9-17	10.16%	6.85%	9.85%	9.69%
Low	0-8	87.11%	66.44%	72.58%	84.18%
None	Undetermined	2.05%	26.46%	16.86%	5.51%

TABLE 2.32: STATE FACILITY VALUE AT RISK ACCORDING TO HAZARD CATEGORIES

Hazard Category	Hazard Score Range	2019 Estimated Value at Risk	2024 Estimated Value at Risk	2019 % Total Value	2024 % Total Value
High	18-25	$89,527,056	$91,518,780.21	0.40%	0.28%
Moderate	9-17	$1,373,269,954	$2,548,936,390.27	6.11%	7.85%
Low	0-8	$19,735,105,056	$29,574,228,084.56	87.85%	91.07%
None	Undetermined	$1,265,633,231	$260,052,213.90	5.63%	0.8%

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 Headquarters a hazard score of 6 (on a scale of 1–25).

As Table 2.31 illustrates, the majority of structures in BLLIP are located in the low hazard areas. Likewise, Table 2.32 shows that more than 90% of the estimated value at risk comes from state-operated facilities 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 2.33: STATE FACILITY EXPOSURE TO 100 YEAR FLOOD AND WIND EVENTS BY AGENCY

Agency	Flooding		Wind	
	Facilities exposed	$ Losses	Facilities exposed	$ Losses
BOR	141	$164,377,606	50	$6,200,210
DBHDD	17	$51,185,205	8	$224,010
DNR	520	$147,703,655	72	$851,840
DOAg	3	$999,965	2	$60,840
DOC	27	$8,620,278	38	$1,153,210
DOD	9	$8,811,550	14	$573,430
DOE	2	$151,575	1	$6,790
DOJJ	6	$4,964,840	7	$106,860
DPS	9	$6,856,590	4	$360,640
GDOT	33	$27,542,700	20	$213,170
GFC	11	2,684,387	12	$65,830
GPA	62	$232,659,087	15	$1,701,980
TCSGA	3	$4,115,359	6	$1,269,030

Agency	Flooding		Wind	
	Facilities exposed	$ Losses	Facilities exposed	$ Losses
Other	54	18,637,897	25	$1,251,360
Total	**897**	**$679,310,697**	**274**	**14,039,200**

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, 2.05% of the state-owned structures and 26.46% of the state-leased structures are not represented due to invalid coordinate information. In terms of the estimated value of structures at risk, 8.77% 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 2.34: 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	113	$19,517,391	5	$293,820
2	Southwest GA	130	$134,852,770	42	$700,970
3	East Central GA	56	$11,677,305	41	$1,383,810
4	West Central GA	43	$8,048,284	13	$474,660
5	Coastal GA	388	$415,037,709	123	$6,865,870
6	Northwest GA	94	$43,866,702	3	$82,620
7	Metro Atlanta	36	$32,567,575	4	$1,107,530
8	South Central GA	37	$13,742,961	36	$550,360
Total		**897**	**$679,310,697**	**267**	**$11,459,640**

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 2.34 and 2.35 show the results of the Hazus analysis by agency and by GEMA/HS area.

2.7.3 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), Pre-Disaster Mitigation Competitive (PDM-C) program, and the Building Resilient Infrastructure and Communities (BRIC) program. Notably, the BRIC program is a replacement for PDMC. While the State continues to manage older active projects funded through PDMC, FEMA has ended the PDMC program for all future projects. 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. 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 State utilized redacted Repetitive Loss data provided by FEMA in accordance with Federal Privacy Protection laws. The results are provided in Table 2.32. 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. Also, of note, while there were no major disaster declarations with flooding between 2017 and 2023, there was a significant increase in the number of RLPs and SRLPs. While there were no flood related declarations, it is possible this is the result of several significant local flood events occurring during this time. Additional analysis would be necessary to determine the actual cause. One change for the 2023 plan is the reduced level of analysis the State is able to do, due to limited access to geo-location data for RLPs and SRLPs. There is a legal process to allow GEMA/HS access to the full data, as of the writing of this plan, the agency is still in the process of completing those requirements. Once full access is re-obtained, the State will re- assess the level of analysis that can be done. 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 2.35: TOTAL REPETITIVE AND SEVERE REPETITIVE LOSS PROPERTIES IN FLOOD HAZARD ZONES BY YEAR OF DATA WITH HAZARD SCORES

Flood Hazard Category	2004	2007	2010	2013	2017	2023
Special Flood Hazard Area (1% Annual Chance of Flood)	N/A	618	823	896	949	1449
Non-Special Flood Hazard Area	N/A	600	807	730	844	828
Total	**811**	**1218**	**1630**	**1626**	**1793**	**2277**

Table 2.35 reveals that between 2017 and 2023 there was an increase in RLPs in the Special Flood Hazard Area. Figures 2.18 through 2.20 illustrate various aspects of the RLPs in Georgia and are helpful in identifying opportunities to reduce risk. Figure 2.19 shows the top 10 jurisdictions based on total number of RLPs. Clusters of RLPs are located in Metro Atlanta, Augusta–Richmond County, Lee and Dougherty

counties, Chatham County and Glynn County. Properties with frequent flood claim losses are possible locations for mitigation actions.

Figure 2.20 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.

Tables 2.34 and 2.35 list the number of validated RLPs and SLRPs by jurisdiction, and Figure 2.21 visually illustrates SLRP 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 2.19: TOP 10 COMMUNITIES BY TOTAL RL PROPERTIES

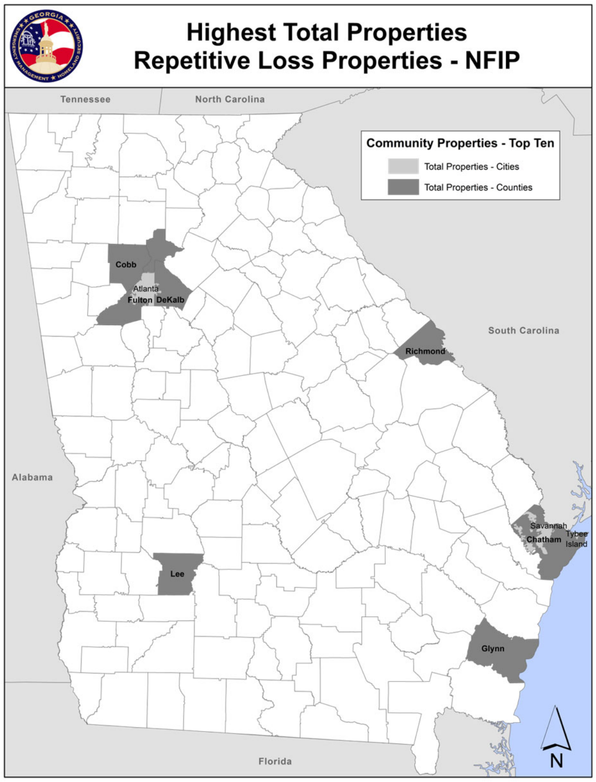


FIGURE 2.20: TOP 10 COMMUNITIES BY TOTAL RLP LOSSES

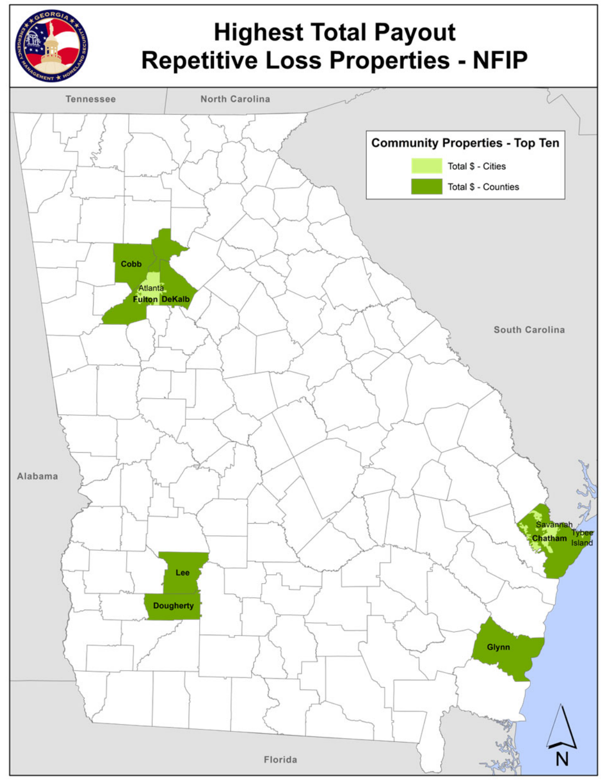


FIGURE 2.21: COMMUNITIES WITH SRL PROPERTIES, AS OF JULY 20, 2023

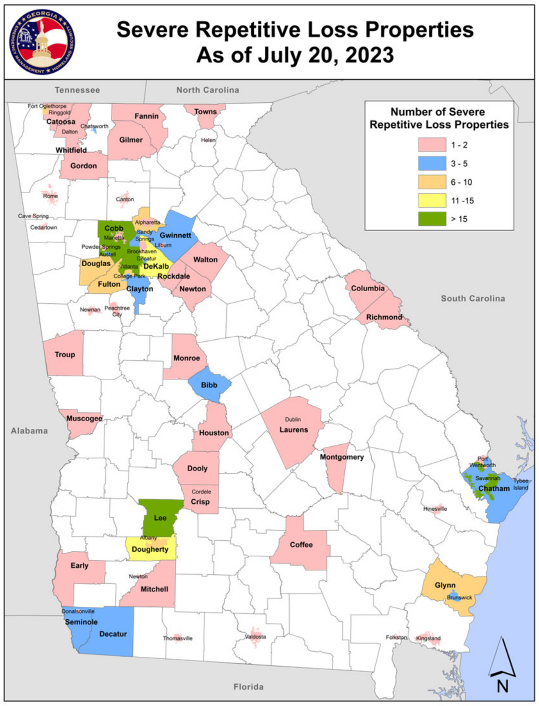


TABLE 2.36: REPETITIVE LOSS (RL), PROPERTIES BY JURISDICTION

County	Total Amounts Paid	Total Number of Properties
BAKER COUNTY	$232,216.63	4
BALDWIN COUNTY	$6,715.61	1
BARROW COUNTY	$343,876.06	1
BARTOW COUNTY	$108,518.84	3
BEN HILL COUNTY	$37,009.65	1
BIBB COUNTY	$928,667.42	11
BROOKS COUNTY	$178,582.23	2
BRYAN COUNTY	$935,793.19	6
BULLOCH COUNTY	$177,118.15	6
BUTTS COUNTY	$80,134.19	3
CALHOUN COUNTY	$32,684.43	1
CAMDEN COUNTY	$1,741,139.22	25
CARROLL COUNTY	$3,667,423.70	5
CATOOSA COUNTY	$3,307,988.20	38
CHARLTON COUNTY	$535,584.99	6
CHATHAM COUNTY	$38,185,074.21	581
CHATTOOGA COUNTY	$202,100.15	4
CHEROKEE COUNTY	$645,369.36	4
CLARKE COUNTY	$54,701.75	5
CLAYTON COUNTY	$807,800.38	22
COBB COUNTY	$23,872,735.35	167
COFFEE COUNTY	$587,667.73	8
COLQUITT COUNTY	$581,655.12	6
COLUMBIA COUNTY	$241,762.86	5
COWETA COUNTY	$164,236.15	4
CRISP COUNTY	$1,541,104.34	13
DADE COUNTY	$86,071.78	1
DECATUR COUNTY	$2,299,059.61	25
DEKALB COUNTY	$14,223,870.82	199
DOOLY COUNTY	$130,483.45	1
DOUGHERTY COUNTY	$7,479,690.59	105
DOUGLAS COUNTY	$2,401,055.36	25
EARLY COUNTY	$237,442.22	3
EFFINGHAM COUNTY	$3,643.64	1
ELBERT COUNTY	$13,732.12	1

County	Total Amounts Paid	Total Number of Properties
FANNIN COUNTY	$189,680.76	9
FAYETTE COUNTY	$740,991.00	11
FLOYD COUNTY	$1,620,920.92	44
FORSYTH COUNTY	$224,278.35	5
FULTON COUNTY	$47,228,312.34	354
GILMER COUNTY	$2,760,677.76	21
GLYNN COUNTY	$15,707,000.08	158
GORDON COUNTY	$485,997.33	7
GRADY COUNTY	$17,556.55	1
GWINNETT COUNTY	$2,298,536.80	29
HABERSHAM COUNTY	$22,733.74	1
HALL COUNTY	$296,765.54	4
HARRIS COUNTY	$112,382.95	1
HENRY COUNTY	$136,044.87	3
HOUSTON COUNTY	$208,339.10	4
JASPER COUNTY	$27,818.04	1
JEFF DAVIS COUNTY	$9,964.37	1
LAMAR COUNTY	$47,216.68	1
LAURENS COUNTY	$1,023,659.52	9
LEE COUNTY	$10,110,120.33	116
LIBERTY COUNTY	$136,943.70	4
LOWNDES COUNTY	$844,127.61	7
LUMPKIN COUNTY	$93,180.42	2
MCINTOSH COUNTY	$130,004.10	1
MILLER COUNTY	$146,219.19	2
MITCHELL COUNTY	$617,845.04	8
MONROE COUNTY	$712,109.44	6
MONTGOMERY COUNTY	$313,862.93	5
MURRAY COUNTY	$440,109.45	6
MUSCOGEE COUNTY	$669,542.95	10
NEWTON COUNTY	$129,174.69	3
PICKENS COUNTY	$37,701.76	1
POLK COUNTY	$205,298.50	13
PULASKI COUNTY	$86,341.54	2
RABUN COUNTY	$159,250.46	2
RICHMOND COUNTY	$2,457,281.42	58

County	Total Amounts Paid	Total Number of Properties
ROCKDALE COUNTY	$472,907.28	8
SEMINOLE COUNTY	$1,024,655.72	11
SUMTER COUNTY	$73,129.85	1
TATTNALL COUNTY	$76,495.36	2
TAYLOR COUNTY	$7,004.24	1
TELFAIR COUNTY	$80,965.92	2
THOMAS COUNTY	$1,757,964.30	5
TIFT COUNTY	$2,092,730.60	5
TOOMBS COUNTY	$228,773.35	6
TOWNS COUNTY	$141,199.67	6
TROUP COUNTY	$818,002.66	8
UNION COUNTY	$183,343.84	3
UNKNOWN	$64,424.64	3
UPSON COUNTY	$117,093.43	3
WALKER COUNTY	$640,750.57	12
WALTON COUNTY	$121,500.39	3
WARE COUNTY	$39,990.89	3
WASHINGTON COUNTY	$6,154.40	1
WHEELER COUNTY	$16,981.97	1
WHITE COUNTY	$114,060.28	3
WHITFIELD COUNTY	$838,249.69	8
WORTH COUNTY	$152,710.27	3
Grand Totals	**$205,589,789.05**	**2301**

TABLE 2.37: SEVERE REPETITIVE LOSS (SRL), PROPERTIES BY JURISDICTION

County	Total Amounts Paid	Total Number of Properties
BAKER COUNTY	$74,722.15	1
BIBB COUNTY	$546,898.45	3
CAMDEN COUNTY	$356,312.21	3
CATOOSA COUNTY	$2,185,487.70	10
CHARLTON COUNTY	$162,466.79	1
CHATHAM COUNTY	$5,754,594.44	47
CHEROKEE COUNTY	$588,088.82	1
CLAYTON COUNTY	$296,429.89	4
COBB COUNTY	$7,535,788.83	27
COFFEE COUNTY	$107,809.81	1
COLUMBIA COUNTY	$108,291.41	1
COWETA COUNTY	$63,039.31	1
CRISP COUNTY	$695,032.80	3
DECATUR COUNTY	$539,173.03	3
DEKALB COUNTY	$3,238,957.56	21
DOOLY COUNTY	$152,821.68	2
DOUGHERTY COUNTY	$2,356,204.56	19
DOUGLAS COUNTY	$1,551,606.41	9
EARLY COUNTY	$132,053.31	1
FANNIN COUNTY	$3,556.52	1
FAYETTE COUNTY	$286,721.29	1
FLOYD COUNTY	$282,815.14	3
FULTON COUNTY	$21,538,141.80	71
GILMER COUNTY	$191,398.88	2
GLYNN COUNTY	$2,399,714.70	12
GORDON COUNTY	$122,377.59	1
GWINNETT COUNTY	$455,455.64	4
HOUSTON COUNTY	$137,967.32	1
LAURENS COUNTY	$464,135.73	2
LEE COUNTY	$4,047,935.00	27
LIBERTY COUNTY	$15,408.70	1
LOWNDES COUNTY	$52,357.88	1
MITCHELL COUNTY	$47,916.32	1
MONROE COUNTY	$312,030.84	2

County	Total Amounts Paid	Total Number of Properties
MONTGOMERY COUNTY	$131,147.31	1
MURRAY COUNTY	$227,935.37	2
MUSCOGEE COUNTY	$317,583.47	1
NEWTON COUNTY	$90,279.64	1
POLK COUNTY	$10,866.29	1
RICHMOND COUNTY	$989,190.24	8
ROCKDALE COUNTY	$202,540.52	1
SEMINOLE COUNTY	$571,587.27	4
THOMAS COUNTY	$1,677,430.29	2
TOWNS COUNTY	$59,211.09	1
TROUP COUNTY	$76,643.40	1
WALTON COUNTY	$60,830.28	1
WHITE COUNTY	$91,972.44	1
WHITFIELD COUNTY	$726,466.12	2
Grand Totals	**$62,037,396.24**	**315**

2.7.4 Community lifelines

The National Response Framework defines community lifelines as "those services that enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security." In other words, community lifelines are those essential services including, but not limited to, power, communication, transportation, water, food, health and safety that are essential for society to function. Notably, the loss of some community lifelines can affect other lifelines. For example, power failure can affect water supplies. In rural areas, where large numbers of homes are on individual wells, that effect is immediate. In areas served by municipal or county water systems, while there is some buffer in the form of water storage tanks, should the power outage last long enough, homes and businesses served by those systems would eventually lose water. Likewise, should the transportation system be significantly impacted by a major weather event, this could impact the community's ability to provide emergency medical services, as well as the community's access to food and other necessities. Table 2.38 below includes various community lifelines that could have either regional or statewide impacts should they be affected by disaster. For the purposes of this section, these lifelines and impacts are considered on an all-hazards basis as they can be caused by multiple hazards. Individual hazard-based community lifeline discussions are included in the hazard profiles in Section 2.8.

TABLE 2.38: IMPACTS ON COMMUNITY LIFELINES

Lifeline	Location	Potential Hazards	Likely Impact Scope	Impact Discussion
Energy	Statewide	Dam Failure, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind, Extreme Heat	Individual county, Regional	Power outages can affect single counties, or an entire region. It can lead to things like loss of heating and cooling capability, which can be dangerous during hot and cold weather; loss of essential perishable necessities, including food, medicine and other items; lack of running water and sewer services; communications failures, failure of critical medical and security systems that require power to function.
Communications	Statewide	Dam Failure, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind, Extreme Heat	Individual county, Regional	Communication failures typically impact single counties, but in the event of large-scale disasters can impact an entire region. Failure of communications systems can lead to the inability to communicate important messages including communicating with and between first responders, including calling 911 for help; problems checking on and providing assistance to family, friends and neighbors; as well as important communications functions for critical systems such as fire and security systems.
Transportation: Streets, roads and highways	Statewide	Dam Failure, Inland Flooding,	Individual county, Regional	Failure of roadways can include washed out or blocked roads and highways, flooded streets and highways,

Lifeline	Location	Potential Hazards	Likely Impact Scope	Impact Discussion
		Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind		damaged or collapsed bridges, etc. This can lead to multiple impacts, including inability to evacuate dangerous and/or hazard impacted areas; hindered rescue efforts due to inability of first responders to access impacted areas; reduced ability for citizens to access critical services, etc.
Transportation: Hartsfield Jackson and Savannah International Airports	Chatham, Clayton and Fulton Counties	Dam Failure, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards (Savannah), Tornadoes, Hurricane Wind, Wildfire, Wind	Nationwide, Regional, Statewide	Mid or Long term closure of either of these airports would have significant regional and, possibly, nationwide, and statewide economic impacts due to affected business and personal travel needs, as well as limiting freight transportation into and out of the state.
Transportation: Regional Commercial airports	Dougherty, Richmond, Glynn, Muscogee, Bibb and Lowndes Counties	Dam Failure, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather,	Regional	Mid or Long term closure of either of these airports would have significant regional economic impacts due to affected business and personal travel needs.

Lifeline	Location	Potential Hazards	Likely Impact Scope	Impact Discussion
		Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind		
Transportation: Sea and Inland Ports	Chatham, Glynn, Crisp and Decatur Counties	Dam Failure, Inland Flooding, Severe Weather, Severe Winter Weather, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind	Nationwide, Statewide, Regional	Mid or long term closure of either of these facilities could have significant regional, statewide and possibly national economic impacts due to reduced freight import and export capabilities.
Transportation: Trains and Railways	Statewide	Dam Failure, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind	Individual County, Regional, Statewide	Damages to the rail system can have economic impacts due to reduced capacity for freight transportation. Depending on the location and type of damage, it could impact surface or water transportation systems due to rail crossings, overpasses and trussells.
Health and Medical:	Statewide	Dam Failure, Inland Flooding,	County level, Regional, Statewide	Mid or long term closure of a hospital can affect a county or region’s capacity for critical

Lifeline	Location	Potential Hazards	Likely Impact Scope	Impact Discussion
		Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind, Extreme Heat		medical services. In rural areas, where there is typically only one hospital that sometimes serves multiple counties, even a short term loss of ER function can determine whether the community is able to reach critical emergency care in time. Loss of use of a community's Emergency Medical Services not only results in reduced capacity for citizens to receive emergency medical care, but also reduced capacity for neighboring communities to provide those services to their citizens if they are willing and able to providing assistance to the disaster impacted jurisdictions.
Safety and Security	Statewide	Dam Failure, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind, Extreme Heat	County level, regional	Major disasters or significant events can stretch a community's Law Enforcement Services either to or beyond their capacity to provide adequate protection and security. This results in reduced capacity to provide protective services to their communities, but can also cause a minor reduction in capacity for neighboring communities to provide those services to their citizens if they are willing and able to providing assistance to the disaster impacted jurisdictions.
Energy: Vogtle, Hatch and Farley	Dothan, Alabama; Burke and	Dam Failure, Drought,	Regional, Statewide	Temporary or long-term loss of use of either of the Vogtle or Hatch plants could have

Lifeline	Location	Potential Hazards	Likely Impact Scope	Impact Discussion
Nuclear Power Plants	Appling Counties	Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind, Extreme Heat		significant impacts on the state's power grid, potentially stressing other power sources. Additionally, any impact to any of these facilities causing radiological releases could result in substantial health and safety impacts to the counties within the 10-mile Emergency Planning Zones and the 50-mile Ingestion Pathway Zones.
Energy: Other power generation systems	Baldwin (1), Barrow (1), Bartow (1), Bibb (1), Butts (1), Camden (1), Chatham (3), Clarke (1), Cobb (1), Columbia (1), Coweta (1), Crisp (1), Decatur (1), Dougherty (3), Early (2), Effingham (2), Fannin (1), Floyd (2), Forsyth (1), Franklin (1), Fulton	Dam Failure, Drought, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind, Extreme Heat	Individual County, Regional	Temporary or long-term loss of use of either of these facilities could result in partial or total loss of power in the communities they serve, as well as stress neighboring systems on the grid as they attempt to compensate.

Lifeline	Location	Potential Hazards	Likely Impact Scope	Impact Discussion
	(2), Gilmer (2), Glynn (1), Gwinnett (1), Habersham (2), Heard (5), Houston (1), Jackson (1), Lamar (1), Laurens (1), Liberty (1), Lowndes (2), Macon (1), Madison (1), Monroe (1), Murray (1), Muscogee (6), Polk (1), Putnam (1), Rabun (5), Richmond (1), Spalding (1), Talbot (1), Taylor (2), Troup (2), Upson (1), Walton (1), Washington (2), Wayne (1), Calhoun Falls South Carolina (Richard B.			

Lifeline	Location	Potential Hazards	Likely Impact Scope	Impact Discussion
	Russell Lake) (1)			
Food Poultry Industry	Statewide	Dam Failure, Drought, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind, Extreme Heat	National, Regional Statewide, Local	The Poultry industry employs more than 88,000 in the state and generates more than $4.3 billion in farm gate value and an overall annual economic impact to the state of more than $28 billion. Georgia produces 31 million pound of chicken and 7.28 million eggs per day for human consumption.
Transportation: Fuel Pipeline	Fulton, DeKalb, Cobb, Gwinnett and Henry	Dam Failure, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind	National, Regional, Statewide, Local	Loss would impact ability to deliver fuel for distribution to fuel stations, disrupting supply chain delivery and affect normal day to day vehicle traffic.
Water: County and Municipal Public Water Systems	Statewide	Dam Failure, Drought, Inland Flooding, Seismic Hazards,	Regional, Local	Temporary or long long-term loss of use of the water system would result in partial or total loss of drinking water, water used in fire suppression, and water used

Lifeline	Location	Potential Hazards	Likely Impact Scope	Impact Discussion
		Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind, Extreme Heat		by commercial customers in the communities served, as well as stress neighboring water systems on the grid as they attempt to compensate. Notably, in addition to the Atlanta Metro area, the state has 13 other metropolitan statistical areas with population centers located in Georgia. The loss of any one of the water systems serving the population centers of these areas could have significant impacts on the State's ability to recover from the event causing the loss.
Communications: Fiber Network	Statewide	Dam Failure, Inland Flooding, Seismic Hazards, Severe Weather, Severe Winter Weather, Geologic Hazards, Coastal Hazards, Tornadoes, Hurricane Wind, Wildfire, Wind	National, Statewide, Regional, Local	Temporary or long long-term loss of use of the Fiber Network would result in partial or total loss of a major communications fiber network that services the east coast of the United States. Business operations throughout the nation would be impacted.

2.8 HAZARD-SPECIFIC ASSESSMENTS

Hazard-specific assessments are presented in the following order:

2.8.1 Hurricane Wind

2.8.2 Coastal Hazards (includes storm surge and coastal flooding)

2.8.3 Wind

2.8.4 Severe Weather (includes lightning and hail)

2.8.5 Tornado

2.8.6 Inland Flooding

2.8.7 Severe Winter Weather

2.8.8 Drought

2.8.9 Wildfire

2.8.10 Earthquake

2.8.11 Geologic Hazards (includes sinkhole and landslide)

2.8.12 Dam Failure

2.8.13 Extreme Heat

2.8.14 Non-Natural Hazards

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.

2.8.1 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 Table 2.42: Hurricane Wind Intensity 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 2.39 presents the total number of hurricanes, by intensity, that have affected any portion of Georgia from 1851 through the present. Table 2.40 presents all of the tropical cyclones that have made landfall on the Georgia Coast from 1800 through the present.

TABLE 2.39: TOTAL NUMBER OF HURRICANES THAT HAVE TRACKED OVER GEORGIA, 1851 TO PRESENT

Hurricane Intensity	Number of Hurricanes
Category 1	14
Category 2	8
Category 3	3
Category 4	2
Category 5	0

Source: HURDAT2 data

TABLE 2.40: 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	15	15
Major Hurricane: Category 3-5	6	37

Source: HURDAT2 data

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. Though not a coastal hurricane, Hurricane Michael entered Southwest Georgia at Seminole County as a category 3 major hurricane, causing 3 fatalities and over $2.3 billion in losses to the agriculture and timber industries, notably destroying what was expected to be a record cotton crop.

Table 2.41 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, a few things stand out when analyzed using NOAA and SHELDUS data. Figure 2.22 shows the tropical cyclonic events per county from 1952 to 2022 and highlights the regions of Coastal, Western and Eastern Georgia. It is not currently clear why eastern Georgia is highlighted the way it is indicated by the map. Some historic data records are controlled by whether there was damage, an injury or death. While this may be the cause, any theory would be speculation without additional analysis. Nevertheless, the data does highlight Coastal and Western Georgia. Historically, the State is impacted by 3 entry points for tropical cyclones: direct landfalling cyclones along the coast, cyclones entering Southwest Georgia after making landfall in and crossing the Florida panhandle, and Western Georgia from gulf cyclones entering Georgia after crossing portions of Alabama.

TABLE 2.41: 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
2019	Dorian	Coastal Georgia	EM 3482 – Emergency declaration only due to evacuations and other preparedness efforts related to the approaching hurricane and potential impacts
2020*	Zeta	Northwest and Northeast Georgia	FEMA 4579; Wind/rain in Northwest and Northeast Georgia; sustained power outages throughout North Georgia; >1 million without power; 3 fatalities; $21 million in estimated damages to public infrastructure
2023	Idalia	South and Southeast Georgia	FEMA 4738; Wind/rain in South and Southeast Georgia; sustained power outages; >200,000 without power; 1 fatality, 8 injuries; estimated >41 million in public infrastructure damages.

*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 A strict view of the NOAA and SHELDUS historic data reveals 47 Tropical Cyclone events between 1960 and 2022. Notably, this is a slight undercount as the data does not include any events between 1980 and 1994. This missing timeframe includes two tropical cyclone related disaster declarations: notably, Hurricanes Klaus and Marco in 1990, and Tropical Storm Alberto in 1994. Based on this history, around 50 tropical cyclones affected the state in this timeframe. This translates to about an 80% chance of a tropical cyclone affecting Georgia per year or approximately one storm every 1.25 years.

Figure 2.23 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.

<u>FIGURE 2.22: HURRICANE WIND EVENTS IN GEORGIA, 1952–2022</u>

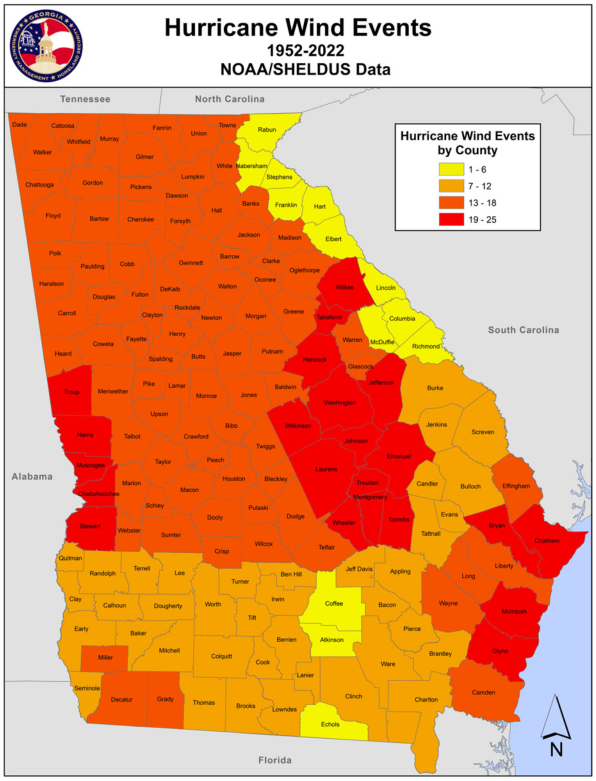
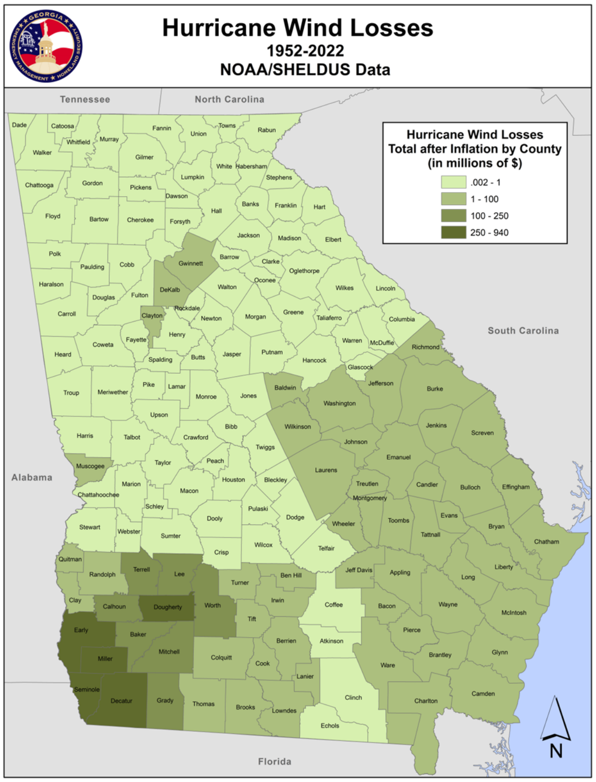


FIGURE 2.23: HURRICANE WIND LOSSES IN GEORGIA, 1952–2022.



Notably, the pattern reflected in Figure 2.22 is a drastic shift from the pattern shown in versions of the same map in previous plans. The 2011, 2014 and 2019 SHMSs all indicated the highest concentrations of hurricane events in Southwest and Coastal Georgia. While It's possible this change in the locations reflected is a result of the State shifting from using mostly SHELDUS data to mostly NOAA data due to access restrictions, it is unclear whether this is truly the cause. Nevertheless, Figure 2023 highlights the highest concentrations of damages in these two areas, which is consistent with previous versions of this strategy. Notably, Counties in Western, Central and Northern Georgia are more often and adversely affected by tropical cyclones that enter from the Gulf of Mexico than by tropical cyclones from the Atlantic Ocean. Statistically, direct landfalling hurricanes are rare in Georgia. While Hurricane Matthew brought hurricane force winds to the Georgia coast, the last hurricane to make landfall along the Georgia coast was Hurricane David in 1979. The last major hurricane to make direct landfall on the Ga coast was a category 4 event in 1898. However, a direct landfalling hurricane along the Georgia coast could be catastrophic, depending on the location and hurricane strength.

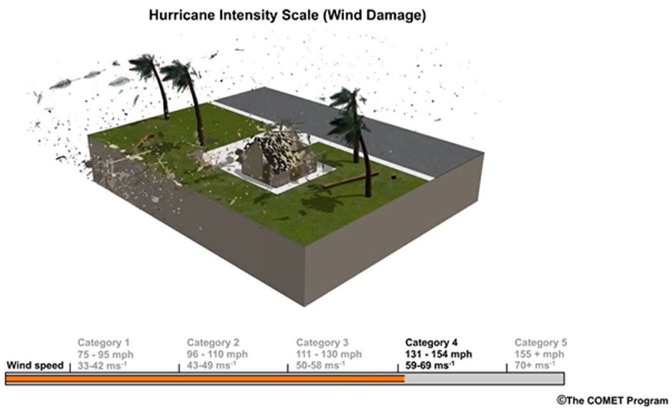
TABLE 2.42: HURRICANE WIND INTENSITY SCALE

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.

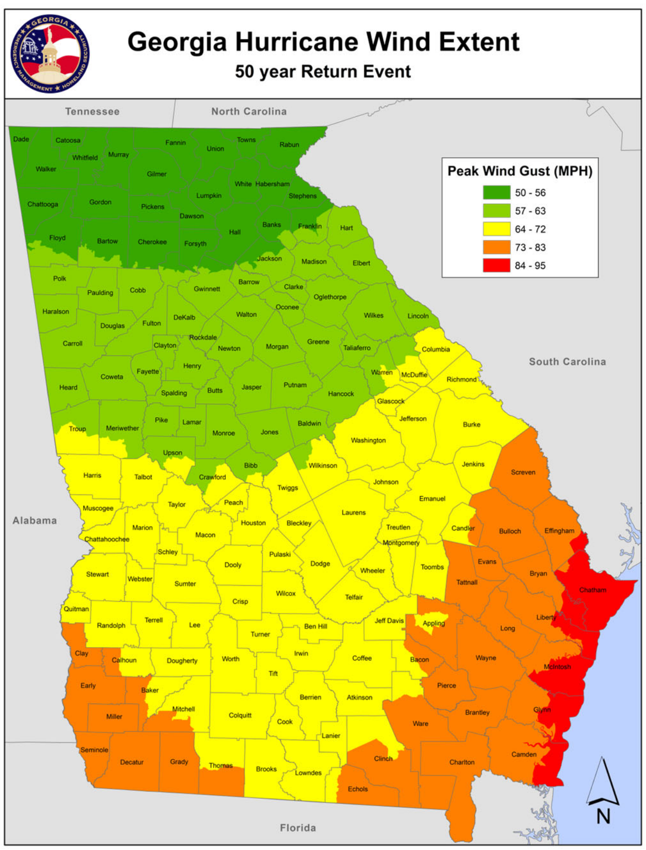
Source: NOAA National Hurricane Center, Http://www.nhc.noaa.gov/aboutsshws.php

FIGURE 2.24: HURRICANE INTENSITY SCALE



Source: https://www.nhc.noaa.gov/aboutsshws.php

FIGURE 2.25: 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. While a Category 5 hurricane in Georgia is not impossible, 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 2.24 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 2.25 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.

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to Hurricane Wind, specifically.

FIGURE 2.26: SOCIAL VULNERABILITY COMPARISON TO HURRICANE WIND EXTENT

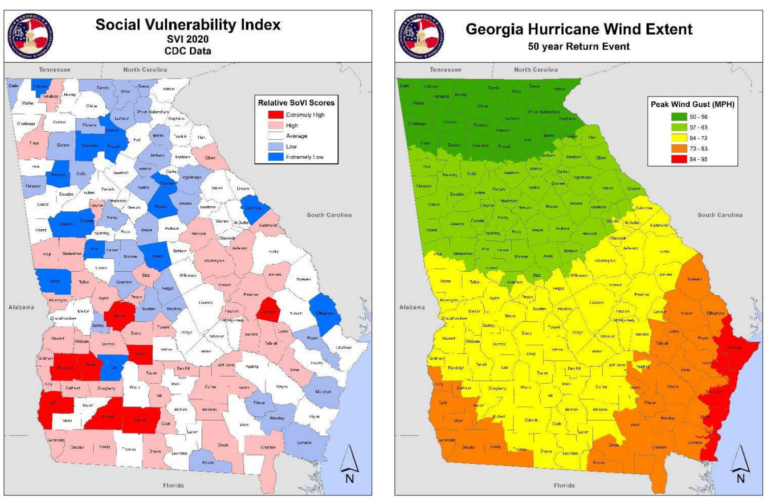


Figure 2.26 shows a comparison of the CDC Social Vulnerability Index to the Georgia Hurricane Wind Extent. Comparing these two maps shows many of the counties that have higher social vulnerability scores are also located in areas susceptible to higher wind speeds during tropical cyclone events. Notably, the top 8 counties with the highest social vulnerability scores are all located in areas susceptible to at least a 64 mph wind gust.

Physical Vulnerability

Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Hurricane Wind hazard, the State analyzed the following resources:

- Local Hazus reports
    - Potential building damages
    - Potential losses to essential facilities
    - Potential Sheltering needs
    - Potential debris.
- Georgia Mitigation Information System
    - Critical Facility data defined and entered by each county as part of their local Hazard Mitigation Plan Update
    - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Cellular Service System outages
    - Average daily percentages of sites out of service for Hurricanes Matthew, Irma, Michael and Zeta.

As part of each county's local Hazard Mitigation Plan update, the State provides a Level 2 Hazus Analysis of potential impacts from a 1% annual chance tropical cyclone event based on locally provided information on essential facilities (EOCs, medical, fire, Police and schools), as well as locally provided Tax Assessor data on all structures, for use as part of the local hazard mitigation plan update. Table 2.43 show the Hurricane Wind results from the Hazus reports, including loss ratios (losses compared to building values), value of losses to structures, economic loss, Essential Facilities damaged or out of service, and potential tons of debris generated. The full report showing all data is located in Appendix D-V.

TABLE 2.43: TOP TEN COUNTIES FROM HAZUS DATA

Loss Ratio	Value of Building Losses	Economic Losses	Essential Facilities Moderately Damaged	Essential Facilities out of Service <1 Day	Potential Total Tons of Debris	Number People needing Short Term Shelter
EARLY	CHATHAM	CHATHAM	EMANUEL	CLARKE	CHATHAM	CHATHAM
GLYNN	WARE	GLYNN	FULTON	GWINNETT	CAMDEN	GLYNN
CHATHAM	GLYNN	FULTON	CHATHAM	FULTON	CHARLTON	CAMDEN
MCINTOSH	DEKALB	EFFINGHAM	MUSCOGEE	COBB	WARE	EFFINGHAM
BRYAN	EFFINGHAM	DEKALB	CLARKE	DEKALB	LIBERTY	MCINTOSH
EFFINGHAM	FULTON	CAMDEN	CARROLL	LOWNDES	SCREVEN	BRYAN
LIBERTY	CAMDEN	COLUMBIA	CLAYTON	CHATHAM	GLYNN	BULLOCH
LONG	COLUMBIA	LIBERTY	COBB	MUSCOGEE	BULLOCH	DECATUR
WAYNE	BRYAN	BRYAN	CRISP	BALDWIN	BRYAN	LONG
DECATUR	GWINNETT	GWINNETT	DEKALB	RICHMOND	MCINTOSH	WAYNE

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on anticipated wind speeds. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities to the Wind hazard. Table 2.44 below shows the top 10 counties based on the number of locally defined Critical Facilities exposed to >90 mph wind gusts. Table 2.45 shows the top ten counties based on Stated owned, leased and other State assets exposed to >90mph wind gusts. Table 2.45a shows the top ten counties based on the values of exposed State owned, leased and other State assets.

TABLE 2.44: TOP TEN COUNTIES NUMBER OF LOCAL CRITICAL FACILITIES EXPOSED TO >90 MPH WINDS

County	Number of Critical Facilities	Value of Critical Facilities
Richmond County	424	$512,393,065
Glynn County	355	$1,371,675,454
Lowndes County	349	$1,233,729,441
Columbia County	299	$1,471,230,022
Bibb County	287	$1,404,723,802
Floyd County	268	$2,949,533,655
Sumter County	254	$721,768,945
Houston County	253	$2,225,780,050
Troup County	227	$1,261,009,712
Chatham County	206	$3,240,646,870

TABLE 2.45: TOP TEN COUNTIES NUMBER OF STATE FACILITIES EXPOSED TO >90 MPH WINDS

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Chatham	469	Baldwin	52	Chatham	766
Tattnall	411	Muscogee	47	Richmond	87
Baldwin	402	Lowndes	44	Glynn	69
Richmond	346	Bibb	38	Tift	56
Tift	322	Bulloch	35	Lowndes	55
Bibb	265	Chatham	33	Baldwin	55
Glynn	242	Tift	27	Dougherty	55
Ware	236	Richmond	23	Emanuel	55
Lowndes	224	Thomas	22	Bibb	49
Muscogee	198	Dougherty	22	Tattnall	48

TABLE 2.45A: TOP TEN COUNTIES VALUE OF STATE FACILITIES EXPOSED TO >90 MPH WINDS

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Richmond	$1,671,301,338	Muscogee	$26,629,032	Chatham	$1,540,781,500
Chatham	$1,229,301,231	Bulloch	$12,452,272	Glynn	$147,220,149
Bulloch	$904,891,048	Bibb	$11,945,084	Bulloch	$19,966,103
Baldwin	$864,670,743	Chatham	$9,543,757	Baldwin	$19,030,064
Lowndes	$741,909,644	Richmond	$7,891,008	Richmond	$17,825,992
Muscogee	$615,674,770	Dougherty	$5,109,794	Lowndes	$14,292,171
Dougherty	$560,742,613	Lowndes	$4,875,097	Tattnall	$10,340,450
Glynn	$422,350,017	Emanuel	$4,451,134	Murray	$8,327,923
Bibb	$392,935,520	Baldwin	$3,678,000	Sumter	$7,215,530
Tift	$339,442,121	Floyd	$2,887,152	Macon	$6,566,198

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One particularly critical need in the aftermath of hurricanes is communications – both landline and cellular service. Notably, landline communication is subject to failure during high wind events from things such as poles breaking, trees and limbs falling on lines, etc. In those times, cellular service can often serve as a backup for communications. While additional research would be necessary to locate and analyze records of landline communication failures, the State was able to locate cellular service failures from the most recent 4 tropical cyclone events – those being Matthew, Irma, Michael and Zeta. Notably, these systems were all vastly different in terms of their strength (wind speeds), speed of progression, precipitation, and location. While these differences make it difficult to determine whether any areas are more susceptible to outages during similar events, it can be assumed outages tend to follow where cyclones happen. Table 2.46 below shows the top ten counties' cellular service average outages from the 4 events. Notably, with the exception of Hurricane Zeta, which impacted Northwest Ga, the majority of the counties listed are in South Georgia, which matches where Hurricanes Irma, Matthew and Michael were. It is notable, however, that Hurricane Zeta (a Northwest Georgia event) caused more counties to suffer losses to cellular service than both Hurricanes Matthew and Irma combined.

TABLE 2.46: CELLULAR SERVICE OUTAGES FROM RECENT TROPICAL CYCLONES

Hurricane Zeta		Hurricane Michael		Hurricane Matthew		Hurricane Irma	
County	Average Percentage Out	County	Average Percentage Out	County	Average Percentage Out	County	Average Percentage Out
LUMPKIN	25.68%	QUITMAN	50.00%	LIBERTY	35.18%	WILKES	50.00%
WHITE	19.48%	WEBSTER	47.05%	BRYAN	26.16%	GLYNN	15.83%
HABERSHAM	18.00%	SCHLEY	44.45%	CHATHAM	18.44%	CAMDEN	12.00%
DAWSON	15.50%	WHEELER	37.50%	CAMDEN	9.46%	LANIER	10.00%
FULTON	14.15%	MILLER	32.50%	GLYNN	8.16%	MITCHELL	8.80%
FANNIN	14.15%	WILCOX	31.25%	MCINTOSH	4.50%	BROOKS	8.67%
RABUN	13.63%	EARLY	30.58%	N/A	N/A	CHARLTON	6.70%
PAULDING	11.85%	PEACH	23.90%	N/A	N/A	WARE	5.87%
POLK	10.70%	WORTH	22.28%	N/A	N/A	THOMAS	5.25%
CARROLL	10.35%	EVANS	21.10%	N/A	N/A	COLQUITT	5.00%

Impact from Changing Conditions

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

As shown in Figures 2.15 and 2.16 in Section 2.7, areas along the coast have generally experienced population growth, along with the relevant development growth around the population centers. In contrast, areas in Southwest Georgia, which often takes Georgia's brunt of cyclones from the Gulf, have experienced a mix of population and development growth and reduction. As the population grows, and requisite development occurs, this has the effect of putting more people and structures in the path of oncoming cyclone systems, thereby increasing the area's overall vulnerability. This is mitigated slightly by the fact that areas subject to tropical cyclone activity, such as the coast and deep southwest Georgia, often have stronger building codes. Conversely decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, but it does remove people considered to be less vulnerable, due in part to their perceived ability to recover, from the equation, thereby increasing the community's overall social vulnerability statistically.

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.

2.8.2 Coastal Hazards

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

Priority	Rank
Medium	7

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 can result 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 2.47 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 2.8.1, the recurrence interval for a major hurricane making landfall in Georgia is approximately once every 37 years.

TABLE 2.47: 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.
September 4, 2019	Hurricane Dorian	Storm Surge 1-3 feet.

SHELDUS and NCEI data include information on some coastal flooding events. One county, Chatham, reported more than nine events between 1952 and 2022. Glynn and McIntosh each reported nine events, Camden eight and Liberty two. 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. Based on SHELDUS and NCEI hazard history data, the State sees 3.6 coastal flood events per year and 3.8 coastal non-flood events per year.

Figures 2.27 and 2.28 show the location of these coastal flooding events and the losses associated with them, respectively.

FIGURE 2.27: COASTAL FLOODING EVENTS IN GEORGIA, 1952 - 2022

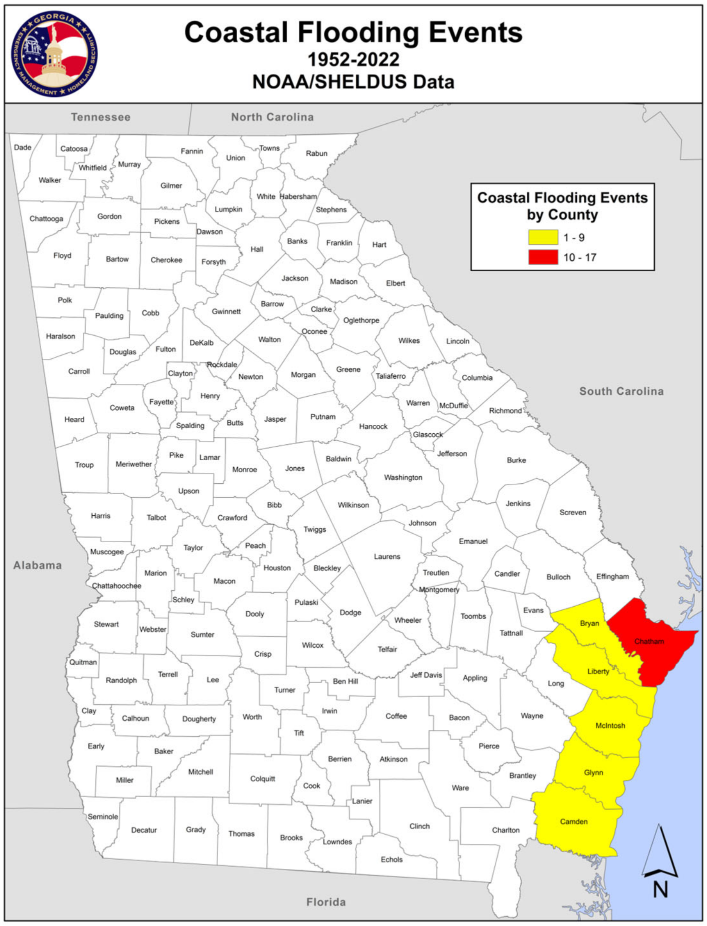


FIGURE 2.28: COASTAL FLOODING LOSSES IN GEORGIA, 1952-2022

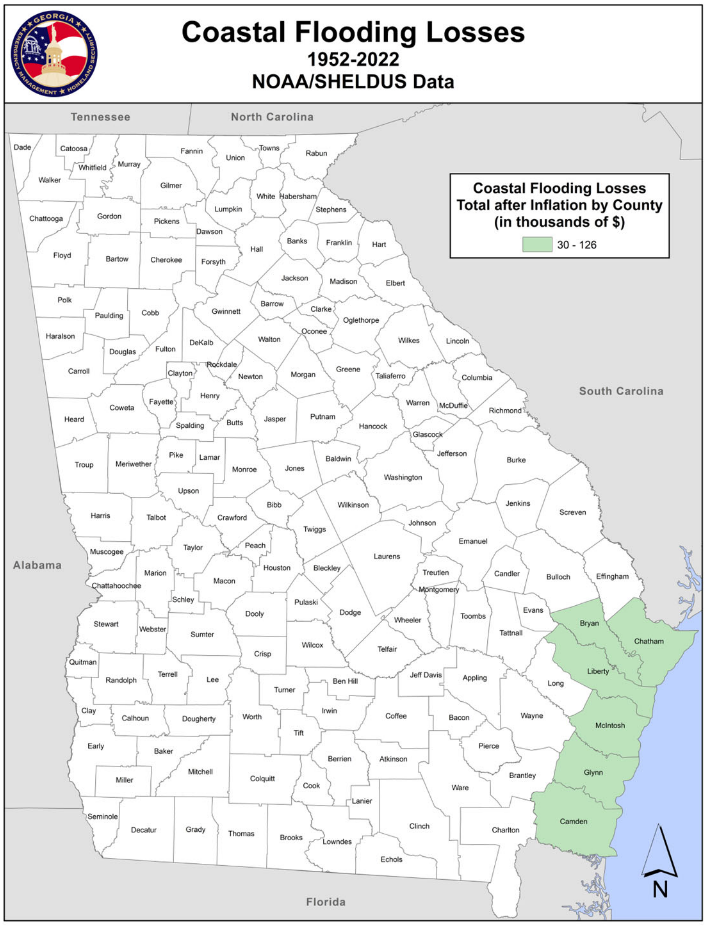


FIGURE 2.29: COASTAL NON-FLOODING EVENTS IN GEORGIA, 1952–2022

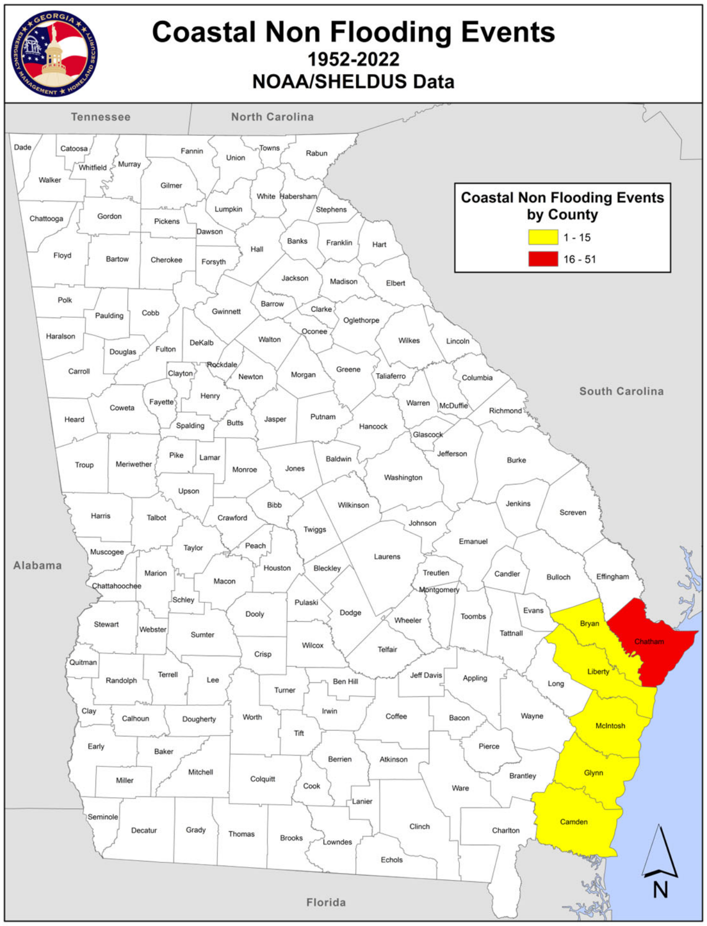
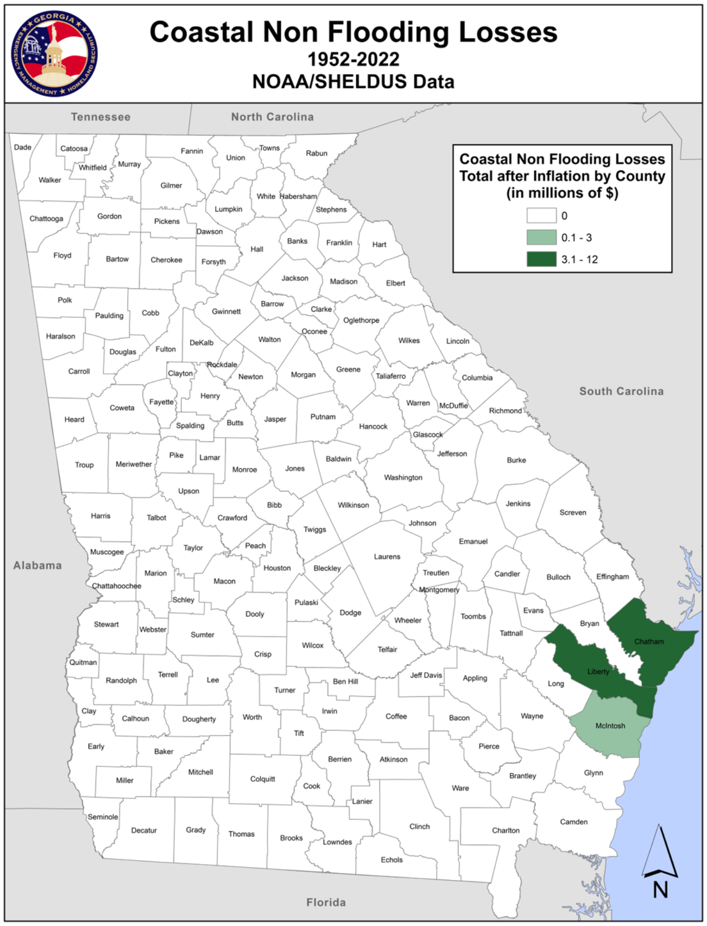
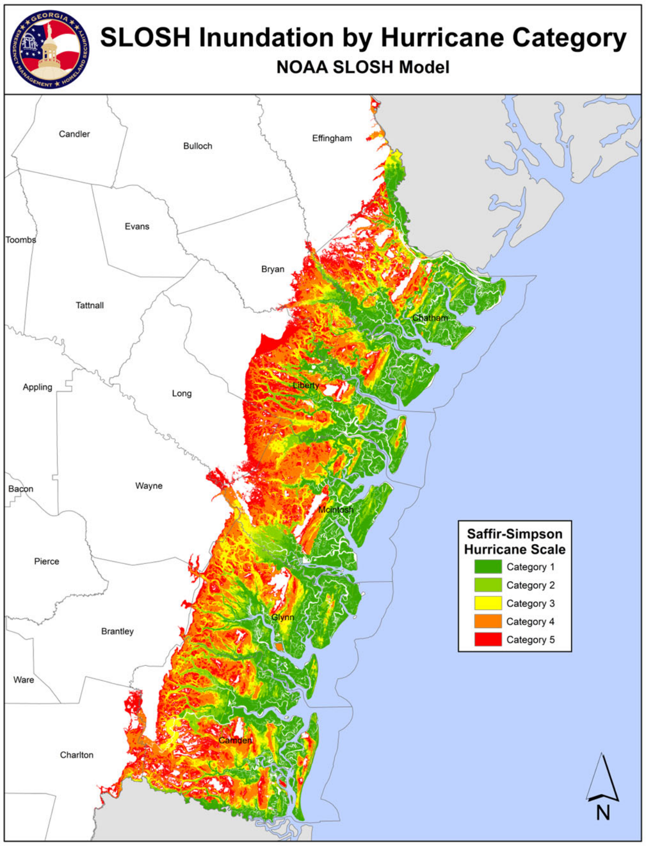


FIGURE 2.30: COASTAL NON-FLOODING LOSSES IN GEORGIA, 1952–2022



Figures 2.29 and 2.30 reflect rip currents, waterspouts, high tides and other types of events that have occurred along the coast. Between 1952 and 2022, there were 86 occurrences, resulting in 13 injuries and 9 deaths. While these were not flood events, the State of Georgia suffered $13.9 million in total losses.

FIGURE 2.31: 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 2.31 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.

The SLOSH-based hazard scores do not stop at the inland borders of the six coastal counties. Strong hurricanes can drive storm surge farther inland to other noncoastal counties. Also, the SLOSH model does not account for any barriers to the storm surge such as Interstate 95 acting as a berm. Figure 2.31, however, offers the best available information.

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to Coastal Hazards, specifically. Figure 2.32 shows the average hazard score from storm surge (SLOSH) for each of the 11 coastal counties according to the Georgia Mitigation Information System. Table 2.13 in Section 2.6 includes a description of the SLOSH hazard scores. Figure 2.33 shows the effect of combining SVI scores to the average Surge hazard scores for the 11 coastal counties. Notably, while Chatham and Liberty Counties are in the 2nd and 3rd highest average hazard score categories, adding Social Vulnerability raises them to the highest category. As Figure 2.8 in Section 2.6 shows, while Chatham, Liberty and Glynn Counties do not have particularly high SVI scores, aside from Charlton and Long, they are the highest of the 11 coastal counties.

FIGURE 2.32: AVERAGE HAZARD SCORE BY COUNTY FROM STORM SURGE

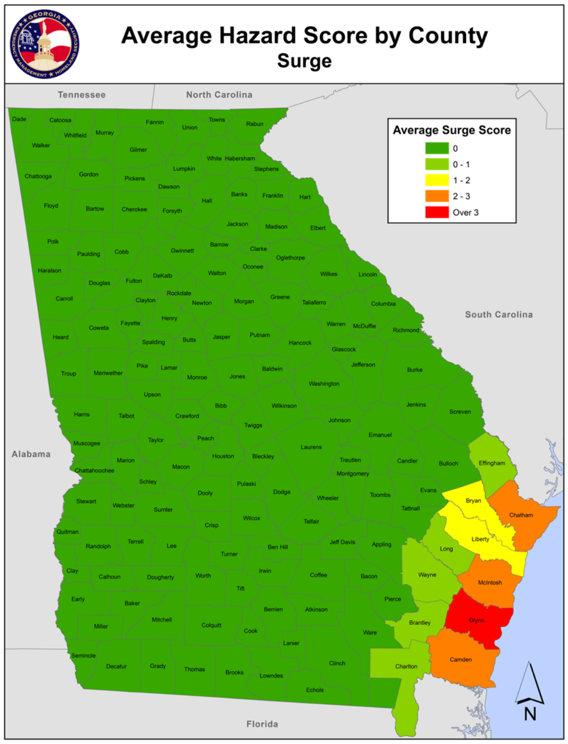
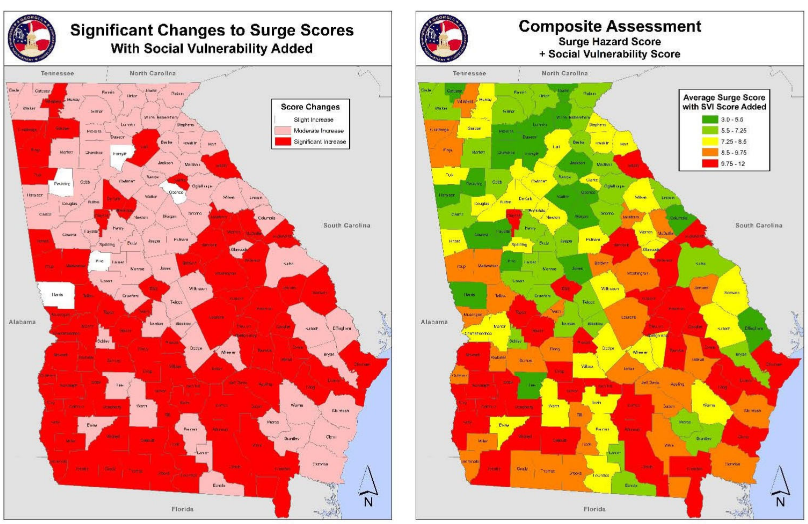


FIGURE 2.33: COMBINED HAZARD SCORE AND SVI BY COUNTY FROM STORM SURGE



Physical Vulnerability

Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Coastal Flooding hazard, the State analyzed the following resources:

- Local Hazus reports
  - Potential building damages
  - Potential losses to essential facilities
  - Potential Sheltering needs
  - Potential debris.
- Georgia Mitigation Information System
  - Critical Facility data defined and entered by each county as part of their local Hazard Mitigation Plan Update
  - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Road Surfaces
  - Number of miles of unpaved Road Surfaces vulnerable to washout during flood events.

As part of each coastal county's local Hazard Mitigation Plan update, the State provides a Level 2 Hazus Analysis on of potential impacts from a 1% annual chance coastal flooding event based on locally provided information on essential facilities (EOCs, medical, fire, Police and schools), as well as locally provided Tax Assessor data on all structures, for use as part of the local hazard mitigation plan update. Table 2.48 shows the Coastal Flooding results from the Hazus reports, including loss ratios (losses compared to building values), value of losses to structures, economic loss, Essential Facilities damaged or out of service, and potential tons of debris generated. Notably, while every county has some essential facilities with anticipated impacts, none are projected to be out of service. The full report showing all data is located in Appendix D-V.

TABLE 2.48: COASTAL COUNTY HAZUS RANKINGS

Loss Ratio	Number Buildings Damaged	Value of Building Losses	Essential Facilities Moderately Damaged	Potential Total Tons of Debris	# Displaced	# Shelter Needs
Bryan	McIntosh	Bryan	Glynn	Glynn	Chatham	Chatham
McIntosh	Glynn	Chatham	Bryan	Chatham	Glynn	Glynn
Glynn	Bryan	Glynn	Chatham	Bryan	Bryan	Bryan
Chatham	Chatham	McIntosh	McIntosh	McIntosh	McIntosh	Camden
Liberty	Camden	Camden	Camden	Camden	Camden	McIntosh
Camden	Liberty	Liberty	Liberty	Liberty	Liberty	Liberty
Effingham	Effingham	Effingham	Effingham	Effingham	Effingham	Effingham

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on each facility's location within the SLOSH hazard area. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities to the SLOSH hazard. Table 2.49 below shows the coastal counties' number of locally defined Critical Facilities exposed to storm surge from category 1 and 2 hurricanes. Table 2.50 shows coastal counties' number of Stated owned, leased and other State assets exposed to storm surge from category 1 and 2 hurricanes.

TABLE 2.49: NUMBER OF LOCAL CRITICAL FACILITIES EXPOSED TO SURGE FROM CATEGORY 1 & 2 HURRICANES

County	Number of Critical Facilities	Value of Critical Facilities
Glynn County	213	$797,224,896

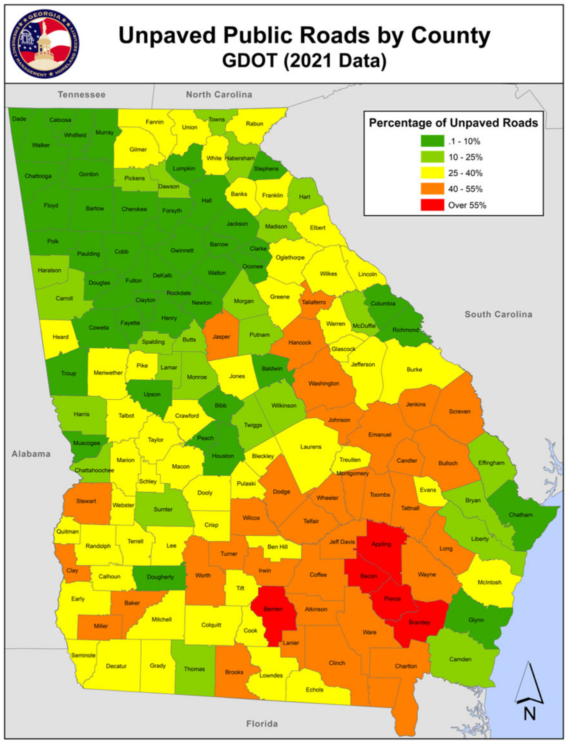
County	Number of Critical Facilities	Value of Critical Facilities
Chatham County	47	$153,006,060
Camden County	28	$48,185,214
McIntosh County	3	$5,365,150
Liberty County	1	$2,540

TABLE 2.50: NUMBER OF STATE FACILITIES EXPOSED TO SURGE FROM CATEGORY 1 & 2 HURRICANES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Chatham	181	Glynn	9	Chatham	539
McIntosh	147	Chatham	8	Glynn	55
Glynn	144	Wayne	1	McIntosh	17
Bryan	18	N/A	N/A	Bryan	3
Camden	6	N/A	N/A	Effingham	1

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One particularly vulnerable lifeline in times of flooding is transportation infrastructure – specifically unpaved roads. While paved roads are certainly not invulnerable, rural unpaved roads are often more susceptible to washouts, especially after lengthy periods of wear and tear. Figure 2.34 below shows the percentage of unpaved roads for each county. Notably, the more exposed counties of Chatham, Bryan, Liberty, McIntosh, Glynn and Camden (those with direct coastlines) all have 60% or more of their roads paved.

FIGURE 2.34: PERCENTAGE OF UNPAVED ROAD MILEAGE



Impact from Changing Conditions

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Areas along the coast have generally experienced population changes, along with the relevant development growth around the population centers. As the population grows, and requisite development occurs, this has the effect of putting more people and structures in the path of oncoming cyclone systems, thereby increasing the area's overall vulnerability. This is mitigated slightly by the fact that areas subject to coastal flooding activity often have stronger building codes, such as NFIP compliant development regulations that regulate development within areas subject to coastal flooding. Conversely decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, but it does remove the statistical factor of having less vulnerable people removed from the equation, thereby increasing the community's overall social vulnerability statistically. This does not appear to be the case with Georgia's coastal communities. Virtually all of Georgia's coastal counties experienced population growth, along with the requisite urbanization growth. The exception to this is Brantley and McIntosh Counties, both of which experienced population decreases between 2010 and 2020. These two communities' social vulnerability scores did not change with the population decrease. It can, therefore, be assumed these communities are now less vulnerable to impacts from disasters, due to having less people in harm's way within their borders.

As climate change continues and sea level rise occurs, coastal areas of Georgia will be more at risk. According to the 2022 NOAA Sea Level Rise Technical Report, increased sea levels will cause increased magnitude and frequency of coastal flooding. Not only would it put more people and property at risk along the coastline, but it could also cause changes to the ecosystem. According to the report, mean sea levels have risen by 0.25 meters since 1920. Along with that rise, high tide flood events have risen from 3.5 days total between 1980 and 1990 to 1-5 days per year between 2010 and 2020.

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 2.51 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-I.

TABLE 2.51: 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%**

Scenario	Building Loss	Content Loss	Inventory Loss	Total Loss
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 2.52 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 2.52: 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

Study Name	Exposure at Risk	Building Losses	Combined Building and Content Losses	Building Loss Ratio
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

2.8.3 Wind

<u>Associated Hazards:</u>

Thunderstorms, downbursts, gustnadoes

Priority	Rank
Medium	11

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 2.35 shows historical wind events in Georgia from 1952 to 2022 based on SHELDUS/NCEI data. The majority of events have taken place in the northern portion of the state. Figure 2.36 reflects the losses suffered by each county throughout the State. Notably, these two maps do not mirror each other, indicating that more events does not necessarily mean more losses. Likewise, fewer events does not necessarily mean fewer losses. Notably, three counties in central Georgia (Crawford, Houston and Pulaski) seem to have suffered the most losses, even though they ranked in the lower to middle range in terms of number of 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 2.37 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 2.53. The highest risk areas are located along the Atlantic Coast and the southern portion of the state. The wind risk map, Figure 2.38, illustrates the wind gust speeds that have a return interval of 50 years for the counties in Georgia.

Figure 2.38 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 56 wind events per year, which equates to a greater than 100% chance of an event occurring each year.

FIGURE 2.35: WIND EVENTS IN GEORGIA, 1952–2022

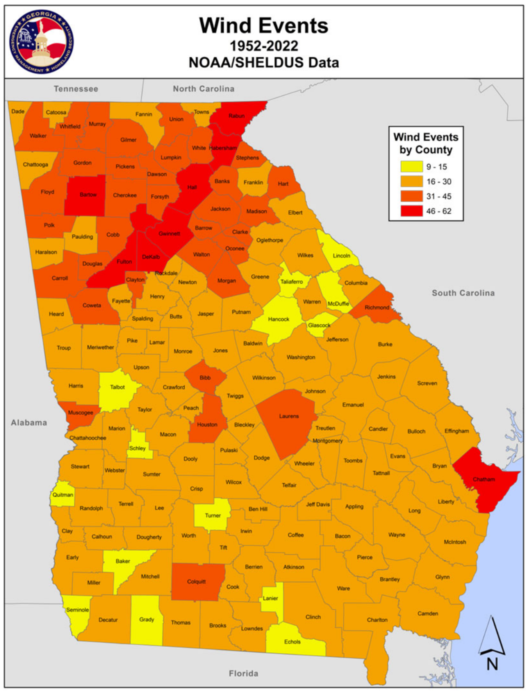


FIGURE 2.36: WIND LOSSES IN GEORGIA, 1952–2022

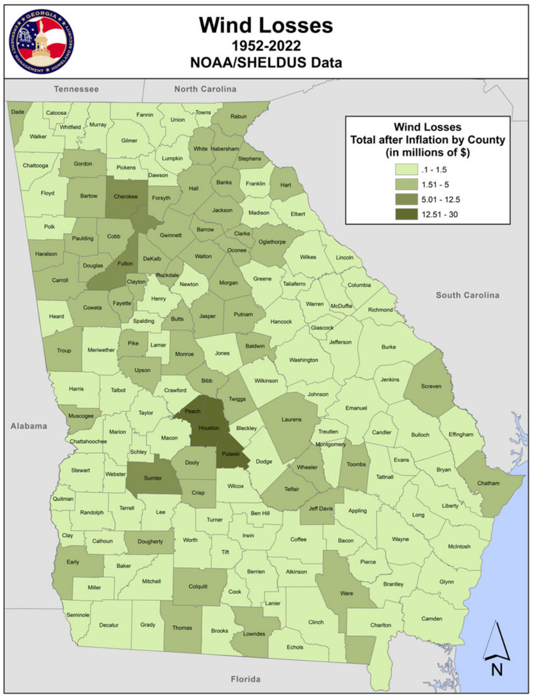


FIGURE 2.37: AVERAGE HAZARD WIND SCORE IN GEORGIA, BY COUNTY

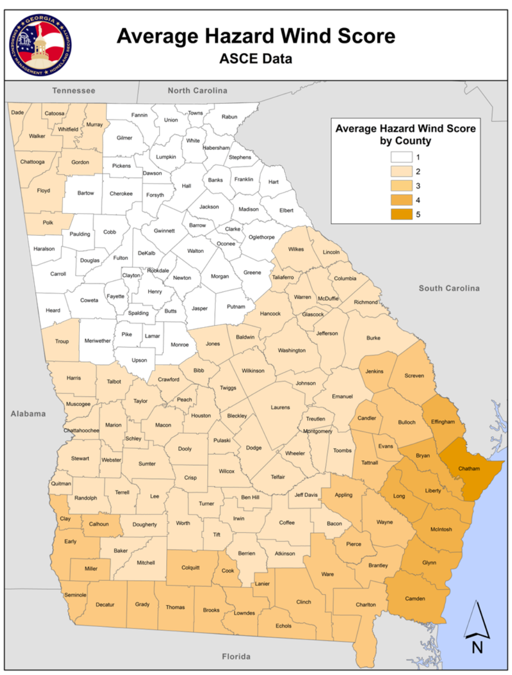
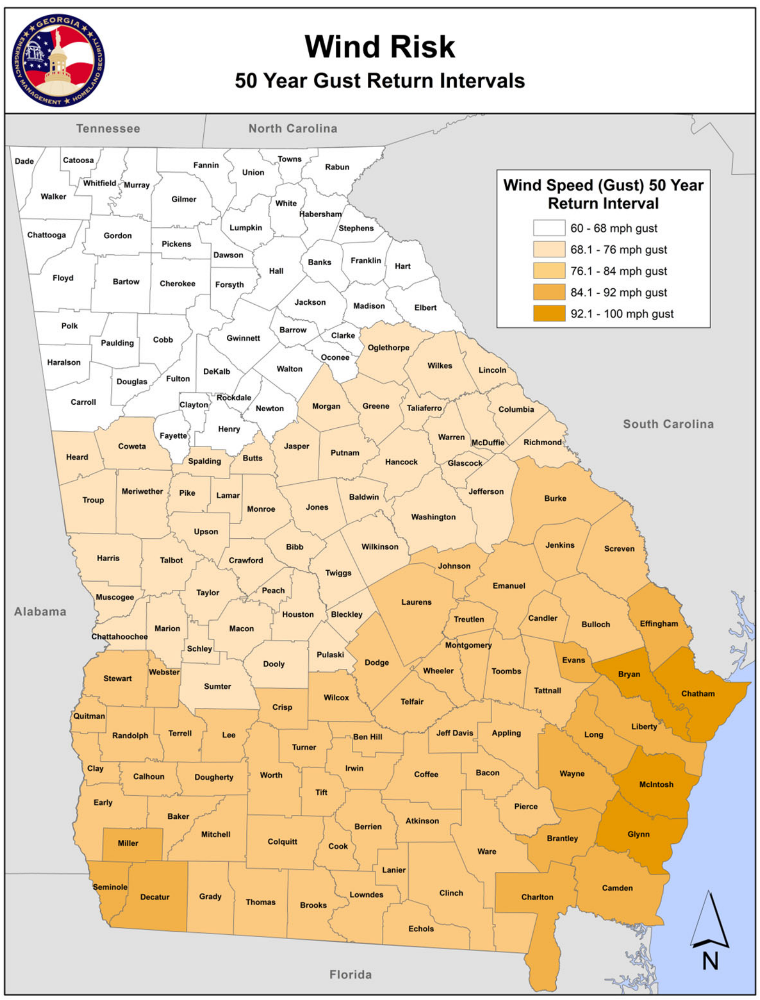


TABLE 2.53: ASSOCIATION BETWEEN WIND SPEED AND HAZARD SCORES

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 2.38: WIND RISK IN GEORGIA, 50 YEAR GUST RETURN INTERVALS



Physical Vulnerability

Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Wind hazard, the State analyzed the following resources:

- Local Hazus reports
  - Potential building damages
  - Potential losses to essential facilities
  - Potential Sheltering needs
  - Potential debris.
- Georgia Mitigation Information System
  - Critical Facility data defined and entered by each county as part of their local Hazard Mitigation Plan Update
  - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Power Outages
  - Number of power outages per county per Department of Energy data

As part of each county's local Hazard Mitigation Plan update, the State provides a Level 2 Hazus Analysis of potential impacts from a 1% annual chance tropical cyclone event based on locally provided information on essential facilities (EOCs, medical, fire, Police and schools), as well as locally provided Tax Assessor data on all structures, for use as part of the local hazard mitigation plan update. Table 2.54 shows the Hurricane Wind results from the Hazus reports, including loss ratios (losses compared to building values), value of losses to structures, economic loss, Essential Facilities damaged or out of service, and potential tons of debris generated. The full report showing all data is located in Appendix D-V.

TABLE 2.54: TOP TEN COUNTIES FROM HAZUS DATA

Loss Ratio	Value of Building Losses	Economic Losses	Essential Facilities Moderately Damaged	Essential Facilities out of Service <1 Day	Potential Total Tons of Debris	Number People needing Short Term Shelter
EARLY	CHATHAM	CHATHAM	EMANUEL	CLARKE	CHATHAM	CHATHAM
GLYNN	WARE	GLYNN	FULTON	GWINNETT	CAMDEN	GLYNN
CHATHAM	GLYNN	FULTON	CHATHAM	FULTON	CHARLTON	CAMDEN
MCINTOSH	DEKALB	EFFINGHAM	MUSCOGEE	COBB	WARE	EFFINGHAM
BRYAN	EFFINGHAM	DEKALB	CLARKE	DEKALB	LIBERTY	MCINTOSH
EFFINGHAM	FULTON	CAMDEN	CARROLL	LOWNDES	SCREVEN	BRYAN
LIBERTY	CAMDEN	COLUMBIA	CLAYTON	CHATHAM	GLYNN	BULLOCH
LONG	COLUMBIA	LIBERTY	COBB	MUSCOGEE	BULLOCH	DECATUR
WAYNE	BRYAN	BRYAN	CRISP	BALDWIN	BRYAN	LONG
DECATUR	GWINNETT	GWINNETT	DEKALB	RICHMOND	MCINTOSH	WAYNE

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on anticipated wind speeds. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities to the Wind hazard. Table 2.55 below shows the top 10 counties based on the number of locally defined Critical Facilities exposed to >90 mph wind gusts. Table 2.56 shows the top ten counties based on Stated owned, leased and other State assets exposed to >90mph wind gusts. Table 2.56a shows the top ten counties based on the values of exposed State owned, leased and other State assets.

TABLE 2.55: TOP TEN COUNTIES NUMBER OF LOCAL CRITICAL FACILITIES EXPOSED TO >90 MPH WINDS

County	Number of Critical Facilities	Value of Critical Facilities
Richmond County	424	$512,393,065
Glynn County	355	$1,371,675,454
Lowndes County	349	$1,233,729,441
Columbia County	299	$1,471,230,022
Bibb County	287	$1,404,723,802
Floyd County	268	$2,949,533,655
Sumter County	254	$721,768,945
Houston County	253	$2,225,780,050
Troup County	227	$1,261,009,712
Chatham County	206	$3,240,646,870

TABLE 2.56: TOP TEN COUNTIES NUMBER OF STATE FACILITIES EXPOSED TO >90 MPH WINDS

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Chatham	469	Baldwin	52	Chatham	766
Tattnall	411	Muscogee	47	Richmond	87
Baldwin	402	Lowndes	44	Glynn	69
Richmond	346	Bibb	38	Tift	56
Tift	322	Bulloch	35	Lowndes	55
Bibb	265	Chatham	33	Baldwin	55
Glynn	242	Tift	27	Dougherty	55
Ware	236	Richmond	23	Emanuel	55
Lowndes	224	Thomas	22	Bibb	49
Muscogee	198	Dougherty	22	Tattnall	48

TABLE 2.56A: TOP TEN COUNTIES VALUE OF STATE FACILITIES EXPOSED TO >90 MPH WINDS

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Richmond	$1,671,301,338	Muscogee	$26,629,032	Chatham	$1,540,781,500
Chatham	$1,229,301,231	Bulloch	$12,452,272	Glynn	$147,220,149
Bulloch	$904,891,048	Bibb	$11,945,084	Bulloch	$19,966,103
Baldwin	$864,670,743	Chatham	$9,543,757	Baldwin	$19,030,064
Lowndes	$741,909,644	Richmond	$7,891,008	Richmond	$17,825,992
Muscogee	$615,674,770	Dougherty	$5,109,794	Lowndes	$14,292,171
Dougherty	$560,742,613	Lowndes	$4,875,097	Tattnall	$10,340,450
Glynn	$422,350,017	Emanuel	$4,451,134	Murray	$8,327,923
Bibb	$392,935,520	Baldwin	$3,678,000	Sumter	$7,215,530
Tift	$339,442,121	Floyd	$2,887,152	Macon	$6,566,198

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One asset particularly vulnerable to high winds is the electrical grid. Overhead power lines tend to be vulnerable to failure due to a number of things, including trees and tree limbs falling on the lines, poles breaking, vehicle accidents where lines run along the roads and the accident includes a vehicle hitting the pole, etc. While many newer developments use underground lines, older developments are usually served by overhead power lines. Also, even though these newer developments often have underground power lines, they are usually served by overhead power lines leading up to the point where the newer underground wiring begins. The Department of Energy tracks power outage reports, which the State was able to use to identify which counties tend to have more power outages, as well as which counties tend to have a higher percentage of their customers reporting power outages. Table 2.57 below shows the top ten counties' average power outage reports between 2015 and 2022. Notably, when grouped according to average number of power outages, the data does not reveal any surprises, as the top 10 counties are all within the top 10-15 most populous counties within the State. However, when looked at based on percentage of the customer, it appears many of the smaller communities within the state have the highest percentages of their customers reporting power outages.

TABLE 2.57: TOP TEN COUNTIES POWER OUTAGES PER YEAR 2015-2022

County	Average Number Out	County	Average Percentage Out
Gwinnett	730	Clay	4.95%
Fulton	729	Echols	4.74%
DeKalb	729	Quitman	4.48%
Chatham	729	Webster	3.96%
Cobb	728	Taliaferro	2.99%
Clayton	727	Baker	2.94%

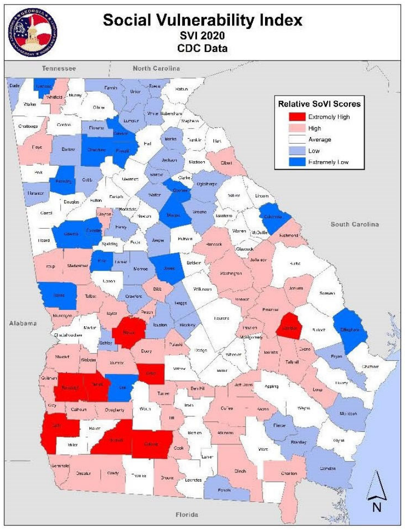
County	Average Number Out	County	Average Percentage Out
Muscogee	719	Miller	2.88%
Richmond	718	Clinch	2.80%
Bibb	716	Calhoun	2.75%
Hall	716	Telfair	2.60%

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to high Winds, specifically. A notable finding has to do with power outages as reflected in Table 2.57 above – specifically the top ten counties based on average percentages of reported outages. Five of those counties (Calhoun, Clay, Clinch, Quitman and Webster) received high SoVI scores from the CDC index. Of the remaining five, only Echols is considered to have a low SoVI score. Notably, all 10 of these communities are small, rural communities. Power outages lasting a day or more could have significant impacts, even if they don't directly affect the entire community. For example, many of these smaller, rural communities may only have one or two grocery stores, often located in close proximity to each other. In such a community, a power outage of more than a few hours, that affects one or both of those stores, could significantly reduce the citizens' ability to purchase food and other critical supplies. In addition, socially vulnerable members of the population may have limited transportation options, leading to difficulty in traveling to other communities to purchase needed supplies.

Figure 2.39 shows a comparison of the CDC Social Vulnerability Index to the ASCE Wind Risk Map. Comparing these two maps shows many of the counties that have higher social vulnerability scores are also located in areas susceptible to higher wind speeds during tropical cyclone events. Notably, the top 8 counties with the highest social vulnerability scores are all located in areas susceptible to at least a 91 mph wind gust.

FIGURE 2.39: SOCIAL VULNERABILITY COMPARISON TO ASCE AVERAGE WIND SCORE



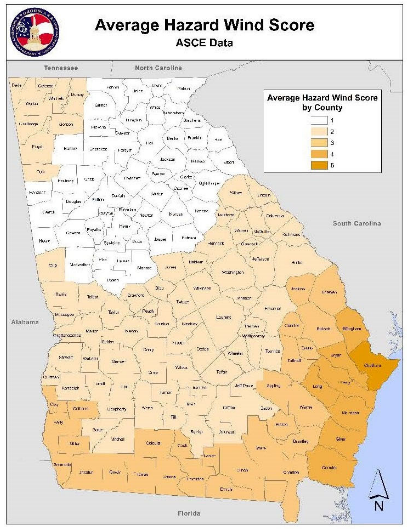
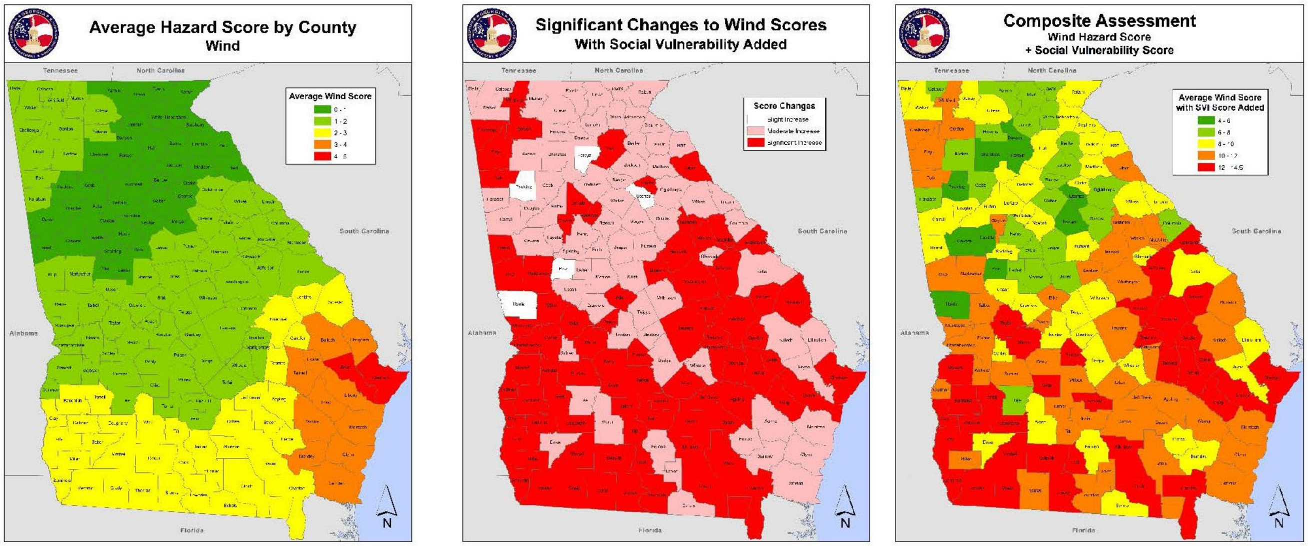


Figure 2.40 is three maps showing the effect of combining the CDC SoVI score with the Wind hazard score from the GMIS system. The average hazard wind score (the map on the left) shows the average wind hazard scores for each county based on the hazard scores from the GMIS system, which are defined in Table 2.14 in Section 2.6. The map in the middle shows the effect adding the CDC Social Vulnerability scores to the GMIS Wind Hazard Scores with the map on the far right showing the results. It is notable that, while Chatham and Bryan Counties are the most at risk counties based solely on geographic hazard risk, when social vulnerability is added in, areas along East Central, South Central and Southwest Georgia become the most vulnerable communities.

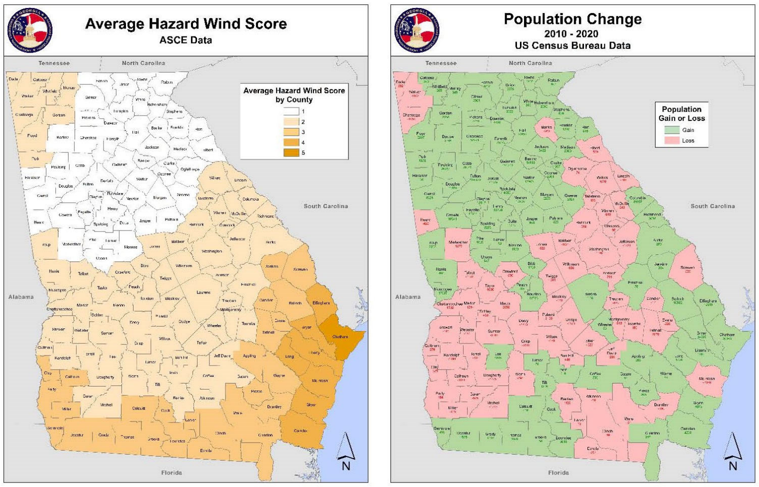
FIGURE 2.40: COMBINED WIND HAZARD SCORE AND SVI BY COUNTY



Impact from Changing Conditions
For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Figure 2.41 shows a comparison of population change throughout the State to areas subject to various wind risk levels. Of particular note are the counties along Coastal and extreme Southern Georgia that have experience population growth and are located in areas considered to be vulnerable to higher wind speeds. As the population grows, and requisite development occurs, this has the effect of putting more people and structures in the path of high wind events, thereby increasing the area's overall vulnerability. This is mitigated slightly by the fact that areas subject to tropical cyclone activity, such as the coast and deep southwest Georgia, often have stronger building codes. Conversely decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, but it does remove people considered to be less vulnerable, due in part to their perceived ability to recover, from the equation, thereby increasing the community's overall social vulnerability statistically.

FIGURE 2.41: COMBINED WIND HAZARD SCORE AND POPULATION CHANGE BY COUNTY



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.

2.8.4 Severe Weather

Associated Hazards:	Priority	Rank
Thunderstorms, hail, lightning	High	6

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.

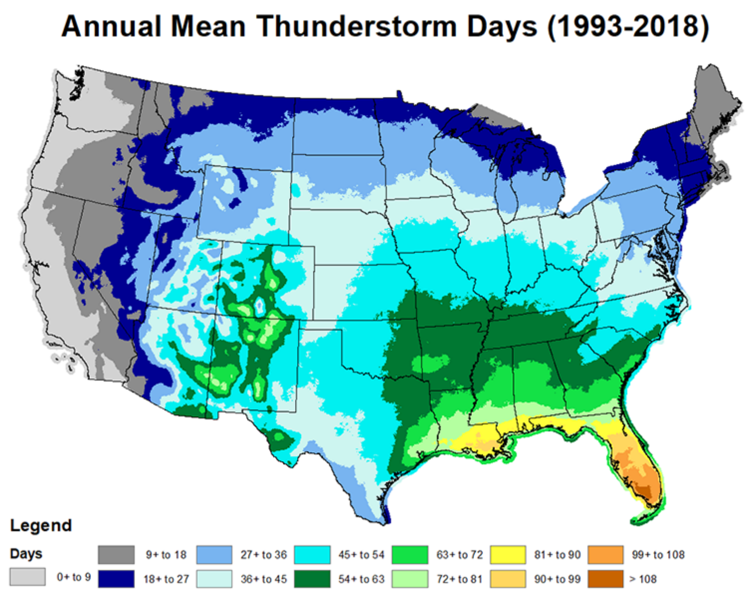
Each thunderstorm cell has the ability to extend several miles across its base and to reach 40,000 feet in altitude. Thunderstorm cells can compound and move abreast to form a squall line of cells, extending farther than any individual cell's potential.

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 2.42: AVERAGE NUMBER OF DAYS WITH THUNDERSTORMS, CONTERMINOUS UNITED STATES 1993-2018. 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 2.43 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 2.44 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 488 severe weather events per year occurred between 1952 and 2022. These events in total have caused 1,162 injuries, 200 fatalities, and more than $1.7 billion in damages. Over the period from 2002 to 2022, the historic occurrence jumps to 942 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/ffc/swaw_ltg, 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 2.43: THUNDERSTORMS/ LIGHTNING/ HAIL EVENTS IN GEORGIA, 1952–2022

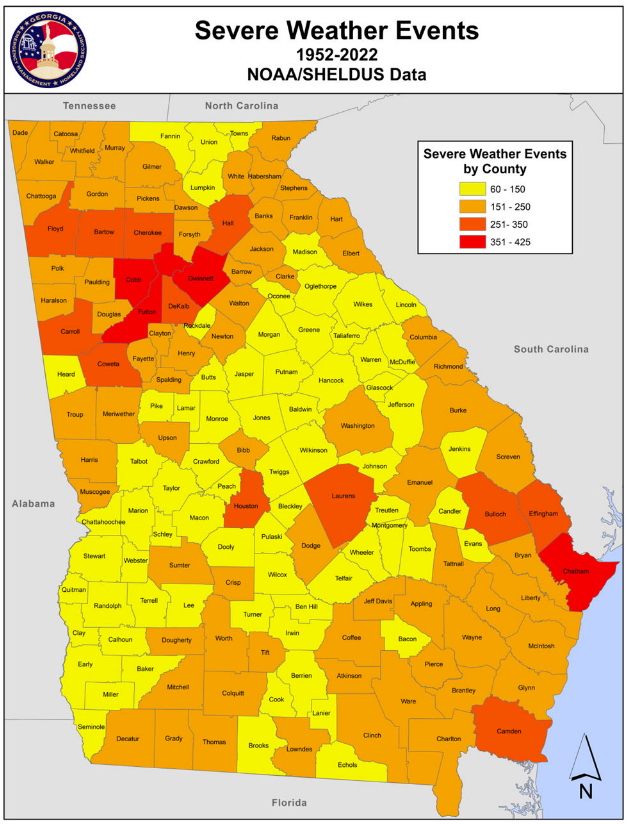
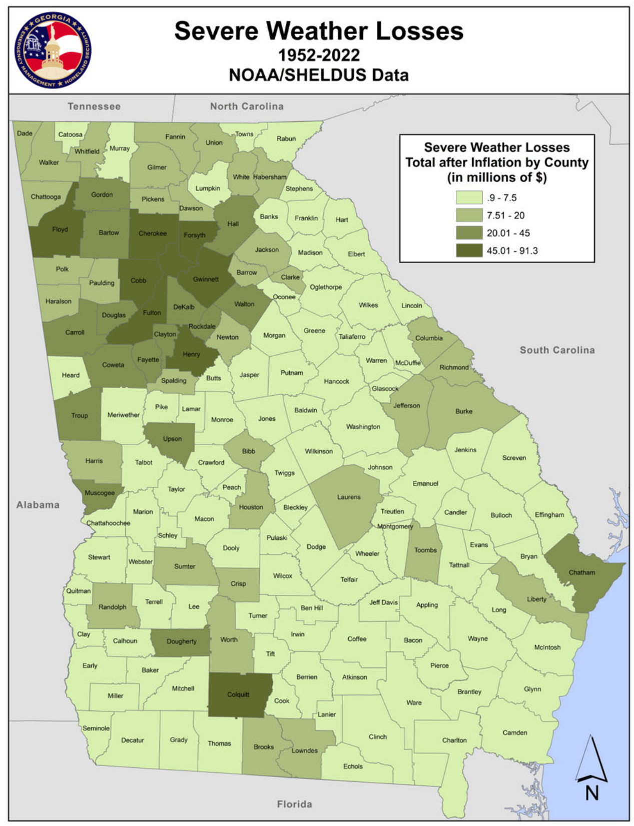


FIGURE 2.44: THUNDERSTORMS/ LIGHTNING/ HAIL LOSSES IN GEORGIA, 1952–2022



Physical Vulnerability

Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Severe Weather hazard, the State analyzed the following resources:

- Local Hazus reports
    - Essential Facilities

- Georgia Mitigation Information System
    - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Power Outages
    - Number of power outages per county per Department of Energy data

As part of each county's local Hazard Mitigation Plan update, the State provides a Level 2 Hazus Analysis of potential impacts from a tropical cyclones, flooding and, where applicable coastal flooding, based on locally provided information, including essential facilities (EOCs, medical, fire, Police and schools), for use as part of the local hazard mitigation plan update. Table 2.58 shows the top ten counties based on the number of essential facilities in each county, where a Hazus report has been completed. Note: Not all counties have had a Hazus report completed. Also, this data does not account for potential damages to essential facilities as Hazus does not model impacts from hail and lightning events. All essential facilities are considered to be equally exposed to severe weather as profiled in this plan. While there are few surprises, since most of the counties in Table 2.58 are within the top 10 most populous counties in the State, Baldwin, Clarke and Lowndes do stand out, due to the fact that they rank 47th, 19th and 22nd, respectively in terms of population. Notably one of the categories of essential facilities is schools, which includes all types of educational facilities. This may tend to extraordinarily inflate the number of essential facilities for some communities. Baldwin County includes two mid-sized college campuses both encompassing multiple city blocks - Georgia College and State University, a 4-year state university, and Georgia Military College, a junior college and k-12 prep school. Lowndes County includes Valdosta State University, a mid-sized state university with two campuses encompassing multiple city blocks. Finally, Clarke County includes The University of Georgia – the State's flagship university and the oldest public university in the country. The full report showing all data is located in Appendix D-V.

TABLE 2.58: TOP TEN COUNTIES ESSENTIAL FACILITIES FROM HAZUS DATA

County	Totals
Clarke	637
Gwinnett	385
Fulton	327
Cobb	267
Dekalb	203
Chatham	175
Lowndes	149
Muscogee	144
Baldwin	121
Richmond	116

Table 2.59 reflects the top ten counties based on the number of essential facilities per capita. Notably, with the exception of Clarke County, the population of each of these counties is less than 100,000. This shows that each facility serves, while not necessarily more people, but a higher percentage of the community's population that in larger counties. Therefore, the loss of any one of these facilities in the smaller communities could have a more significant impact on that community's ability to provide basic services to its citizens.

TABLE 2.59: TOP TEN COUNTIES ESSENTIAL FACILITIES FROM HAZUS DATA PER 1000 PEOPLE

County	Totals	2020 Census Population	Facilities / 1000 people
Taliaferro	9	1,559	5.77
Clarke	637	128,671	4.95
Quitman	11	2,235	4.92
Glascock	12	2,884	4.16
Calhoun	22	5,573	3.95
Randolph	24	6,425	3.74
Baker	10	2,876	3.48
Sumter	101	29,616	3.41
Johnson	30	9,189	3.26
Oglethorpe	45	14,825	3.04

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on various hazards. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities as well. Table 2.60 shows the top ten counties based on State owned and leased properties and other State assets. Note: Since severe weather, as profiled in this plan, is not a spatially defined hazard, GMIS does not reflect differences in risk based on geography for this hazard. All State assets are considered to be equally exposed to severe weather as profiled in this plan. Therefore, Table 2.60 reflects all State assets. Table 2.60a shows the top ten counties based on the values of exposed State owned, leased and other State assets.

TABLE 2.60: TOP TEN COUNTIES NUMBER OF STATE FACILITIES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Clarke	708	Fulton	185	Chatham	826
Chatham	476	Clarke	136	Fulton	109
Tattnall	418	DeKalb	89	Clarke	92
Baldwin	416	Hall	80	Richmond	89
Bartow	410	Gwinnett	79	DeKalb	76
DeKalb	406	Lowndes	71	Elbert	70
Fulton	379	Baldwin	69	Glynn	69
Richmond	352	Muscogee	61	Tift	56
Tift	323	Bulloch	52	Baldwin	55
Bibb	269	Chatham	51	Dougherty	55

TABLE 2.60A: TOP TEN COUNTIES VALUE OF STATE FACILITIES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Fulton	$10,455,703,972	Fulton	$380,094,265	Chatham	$1,586,507,493
Clarke	$5,694,727,478	DeKalb	$164,591,999	Fulton	$197,074,933
Richmond	$2,256,998,611	Cobb	$91,349,844	Glynn	$147,220,149
DeKalb	$1,810,425,219	Richmond	$29,224,946	DeKalb	$142,396,708
Chatham	$1,648,597,848	Gwinnett	$28,879,528	Clarke	$35,968,452
Baldwin	$1,282,046,324	Muscogee	$28,010,832	Gwinnett	$25,494,996
Bulloch	$1,065,563,613	Bulloch	$24,245,835	Bulloch	$19,966,103
Cobb	$1,058,810,451	Chatham	$23,252,708	Baldwin	$19,030,064
Dougherty	$911,359,307	Clayton	$19,177,393	Hall	$18,857,223
Lowndes	$741,909,644	Clarke	$13,732,412	Richmond	$17,857,293

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One asset that could be vulnerable to electrical storms could be the electric grid. If lightning hits any portion of the power grid that isn't sufficiently protected, the impacts could be significant. The Department of Energy tracks power outage reports, which the State was able to use to identify which counties tend to have more power outages, as well as which counties tend to have a higher percentage of their customers reporting power outages. Table 2.61 below shows the top ten counties' average power outage reports between 2015 and 2022. Notably, when grouped according to average number of power outages, the data does not reveal any surprises, as the top 10 counties are all within the top 10-15 most populous counties within the State. However, when looked at based on percentage of the customer base, it appears many of the smaller communities within the state have the highest percentage of their customers reporting power outages.

TABLE 2.61: TOP TEN COUNTIES POWER OUTAGES PER YEAR 2015-2022

County	Average Number Out	County	Average Percentage Out
Gwinnett	730	Clay	4.91%
Fulton	730	Echols	4.74%
DeKalb	729	Quitman	4.20%
Chatham	729	Webster	3.65%
Cobb	728	Miller	2.97%
Clayton	727	Taliaferro	2.91%
Muscogee	719	Baker	2.89%

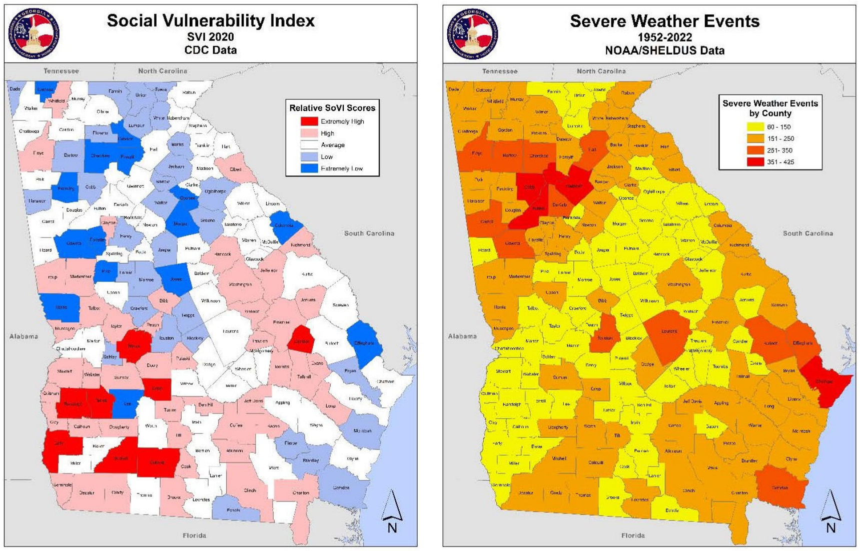
County	Average Number Out	County	Average Percentage Out
Richmond	718	Clinch	2.68%
Bibb	717	Calhoun	2.59%
Hall	716	Telfair	2.44%

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to severe weather, specifically. A notable finding has to do with power outages as reflected in Table 2.61 above – specifically the top ten counties based on average percentages of reported outages. Five of those counties (Calhoun, Clay, Clinch, Quitman and Webster) received high SoVI scores from the CDC index. Of the remaining five, only Echols is considered to have a low SoVI score. Notably, all 10 of these communities are small, rural communities. Power outages lasting a day or more could have significant impacts, even if they don't directly affect the entire community. For example, many of these smaller, rural communities may only have one or two grocery stores, often located in close proximity to each other. In such a community, a power outage of more than a few hours, that affects one or both of those stores, could significantly reduce the citizens' ability to purchase food and other critical supplies. In addition, socially vulnerable members of the population may have limited transportation options, leading to difficulty in traveling to other communities to purchase needed supplies.

Figure 2.45 shows a comparison of the CDC Social Vulnerability Index to the Severe Weather Events Map. Comparing these two maps shows many of the counties that tend to have more severe weather events are actually less socially vulnerable. Particularly, all counties within the top two rankings of severe weather events received "average," "low," or "extremely low" SoVI scores.

FIGURE 2.45: SOCIAL VULNERABILITY COMPARISON TO SEVERE WEATHER EVENTS

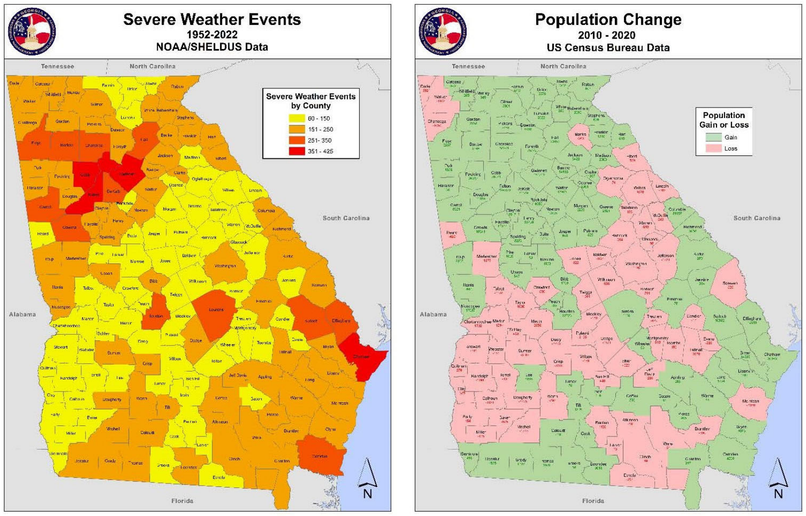


Impact from Changing Conditions

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Figure 2.46 shows a comparison of population change throughout the State to areas that tend to experience more severe weather events. Of particular note are the counties in the Coastal and Metropolitan Atlanta areas that have experienced population growth and are located in areas that have reported more severe weather events. As the population grows, and requisite development occurs, this has the effect of putting more people and structures in the path of high wind events, thereby increasing the area's overall vulnerability. This is mitigated slightly by the fact that areas subject to tropical cyclone activity, such as the coast, often have stronger building codes. Conversely decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, but it does remove people considered to be less vulnerable, due in part to their perceived ability to recover, from the equation, thereby increasing the community's overall social vulnerability statistically.

FIGURE 2.46: COMBINED SEVERE WEATHER EVENTS AND POPULATION CHANGE BY COUNTY



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.

2.8.5 Tornado

Associated Hazards:

Thunderstorms, tropical cyclones

Priority	Rank
High	2

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 2.47: TORNADO CHARACTERISTICS BY STRENGTH

Source: NOAA National Weather Service

Weak Tornadoes

- 88% of all tornadoes
- Less than 5% of tornado deaths
- Lifetime 1 – 10+ minutes
- Winds less than 110 mph
- Produces EF0 or EF1 damage

Strong Tornadoes

- 11% of all tornadoes
- Nearly 30% of all tornado deaths
- May last 20 minutes or longer
- Winds 111-165 mph
- Produces EF2 or EF3 damage

Violent Tornadoes

- Less than 1% of all tornadoes
- 70% of all tornado deaths
- Can exceed 1 hour
- Winds greater than 166 mph
- Produces EF4 or EF5 damage

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 2.62 lists the rankings on the Enhanced Fujita Scale and the corresponding magnitude and intensity measures.

TABLE 2.62: 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 2.48: TORNADO EVENTS IN GEORGIA, 1952–2022

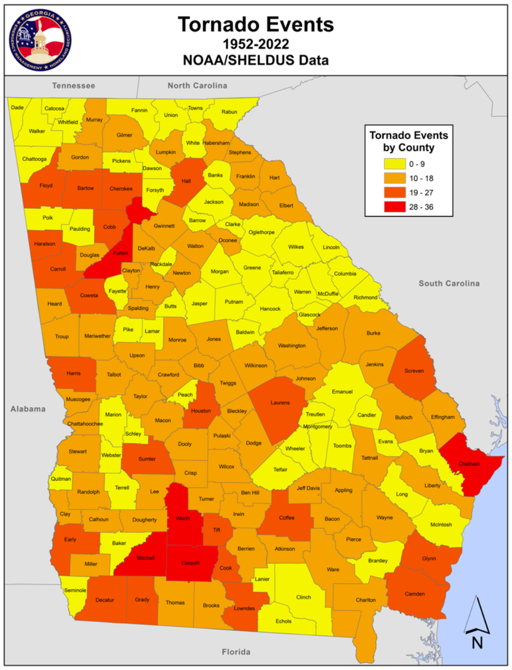


FIGURE 2.49: TORNADO LOSSES IN GEORGIA, 1952–2022

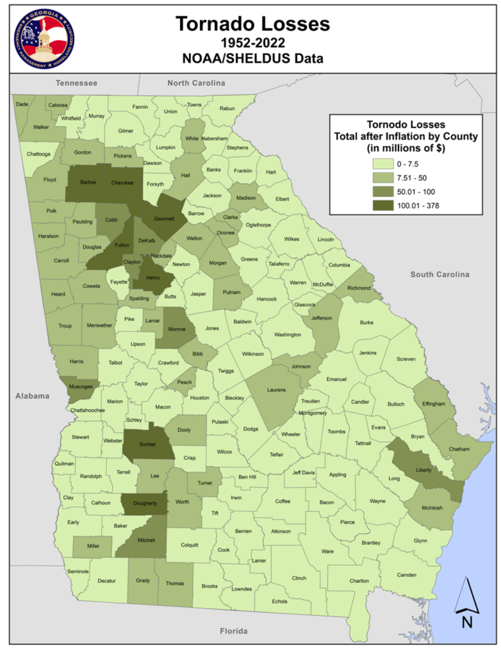


FIGURE 2.50: TORNADO TRACKS IN GEORGIA, 1950–2021

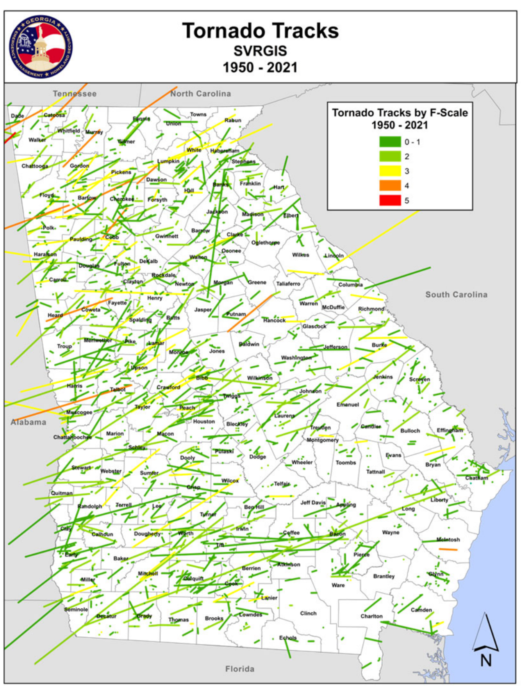


Figure 2.48 illustrates the tornado events per county from 1952 to 2022. Based on this map, counties in Northwest and Southwest Georgia have experienced a higher number of tornado events. However, tornadoes can occur anywhere within the state. In terms of losses associated with these events, Figure 2.49 illustrates that the areas with the most losses from tornadoes exist around Metro Atlanta and Northwest Georgia. This phenomenon is most likely due to two factors. Urban areas have more potential for loss in terms of property (not necessarily including crop damage). Also, as reflected in Figure 2.50, the preponderance of stronger tornados (EFs 4 & 5) appear to have occurred in the northern western quarter of the state.

Table 2.63 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, 2,141 tornado events occurred between 1952 and 2022 in Georgia according to SHELDUS/NCEI data. This equates to a historic average of approximately 31 events per year. These events have caused a total of 3,283 injuries, 188 fatalities, and more than $2.9 billion in damages. Moreover, in the most recent 20-year record, there have been 983 events (average 49/year), 870 injuries, 72 fatalities and more than $1.5 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 1950–2021. Figure 2.50 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 EF5 in Dade County.

TABLE 2.63: 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
2021*	Northwest and Northeast Georgia	FEMA DR 4600; EF-4 tornado in Coweta County; Significant power outages; 1 fatality and 5 injuries
2023*	West and Central Georgia	FEMA DR 4685; EF-3 tornado in Spalding County; Significant power outages; 4 fatalities and 102 injuries

*Presidential declared disaster

Physical Vulnerability

Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Tornado hazard, the State analyzed the following resources:

- Local Hazus reports
    - Essential Facilities
- Georgia Mitigation Information System

    - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Power Outages
    - Number of power outages per county per Department of Energy data

As part of each county's local Hazard Mitigation Plan update, the State provides a Level 2 Hazus Analysis of potential impacts from tropical cyclones, flooding and, where applicable coastal flooding, based on locally provided information, including essential facilities (EOCs, medical, fire, Police and schools), for use as part of the local hazard mitigation plan update. Table 2.64 shows the top ten counties based on the number of essential facilities in each county, where a Hazus report has been completed. Note: Not all counties have had a Hazus report completed. Also, this data does not account for potential damages to essential facilities. Hazus tornado models are based on one hypothetical tornado, often on a worst-case scenario path. All essential facilities are considered to be equally exposed to tornados. While there are few surprises, since most of the counties in Table 2.64 are within the top 10 most populous counties in the State, Baldwin, Clarke and Lowndes do stand out, due to the fact that they rank 47th, 19th and 22nd, respectively in terms of population. Notably one of the categories of essential facilities is schools, which includes all types of educational facilities. This may tend to extraordinarily inflate the number of essential facilities for some communities. Baldwin County includes two mid-sized college campuses both encompassing multiple city blocks - Georgia College and State University, a 4-year state university, and Georgia Military College, a junior college and k-12 prep school. Lowndes County includes Valdosta State University, a mid-sized state university with two campuses encompassing multiple city blocks. Finally, Clarke County includes The University of Georgia – the State's flagship university and the oldest public university in the country. The full report showing all data is located in Appendix D-V.

TABLE 2.64: TOP TEN COUNTIES ESSENTIAL FACILITIES FROM HAZUS DATA

County	Totals
Clarke	637
Gwinnett	385
Fulton	327
Cobb	267
Dekalb	203
Chatham	175
Lowndes	149
Muscogee	144
Baldwin	121
Richmond	116

Table 2.65 reflects the top ten counties based on the percentage of county population served by each essential facility. This shows that each facility serves, while not necessarily more people, but a higher percentage of the community's population that in larger counties. Therefore, the loss of any one of these facilities in the smaller communities could have a more significant impact on that community's ability to provide basic services to its citizens.

TABLE 2.65: TOP TEN COUNTIES ESSENTIAL FACILITIES FROM HAZUS DATA BY PERCENT POPULATION SERVED

County	Totals	2020 Census Population	Population Served per Facility
Clay	7	2,848	14.29%
Schley	9	4,547	11.11%
Taliaferro	9	1,559	11.11%
Baker	10	2,876	10.00%
Candler	10	10,981	10.00%
Echols	10	3,697	10.00%
Quitman	11	2,235	9.09%
Wheeler	12	7,471	8.33%
Treutlen	12	6,406	8.33%
Glascock	12	2,884	8.33%

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on various hazards. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities as well. Table 2.66 shows the top ten counties based on State owned and leased properties and other State assets. Note: Since the Tornados are not a spatially defined hazard, GMIS does not reflect differences in risk based on geography for this hazard. All State assets are considered to be equally exposed to tornados. Therefore, Table 2.66 reflects all State assets. Table 2.66a shows the top ten counties based on the values of exposed State owned, leased and other State assets.

TABLE 2.66: TOP TEN COUNTIES NUMBER OF STATE FACILITIES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Clarke	708	Fulton	185	Chatham	826
Chatham	476	Clarke	136	Fulton	109
Tattnall	418	DeKalb	89	Clarke	92
Baldwin	416	Hall	80	Richmond	89
Bartow	410	Gwinnett	79	DeKalb	76
DeKalb	406	Lowndes	71	Elbert	70
Fulton	379	Baldwin	69	Glynn	69
Richmond	352	Muscogee	61	Tift	56
Tift	323	Bulloch	52	Baldwin	55
Bibb	269	Chatham	51	Dougherty	55

TABLE 2.66A: TOP TEN COUNTIES VALUE OF STATE FACILITIES

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****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One asset that could be vulnerable to tornados could be the electric grid. Impacts to whatever is in the path of a tornado are typically significant. If a tornado on the ground crosses an area with exposed power lines, or worse, impacts a substation or main trunk line, the effects on those supplied by those lines could be significant, even long lasting. The Department of Energy tracks power outage reports, which the State was able to use to identify which counties tend to have more power outages, as well as which counties tend to have a higher percentage of their customers reporting power outages. Table 2.67 below shows the top ten counties' average power outage reports between 2015 and 2022. Notably, when grouped according to average number of power outages, the data does not reveal any surprises, as the top 10 counties are all within the top 10-15 most populous counties within the State. However, when looked at based on percentage of the customer base, it appears many of the smaller communities within the state have the highest percentage of their customers reporting power outages.

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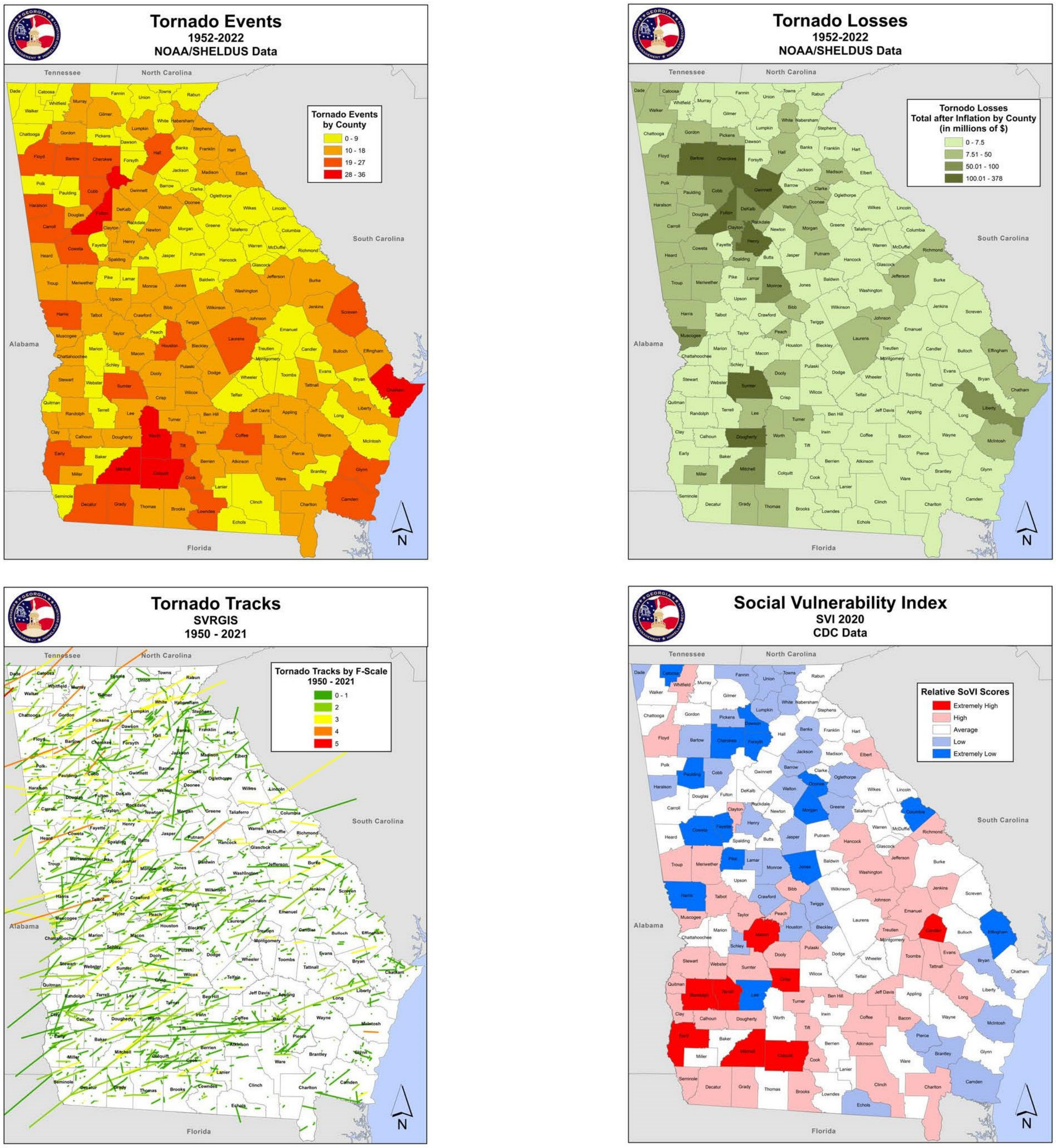
Chatham	729	Webster	3.96%
Cobb	728	Taliaferro	2.99%
Clayton	727	Baker	2.94%
Muscogee	719	Miller	2.88%
Richmond	718	Clinch	2.80%
Bibb	716	Calhoun	2.75%
Hall	716	Telfair	2.60%

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to tornados, specifically. A notable finding has to do with power outages as reflected in Table 2.67 above – specifically the top ten counties based on average percentages of reported outages. Five of those counties (Calhoun, Clay, Clinch, Quitman and Webster) received high SoVI scores from the CDC index. Of the remaining five, only Echols is considered to have a low SoVI score. Notably, all 10 of these communities are small, rural communities. Power outages lasting a day or more could have significant impacts, even if they don't directly affect the entire community. For example, many of these smaller, rural communities may only have one or two grocery stores, often located in close proximity to each other. In such a community, a power outage of more than a few hours, that affects one or both of those stores, could significantly reduce the citizens' ability to purchase food and other critical supplies. In addition, socially vulnerable members of the population may have limited transportation options, leading to difficulty in traveling to other communities to purchase needed supplies.

For this hazard, the State compared the CDC social vulnerability map to each of the three tornado event and loss maps above. Figure 2.51 shows a comparison of the four maps. Comparing these four maps does highlight a couple of things. First, many of the stronger tornadoes (EF4s and 5s) appear to occur in the northern half of the State, which is also considered less socially vulnerable. While the losses map shows the most significant concentration of losses around Northwest Ga and Metro Atlanta, it follows where the strongest tornadoes have tended to occur. However, both the events and loss maps also show concentrations in Southwest Georgia, which appears to also have the highest concentrations of socially vulnerable populations.

FIGURE 2.51: SOCIAL VULNERABILITY COMPARISON TO TORNADO HAZARD

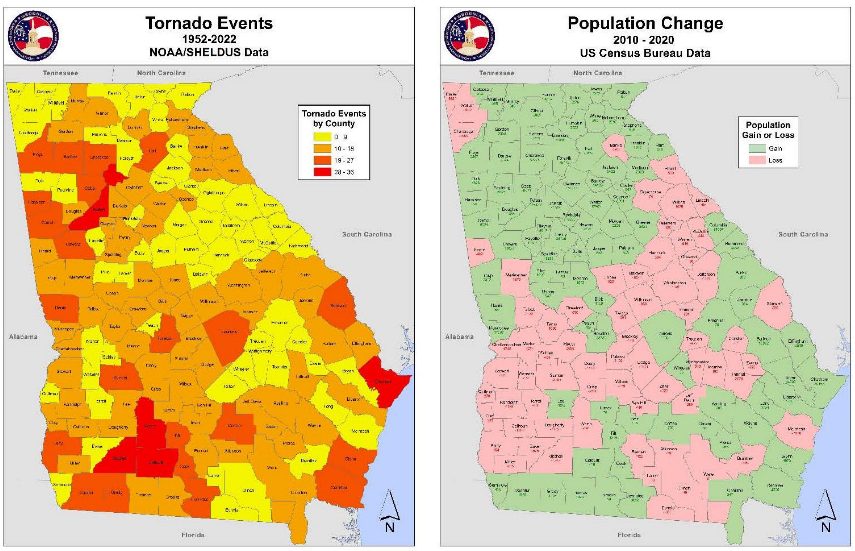


Impact from Changing Conditions

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Figure 2.52 shows a comparison of population change throughout the State to areas that tend to experience more tornado events. A comparison of the two maps highlights 3 areas of the State. Coastal and Northwest Georgia are two areas that have experience higher numbers of tornado events. These two areas have also shown population growth. Southwest Georgia, on the other hand, has also experienced higher numbers of tornado events, but has seen a general loss in population. As the population grows, and requisite development occurs, this has the effect of putting more people and structures in the path of tornado events, thereby increasing the area's overall vulnerability. Even though areas along the coast and Southwest Georgia have generally adopted stronger building codes due to their proximity to hurricane and high wind activity, any increased protection these higher building standards provide from tornados is minimal at best due to the nature of tornados versus hurricanes or straight line wind events. Conversely decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, but it does remove people considered to be less vulnerable, due in part to their perceived ability to recover, from the equation, thereby increasing the community's overall social vulnerability statistically.

FIGURE 2.52: COMBINED TORNADO EVENTS AND POPULATION CHANGE BY COUNTY



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.

2.8.6 Inland Flooding

<u>Associated Hazards:</u>

Thunderstorms, tropical cyclones, dam failure

Priority	Rank
High	1

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 2.8.2 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 2.53 maps the flooding hazard event history in the State of Georgia from 1952 to 2022. Figure 2.54 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 2.53: FLOOD EVENTS IN GEORGIA, 1952–2022

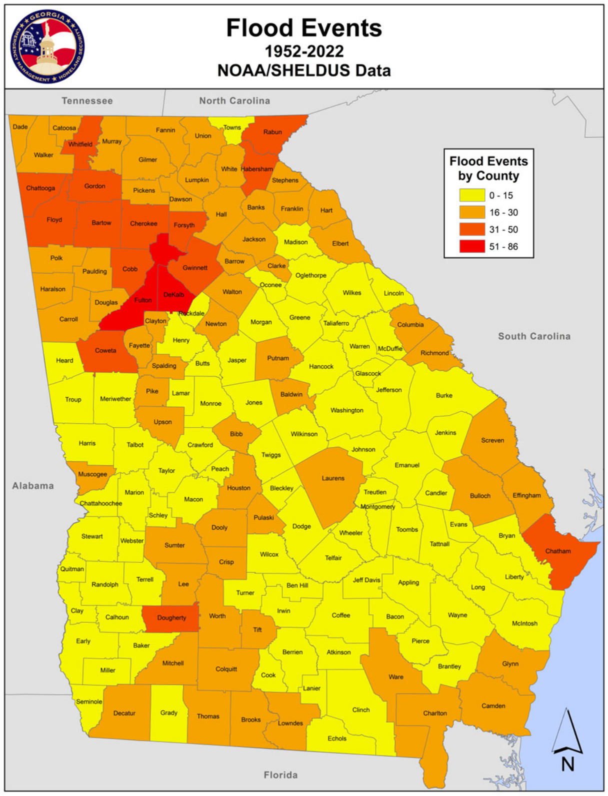
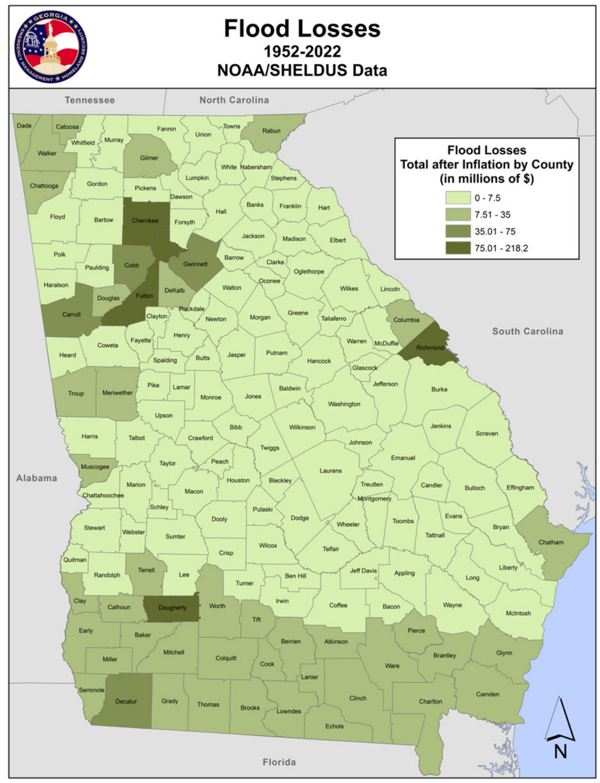


FIGURE 2.54: FLOOD LOSSES IN GEORGIA, 1952–2022



In total, 3,402 inland flooding events occurred between 1952 and 2022 in Georgia according to the SHELDUS/NCEI data. This equates to a historic average of approximately 49 events per year. These storms in total have caused 51 injuries, 80 fatalities, and more than $1.4 billion in damages. In the past 20 years, (2002-2022) there have been 2,219 flood events, causing 15 injuries, 16 fatalities, and $616 million in damages. In the past 20 years, Georgia has seen an average of 110 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 2.68 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's recorded history 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 2.55). 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 2.68: NOTABLE FLOOD EVENTS IN GEORGIA, 1881–2023

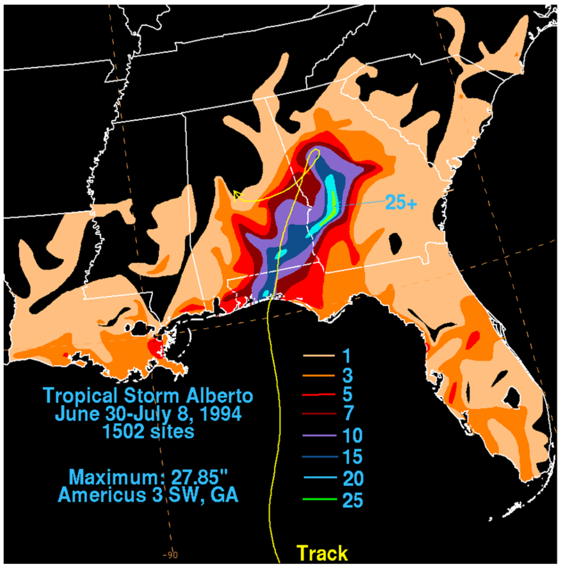
Year	Area Affected	Recurrence Interval	Remarks
1881	Savannah Area	>100 years	335 deaths; $1.5 million in damages
1893	Savannah Area	>100 years	2,500 deaths; $10 million in damages
1916	Chattahoochee, Coosa, and Flint Rivers	25 to >100 years	8-21 inches of rain; $2.3 million in damages
1925	Central / 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

Year	Area Affected	Recurrence Interval	Remarks
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

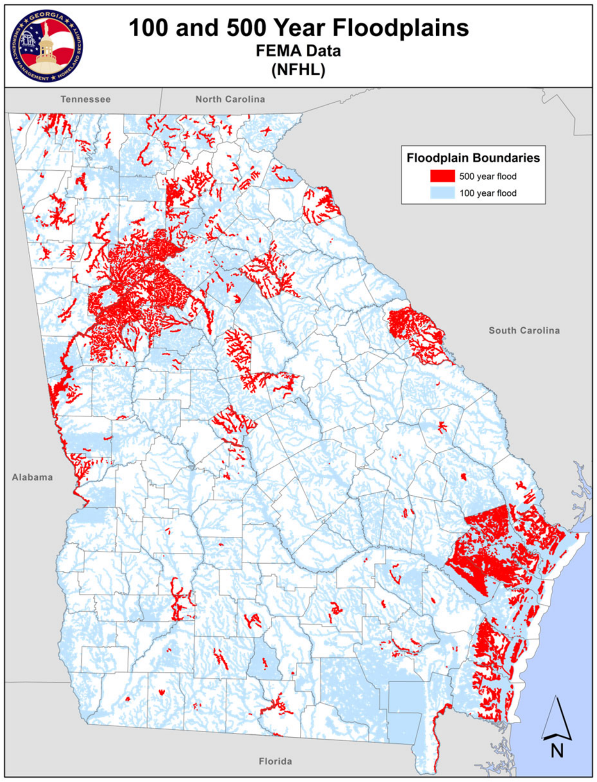
FIGURE 2.55: TROPICAL STORM ALBERTO RAINFALL TOTALS IN INCHES

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.



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.

FIGURE 2.56: 100 AND 500 YEAR FLOODPLAINS IN GEORGIA



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 2.56 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 beginning in 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.

Physical Vulnerability

Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Flooding hazard, the State analyzed the following resources:

- Local Hazus reports
    - Potential building damages
    - Potential losses to essential facilities
    - Potential Sheltering needs

    - Potential debris.
- Georgia Mitigation Information System
    - Critical Facility data defined and entered by each county as part of their local Hazard Mitigation Plan Update
    - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Road Surfaces
    - Number of miles of unpaved Road Surfaces vulnerable to washout during flood events.

As part of each county's local Hazard Mitigation Plan update, the State provides a Level 2 Hazus Analysis of potential impacts from a 1% annual chance flood based on locally provided information on essential facilities (EOCs, medical, fire, Police and schools), as well as locally provided Tax Assessor data on all structures, for use as part of the local hazard mitigation plan update. Table 2.69 shows the Flooding results from the Hazus reports, including loss ratios (losses compared to building values), value of losses to structures, economic loss, Essential Facilities damaged or out of service, and potential tons of debris generated. Notably, every county could experience complete loss of some essential facility services for a day or more. The full report showing all data is located in Appendix D-V.

TABLE 2.69: TOP TEN COUNTIES FROM HAZUS DATA

Loss Ratio	Number Buildings Damaged	Value of Building Losses	Essential Facilities Moderately Damaged	Essential Facilities out of Service	Potential Total Tons of Debris	# Displaced	# Shelter Needs
Seminole	Chatham	Dekalb	Glynn	Ware	Dekalb	Walker	Chatham
Baker	Glynn	Chatham	Clarke	Jeff Davis	Fulton	Bibb	Gwinnett
Glynn	Dekalb	Fulton	Mitchell	Mcintosh	Cobb	Chatham	Glynn
Walker	Cobb	Cobb	Fulton	Appling	Gwinnett	Cobb	Dekalb
Bryan	Fulton	Gwinnett	Muscogee	Bryan	Cherokee	Dekalb	Cobb
Mitchell	Dougherty	Walker	Baldwin	Camden	Forsyth	Glynn	Fulton
Union	Gwinnett	Glynn	Chattooga	Bulloch	Whitfield	Fulton	Clayton
Chatham	Bryan	Bibb	Dade	Coffee	Catoosa	Clayton	Dougherty
Crisp	Floyd	Clayton	Gordon	Brantley	Hall	Gwinnett	Henry
Chattooga	Richmond	Bryan	Ware	Wilkinson	Stephens	Henry	Cherokee

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on each facility's location within the various flood hazard areas. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities to the flood hazard. Table 2.70 below shows the top ten counties' number of locally defined Critical Facilities located within the 1% Annual Chance Floodplain, also known as the Special Flood Hazard Area (SFHA). Table 2.71 shows the top ten counties' number of Stated owned and or operated assets located within the SFHA. Table 2.71a shows the top ten counties based on the values of exposed State owned, leased and other State assets.

TABLE 2.70: TOP TEN COUNTIES NUMBER OF LOCAL CRITICAL FACILITIES EXPOSED TO SPECIAL FLOOD HAZARD AREA

County	Number of Critical Facilities	Value of Critical Facilities
Glynn County	93	$331,998,240
Chatham County	55	$128,439,260
Gwinnett County	40	$38,804,500
Forsyth County	34	$26,712,924
Floyd County	27	$70,319,029
Troup County	27	$144,645,498
Rockdale County	25	$122,982,300
Gilmer County	24	$33,733,900
Stephens County	19	$8,807,401
Taylor County	19	$15,812,000

TABLE 2.71: TOP TEN COUNTIES NUMBER OF STATE FACILITIES EXPOSED TO SPECIAL FLOOD HAZARD AREA

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Chatham	149	Chatham	10	Chatham	528
McIntosh	130	Baldwin	7	Elbert	46
Bartow	68	Lowndes	5	Glynn	34
Glynn	59	Clayton	4	Dougherty	28
Union	34	Cobb	4	Barrow	23
Crisp	26	Bryan	3	McIntosh	21
Barrow	20	Camden	3	Seminole	11
Dougherty	20	Richmond	3	Stewart	11
Stewart	15	Bartow	2	Rabun	10
Colquitt	14	Cook	2	Hall	9

TABLE 2.71A: TOP TEN COUNTIES VALUE OF STATE FACILITIES EXPOSED TO SPECIAL FLOOD HAZARD AREA

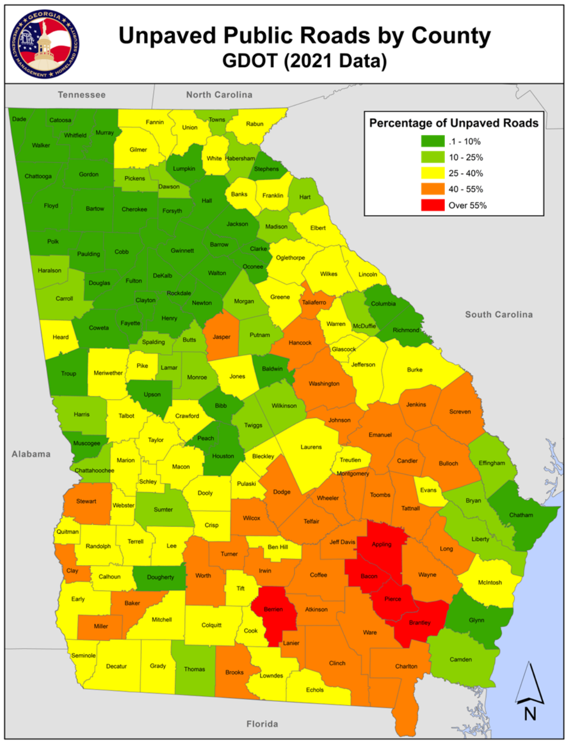
Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Richmond	$319,683,584	Chatham	$2,202,236	Chatham	$631,636,957

Glynn	$199,526,946	Floyd	$2,105,484	Glynn	$136,254,545
Troup	$103,496,143	Cobb	$651,227	Hall	$8,620,281
Washington	$67,276,459	Clayton	$580,533	Douglas	$5,075,000
McIntosh	$36,573,064	Gordon	$482,960	Barrow	$3,078,391
Upson	$33,353,309	Whitfield	$469,568	Mitchell	$2,318,000
Gordon	$30,205,017	Meriwether	$466,165	McIntosh	$2,143,680
Walton	$28,781,928	Baldwin	$365,000	Dougherty	$2,135,417
Henry	$27,100,000	Appling	$327,166	Crisp	$2,058,750
Walker	$22,423,638	Emanuel	$309,074	Clay	$2,025,000

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One particularly vulnerable lifeline in times of flooding is transportation infrastructure – specifically unpaved roads. While paved roads are certainly not invulnerable, rural unpaved roads are often more susceptible to washouts, especially after lengthy periods of wear and tear. Figure 2.57 below shows the percentage of unpaved roads for each county.

FIGURE 2.57: PERCENTAGE OF UNPAVED ROAD MILEAGE



Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to inland flooding, specifically. Figure 2.58 shows the average hazard score from inland flooding for Georgia counties according to the Georgia Mitigation Information System. Table 2.15 in Section 2.6 includes a description of the Flood hazard scores. Figure 2.59 shows the effect of combining SVI scores to the average Flood hazard scores per county from the GMIS system. Notably, while the coast and Metro Atlanta areas received the highest scores based solely on geographic vulnerabilities, adding Social Vulnerability shifts the focus from these two areas to areas throughout the southern half of the state with concentrations in East Central, Southern and Southwest Georgia.

FIGURE 2.58: AVERAGE HAZARD SCORE BY COUNTY FROM FLOODING

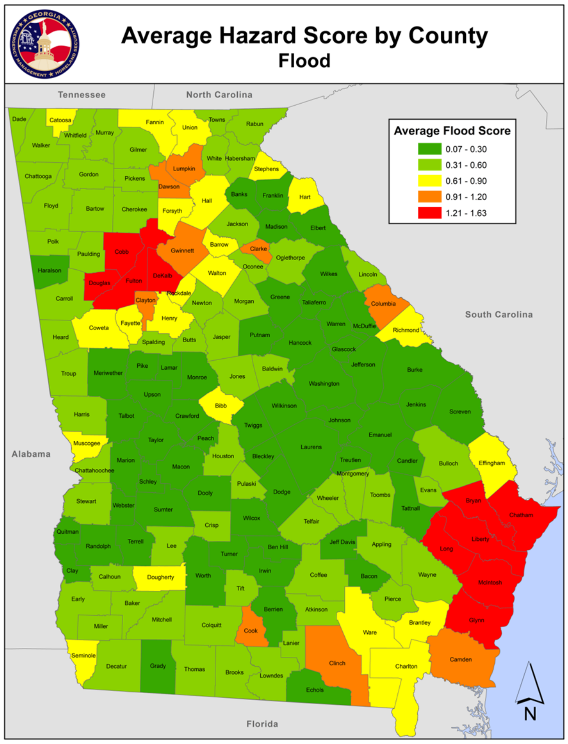
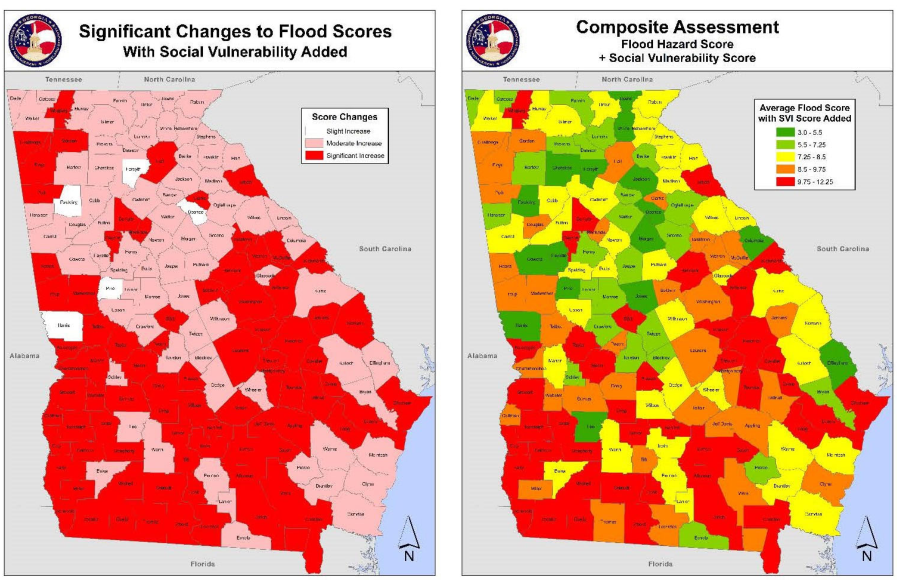


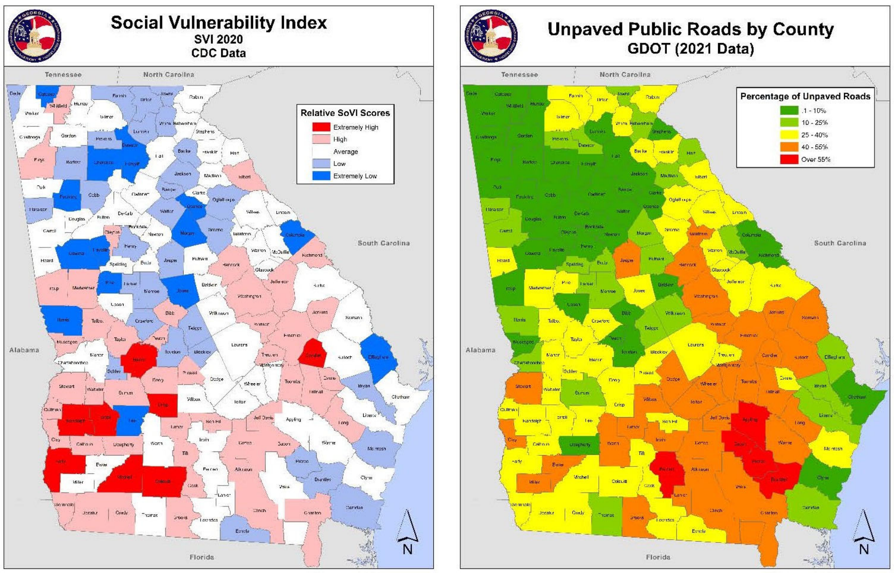
FIGURE 2.59: COMBINED HAZARD SCORE AND SVI BY COUNTY FROM FLOODING



In additional the above, the State compared the CDC Social Vulnerability map to the GDOT road surface map. The maps in Figure 2.60 show this comparison. There is a high concentration of counties in the

Southeastern quadrant of the state with 50%, or more, of their roads unpaved. While not an exact match, this same quadrant has a concentration of counties that scored either average or high on the Social Vulnerability scoring. Depending on the factors driving each individual county's social vulnerability reality, this could lead to concerns regarding some of those counties' citizens' ability to withstand, or recover from, flood events that cause road washouts, which may limit their ability to reach needed supplies and services.

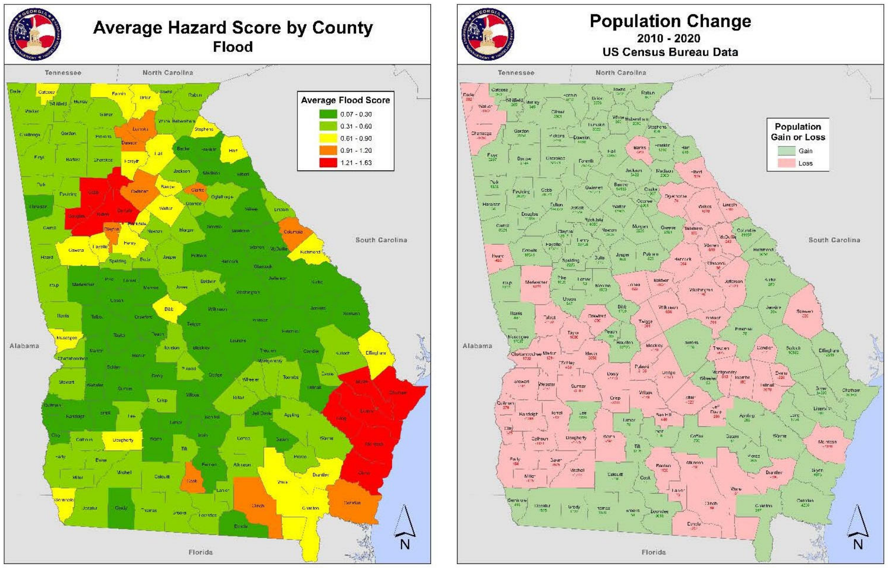
<u>FIGURE 2.60: CDC SOCIAL VULNERABILITY SCORE AND UNPAVED ROADS</u>



<u>Impact from Changing Conditions</u>

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

FIGURE 2.61: FLOOD HAZARD SCORE AND POPULATION CHANGE



Generally speaking, the State of Georgia has experienced overall population growth. As can be seen in Figure 2.61, various areas have experienced population growth, while others have experienced population reduction. Figure 2.61 above shows that counties that are more at risk to flooding geographically, have also experienced population growth. The State is currently unable to analyze development trends specifically within the SFHA at the Statewide level. If these population increases include more development in and around the SFHA, this growth, and requisite development that comes with it, has the effect of putting more people and structures in the path of flood events, thereby increasing the area's overall vulnerability. This is mitigated slightly by communities that develop and adopt floodplain development regulations that include minimum heights above the Base Flood Elevation, mitigated impacts on upstream and downstream water surface elevations, etc. Conversely decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, it does remove people considered to be less vulnerable, due in part to their perceived ability to recover, from the equation, thereby increasing the community's overall social vulnerability statistically.

In terms of 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 2.72 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-I.

TABLE 2.72: 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

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2.8.7 Severe Winter Weather

Associated Hazards:

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

Priority	Rank
High	4

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 2.62 – 2.65 (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 2.73: 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 2.62), 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 2.63 shows a similar map for the winter storm that hit the Southeast in March of 1993.

FIGURE 2.62: MAP OF THE EFFECTS OF A 1973 WINTER STORM WITH RSI OF 12.52

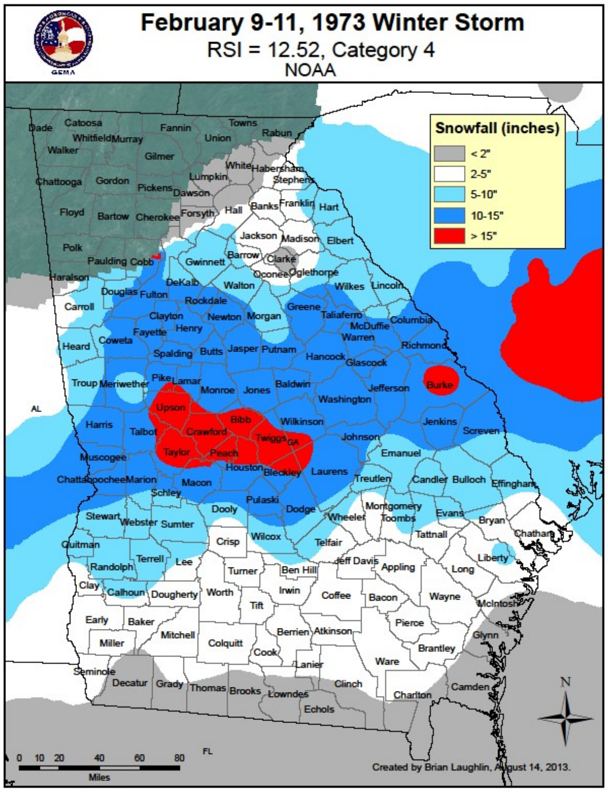


FIGURE 2.63: MAP OF THE EFFECTS OF A 1993 WINTER STORM WITH RSI OF 20.57

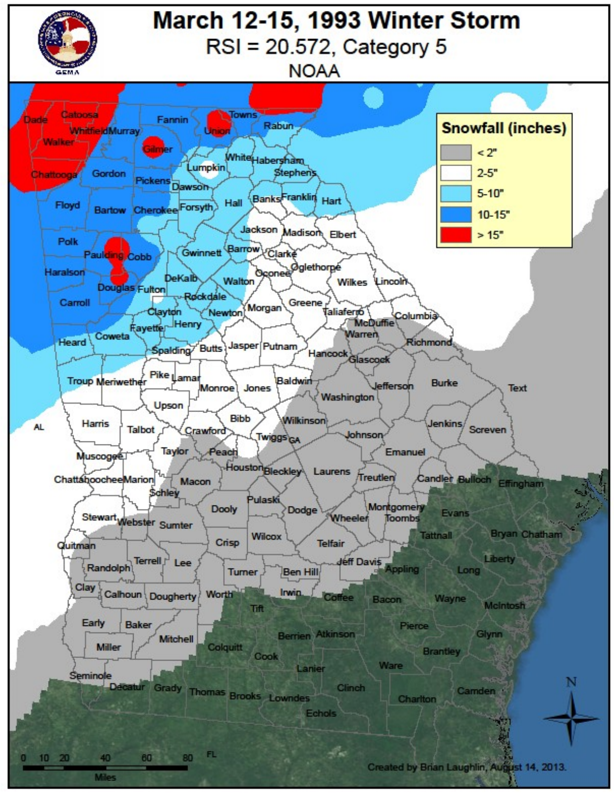


FIGURE 2.64: MAP OF THE EFFECTS OF A 2014 WINTER STORM WITH RSI OF 4.398

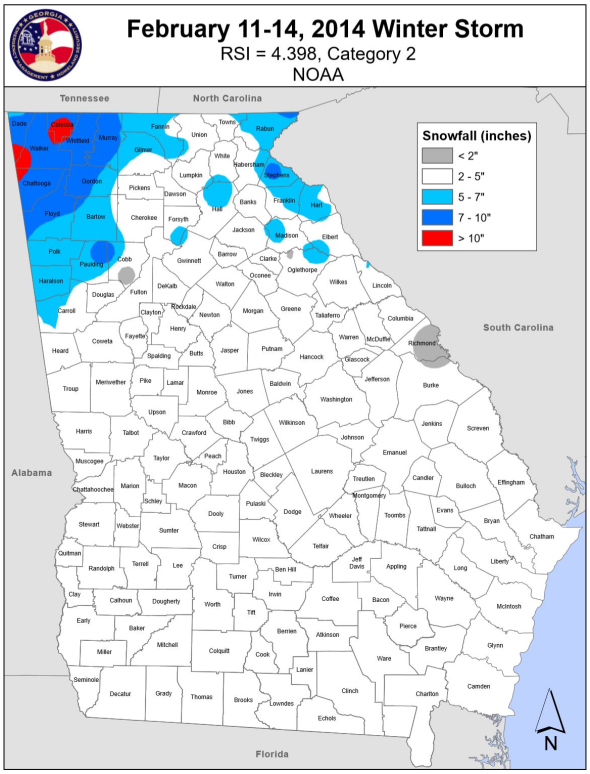
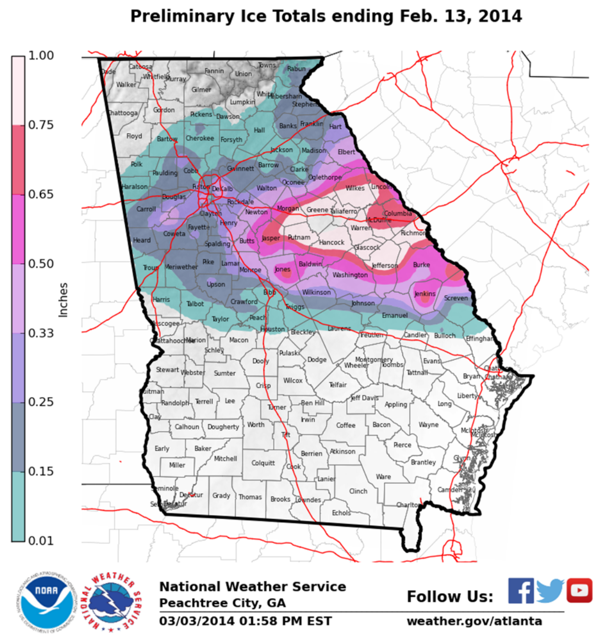


FIGURE 2.65: 2014 WINTER STORM ICE TOTALS



The severe winter weather historical events map, Figure 2.66, 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 2.67 do not mirror the event distribution. The areas with the highest losses do not always correspond with the areas with the most events. In the case of winter weather, there are concentrations if high losses in central and Southwest Georgia – two areas of the state not known to have as many events as North Georgia. Figure 2.62 shows that snowfall from the winter storm of 1973 had greater impacts on Central and South Georgia. Figures 2.64 and 2.65 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 2.62 – 2.65 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 2.66: WINTER STORM EVENTS IN GEORGIA, 1952–2022

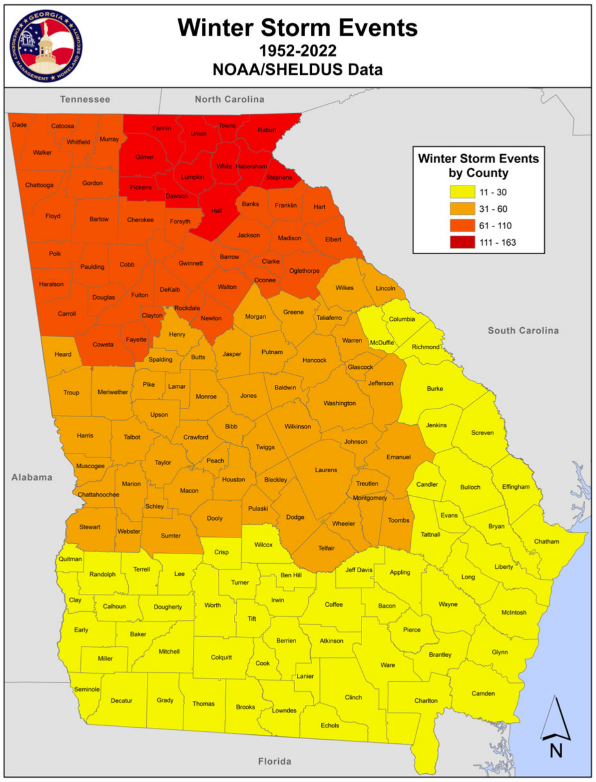


FIGURE 2.67: WINTER STORM LOSSES IN GEORGIA, 1952–2022

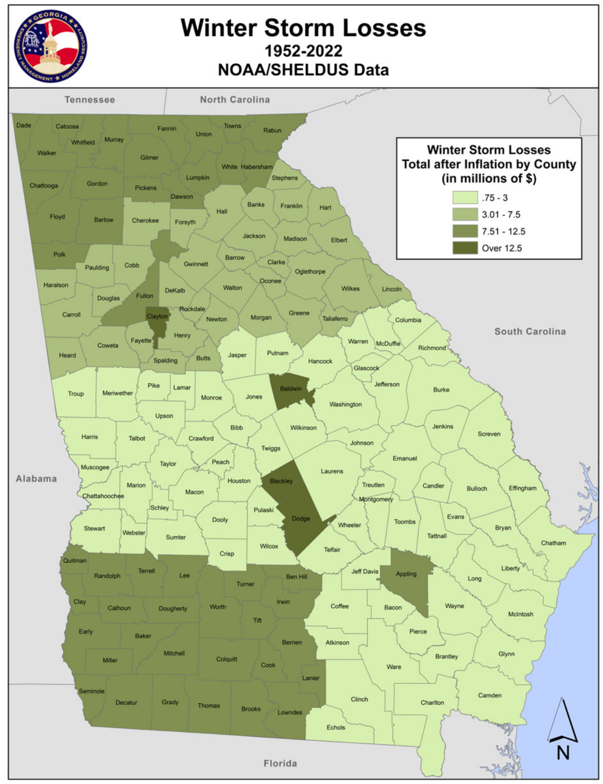


Table 2.74 lists major winter storms that have occurred in Georgia. The most notable of these events occurred in March of 1993. On the morning of March 12, 1993, the collision of a low-pressure system from the Gulf of Mexico, an arctic high pressure system from the Great Plains, and a steep southward 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, 8,052 severe winter weather events occurred from 1952 to 2022 in Georgia according to SHELDUS/NCEI data. This equates to a historic average of approximately 115 events per year. These storms in total have caused 474 injuries, 52 fatalities, and more than $1.6 billion in damages. In the more recent 20 years (2002 – 2021) there were 3,029 occurrences, 64 injuries, 13 fatalities and more $1.1 billion in damages. This equates to approximately 151 events per year.

TABLE 2.74: 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

Physical Vulnerability
Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Severe Winter Weather hazard, the State analyzed the following resources:

- Local Hazus reports
  - Essential Facilities
- Georgia Mitigation Information System
  - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Power Outages
  - Number of power outages per county per Department of Energy data

As part of each county's local Hazard Mitigation Plan update, the State provides a Level 2 Hazus Analysis of potential impacts from a tropical cyclones, flooding and, where applicable coastal flooding, based on locally provided information, including essential facilities (EOCs, medical, fire, Police and schools), for use as part of the local hazard mitigation plan update. Table 2.75 shows the top ten counties based on the number of essential facilities in each county, where a Hazus report has been completed. Note: Not all counties have had a Hazus report completed. Also, this data does not account for potential damages to essential facilities as Hazus does not model impacts from Winter Weather events. All essential facilities are considered to be equally exposed to severe winter weather as profiled in this plan. While there are few surprises, since most of the counties in Table 2.75 are within the top 10 most populous counties in the State, Baldwin, Clarke and Lowndes do stand out, due to the fact that they rank 47th, 19th and 22nd, respectively in terms of population. Notably one of the categories of essential facilities is schools, which includes all types of educational facilities. This may tend to extraordinarily inflate the number of essential facilities for some communities. Baldwin County includes two mid-sized college campuses both encompassing multiple city blocks - Georgia College and State University, a 4-year state university, and Georgia Military College, a junior college and k-12 prep school. Lowndes County includes Valdosta State University, a mid-sized state university with two campuses encompassing multiple city blocks. Finally, Clarke County includes The University of Georgia – the State's flagship university and the oldest public university in the country. The full report showing all data is located in Appendix D-V.

TABLE 2.75: TOP TEN COUNTIES ESSENTIAL FACILITIES FROM HAZUS DATA

County	Totals
Clarke	637
Gwinnett	385
Fulton	327
Cobb	267
Dekalb	203
Chatham	175
Lowndes	149
Muscogee	144
Baldwin	121
Richmond	116

Table 2.76 reflects the top ten counties based on the number of essential facilities per capita. Notably, with

the exception of Clarke County, the population of each of these counties is less than 100,000. This shows that each facility serves, while not necessarily more people, but a higher percentage of the community's population that in larger counties. Therefore, the loss of any one of these facilities in the smaller communities could have a more significant impact on that community's ability to provide basic services to its citizens.

TABLE 2.76: TOP TEN COUNTIES ESSENTIAL FACILITIES FROM HAZUS DATA PER 1000 PEOPLE

County	Totals	2020 Census Population	Facilities / 1000 people
Taliaferro	9	1,559	5.77
Clarke	637	128,671	4.95
Quitman	11	2,235	4.92
Glascock	12	2,884	4.16
Calhoun	22	5,573	3.95
Randolph	24	6,425	3.74
Baker	10	2,876	3.48
Sumter	101	29,616	3.41
Johnson	30	9,189	3.26
Oglethorpe	45	14,825	3.04

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on various hazards. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities as well. Table 2.77 shows the top ten counties based on State owned and leased properties and other State assets. Note: Since severe winter weather, as profiled in this plan, is not a spatially defined hazard, GMIS does not reflect differences in risk based on geography for this hazard. All State assets are considered to be equally exposed to severe winter weather as profiled in this plan. Therefore, Table 2.77 reflects all State assets. Table 2.77a shows the top ten counties based on the values of exposed State owned, leased and other State assets.

TABLE 2.77: TOP TEN COUNTIES NUMBER OF STATE FACILITIES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Clarke	708	Fulton	185	Chatham	826
Chatham	476	Clarke	136	Fulton	109
Tattnall	418	DeKalb	89	Clarke	92
Baldwin	416	Hall	80	Richmond	89
Bartow	410	Gwinnett	79	DeKalb	76
DeKalb	406	Lowndes	71	Elbert	70
Fulton	379	Baldwin	69	Glynn	69
Richmond	352	Muscogee	61	Tift	56
Tift	323	Bulloch	52	Baldwin	55
Bibb	269	Chatham	51	Dougherty	55

TABLE 2.77A: TOP TEN COUNTIES VALUE OF STATE FACILITIES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Fulton	$10,455,703,972	Fulton	$380,094,265	Chatham	$1,586,507,493
Clarke	$5,694,727,478	DeKalb	$164,591,999	Fulton	$197,074,933
Richmond	$2,256,998,611	Cobb	$91,349,844	Glynn	$147,220,149
DeKalb	$1,810,425,219	Richmond	$29,224,946	DeKalb	$142,396,708
Chatham	$1,648,597,848	Gwinnett	$28,879,528	Clarke	$35,968,452
Baldwin	$1,282,046,324	Muscogee	$28,010,832	Gwinnett	$25,494,996
Bulloch	$1,065,563,613	Bulloch	$24,245,835	Bulloch	$19,966,103
Cobb	$1,058,810,451	Chatham	$23,252,708	Baldwin	$19,030,064
Dougherty	$911,359,307	Clayton	$19,177,393	Hall	$18,857,223
Lowndes	$741,909,644	Clarke	$13,732,412	Richmond	$17,857,293

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One asset that could be vulnerable to severe winter weather could be the electric grid. Overhead powerlines are often vulnerable to winter weather, due to trees and limbs falling on lines due to snow and ice accumulation, glaze ice forming directly on poles and lines, and other impacts. Power failure during winter weather can be particularly dangerous due to lack of heat, fires due to people trying to heat homes using makeshift means or using portable heaters in unsafe manners, etc. The

Department of Energy tracks power outage reports, which the State was able to use to identify which counties tend to have more power outages, as well as which counties tend to have a higher percentage of their customers reporting power outages. Table 2.78 below shows the top ten counties' average power outage reports during winter months between 2015 and 2022. Notably, when grouped according to average number of power outages, the data does not reveal any surprises, as the top 10 counties are all within the top 10-15 most populous counties within the State. However, when looked at based on percentage of the customer base, it appears many of the smaller communities within the state have the highest percentage of their customers reporting power outages. Note, this data includes the months of December through March, some of which are also susceptible to early Spring severe weather. Table 2.78 does not account for what caused the reported outages.

TABLE 2.78: TOP TEN COUNTIES POWER OUTAGES PER YEAR 2015-2022

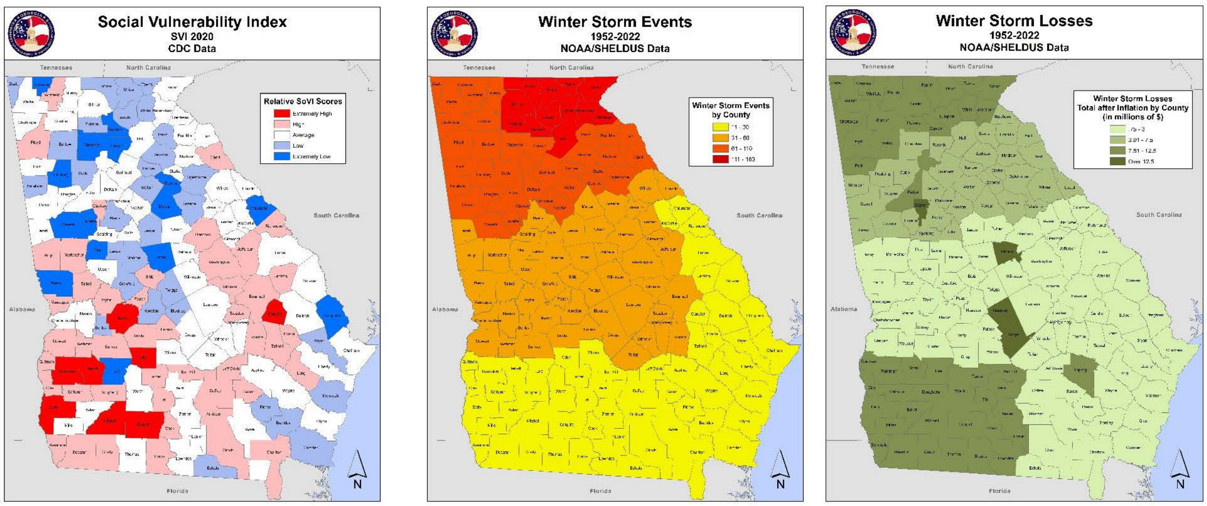
County	Average Number Out	County	Average Percentage Out
Fulton	303	Clay	3.63%
Gwinnett	303	Quitman	3.20%
Chatham	303	Echols	2.98%
DeKalb	303	Baker	2.45%
Cobb	303	Taliaferro	2.07%
Clayton	302	Miller	1.97%
Muscogee	298	Fannin	1.67%
Bibb	297	Webster	1.63%
Richmond	296	Calhoun	1.60%
Hall	295	Glascock	1.44%

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to winter weather, specifically. A notable finding has to do with power outages as reflected in Table 2.78 above – specifically the top ten counties based on average percentages of reported outages. Five of those counties (Calhoun, Clay, Clinch, Quitman and Webster) received high SoVI scores from the CDC index. Of the remaining five, only Echols is considered to have a low SoVI score. Notably, all 10 of these communities are small, rural communities. Power outages lasting a day or more could have significant impacts, even if they don't directly affect the entire community. For example, many of these smaller, rural communities may only have one or two grocery stores, often located in close proximity to each other. In such a community, a power outage of more than a few hours, that affects one or both of those stores, could significantly reduce the citizens' ability to purchase food and other critical supplies. In addition, socially vulnerable members of the population may have limited transportation options, leading to difficulty in traveling to other communities to purchase needed supplies.

Figure 2.68 shows a comparison of the CDC Social Vulnerability Index to the Severe Winter Weather Events and Losses Maps. Comparing these three maps shows a couple of things. The areas that tend to experience the most winter storm events tend to be the northern half of the State, which is considered to be less socially vulnerable. However, there is a concentration of counties in Southwest Georgia that are considered highly and extremely highly socially vulnerable that have experienced more losses from winter weather. While this could be caused by any number of factors, it appears socially vulnerable areas located in areas that don't experience as many severe weather events as others, and may not be as well equipped to respond to them, are more vulnerable to losses and impacts when winter weather does happen.

FIGURE 2.68: SOCIAL VULNERABILITY COMPARISON TO WINTER STORM EVENTS AND LOSSES

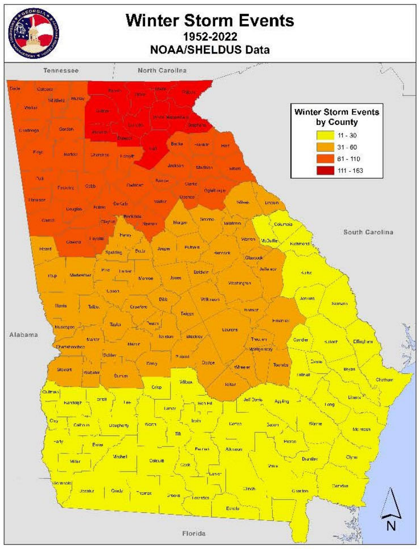


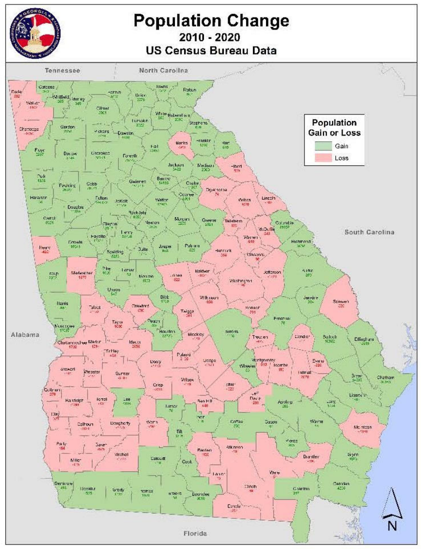
Impact from Changing Conditions

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Figure 2.69 shows a comparison of population change throughout the State to areas that tend to experience more severe winter weather events. Of particular note, the northern 2/3s of the State is largely counties that have experienced population growth. As the population grows, this has the effect of putting more people in areas that tend to have more winter weather events. Conversely decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, it does remove people considered to be less vulnerable, due in part to their perceived ability to recover, from the equation, thereby increasing the community's overall social vulnerability statistically.

FIGURE 2.69: COMBINED SEVERE WEATHER EVENTS AND POPULATION CHANGE BY COUNTY





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.

2.8.8 Drought

Priority	Rank
High	5

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 2.70 and 2.71) indicate the western 2/3 of Georgia have experienced the most drought events, while the northern half appears to have suffered the most losses. 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 2.70: DROUGHT EVENTS IN GEORGIA, 1952–2022

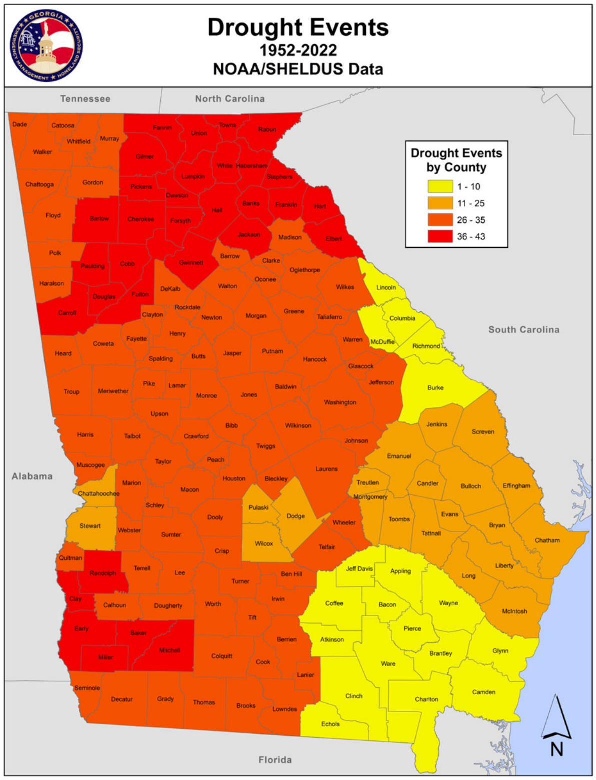
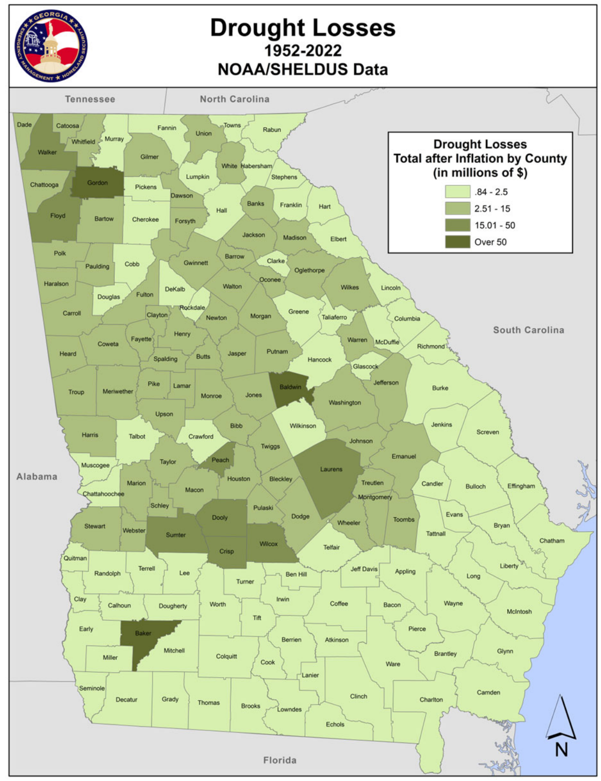


FIGURE 2.71: DROUGHT LOSSES IN GEORGIA, 1952–2022



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 2.79 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 2.79 shows eleven drought events occurring within 113 years. Looking at the 113-year record from 1903 to 2016, 54 of those 113 years were affected by drought. This yields a probability of a 48% chance of a drought occurring in any given year.

TABLE 2.79: 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

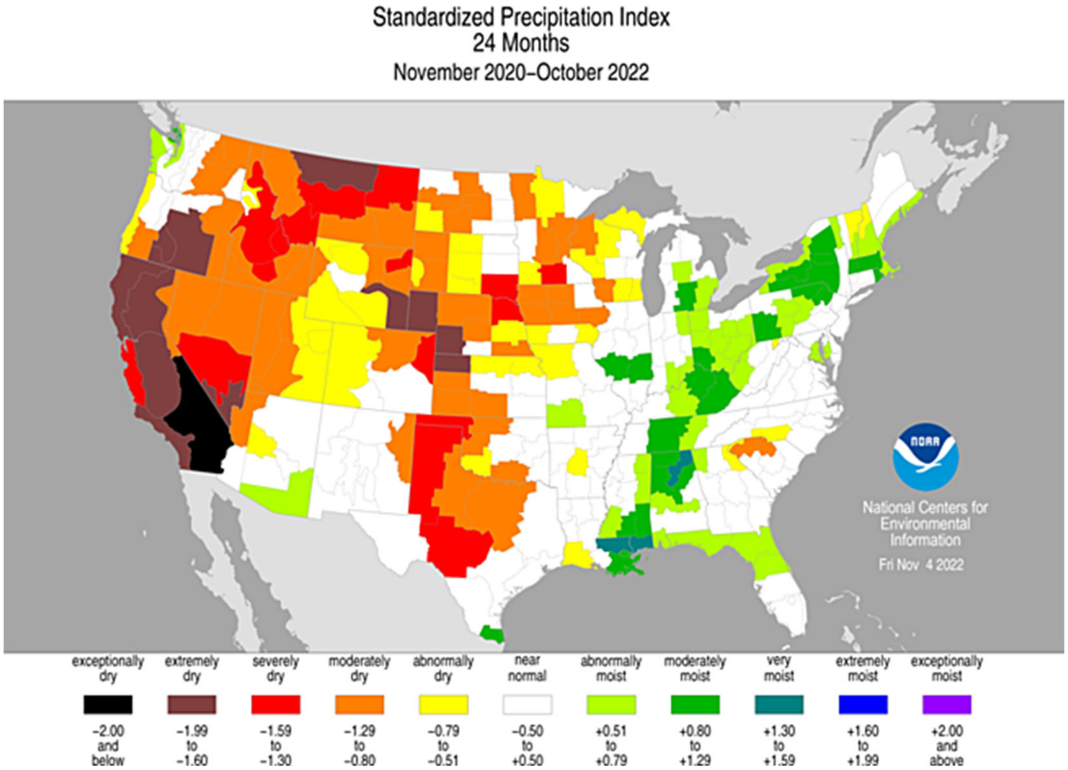
One index of drought, also an effective measure of extent or magnitude, is the Standardized Precipitation Index (SPI), which is based on the probability of precipitation for any time scale. This index is used by many drought planners because of the versatility of computing for different time scales and 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 2.72 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 2.80: 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 2.72: STANDARDIZED PRECIPITATION INDEX, NOVEMBER 2020–OCTOBER 2022

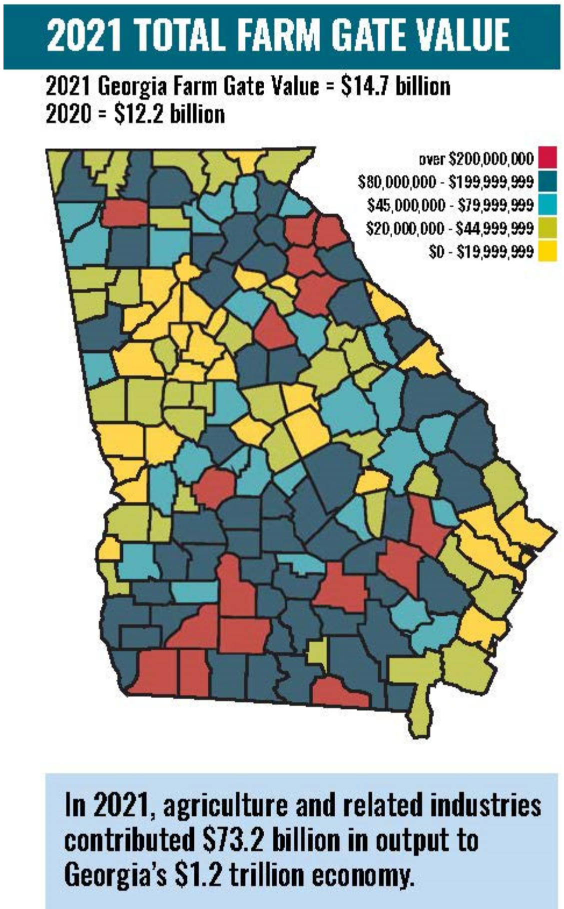


Physical Vulnerability

Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. As it relates to Drought, as defined in this plan, the with the exception of water systems, the built environment is not generally susceptible to damage from drought. The primary risks are to agriculture, water systems and human population. Notably, the risk to human population is connected to the risk to water systems. For the Drought hazard, the State analyzed the following resources:

- Agriculture
    - University of Georgia 2023 Ag Snapshot
- Public Water Systems
    - Environmental Protection Division permitted water systems
- Census
    - Total population per county

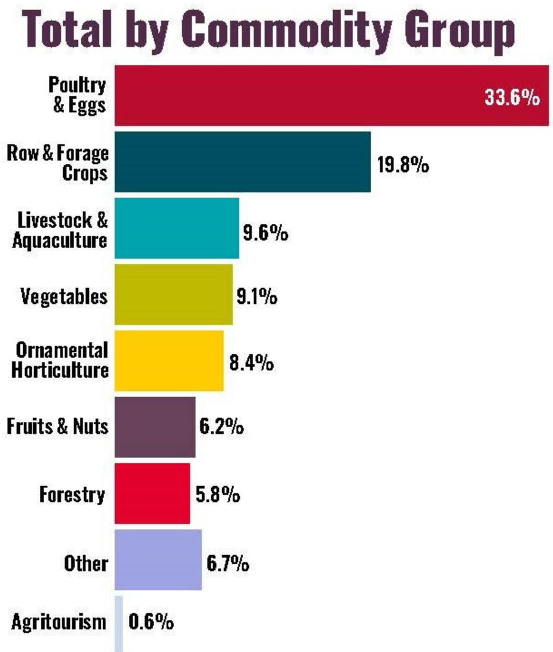
Figure 2.73 2021: GEORGIA FARMGATE VALUE BY COUNTY



Agriculture is a major driver for the State of Georgia's economy. Due to the nature of agriculture and its dependance on water resources, drought can have a significant, possibly devastating, impact on crops and livestock. Figures 2.73 and 2.74 show the estimated farmgate values for the State per county and per commodity.

Source: Ag Snapshots 2023; University of Georgia College of Agricultural and Environmental Sciences

Figure 2.74 2021: GEORGIA FARMGATE VALUE BY COMMODITY



Source: Ag Snapshots 2023; University of Georgia College of Agricultural and Environmental Sciences

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One asset that could be vulnerable to drought is water systems. As noted earlier, the risk to the human population is connected to the risk to the water infrastructure. If a community's water system fails, that limits the community's access to potable water. A water system is only functional as long as the water table, for those that access ground water, or surface water volume, for those that are supplied by surface water, is high or full enough for the water system to access it. Table 2.81 shows the top ten counties based on population served by community or facility water systems. Notably, this is provided as best available data and the population served is not indicative of a percentage of the county's census population. The population served by a water system and census populations for a county are based on different parameters. For example, some of the included water systems are designed to serve college campuses. The population served is based on the estimated population that would utilize the system, including dorm students as well as staff and students that commute to campus, regardless of whether they live in the community. The census would only attribute residential students to that location if they spent the majority of the previous year there and would not include commuter staff and students that don't live in the community.

TABLE 2.81: TOP TEN COUNTIES POPULATION SERVED BY WATER SYSTEMS

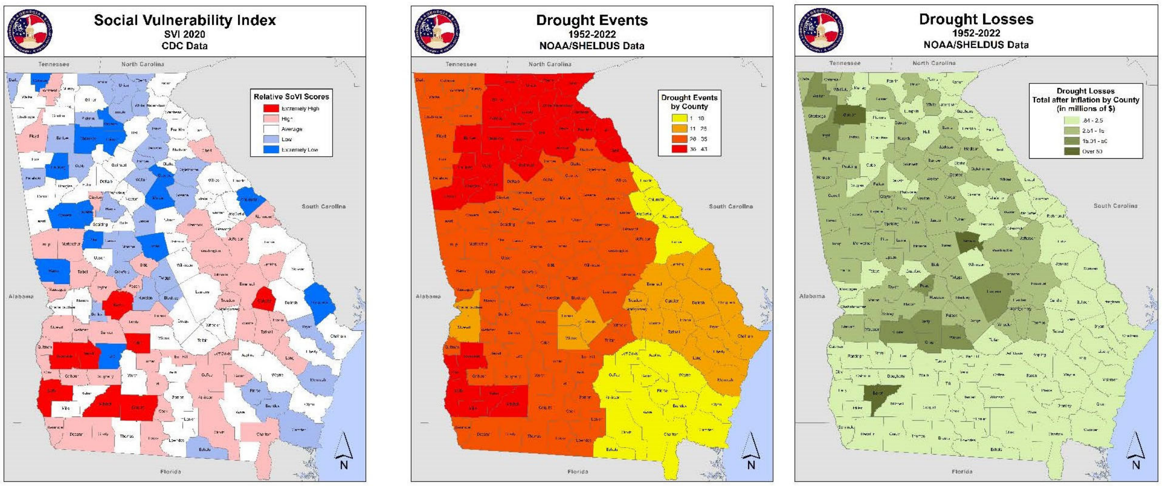
County Name	Population Served
Fulton	1636159
Gwinnett	837198
Cobb	832874
DeKalb	743000
Chatham	328091
Forsyth	292873
Clayton	270075
Henry	247909
Muscogee	229000
Cherokee	224803

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to Drought, specifically.

Figure 2.75 shows a comparison of the CDC Social Vulnerability Index to the Drought Events and Losses Maps. Comparing these three maps shows there does not appear to be a great deal of correlation between social vulnerability and drought events and losses. There are concentrations of events in Southwest Georgia, which largely scores high to extremely high on the CDC Social Vulnerability ranking. Conversely, with only a few exceptions, the majority of the drought losses appear to be in areas that received average to extremely low social vulnerability scores. Nevertheless, while the State was unable to locate usable records of water system failures to compare to social vulnerability rankings, it is recognized that a water system failure in a socially vulnerable area could have signficant impacts due to citizens' potentially reduced ability to access other sources of water for drinking and cleaning purposes.

FIGURE 2.75: SOCIAL VULNERABILITY COMPARISON TO DROUGHT EVENTS AND LOSSES

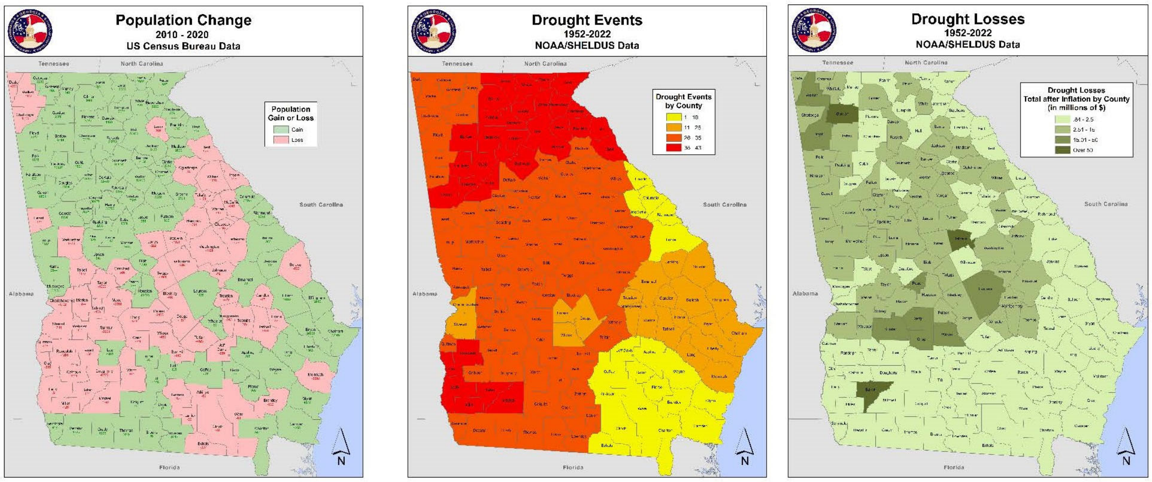


Impact from Changing Conditions

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Figure 2.76 shows a comparison of population change throughout the State to areas that tend to experience more drought events and losses. As with the social vulnerability comparison above, there does not appear to be a lot of correlation between the population change map and the events and losses maps. Nevertheless, as the population grows, this has the effect of putting more people at risk when a drought occurs. Increases in population puts more demand on the water system by putting more people in the area to be served. Conversely decreases in population means less people in the path of a drought in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. Theoretically, removing people from a water system reduces demand on the system, meaning the system has more capacity to serve the people that remain.

FIGURE 2.76: COMBINED DROUGHT EVENTS, LOSSES, AND POPULATION CHANGE BY COUNTY



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.

2.8.9 Wildfire

Priority	Rank
Medium	10

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 2.82 provides the National Interagency Fire Center figures for wildland fire and burn acreage totals from 2002 to 2021 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 18 acres. Based on this data, Georgia can expect to experience approximately 4,604 wildland fires in any given year.

TABLE 2.82: 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
2018	2,572	14,236
2019	3,158	12,407
2020	1,699	5,677
2021	2,139	11,108

Year	Fires	Acres
Total	**92,080**	**1,652,808**
Average	**4,604**	**82,640**

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 2.83 below. Notably, the majority of these declarations are for 2 major wildfire events (2007 and 2011 – See Table 2.83) 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 2.77 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 2.79 shows the Wildfire Risk map for Georgia.

TABLE 2.83: FIRE MANAGEMENT ASSISTANCE DECLARATIONS

Fire Management Assistance Declarations			
Number	**Date**	**Incident Description**	**Location**
2362	5/23/2001	Blounts Pasture Fire	McIntosh County
2685	4/17/2007	Sweat Farm Road Fire	Charlton and Ware Counties
2686	4/26/2007	Kneeknocker Swamp Fire	Brantley County
2688	5/5/2007	Roundabout Fire	Atkinson County
2693	5/9/2007	Bugaboo Scrub Fire	Charlton County
2697	5/31/2007	Harveytown Fire	Bryan County
2875	3/25/2011	Elan Church Road Fire	Long County
2876	3/25/2011	Mosley Road Fire	Coffee County
2920	6/15/2011	Racepond Fire	Brantly, Charlton and Ware Counties
2921	6/16/2011	Sweat Farm Again Fire	Ware County
5163	11/11/2016	Tatum Gulf Fire	Dade County
5181	5/8/2017	West Mims Fire	Charlton, Clinch and Ware Counties

The Fire Intensity Scale (Figure 2.80) 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. The Burn Probability data (Figure 2.81) 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 2.77 to show the likelihood of an area to burn. As Figures 2.80 and 2.81 show, areas such as Atlanta with its urban development, have less impact potential than the more forested areas in Northwest Georgia or Southeast Georgia.

<u>FIGURE 2.77: SOUTHERN WILDFIRE RISK ASSESSMENT MODEL</u>

Source: SWRA Final Report (2006).

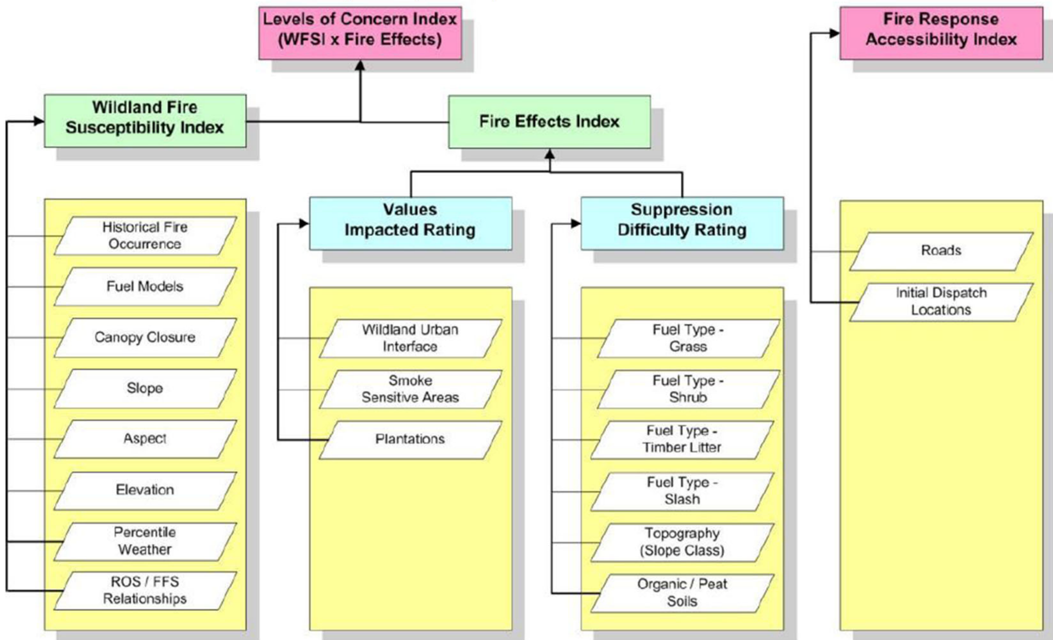


FIGURE 2.78: WILDFIRE IMPACT POTENTIAL

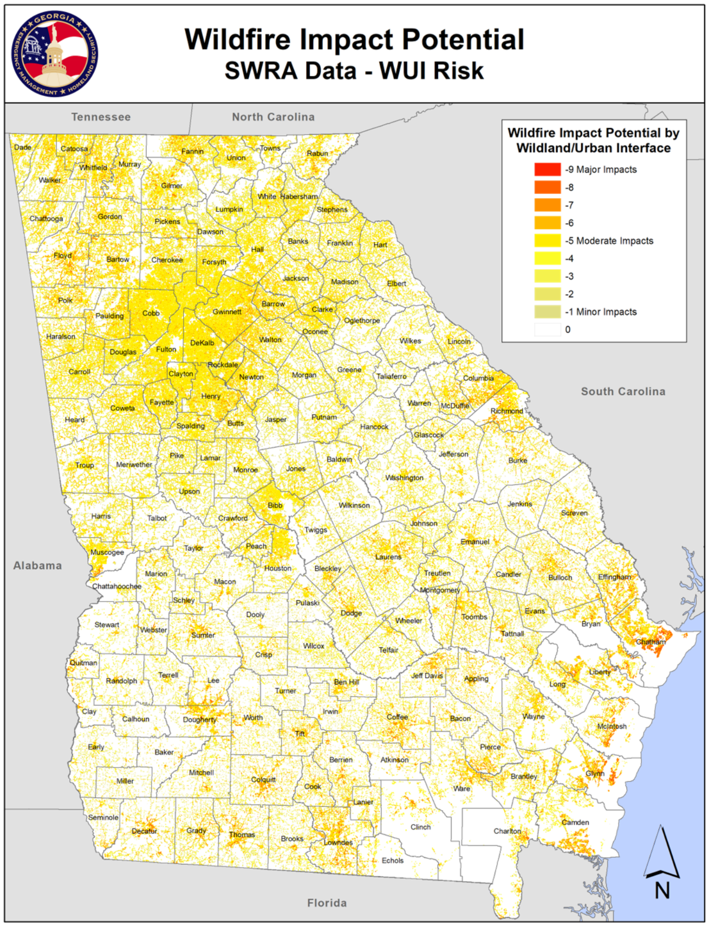


FIGURE 2.79: WILDFIRE RISK LEVEL

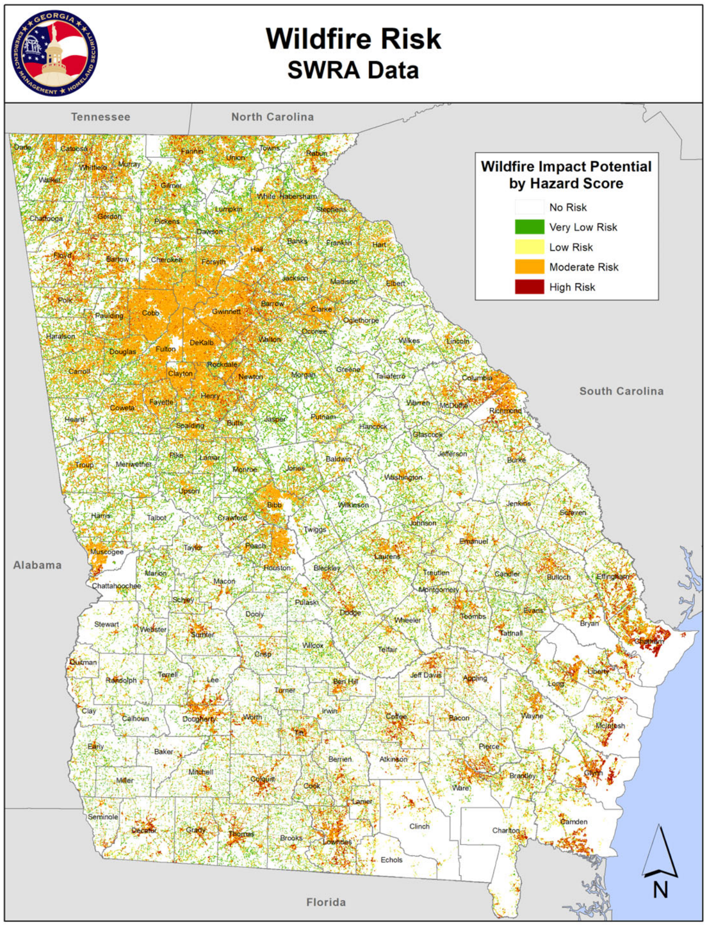


FIGURE 2.80: FIRE INTENSITY SCALE

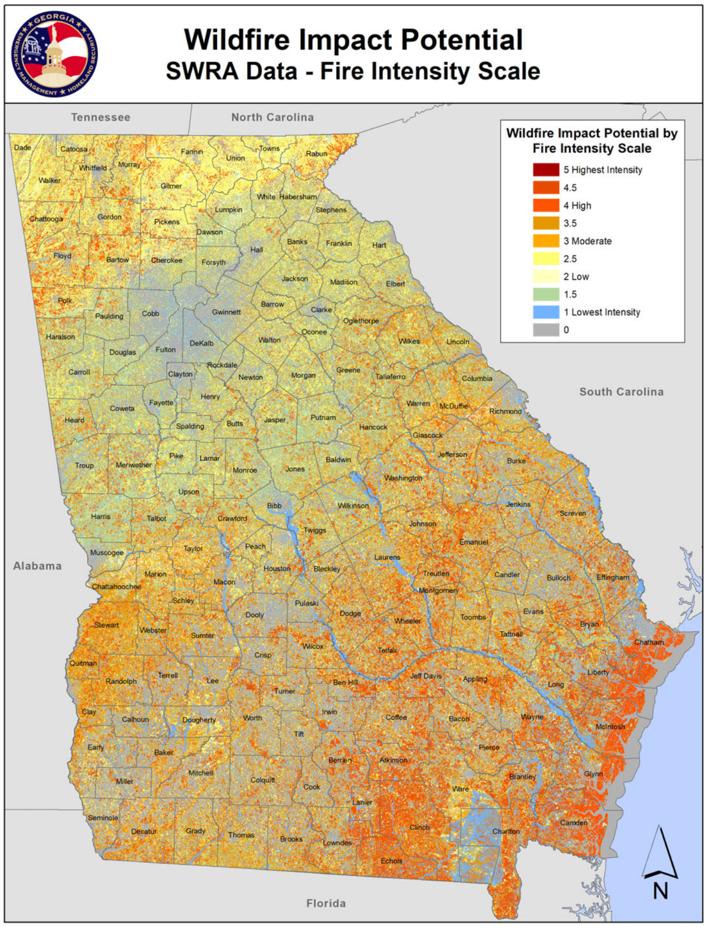
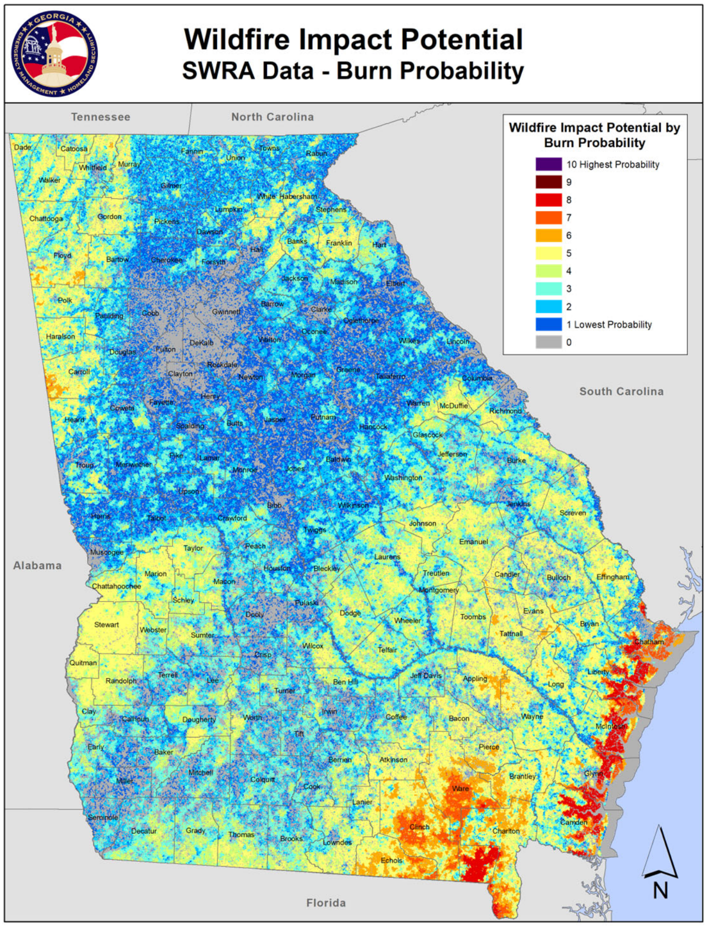


FIGURE 2.81: WILDFIRE BURN PROBABILITY



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 2.82: EXAMPLE OF WUI BOUNDARY (GFC)

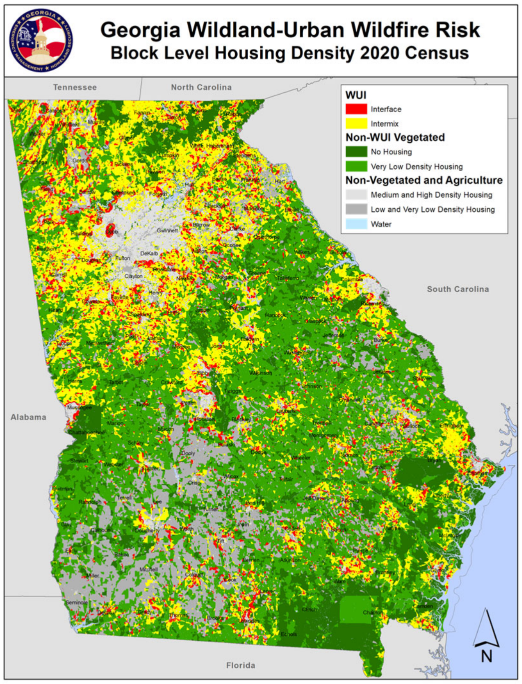


FIGURE 2.83: LOCATION OF WUI AREAS IN GEORGIA.

Figure 2.83 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 2.84 provides the size and percentage increase of WUI areas in the state.

TABLE 2.84: WILDLAND-URBAN INTERFACE AREAS IN GEORGIA, 1990–2020

	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%
2020	59,419.09	12,200.52	20.53%	3,232.96	5.44%	15,433.48	25.97%

Source: https://silvis.forest.wisc.edu/data/wui-change/.

Physical Vulnerability
Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Wildfire hazard, the State analyzed the following resources:

- Gorgia Mitigation Information System

- Critical Facility data defined and entered by each county as part of their local Hazard Mitigation Plan Update
- State facilities from the Building Land Lease Inventory of Properties (BLLIP)

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on anticipated wind speeds. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities to the Wind hazard. Table 2.85 below shows the top 10 counties based on the number of locally defined Critical Facilities located in areas considered to be at moderate to high risk of wildfires. Table 2.87 shows the top ten counties based on Stated owned, leased and other State assets located in areas considered to be at moderate to high risk of wildfires. The full reports are in Appendix D-V.

TABLE 2.85: TOP TEN COUNTIES NUMBER OF LOCAL CRITICAL FACILITIES MODERATE TO HIGH WILDFIRE RISK

County	Number of Critical Facilities	Value of Critical Facilities
Fulton County	1332	$7,445,328,223
Gwinnett County	666	$4,080,793,277
Clarke County	351	$780,013,508
DeKalb County	330	$1,529,998,490
Cobb County	313	$1,125,192,152
Glynn County	235	$845,267,332
Lowndes County	230	$703,802,856
Richmond County	228	$198,031,983
Forsyth County	227	$454,657,520
Carroll County	219	$358,414,025

Table 2.86 reflects the top ten counties based on the percentage of county population served by each essential facility. Notably, each of these counties are smaller, more rural counties. This shows that each facility serves, while not necessarily more people, but a higher percentage of the community's population that in larger counties. Therefore, the loss of any one of these facilities in the smaller communities could have a more significant impact on that community's ability to provide basic services to its citizens. The full report is in Appendix D-V.

TABLE 2.86: TOP TEN COUNTIES ESSENTIAL FACILITIES FROM HAZUS DATA BY PERCENT POPULATION SERVED

County	Totals	2020 Census Population	Population Served per Facility
Clay	7	2,848	14.29%
Schley	9	4,547	11.11%
Taliaferro	9	1,559	11.11%
Baker	10	2,876	10.00%
Candler	10	10,981	10.00%

County	Totals	2020 Census Population	Population Served per Facility
Echols	10	3,697	10.00%
Quitman	11	2,235	9.09%
Wheeler	12	7,471	8.33%
Treutlen	12	6,406	8.33%
Glascock	12	2,884	8.33%

Table 2.87 shows the top ten counties based on Stated owned, leased and other State assets exposed to moderate to high wildfire risk. Table 2.87a shows the top ten counties based on the values of exposed State owned, leased and other State assets.

TABLE 2.87: TOP TEN COUNTIES NUMBER OF STATE FACILITIES MODERATE TO HIGH WILDFIRE RISK

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Clarke	326	Hall	66	Chatham	84
Chatham	277	DeKalb	62	DeKalb	61
Tattnall	261	Walton	32	Clarke	41
DeKalb	178	Gwinnett	30	Glynn	40
Bibb	148	Lowndes	27	Dougherty	36
Richmond	145	Chatham	24	Gwinnett	34
Muscogee	140	Clarke	24	Tattnall	32
Baldwin	119	Fulton	23	Lowndes	29
Lowndes	112	Clayton	22	Cobb	24
Ware	107	Bibb	21	Tift	23

TABLE 2.87A: TOP TEN COUNTIES VALUE OF STATE FACILITIES EXPOSED TO MODERATE TO HIGH WILDFIRE RISK

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Chatham	$840,264,513	DeKalb	$30,941,875	Chatham	$142,789,932
Carroll	$240,491,949	Fulton	$25,209,477	DeKalb	$111,059,665
Baldwin	$159,204,069	Clayton	$12,000,799	Fulton	$18,279,348
Gwinnett	$104,231,614	Clarke	$8,629,213	Bulloch	$15,860,500
Fulton	$84,839,746	Bibb	$7,014,678	Clarke	$13,023,998

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Muscogee	$73,530,666	Gwinnett	$6,411,013	Tattnall	$8,056,450
Cobb	$63,184,395	Hall	$3,891,022	Gwinnett	$8,003,120
Dougherty	$62,304,171	Cobb	$3,591,513	Cobb	$7,304,654
Clarke	$49,104,752	Chatham	$3,357,095	Lowndes	$7,053,645
Peach	$46,864,324	Coweta	$3,248,205	Sumter	$6,937,400

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. Suffice to say, all community lifelines are at similar risk as the communities they are located in. However, the electrical grid does pose some specific risks to wildfire in a couple of ways.

First, high voltage power from the generating source, whether that be a plant, dam, solar farm, etc., is transferred from the plant using large, high voltage trunk lines, to the electric substations where it is transformed to lower voltage to be distributed throughout the community. Where possible, these trunk lines traverse rural, less developed areas, which based on Figures 2.80 and 2.81 above, are areas that are more susceptible to burning with higher intensity. Often, this power can be transmitted hundreds of miles from the generating source prior to being transformed for local distribution using these trunk lines. For example, a solar farm in Lee County in Southwest Ga was recently constructed to supply power to Walton EMC, approximately 150 miles away "as the crow flies" near Metropolitan Atlanta. A wildfire anywhere between those two locations could negatively impact Walton EMC's ability to supply power to its customers.

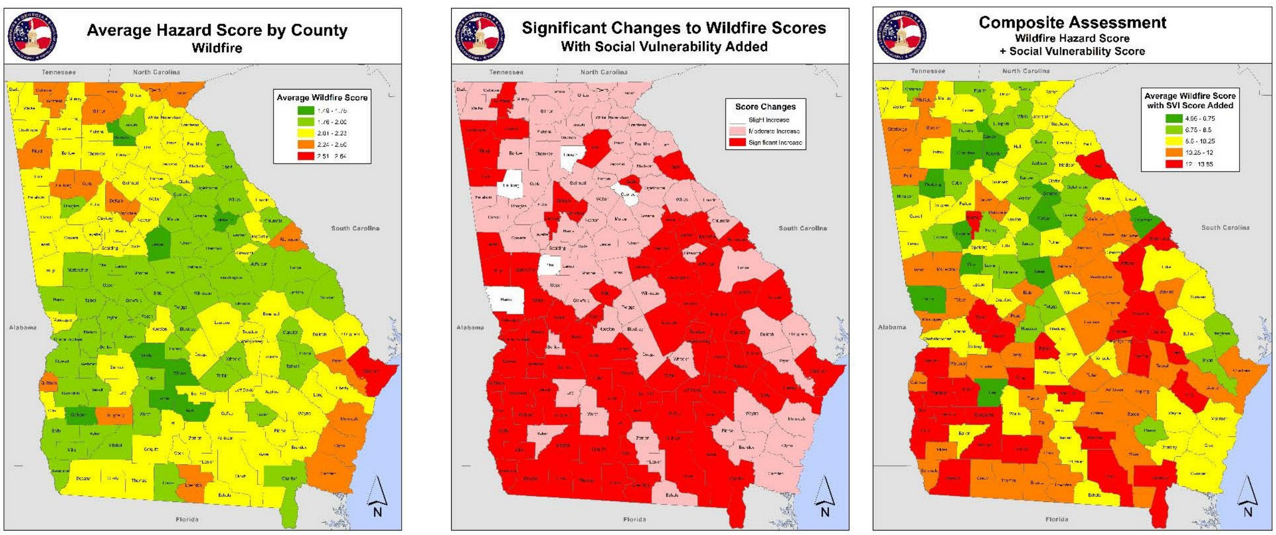
Second, according to the Solar Energy Industries association, the State of Georgia has 11,541 solar installations (includes residential, commercial, community and utility installation types) supplying nearly 6% of the state's power. This includes with multiple "solar farms" throughout the State. Large solar farms can have a particular vulnerability to fire due to access for fighting fires on location. If a fire were to breakout at one of these locations, it could negatively impact the state's ability to meet power demands, especially during peak seasons. Managers of these sites must take preventative steps, including undergrowth management, to reduce the risk of fires at these locations.

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to wildfire, specifically.

Figure 2.84 is three maps showing the effect of combining the CDC SoVI score with the Wildfire hazard score from the GMIS system. The average hazard wind score (the map on the left) shows the average wildfire hazard scores for each county based on the hazard scores from the GMIS system, which are defined in Table 2.16 in Section 2.6. The map in the middle shows the effect adding the CDC Social Vulnerability scores to the GMIS Wildfire Hazard Scores with the map on the far right showing the results. It is notable that, while both the Geographic score map on the left and the composite score map on the right had their most vulnerable counties scattered throughout the state. However, many of the more vulnerable counties based strictly on geography became some of the least vulnerable counties once social vulnerability is added to the score. Conversely, many of the less vulnerable counties, especially in Southwest and East Central Georgia, became some of the most vulnerable areas.

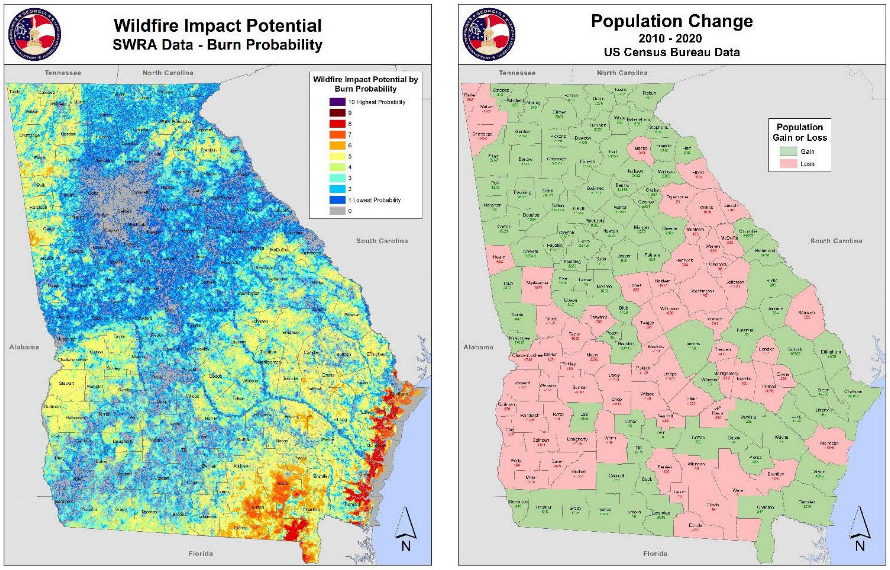
FIGURE 2.84: SOCIAL VULNERABILITY COMPARISON TO WILDFIRE HAZARD AREAS



Impact from Changing Conditions
For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Figure 2.85 shows a comparison of population change throughout the State to areas subject to potential burning. As the population grows, and requisite development occurs, this has the effect of putting more people and structures in the path of high wind events, thereby increasing the area's risk of impacts when fires do occur. Conversely decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, but it does remove people considered to be less vulnerable, due in part to their perceived ability to recover, from the equation, thereby increasing the community's overall social vulnerability statistically. Nevertheless, and particularly notably, the population change pattern reflects an overall population migration away from areas more susceptible to burning, thereby reducing the percentage of the population at risk.

FIGURE 2.85: COMBINED WILDFIRE IMPACT POTENTIAL AND POPULATION CHANGE BY COUNTY



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.

2.8.10 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 2.88). 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 2.89 explains the Modified Mercalli Scale of Intensity. Figure 2.85 shows an example of historical earthquake intensity from the 1886 Charleston, South Carolina earthquake.

TABLE 2.88: 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 2.89: 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 2.86: MERCALLI EARTHQUAKE INTENSITY FROM 1886 CHARLESTON, SC EARTHQUAKE

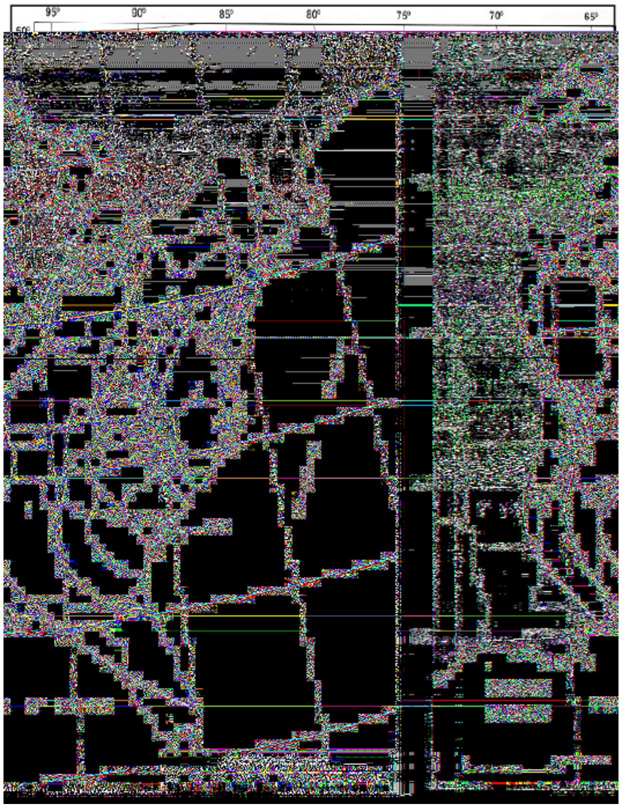
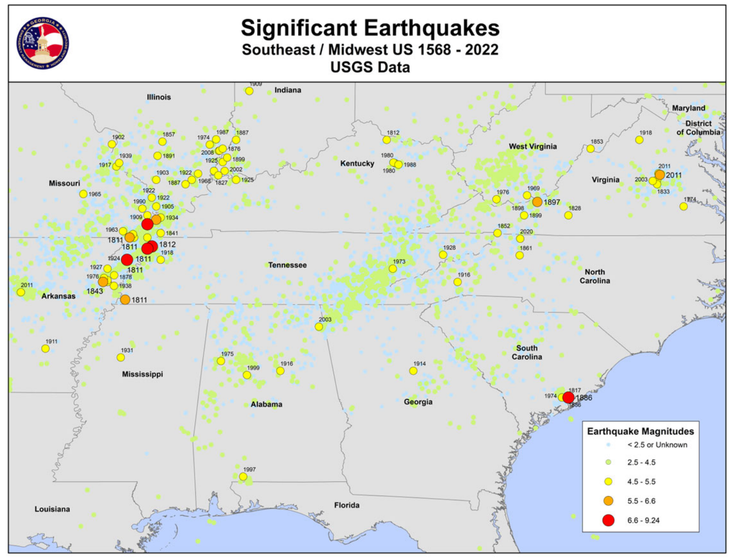


FIGURE 2.87: SIGNIFICANT EARTHQUAKES IN THE U.S. SOUTHEAST AND MIDWEST, 1568–2022



Source: USGS.

While SHELDUS/NCEI reports no earthquake events between 1952 and 2022, 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 2.90 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 2.87 maps notable earthquakes from 1568 through 2022 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.

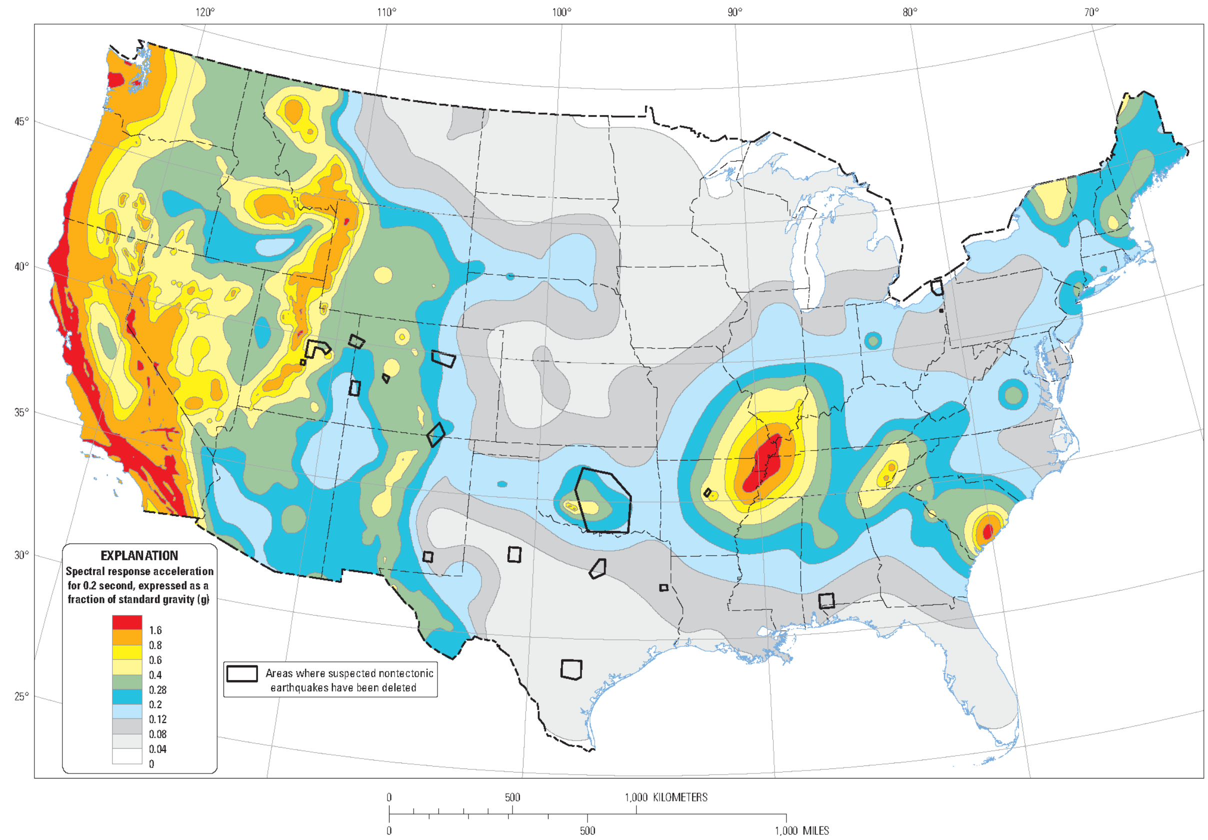
TABLE 2.90: NOTABLE EARTHQUAKE EVENTS AFFECTING GEORGIA

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 2.88 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.

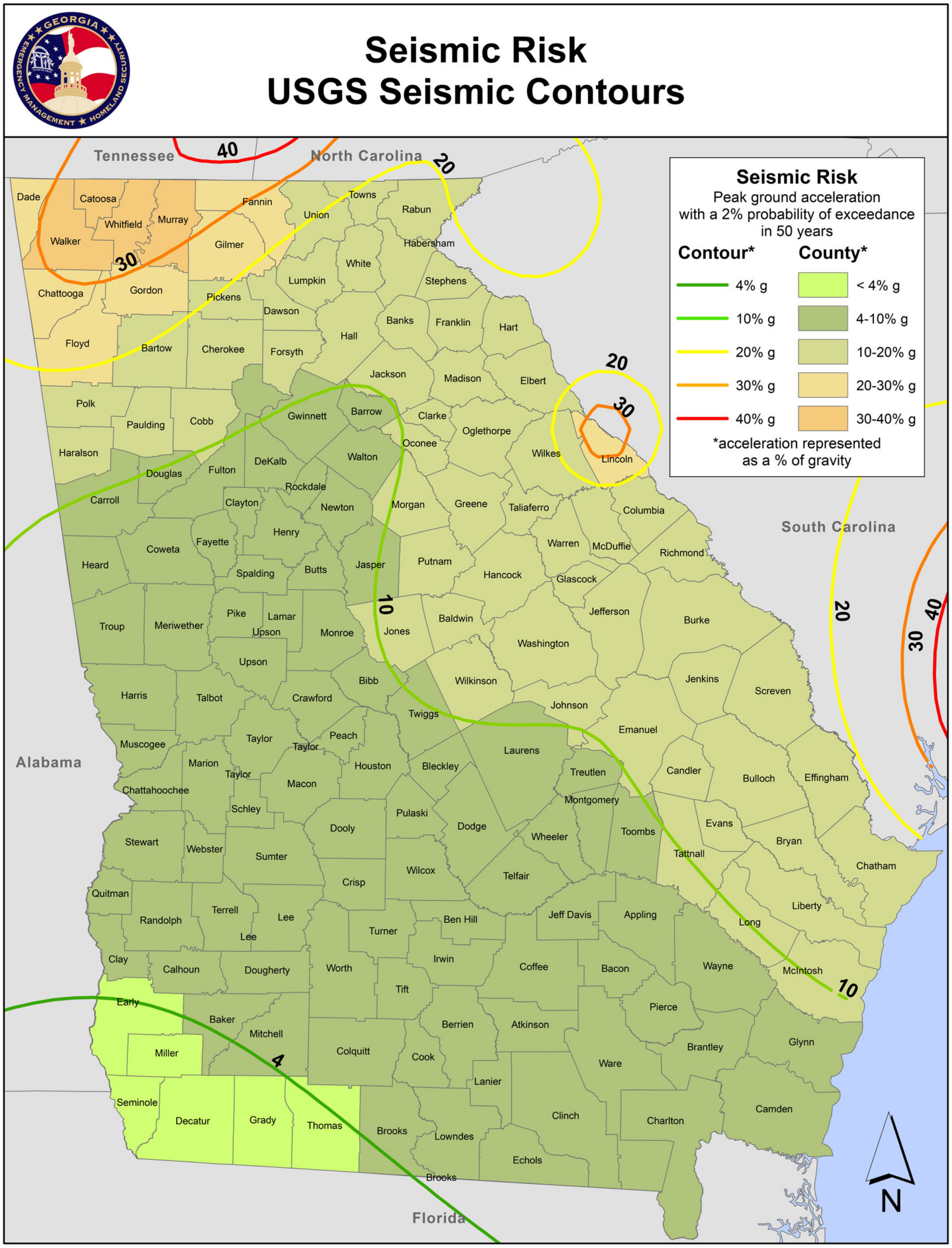
The Georgia-specific earthquake hazard risk map, Figure 2.89, uses the data from the previous figure. This map, like Figure 2.88, presents the 0.2 second spectral acceleration as a percentage of gravity. In other words, the seismic contour lines delineate areas of higher risk of exceeding a certain intensity 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 2.88: 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 2.89: GEORGIA SEISMIC RISK



Physical Vulnerability
Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Earthquake hazard, the State analyzed the following resources:

- Georgia Mitigation Information System
    - State facilities from the Building Land Lease Inventory of Properties (BLLIP)

The State rarely experiences earthquakes causing damage to structures. Significant impacts are not expected. Nevertheless, the State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on earthquake risk. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities to the Earthquake hazard. Table 2.91 below shows the top 10 counties based on the number of locally defined Critical Facilities at risk of 33%-83% peak gravity acceleration from earthquakes. Table 2.92 shows the top ten counties based on Stated owned, leased and other State assets at risk of 33%-83% peak gravity acceleration from earthquakes. Table 2.92a shows the top ten counties based on the values of exposed State owned, leased and other State assets. The full reports for both tables are in Appendix D-V.

TABLE 2.91: TOP TEN COUNTIES NUMBER OF LOCAL CRITICAL FACILITIES AT RISK OF 33%-83% PEAK ACCELERATION FROM EARTHQUAKES

County	Number of Critical Facilities	Value of Critical Facilities
Bartow County	418	$2,242,584,456
Floyd County	268	$2,949,533,655
Columbia County	231	$1,301,623,851
Chatham County	206	$3,240,646,870
Whitfield County	203	$479,137,871
Richmond County	186	$317,421,735
Stephens County	177	$241,312,111
Polk County	158	$650,328,517
Elbert County	137	$561,175,786
Cherokee County	102	$568,805,838

TABLE 2.92: TOP TEN COUNTIES NUMBER OF STATE FACILITIES AT RISK OF 33%-83% PEAK ACCELERATION FROM EARTHQUAKES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Chatham	460	Chatham	33	Chatham	734
Bartow	362	Bartow	30	Richmond	75
Richmond	165	Floyd	17	Elbert	69
Elbert	150	Richmond	17	Rabun	38
Floyd	133	Whitfield	11	Screven	26

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Union	120	Walker	10	Murray	24
Murray	104	Effingham	9	Chattooga	22
Chattooga	98	Stephens	7	Floyd	22
Rabun	97	Polk	7	Hart	20
Franklin	92	Elbert	7	Franklin	16

TABLE 2.92A: TOP TEN COUNTIES VALUE OF STATE FACILITIES AT RISK OF 33%-83% PEAK ACCELERATION FROM EARTHQUAKES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Chatham	$1,206,274,999	Chatham	$9,543,757	Chatham	$1,412,079,500
Richmond	$495,321,683	Richmond	$6,316,306	Richmond	$14,818,067
Whitfield	$209,528,978	Bartow	$4,112,854	Murray	$8,401,789
Floyd	$199,884,494	Floyd	$2,887,152	Chattooga	$3,870,515
Lumpkin	$168,139,722	Whitfield	$2,852,407	Floyd	$2,999,680
Bartow	$122,094,847	Walker	$1,393,926	Whitfield	$2,845,931
Habersham	$86,714,294	Gordon	$976,124	Bartow	$2,347,352
Walker	$83,937,808	Polk	$917,860	Elbert	$1,526,602
Elbert	$48,875,831	Gilmer	$893,449	Walker	$1,466,941
Chattooga	$46,449,257	Columbia	$770,090	Screven	$1,443,580

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

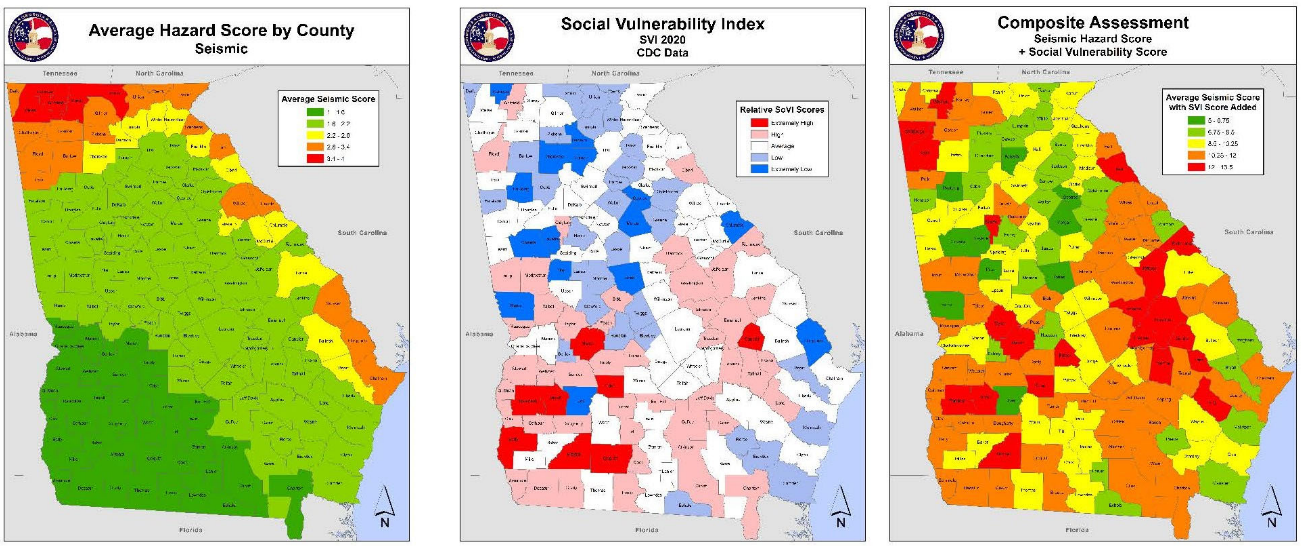
Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. While there was one magnitude 4.9 earthquake in 2003 that caused some power outages, and while that is certainly possible going forward, as noted above, the vast majority of earthquakes in Georgia have been much smaller, causing little to no impacts, often even going unnoticed other than instrument readings and maybe some rumbling heard by people nearby. Significant impacts to any of the State's infrastructure, community lifelines or other facilities or structures are not expected in the foreseeable future.

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to Earthquake, specifically.

Figure 2.90 shows a comparison of the CDC Social Vulnerability Index to the Seismic geographic Hazard Score map and the effects of SVI on the hazard scores. Comparing these three maps shows many of the counties that are at higher risk of experiencing an earthquake are also counties that are considered to be average to low in social vulnerability. As noted above, significant impacts from an earthquake are not likely. However, should a major earthquake strike the state, it would likely be in the areas highlighted in average hazard score map on the left below. As seen in the comparison between the maps, these areas are largely not considered to be socially vulnerable. Therefore, impacts to the socially vulnerable communities from earthquake should be minimal.

<u>FIGURE 2.90: SOCIAL VULNERABILITY COMPARISON TO ASCE AVERAGE SEISMIC HAZARD SCORE</u>

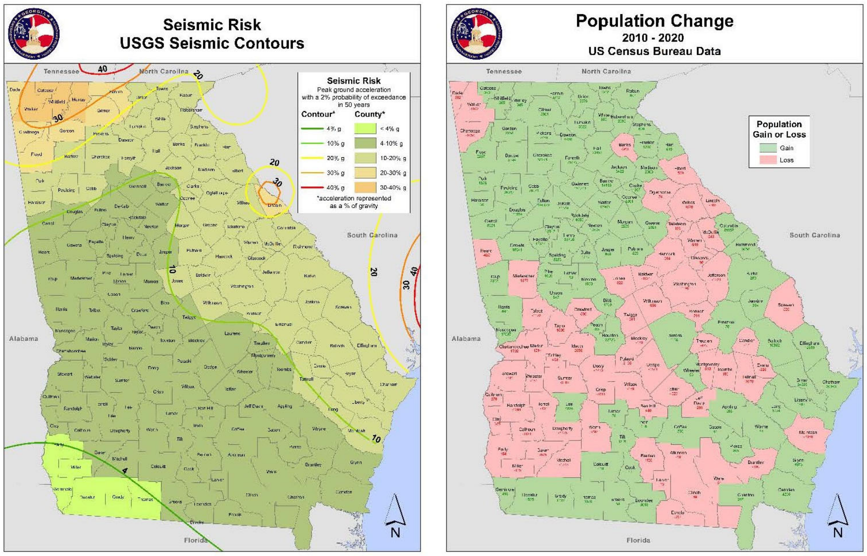


<u>Impact from Changing Conditions</u>

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Figure 2.91 shows a comparison of population change throughout the State to areas subject to earthquake hazard risks. Of particular note are the counties at higher risk of earthquakes are ones that are gaining population. Generally speaking, while the impacts are still expected to be minimal, this does have the effect of putting more people at risk of at least experiencing what is likely to be a small, minor earthquake. With a few exceptions, the areas that have lost population are areas that either have not experienced any earthquakes, or they have been very minor to almost unnoticeable.

FIGURE 2.91: COMBINED EARTHQUAKE HAZARD SCORE AND POPULATION CHANGE BY COUNTY



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.

2.8.11 Geologic Hazards

<u>Associated Hazards:</u>

Sinkholes, landslides, debris flow, mudslides, flooding, tropical cyclones, wildfire

Priority	Rank
Low	13

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

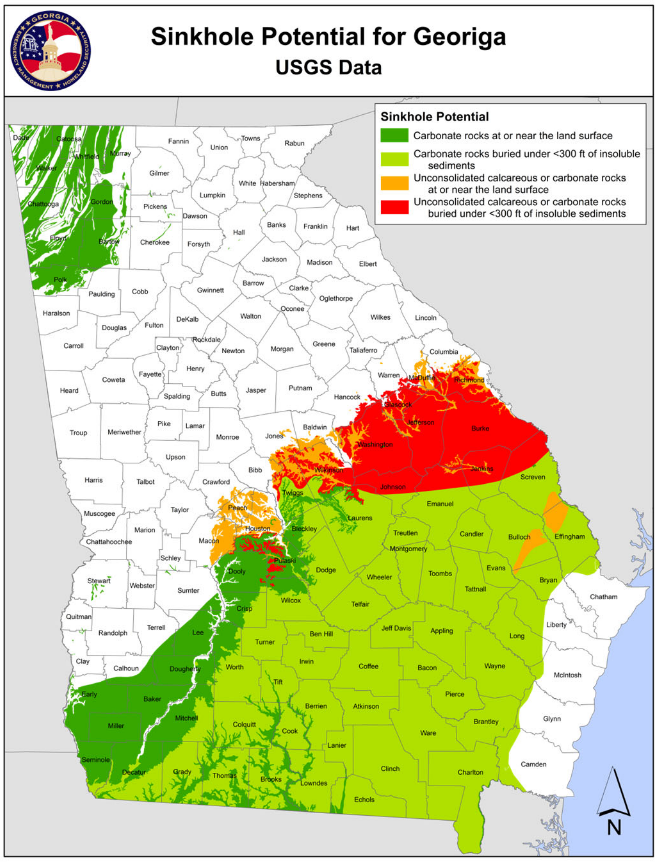
Sinkhole

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 2.92. In terms of spatial extent, sinkholes can affect areas from less than one meter to several hundred meters in diameter and depth.

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 2.92.

FIGURE 2.92: GEOLOGY ASSOCIATED WITH SINKHOLE POTENTIAL IN GEORGIA.



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

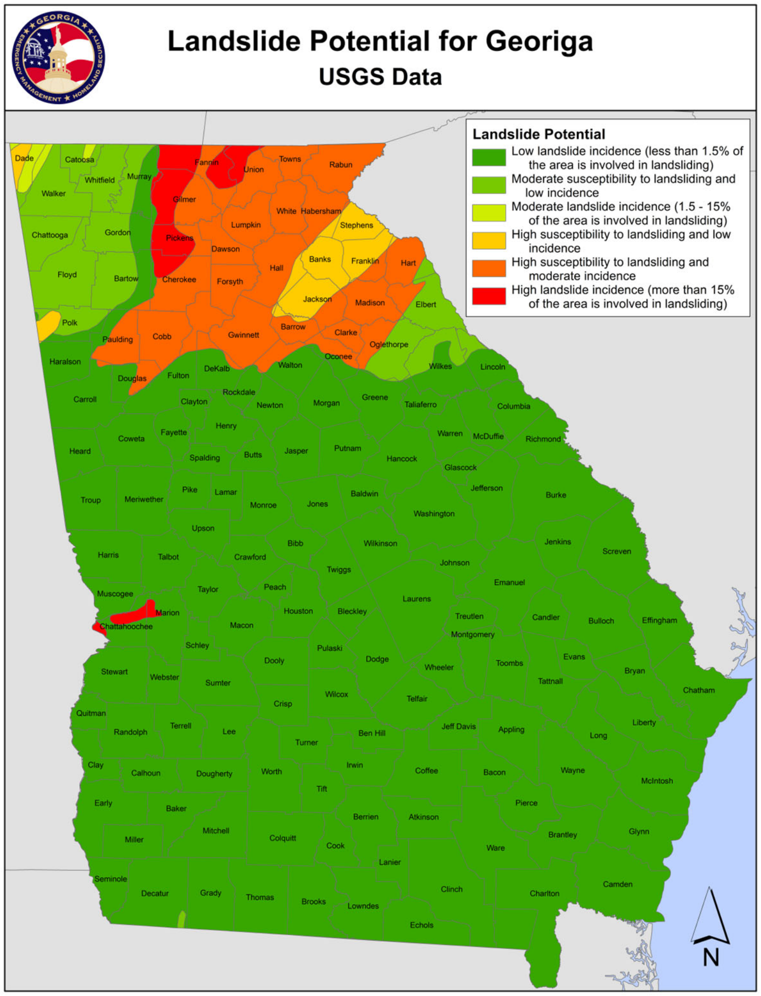
A comprehensive historical record is difficult to compile because many landslide and debris flow events are minor, do not cause significant damage, or go unreported. For 1952 to 2017, SHELDUS/NCEI lists only three events, two of which occurred in Rabun County. In 2004 a landslide was triggered in Rabun 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 2.93. 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 2.93: LANDSLIDE POTENTIAL FOR GEORGIA



Physical Vulnerability
Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. While the State does not have the ability to analyze physical vulnerability to sinkholes, specifically, the State is able to, on a limited basis, discuss physical vulnerability to landslides. For the Geologic hazards, the State analyzed the following resources:

- Georgia Mitigation Information System
  - Critical Facility data defined and entered by each county as part of their local Hazard Mitigation Plan Update
  - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Road Mileage
  - Number of miles of Roads vulnerable to damage during landslide events.

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on each facility's location within the Landslide hazard area. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities to the Landslide hazard. Table 2.93 below shows the top ten counties' number of locally defined Critical Facilities located within the Landslide Hazard Area within the GMIS system. Table 2.94 shows the top ten counties' number of Stated owned and or operated assets located within the same Landslide Hazard area. Table 2.94a shows the top ten counties based on the values of exposed State owned, leased and other State assets. Notably, the data layer used is only useful for a "broad-brush" analysis and does not account for specific building locations that may be more or less vulnerable to landslides than others, such as on hillsides, in valleys, on top of mountains, etc. The full reports for Tables 2.93, 2.94, and 2.94a are in Appendix D-V.

TABLE 2.93: TOP TEN COUNTIES NUMBER OF LOCAL CRITICAL FACILITIES POTENTIALLY EXPOSED TO LANDSLIDES

County	Number of Critical Facilities	Value of Critical Facilities
Gwinnett County	863	$6,595,754,378
Clarke County	686	$2,311,724,420
Fulton County	582	$4,804,664,189
Cobb County	459	$1,499,792,492
Forsyth County	371	$2,454,540,403
Bartow County	300	$2,149,649,396
Floyd County	268	$2,949,533,655
Cherokee County	206	$1,455,091,548
Whitfield County	203	$479,137,871
Hall County	201	$1,272,644,247

TABLE 2.94: TOP TEN COUNTIES NUMBER OF STATE FACILITIES POTENTIALLY EXPOSED TO LANDSLIDES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Clarke	701	Hall	71	Clarke	92
White	193	Gwinnett	38	Elbert	69
Franklin	175	Clarke	35	Hall	49
Barrow	174	Cobb	28	Barrow	45
Elbert	150	Bartow	26	Rabun	39
Hall	136	Floyd	17	Gwinnett	37
Floyd	133	DeKalb	14	Cobb	31
Cobb	129	Whitfield	11	Habersham	24
Habersham	126	Walker	10	Chattooga	22
DeKalb	123	Lumpkin	10	Floyd	22

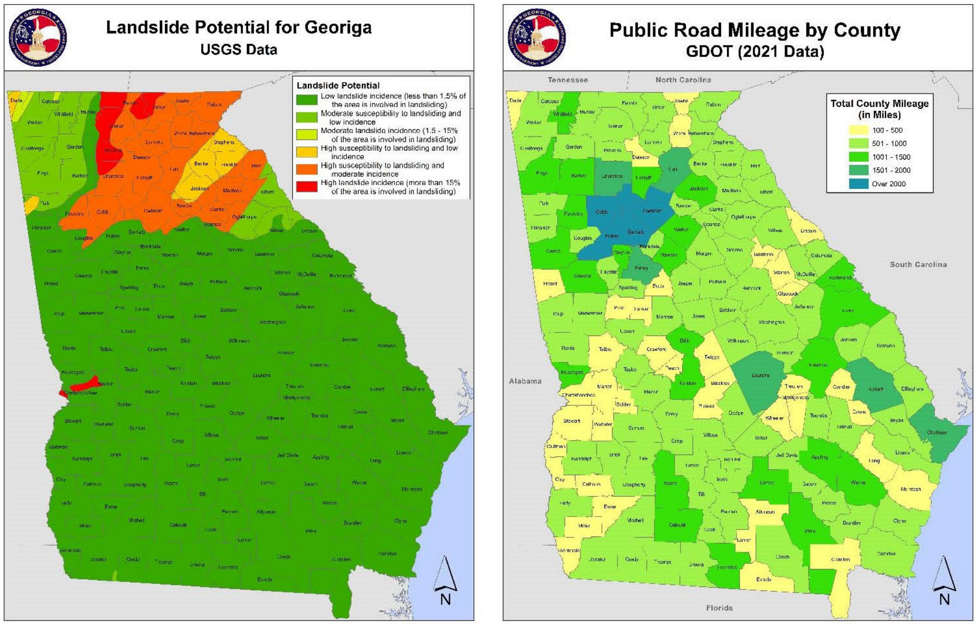
TABLE 2.94A: TOP TEN COUNTIES VALUE OF STATE FACILITIES POTENTIALLY EXPOSED TO LANDSLIDES

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
DeKalb	$36,235,000	Cobb	$44,311,572	DeKalb	$36,235,000
Clarke	$35,968,452	Gwinnett	$27,275,855	Clarke	$35,968,452
Hall	$18,857,223	Clarke	$10,679,491	Hall	$18,857,223
Fulton	$13,016,332	Bartow	$4,112,854	Fulton	$13,016,332
Cobb	$10,918,982	Fulton	$3,199,467	Cobb	$10,918,982
Gwinnett	$9,206,014	Floyd	$2,887,152	Gwinnett	$9,206,014
Douglas	$6,596,725	Whitfield	$2,852,407	Douglas	$6,596,725
Habersham	$4,604,991	Hall	$2,498,622	Habersham	$4,604,991
Barrow	$4,033,192	Forsyth	$2,387,354	Barrow	$4,033,192
Chattooga	$3,870,515	Cobb	$44,311,572	Chattooga	$3,870,515

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One particularly vulnerable lifeline in times of landslide is transportation infrastructure – specifically roads along hillsides that can, and usually do, get blocked, if not significantly damaged. While the State is currently unable to identify which roads are located in particularly vulnerable areas Figure 2.94 below shows a comparison of the USGS Landslide Hazard area and total road miles per county. Notably, Cobb, Northern Fulton and Gwinnett Counties are included in areas of high susceptibility to landslides. Unsurprisingly, given these counties are part of Metropolitan Atlanta, these counties are in the group with the highest amounts of public road mileage.   Conversely, the areas of highest susceptibility and likelihood of landslides have some of the lowest public road mileage. In urban areas, while there may be more roads susceptible to damage from landslides, these areas also often have more options, or available routes, for citizens to get where they need to go. In the more rural areas, this often not the case. While there may be fewer roads that could be damaged, many times these roads are either the only way, or one of few ways for people to get where they are going. If one way is blocked, if there is an alternate route, it can be a significantly longer route.

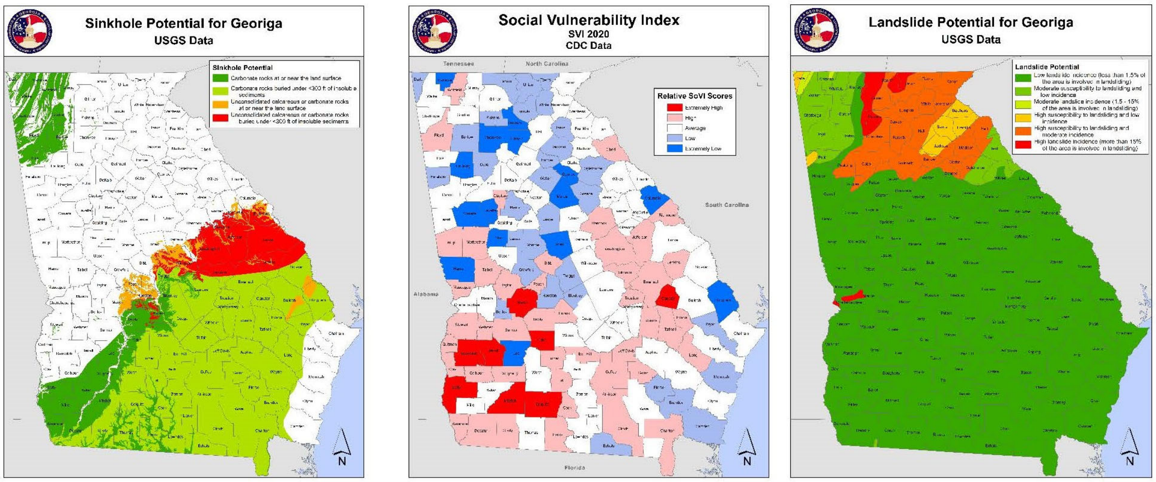
FIGURE 2.94: COMBINED LANDSLIDE POTENTIAL AND PUBLIC ROAD MILEAGE PER COUNTY



Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to geologic hazards, specifically. Figure 2.95 shows comparisons of the CDC SVI to both the landslide and sinkhole hazards. There's a notable difference between the two "sub-hazards" and their relation to areas that are considered socially vulnerable and those that are not. The areas more susceptible to sinkholes are also, largely, more socially vulnerable. That said, aside from the noted impacts around Dougherty County from the sinkholes caused by the 1994 flood, the State doesn't have a significant historic record of damages or impacts from sinkholes. Often, they are located in currently rural, undeveloped areas. The State does, however, have some limited history of damages from landslides. Contrary to sinkholes, the landslide hazard area is largely located in areas not considered to be significantly socially vulnerable.

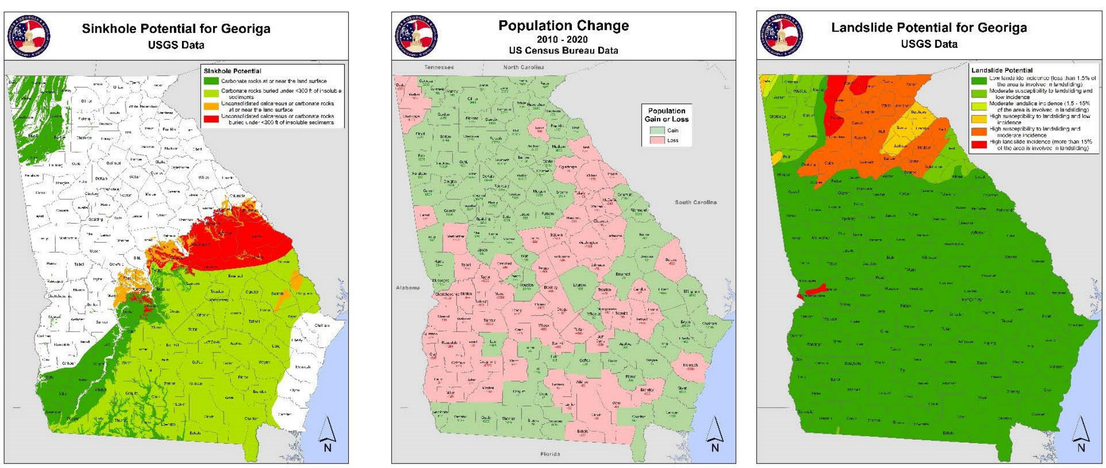
FIGURE 2.95: SOCIAL VULNERABILITY AND GEOLOGIC HAZARDS



Impact from Changing Conditions

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

FIGURE 2.96: COMBINED GEOLOGICAL HAZARDS AND POPULATION CHANGE



Generally speaking, the State of Georgia has experienced overall population growth. As can be seen in Figure 2.96, various areas have experienced population growth, while others have experienced population reduction. There's a notable difference between the two "sub-hazards" and their relation to areas that are that are growing in population and areas that are shrinking. Many of the areas susceptible to sinkholes are also, losing population. As noted earlier the State doesn't have a significant historic record of damages or impacts from sinkholes. Nevertheless, reduction in population removes people from the at risk areas. The State does, however, have some limited history of damages from landslides. Contrary to sinkholes, the landslide hazard area is largely located in areas that are increasing in population, placing more people at potential risk to landslides.

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.

2.8.12 Dam Failure

Associated Hazards:	Priority	Rank
Flooding, technological (man-made) hazards	Medium	8

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 2.95 lists the dam categories and potential impact of dam failure.

TABLE 2.95: 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 2.97 and 2.98, only show one event from 1952 to 2022.

FIGURE 2.97: DAM FAILURE EVENTS IN GEORGIA, 1952–2022

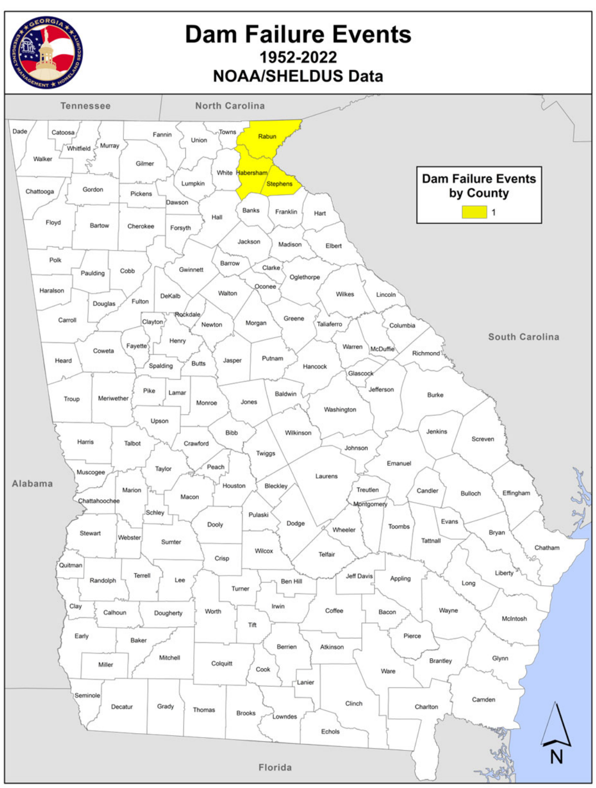


FIGURE 2.98: DAM FAILURE LOSSES IN GEORGIA, 1952–2022

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 2.96: DAM FAILURE NOTABLE EVENTS

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

*Presidential declared disaster.

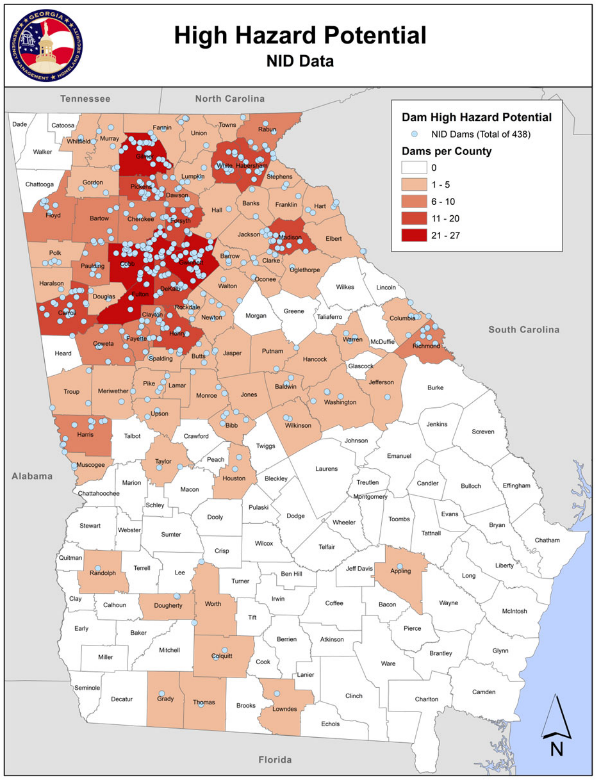
From 1992 to 2022, SHELDUS/NCEI reports a total of 3 events, including the Kelly Barnes event described above. This equates to a statistical 4% chance the State could experience a dam failure event in any given year. Notably, this does not account for failures that did not cause damages or injuries or did not contribute significantly to overall flooding in the vicinity.

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.

The national Inventory of Dams (NID) classifies potential hazard of each dam as High, Significant, Low or Undetermined. The NID documents 5,455 total dams in Georgia. 543 of these dams are classified as High potential hazard. Figure 2.99 shows the location of all NID High Hazard dams within the State. The full list is provided in Appendix D-VI.

FIGURE 2.99: NID HIGH HAZARD DAMS AS OF APRIL 2023



Emergency Action Plans (EAPs) are developed by individual dam owners. EAPs include various risk assessment data, such as population at-risk, at-risk structures and infrastructure, inundation zone mapping, downstream property owner notification information, etc. While specific assumptions, scenarios and other details are determined between the dam owner and engineer developing the EAP, typically EAPs are developed based on the following:

- The risk assessments are often based on “blue sky” failure scenarios which don’t include additional factors such as upstream flooding overwhelming the dam, nearby rainfall or downstream or flooded tributaries contributing additional water downstream, etc.
- Generally, the assessments are based on the impoundment being full and spillways are not operational.
- Typically, the assessments are developed using HEC-RAS, but a variety of engineering tools and modeling software can be used.

While the State houses individual EAPs for most of these dams, they are only available for access on an individual request basis after being redacted of personal information if necessary. The EAPs are available to local Emergency Management Agencies and other agencies with relevant emergency management and/or response responsibilities. Also, due to limited resources and the large number of individual EAPs, the State does not compile this information into a readily accessible format for analysis unless the dam is eligible for funding through the High Hazard Potential Dam (HHPD) program. Action Step 80 in Chapter 3 notes the State’s desire to compile this information for the purposes of assessment as time and resources become available. Eligibility requirements for the HHPD program are listed below Table 2.97.

Georgia DNR Safe Dams classifies dams as either Category I or II. The definitions of these dams are different from the NDSP definitions and are shown below.

> **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 2.100 shows the location of all Category I and Category II dams in the state. Figure 2.101 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 2.100: CLASSIFICATION OF DAMS IN GEORGIA.

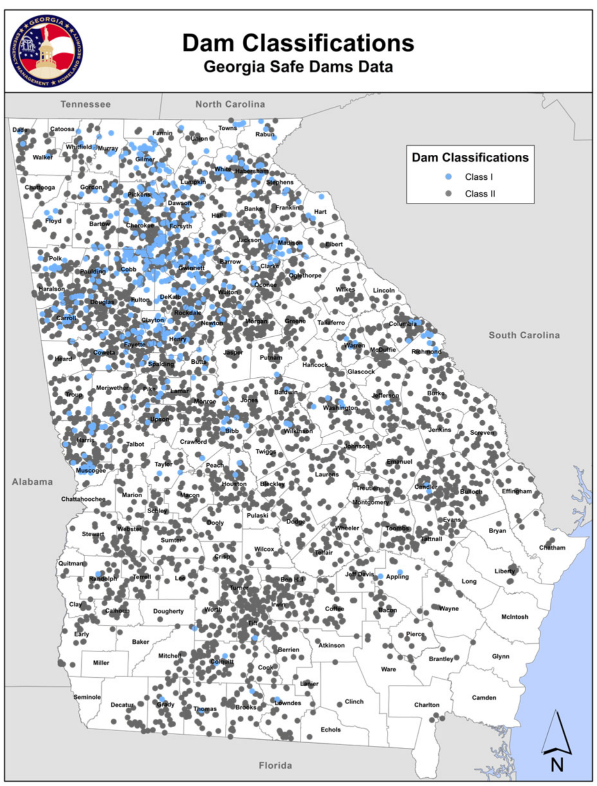
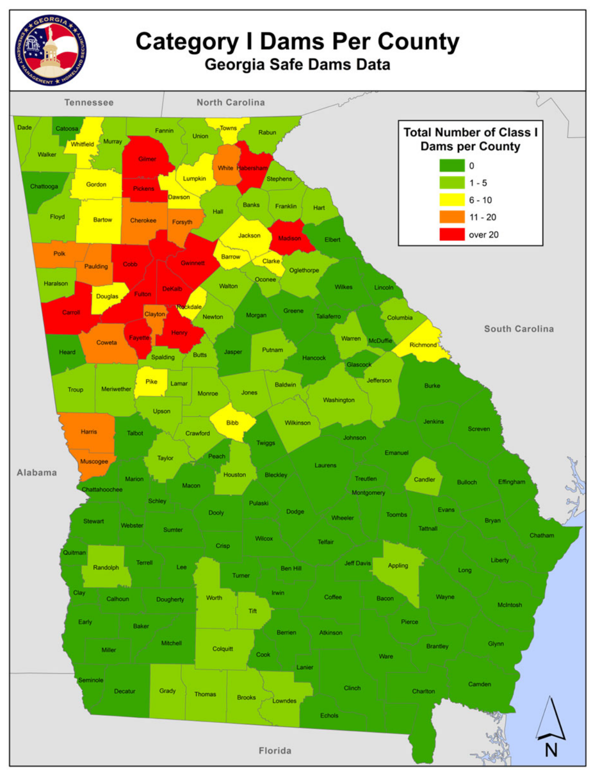


FIGURE 2.101: CATEGORY 1 DAMS PER COUNTY IN GEORGIA.



The dams presented in Figures 2.102 and 2.103 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 2.101, 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 2.102, 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 2.101. 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 2.102: IMPACT POTENTIAL FOR DAMS IN GEORGIA

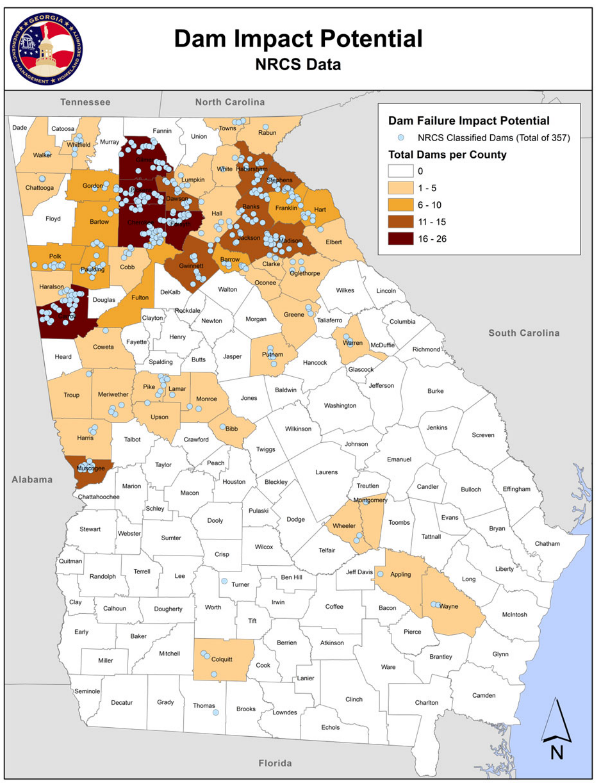
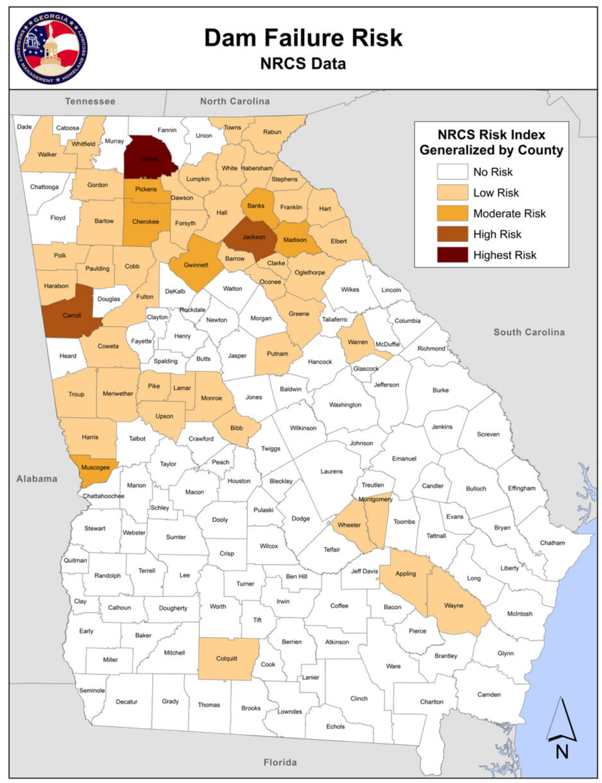


FIGURE 2.103: FAILURE RISK FOR DAMS IN GEORGIA.



Georgia Safe Dams manages the State's High Hazard Potential Dams program. Safe Dams provided information on eligible High Hazard Potential Dams, shown below in Table 2.97. A more detailed table is provided in Appendix D-VI. A full list of all High Hazard Dams from the National Inventory of Dams is also provided in Appendix D-VI. Notably, as of the writing of this plan, the State does not have Population at Risk and downstream structures at risk compiled for all of these sites. The information is provided in individual EAPs, but it would take a significant amount of time and resources to compile it for all high hazard dams.

TABLE 2.97: LIST OF ELIGIBLE HIGH HAZARD POTENTIAL DAMS

County	Dam Name	Population At Risk (PAR)*	Comments
Bibb	Lake Wildwood Dam	379	73 homes, 20 businesses (including a school and an apartment building)
Bibb	Lakeside Dam	N/A	N/A
Carroll	Lake Ashley Dam	N/A	N/A
Carroll	Tara Lake Dam	174	57 homes, 1 business
Clarke	Bedgood's Lake Dam	9	3 homes
Cobb	Cochran Lake Dam	186	62 homes (including 2 clubhouses)
Cobb	Jackson Creek Lake Dam	N/A	N/A
Cobb	Kellner Lake Dam	N/A	N/A
Cobb	Wigley Lake Dam	N/A	N/A
Columbia	Woodbridge Lake Dam	93	31 homes
Coweta	McKnight Lake Dam	3	1 home
Coweta	Sibley Millpond Dam	6	2 homes
DeKalb	Crooked Creek Lake Dam	69	23 homes
DeKalb	Erin Lake Dam	201	67 homes
DeKalb	Kings Cliff Lake Dam	81	27 homes
Douglas	Plantation Subdivision Lake Dam	21	7 homes
Fannin	Young Lake Dam	42	13 homes, 1 business
Fayette	Kozisek Lake Dam	15	1 mobile home park, 2 homes, 4 businesses
Fayette	Margaret Phillips Lake Dam	15	1 mobile home park, 1 home, 4 businesses
Floyd	Conasauga Lake Dam	612	204 structures
Floyd	Stonebridge Lake Dam	33	11 homes
Forsyth	Green Lake Dam	N/A	N/A
Forsyth	Tyson Proteins Oxidation Pond Dam	N/A	N/A
Fulton	Atlanta Reservoir Dam No. 1	6399	1845 homes, 61 mixed use, 107 industrial, up to 8 commercial

County	Dam Name	Population At Risk (PAR)*	Comments
Fulton	East Point Reservoir Dam	3	1 business
Fulton	Irene Lake Dam	33	10 homes, 1 business
Fulton	Lake Forrest Dam	156	45 homes, 7 businesses
Fulton	Stonegate Lake Dam	27	9 homes
Gilmer	Fowler Lake Dam	51	17 homes
Gilmer	Lovejoy Lake Dam	30	9 homes, 1 business
Gilmer	Rainbow Lake Dam	243	81 homes
Gwinnett	Hogan's Lake Dam	138	46 homes
Gwinnett	Summit Chase No. 1 Dam	234	78 homes
Harris	Walter Richards Lake Dam	105	35 homes
Henry	Lake Cindy Dam	135	45 homes
Henry	Lake Dow Dam	18	6 homes
Henry	Moon Lake Dam	81	27 homes
Lowndes	Nelson Hill Subdivision Lake Dam	150	50 homes
Madison	Seagraves Mill Pond Dam	N/A	N/A
Oconee	The Farm Lake Dam	24	8 homes
Paulding	Lake Swan Dam	9	3 homes
Paulding	Pegamore Lake Dam	45	15 homes
Pickens	Sequoyah Lake Dam	84	27 homes, 1 business
Richmond	Forest Hills Lake Dam	33	11 homes
Rockdale	Cowan Lake Dam	48	16 homes
Washington	Walden Woods Lake Dam	N/A	N/A
White	Clear Lake Dam	12	2 homes, 2 businesses
White	Pfau Lake Dam	33	11 homes
Whitfield	Dalton Utilities Impoundment Dike #3	12	4 homes

Table 2.97 is a listing of current Category I dams deemed to meet the HHPD eligibility criteria through 2022, which include the following:

- The dam cannot be used for hydropower.
- The dam cannot have been constructed by NRCS (watershed dams)
- The dam must have an EAP
- The dam must have known deficiencies
- The dam must have a local sponsor – either a state or local government or non-profit

The State has determined each of these are potentially a High Hazard Potential Dam, due to the potential for loss of life in the event of failure. The State is aware the risk of failure and the damage that could occur upon such an event varies between the dams identified. Any attempt to rank these dams based on that potential failure risk and the losses that could occur would be simple estimates at this time. Therefore, the State has recognized the need to conduct further evaluation of all existing Category I dams to determine those that have increased risk of failure, whether the increased risk is due to age, neglect, erosion, etc. as well as the potential damages should failure occur.

Contributing Factors

As noted above, individual risk assessments are done as part of the development of EAPs for each individual dam. Many of these are done based on a hypothetical, "blue-sky" scenario. In other words the dam simply breaks or gives way under otherwise normal conditions with no other contributing factors, other than possibly age, inadequate design and construction, lack of maintenance, etc. While those situations do occur, it is usually with Category II dams where their failure is not expected to cause any significant damages or losses. Other failures have been the result of, or in concurrence with, other contributing factors, usually with significant rainfall and/or ongoing flood events.

In the case of the Kelly Barnes Dam, while the exact cause for the failure was never determined, and although the dam was noted to be in poor condition and not designed adequately, the area had been inundated with 3-4 inches of rain in the previous couple of days, including multiple heavy downpours. As noted above, it was discovered that a large portion of the downstream face of the dam had collapsed a few years prior. While it was not determined for certain whether this contributed to the failure, it is very possible this could have weakened the structure, or could have been a sign of weakening over time due to age.

In other examples, during the 1994 flood along the Oconee, Ocmulgee and Flint Rivers, there were multiple dam failures throughout the area including, notably, the failure of the earthen portion of the Lake Blackshear Dam near Cordele approximately 40 miles above Albany on the Flint River. These failures were a result of a deluge or fain from Tropical Storm Alberto, in some cases nearly 24 inches of rain in 24 hours, overwhelming these dams. It was noted, however, that none of these failures contributed significantly to the already ongoing flooding.

Suffice to say dam failures can be standalone events or a cascading effect of other hazard occurrences. Table 2.98 highlights the other natural hazards profiled in this plan and their potential relationship, or cascading effects, on potential dam failure events. Notably, these effects are based on what could be expected in Georgia. For example, in the northern portion of the United States, as Winter gives way to Spring, Ice jams begin to form and could potentially affect downstream dams. Georgia is not known to get cold enough to experience ice jams.

TABLE 2.98: CASCADING EFFECTS OF OTHER HAZARDS ON DAM FAILURE

Hazard	Potential Effects
Wind (including Hurricane Wind, Wind, Tornado)	Earthen dams sometimes have trees that grown on the actual dam. Wind can sometimes blow those trees over, pulling up the root balls, which can potentially weaken the dam structure. Wind could also impact power (ability to raise and lower flood gates at the dam). Trees and debris blown down could potentially impact downstream waterway causing additional flooding between the impacted area and the dam.
Flooding (Inland Flooding and Coastal Hazards)	Heavy rainfall and flooding upstream of a dam could overwhelm a dam by causing the lake or pond to exceed the dam's storage capacity. Downstream flooding, whether inland or coastal, reduces the downstream waterway's capacity to withstand the additional water from a dam failure. Again, depending on the level and extent of ongoing flooding, a failure may or may not contribute significantly to the overall event.
Wildfire	A large wildfire can change the landscape in such as way that the area is no longer able to absorb or hold water as well is it previously was. This can lead to additional flooding from subsequent storms which can, as noted above contribute to dam failures or the downstream results of dam failures.
Drought	A significant drought can lead to cascading effects on dam failure events in a couple of ways. They can increase the chance of wildfires (see above for effects). They can also affect an area's ability to absorb water. Oftentimes ongoing drought reduces the risk of flooding from heavy rain events due to lowered river and creek levels allowing them to absorb an influx of water.
Severe Weather and Severe Winter Weather	Severe Weather, as defined in this plan, as well as Severe Winter Weather can impact power which is necessary to raise and lower flood gates at a dam. In the event of concurrent upstream flooding, this reduces the ability of the dam to prepare for the coming influx of water.
Geologic Hazards	Geologic hazards, if they occur too close to a dam, could impact the structure itself, leading to increased change of failure. Also, a landslide upstream of a dam could certainly cause a sudden influx of water to enter the impounded lake or pond. A landslide into the waterway downstream of a dam could impact the downstream waterway's capacity

Hazard	Potential Effects
	to withstand the influx of water from a dam failure.
Earthquake	While an earthquake near a dam could potentially affect the structure, earthquakes in Georgia are not normally strong enough to cause structural damage.

Physical Vulnerability
Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. For the Dam Failure hazard, the State utilized a variety of resrouces as shown below.

- Local Hazus reports
  - Potential building damages
  - Potential losses to essential facilities
  - Potential Sheltering needs
  - Potential debris.
- Georgia Mitigation Information System (GMIS)
  - Critical Facility data defined and entered by each county as part of their local Hazard Mitigation Plan Update
  - State facilities from the Building Land Lease Inventory of Properties (BLLIP)
- Road Surfaces
  - Number of miles of unpaved Road Surfaces vulnerable to washout during flooding from dam failure events.

Notably, while inundation zones and specific risk assessment data are available on a case by case basis for each of the states over 450 dams, the data is not compiled, and the State does not currently have the immediate resources to do so, for analysis on a statewide basis. Therefore, the Hazus and GMIS data is based on the 1% annual chance Special Flood Hazard Area (SFHA) and is provided as “best available” information.

As part of each county’s local Hazard Mitigation Plan update, the State provides a Level 2 Hazus Analysis of potential impacts from a 1% annual chance flood based on locally provided information on essential facilities (EOCs, medical, fire, Police and schools), as well as locally provided Tax Assessor data on all structures, for use as part of the local hazard mitigation plan update. Table 2.99 shows the Flooding results from the Hazus reports, including loss ratios (losses compared to building values), value of losses to structures, economic loss, Essential Facilities damaged or out of service, and potential tons of debris generated. Notably, every county could experience complete loss of some essential facility services for a day or more. The full report showing all data is located in Appendix D-V.

TABLE 2.99: TOP TEN COUNTIES FROM HAZUS DATA

Loss Ratio	Number Buildings Damaged	Value of Building Losses	Essential Facilities Moderately Damaged	Essential Facilities out of Service	Potential Total Tons of Debris	# Displaced	# Shelter Needs
Seminole	Chatham	Dekalb	Glynn	Ware	Dekalb	Walker	Chatham
Baker	Glynn	Chatham	Clarke	Jeff Davis	Fulton	Bibb	Gwinnett
Glynn	Dekalb	Fulton	Mitchell	Mcintosh	Cobb	Chatham	Glynn
Walker	Cobb	Cobb	Fulton	Appling	Gwinnett	Cobb	Dekalb
Bryan	Fulton	Gwinnett	Muscogee	Bryan	Cherokee	Dekalb	Cobb
Mitchell	Dougherty	Walker	Baldwin	Camden	Forsyth	Glynn	Fulton
Union	Gwinnett	Glynn	Chattooga	Bulloch	Whitfield	Fulton	Clayton
Chatham	Bryan	Bibb	Dade	Coffee	Catoosa	Clayton	Dougherty
Crisp	Floyd	Clayton	Gordon	Brantley	Hall	Gwinnett	Henry
Chattooga	Richmond	Bryan	Ware	Wilkinson	Stephens	Henry	Cherokee

The State of Georgia maintains the Georgia Mitigation Information System for use by each county to enter their locally defined critical facilities for risk analysis based on each facility's location within the various flood hazard areas. The system also accesses data on State owned and/or operated facilities from the BLLIP system and is able to be used to analyze risks of State facilities to the flood hazard. Table 2.100 below shows the top ten counties' number of locally defined Critical Facilities located within the 1% Annual Chance Floodplain, also known as the Special Flood Hazard Area (SFHA). Table 2.101 shows the top ten counties' number of Stated owned and or operated assets located within the SFHA. Table 2.101a shows the top ten counties based on the values of exposed State owned, leased and other State assets.

TABLE 2.100: TOP TEN COUNTIES NUMBER OF LOCAL CRITICAL FACILITIES EXPOSED TO SPECIAL FLOOD HAZARD AREA

County	Number of Critical Facilities	Value of Critical Facilities
Glynn County	93	$331,998,240
Chatham County	55	$128,439,260
Gwinnett County	40	$38,804,500
Forsyth County	34	$26,712,924
Floyd County	27	$70,319,029
Troup County	27	$144,645,498
Rockdale County	25	$122,982,300
Gilmer County	24	$33,733,900
Stephens County	19	$8,807,401
Taylor County	19	$15,812,000

TABLE 2.101: TOP TEN COUNTIES NUMBER OF STATE FACILITIES EXPOSED TO SPECIAL FLOOD HAZARD AREA

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Number of Facilities	County	Number of Facilities	County	Number of Facilities
Chatham	149	Chatham	10	Chatham	528
McIntosh	130	Baldwin	7	Elbert	46
Bartow	68	Lowndes	5	Glynn	34
Glynn	59	Clayton	4	Dougherty	28
Union	34	Cobb	4	Barrow	23
Crisp	26	Bryan	3	McIntosh	21
Barrow	20	Camden	3	Seminole	11
Dougherty	20	Richmond	3	Stewart	11
Stewart	15	Bartow	2	Rabun	10
Colquitt	14	Cook	2	Hall	9

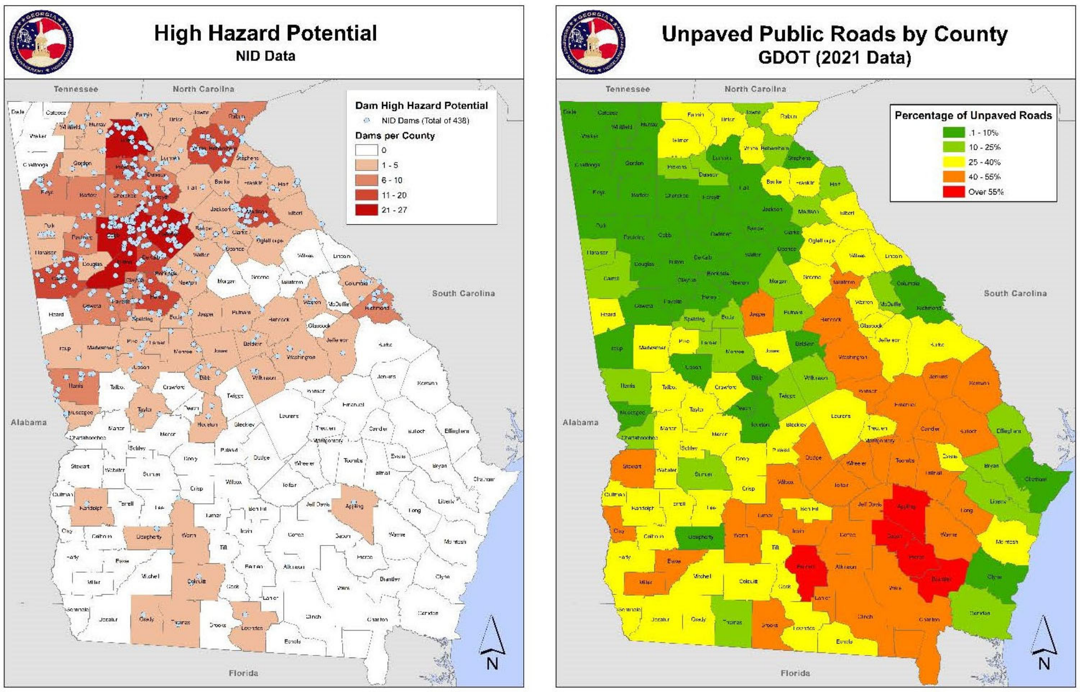
TABLE 2.101A: TOP TEN COUNTIES VALUE OF STATE FACILITIES EXPOSED TO SPECIAL FLOOD HAZARD AREA

Stated Owned Facilities		State Leased Facilities		Other State Facilities	
County	Value of Facilities*	County	Value of Insured Contents**	County	Value of Insured Assets**
Richmond	$319,683,584	Chatham	$2,202,236	Chatham	$631,636,957
Glynn	$199,526,946	Floyd	$2,105,484	Glynn	$136,254,545
Troup	$103,496,143	Cobb	$651,227	Hall	$8,620,281
Washington	$67,276,459	Clayton	$580,533	Douglas	$5,075,000
McIntosh	$36,573,064	Gordon	$482,960	Barrow	$3,078,391
Upson	$33,353,309	Whitfield	$469,568	Mitchell	$2,318,000
Gordon	$30,205,017	Meriwether	$466,165	McIntosh	$2,143,680
Walton	$28,781,928	Baldwin	$365,000	Dougherty	$2,135,417
Henry	$27,100,000	Appling	$327,166	Crisp	$2,058,750
Walker	$22,423,638	Emanuel	$309,074	Clay	$2,025,000

***Stated owned facilities data based on the higher of insurance or replacement cost. Where no value is provided, an average cost per square foot for all facilities was applied. The impact of ranking of top ten counties was negligible.**
****Data does not allow for any assumptions to be applied to account for facilities where no value was given.**

Another aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One particularly vulnerable lifeline in times of flooding from dam failure is transportation infrastructure – specifically unpaved roads. While paved roads are certainly not invulnerable, rural unpaved roads are often more susceptible to washouts, especially after lengthy periods of wear and tear. Figure 2.104 below shows the percentage of unpaved roads for each county compared to the locations of high hazards dams according to the National Inventory of Dams. The comparison does not reveal much in the way of surprises. Dams are deemed to be high hazard based on population and development at risk. This means areas with higher concentrations of population and development are more likely to have high hazard dams. These same areas with higher population and development concentrations are also more likely to have a higher percentage of paved roads. Therefore, as the maps show, the areas with higher concentrations of high hazard dams also have lower percentages of unpaved road surfaces.

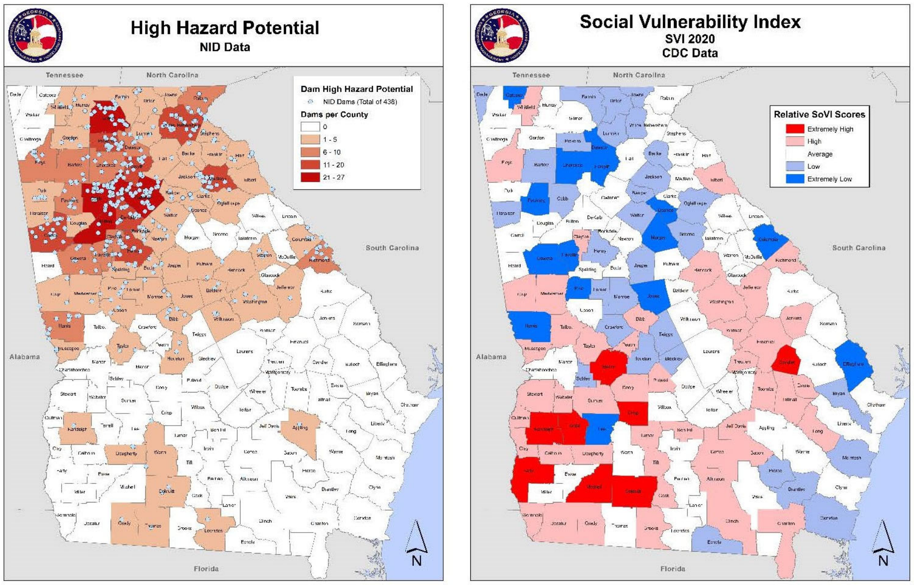
FIGURE 2.104: PERCENTAGE OF UNPAVED ROAD MILEAGE AND NID HIGH HAZARD DAMS



Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to dam failure, specifically. The State compared the CDC Social Vulnerability map to the GDOT road surface map. The maps in Figure 2.105 show this comparison. Notably, as the maps reveal, the areas with higher concentrations of high hazard dams are also areas determined to be less socially vulnerable.

FIGURE 2.105: CDC SOCIAL VULNERABILITY SCORE AND HIGH HAZARD DAMS



Other Impacts

Dam failures can have impacts beyond injuries, loss of life, and physical damages to structures and infrastructure. A dam failure can have economic, social and environmental impacts. They can also have both direct and indirect impacts on multiple jurisdictions.

The economic impact of a dam failure could be significant. The downstream impacts could be catastrophic. For example, in the case of the Kelly Barnes dam, one of the first things in the almost immediate path of the water was a college campus with residential houses, mobile homes and dormitories all near the creek, many of which were completely destroyed. In addition, should transportation routes be impacted, this could affect local citizens' ability to access local shopping and business locations, potentially affecting work production, as well as retail sales. However, upstream impacts can be significant as well. In the case of a developed lake, while there wouldn't be the damages from the sudden influx of water, surrounding property owners with water frontage will often have docks, boats, etc. and use the lake for recreational value. Boats can be left stranded on dry ground. Loss of the lake can impact property values, especially if it is decided not to repair the dam, or repairs are slow. Finally, a failure of sufficient magnitude could stress local and state resources, with responding agencies incurring significant costs.

Environmental impacts from a dam failure can be significant. In the case of a sudden catastrophic failure of a dam, the sudden rush of potentially millions of gallons of water can cause significant scouring of downstream areas, completely washing away vegetation and trees, while unearthing root systems of nearby trees and vegetation that remains along the sides of the changed areas. In addition, the sudden surge of water from a lake or pond can bring significant amounts of sediment in normally dry areas outside of the downstream channel. Should the downstream area be developed in any way, there would likely be sewage or septic systems at risk of being inundated. Anytime floodwaters overwhelm a sewage or septic system, there is risk of the sewage being carried freely downstream, which can cause significant health and environmental hazards. Finally, a failure could impact nearby ecosystems, causing death or migration of local wildlife.

Socially, dam failures can have a tremendous impact. Impacts to infrastructure serving the community and social vulnerability of the community are discussed above. However, the potential loss of life can also have a significant social impact. In the example of Kelly Barnes dam, the event killed 39 people. In addition to the impact on the families and friends, in a town of 9000, this can be tremendous to the community. These students and faculty lived life in the town shopping, working, going to church, etc. It is highly likely many of them were known, if not recognized by town's citizens. Their loss was likely noticed and felt by many throughout the town.

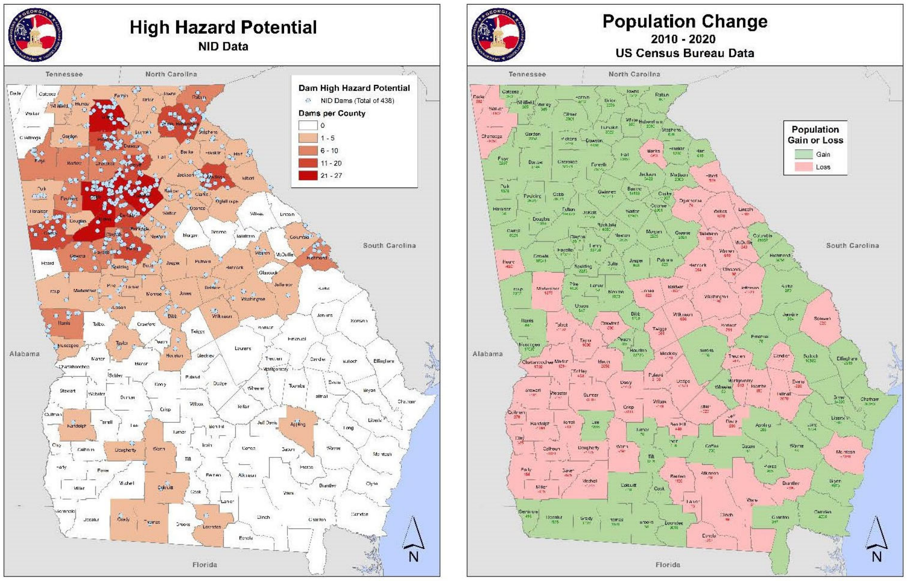
A dam failure can have impacts across multiple jurisdictions. If a dam is upstream of a jurisdictional boundary, the water is going to go where it goes, and cause the damages it's going to cause, regardless of any non-physical boundaries, such as political lines on a map. If the impounded lake or pond is along a jurisdictional boundary, as many often are in the case of impounded lakes along rivers, the sudden loss of the lake as noted above, will impact the property owners having lake frontage, regardless of which jurisdiction they are located in.

Any event, dam failure included, that overwhelms the local community's event to respond, whether that's due to direct impacts to the medical and first response systems, to the magnitude of the event being more than the community can handle alone, will have indirect impact on neighboring communities due to their efforts to assist. A community providing 1st response assistance to a neighboring community must make sure they maintain the capability to provide emergency services to its own community. When the local medical system is overwhelmed, either due to direct impacts, the injured have to be transported to neighboring communities' medical systems. For example, in the case of the Kelly Barnes failure, the response effort likely overwhelmed the small town of Toccoa, likely requiring assistance from several, also small, neighboring communities. More recently, while not a dam failure event, in 2007, the Sumter Regional Hospital in Americus, took a direct hit from an EF-3 tornado, destroying the hospital. In the immediate aftermath, and until a temporary emergency facility could be constructed, sick and injured people in Sumter County had to either go to, or be transported to neighboring areas such as Cordele and Albany to receive medical treatment. Those areas had to be able to absorb the extra medical needs over and above their normal caseloads.

<u>Impact from Changing Conditions</u>

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

FIGURE 2.106: NID HIGH HAZARD DAMS AND POPULATION CHANGE



Generally speaking, the State of Georgia has experienced overall population growth. As can be seen in Figure 2.106, various areas have experienced population growth, while others have experienced population reduction. Figure 2.106 above shows that counties that, generally speaking, counties that have more high hazard dams are also counties that are growing in population. The State is currently unable to analyze development trends within specific inundation zones, presumably these population increases also include increases within the impact areas. If this is the case, this growth, and requisite development that comes with it, has the effect of putting more people and structures in the path of flood events, thereby increasing the area's overall vulnerability. This is mitigated slightly by communities that develop and adopt floodplain development regulations that include minimum heights above the Base Flood Elevation, and construction specifications related to how the structure reacts to flood waters. This, however, is only relevant to structures within the Special Flood Hazard Area (SFHA). It does not account for the idea that dam failure can flood areas outside of the SFHA. It also may not account for impacts from the volume and velocity of flood waters from a sudden dam breach.

Conversely, decreases in population means less people in the path of potential weather in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. While wealthy people leaving does not increase the vulnerability of people that stay, it does remove people considered to be less vulnerable, due in part to their perceived ability to recover, from the equation, thereby increasing the community's overall social vulnerability statistically.

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.

2.8.13 Extreme Heat

Associated Hazards:

High Heat, Heat Waves, Excessive Heat

Priority	Rank
Medium	9

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 1,578 Extreme Heat type events from 1952 - 2022. NCEI, alone, documents 318 separate Excessive heat events between 2002 and 2022. 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 – 2022 timeframe. Based on that, 13 days in 20 years leads to a 65% 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 2.107 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 2.107: NATIONAL WEATHER SERVICE HEAT INDEX

NWS Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

In terms of impacts, aside from taxing power systems, the primary losses from extreme heat events are deaths and injuries. Figure 2.108 depicts the number of heat events that occurred between 1952 and 2022. Figure 2.109 depicts the number of casualties that have occurred in that timeframe. Georgia recorded 4 injuries and 147 deaths. This equates to 7-8 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 2.108: HEAT EVENTS 1952 – 2022

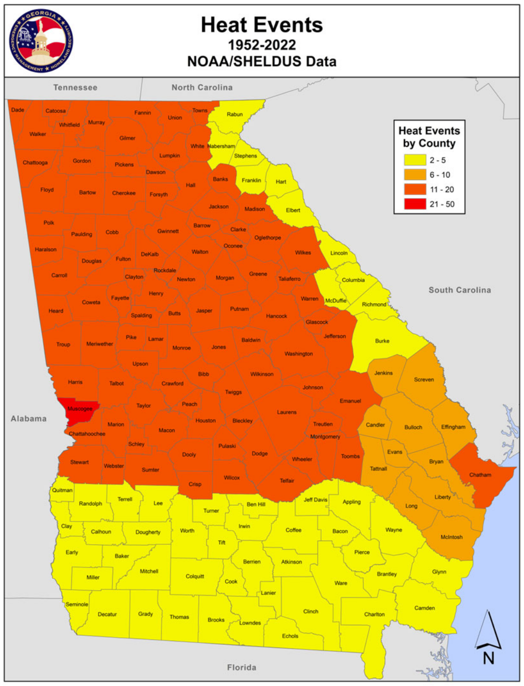
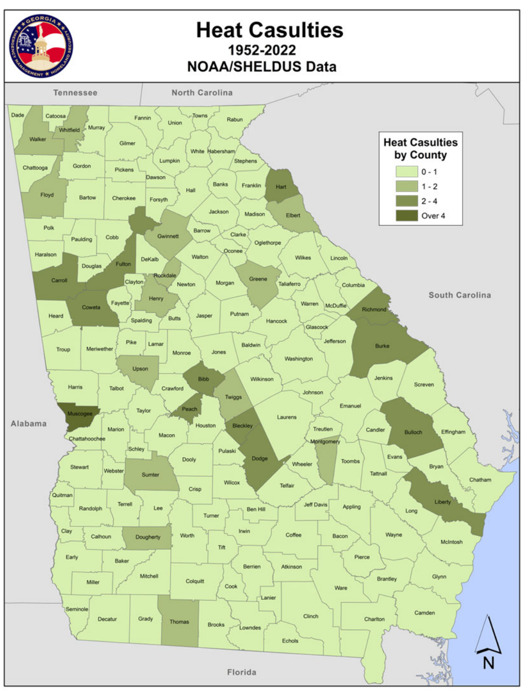


FIGURE 2.109: HEAT CASUALTIES 1952 - 2022



Physical Vulnerability
Physical vulnerability to hazards is identifying risks to the built environment, as well as the population. It can include, among other things, potential damages to structures and infrastructure; potential for injuries and loss of life; impacts resulting from certain types of damages; etc. As it relates to Extreme Heat the built environment is not generally susceptible to damage. The primary risks are to the human population. For the Extreme Heat hazard, the State analyzed the following resources:

- Census
  - Total population per county in areas susceptible to extreme heat.
- Power Outages
  - Number of power outages per county per Department of Energy data

One aspect of vulnerability has to do with community lifelines, or services and systems that are critical to society and a community's ability to be self-sufficient. This can include energy, communications, public safety, water, food, shelter, health, etc. One asset that could be vulnerable to severe winter weather could be the electric grid. During the summer months, air conditioning and other cooling systems often tend to draw more electricity than any other system within residential and many commercial buildings. Often, during times of extreme and excessive heat, air conditioners, in particular, struggle, often running nonstop throughout the day, to keep up with the heat. This can often overtax power distribution systems, sometimes causing brownouts and blackouts. Sometimes, power systems will resort to rolling brownouts or blackouts to conserve power and protect the system from failure due to overtaxing. Power failure during extreme or excessive heat events can be particularly dangerous due to lack of ability to stay cool or cool off. The Department of Energy tracks power outage reports, which the State was able to use to identify which counties tend to have more power outages, as well as which counties tend to have a higher percentage of their customers reporting power outages. Table 2.102 below shows the top ten counties' average power outage reports during summer months between 2015 and 2022. Notably, when grouped according to average number of power outages, the data does not reveal any surprises, as the top 10 counties are all within the top 10-15 most populous counties within the State. However, when looked at based on percentage of the customer base, it appears many of the smaller communities within the state have the highest percentage of their customers reporting power outages. Note, this data includes the months of May through August, which are also susceptible to thunderstorms and late Summer Hurricanes. Table 2.102 does not account for what caused the reported outages.

TABLE 2.102: TOP TEN COUNTIES POWER OUTAGES PER YEAR 2015-2022

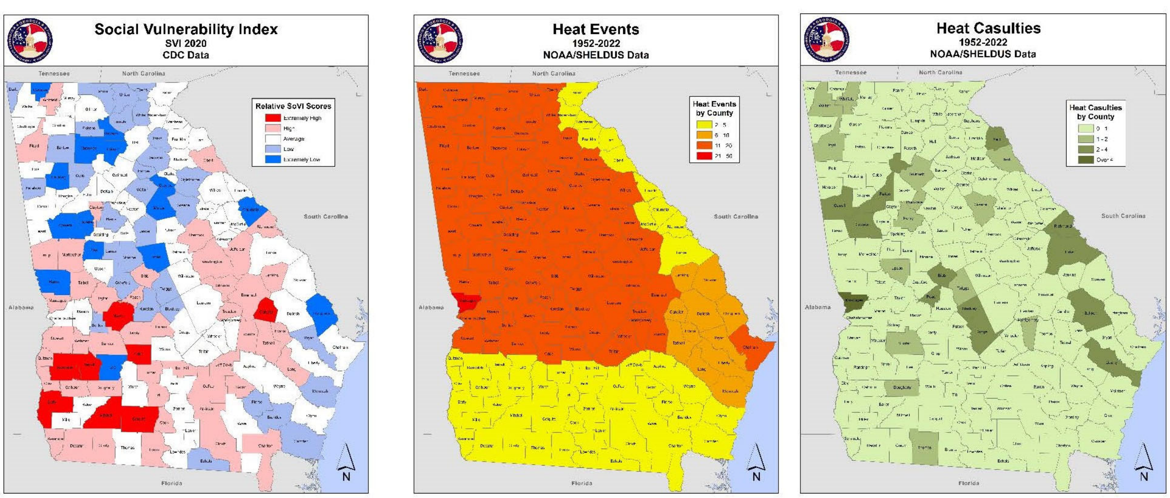
County	Average Number Out	County	Average Percentage Out
Gwinnett	246	Quitman	4.37%
Fulton	245	Clay	3.58%
DeKalb	245	Echols	2.94%
Cobb	245	Miller	2.90%
Chatham	245	Taliaferro	2.58%
Clayton	245	Wheeler	1.94%
Richmond	244	Glascock	2.24%
Hall	244	Webster	2.55%
Bibb	244	Clinch	2.20%
Muscogee	242	Baker	2.16%

Social Vulnerability

A discussion on social vulnerability looks at how factors such as socioeconomic status, age, household marital status (ie single parent vs two parent) and other affect the potential impacts of natural hazards on the overall vulnerability of the community. This can be in terms of potential damages and losses, as well as the anticipated ability of the community to recover. Sections 2.5 and 2.6 address how social vulnerability affects the State's overall vulnerability to natural hazards in general. This section is intended to identify how social vulnerability affects the State's vulnerability to Extreme Heat, specifically.

Figure 2.110 shows a comparison of the CDC Social Vulnerability Index to the Extreme Heat Events and Losses Maps. Comparing these three maps shows, largely the areas that experience the most heat events are average to low social vulnerability with pockets of socially vulnerable communities scattered throughout East and West Georgia. What stands out, however are areas such as Muscogee County, pockets within Central and East Georgia, as well as smaller pockets throughout the rest of the State, that have experienced the higher amounts of losses and are considered higher on the Social Vulnerability scales. While further analysis would be necessary to determine exact factors, it is likely this is due to social vulnerability factors that are thought to increase risk to high temperatures, such as age, health, inadequate or total lack of air conditioning, etc.

FIGURE 2.110: SOCIAL VULNERABILITY COMPARISON HEAT EVENTS AND LOSSES

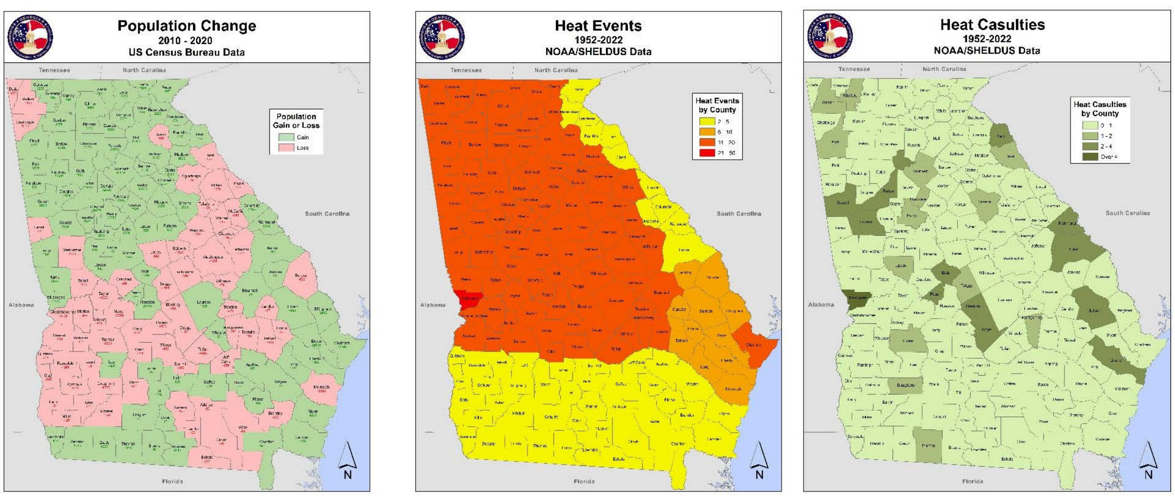


Impact from Changing Conditions

For the purposes of mitigation planning, changing conditions can be defined as any type of conditions that, as they change, those changes can affect the community's overall vulnerability. This includes, but is not limited to, climate change or adaptation, developmental patterns, population changes and migration, etc.

Figure 2.111 shows a comparison of population change throughout the State to areas that tend to experience more extreme heat events and losses. Largely the areas that experience more events are growing in population, with the exception of pockets around Central, Eastern and Western Georgia that have lost population. Notably, areas around Bibb, Muscogee and Richmond Counties have grown, but have also experienced some of the higher amounts of loss from heat events. Nevertheless, as the population grows, this has the effect of putting more people at risk when a drought occurs. Increases in population puts more demand on the water system by putting more people in the area to be served. Conversely decreases in population means less people in the path of a drought in that area. Often, when an area experiences decreases in population due to population migration, it is the more wealthy that are leaving the area. This has the effect of increasing the area's social vulnerability. However, this effect could be falsely high. Often, population migration is the result of people considered less socially vulnerable relocating, while the more socially vulnerable tend to stay in the area. While this does not change the vulnerability of those that stay, it does change the community's social vulnerability statistic by removing the less vulnerable from the equation.

FIGURE 2.111: COMBINED SEVERE WEATHER EVENTS AND POPULATION CHANGE BY COUNTY



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.

2.8.14 Non-Natural Hazards

Associated Hazards:

Infrastructure Failure, Cyber Attack, Hazardous Material Spill/Release, Active Shooters, Infectious Diseases, Radiological Release

In addition to the natural hazards described above, the State of Georgia is also exposed to various non-natural and human caused hazards. Mitigation Planning requirements do not require a full profile of non-natural hazards. Also, due to the nature of these hazards and the type of data available, the state did not include them within the prioritization of the natural hazards. Instead, the State utilized the prioritization method identified in the State's Hazard Identification and Risk Assessment (HIRA), which includes its own risk and consequence analysis of all hazards, including both natural and non-natural.

Hazard Description
Non-natural hazards are those hazards, which are not created by a meteorological, environmental or geologic event. They can be human-caused, technological, health related, infrastructure based, etc.

Profile
The State of Georgia HIRA includes a history of each of these types of hazards and develops a profile based on the history and potential consequences of the events based on the following factors:

- Frequency: The likelihood of hazard occurrence
- Social Impacts: The potential fatalities, injuries and likelihood of evacuation
- Property Damage: Potential damage to property from an event
- Critical Infrastructure Service Impact: Impact to infrastructure critical to meeting human needs, economy, public safety and continuity and confidence in government
- Environmental damage: Potential impact to the environment
- Business/Financial impact: Potential economic consequences
- Psychosocial Impact: Likelihood of a negative response from the community, including self evacuation, mass panic, etc.

Based on combining and scoring the factors listed above, the HIRA ranks the non-natural hazards in the following order. Full details on the scoring system can be found in the HIRA, located in Appendix D-IV.

1. Infrastructure Failure: Scored 36 – Extreme
2. Cyber Attack: Scored 36 – Extreme
3. Hazardous Materials Spill/Release: Scored 36 – Extreme
4. Active Shooter: Scored 30 – Extreme
5. Infectious Diseases: Scored 6 – Low
6. Radiological Release: Scored 3 – Very Low

Historic Information on non-natural hazards varies in its detail and availability. The HIRA lists the following notable occurrences for each non-natural hazard:

1. Infectious Diseases
    i. Zika, Legionella, Measles, Mumps and Covid. Notably, Covid began March 2020. By September 2021, there were over 20,000 deaths and 76,000 hospitalizations due to Covid.
2. Cyber Attack:
    i. Colonial Pipeline Attack April 2021. Shut down the largest fuel pipeline in the U.S. for five days, causing panic buying of fuel, leading to fuel shortages and outages in many areas. The supply chain took several weeks to recover.
    ii. 15 Ransomware attacks
    iii. O365 compromised five times
    iv. Websites defaced three times
    v. Networks compromised 2 times
    vi. Two supply chain attacks
    vii. One Third Party Vendor
    viii. 1 End Point Compromise
    ix. 1 Typo Squatting
3. Active Shooter (All 2016)
    i. Gwinnett County – perpetrator shoots into a car, injuring 4 people
    ii. Northwest Atlanta – 5 innocent bystanders injured in a shooting near a well-known nightclub.
    iii. Columbia County – man suspected of fatally shooting 5 people in two separate incidents found dead of apparent gunshot wound
    iv. Moultrie – 5 people shot and house set afire in cover up attempt
    v. Jackson – 1 killed, 3 injured in one incident
    vi. Henry County – 4 people fatally shot in a home.
4. Radiological Release – None on record in Georgia
5. Hazardous Material Spill/Release (All below occurred in 2017)
    i. Benzyl Chloride releases in Fulton and Clayton Counties
    ii. Sulfuric Acid spill in Fulton County
    iii. Multiple tanker rollovers throughout GA releasing gasoline and diesel fuel
    iv. Multiple train derailments releasing oil and diesel fuel
    v. 1200 gallons gasoline spilled into Lake Thurmond Reservoir
    vi. Mercury spill in Whitfield County
    vii. Multiple sunken vessels along GA coastline
6. Infrastructure Failure
    i. 2017 I-85 bridge collapse due to large fire under the bridge. I-85 northbound and southbound was closed in NW Metro Atlanta for a 1.5 months.
    ii. 2017 Internet outage disrupted Georgia Milestones testing, delaying statewide end of year testing for 124 school districts.
    iii. 2017 major power outage halted inbound and outbound traffic at Hartsfield-Jackson Atlanta International Airport for 11 hours.

Chapter 3: State Mitigation Strategy

3.1 OVERVIEW

The summary of changes to Chapter 3 of Georgia's Hazard Mitigation Strategy (GHMS) since the 2019 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
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

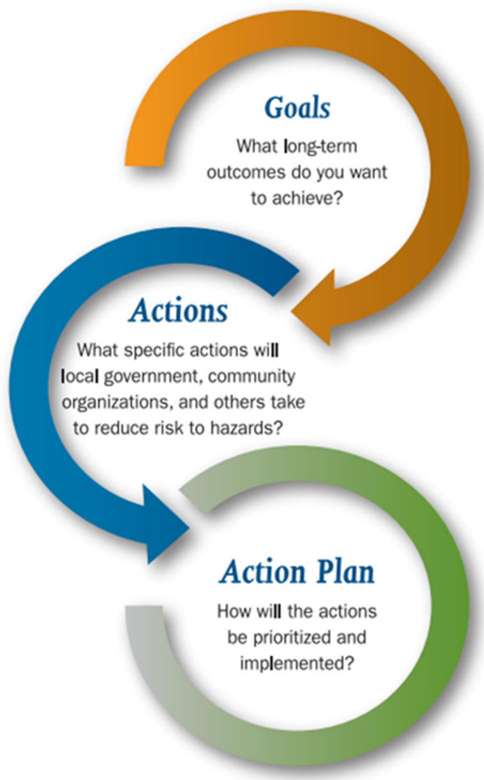
3.2.1 Overview

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 broad, long-term policy and vision statements that explain what will be achieved by implementing the mitigation strategy.
>
> **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 2019 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 2024 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 2019 plan, review of mitigation actions from local 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 2023 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 Department of Community Affairs (DCA), Georgia Environmental Finance Authority (GEFA), the Technical College System of Georgia (TCSG), Georgia Department of Transportation (GDOT), and Georgia Department of Agriculture (Agr). For a full list of participants, see Appendix B. One key finding of the workshop was that the majority (60%) of the chosen actions fall within the "planning and regulation" and "education and awareness" categories. Notably, the top action chosen, receiving 8% of the votes was related to emergency power supply, while building and development regulations was the second choice receiving 5% of votes. This is a change over the 2019 plan where building codes had been the top choice. This change is likely due to two factors: 1) Generators and backup power supplies are now eligible for mitigation funding from FEMA.

Beginning with the 2014 ice storm event, the State has applied for and passed HMGP funds through to a multitude of local communities for emergency power supplies for their critical facilities and has purchased a cache of generators for deployment in the aftermath of major hazard events causing power outages. 2) Over the last decade, the State has suffered a multitude of disasters where power outages affecting critical systems was a major contributor to the impacts. For details on the chosen categories, please see Figure 3.2.

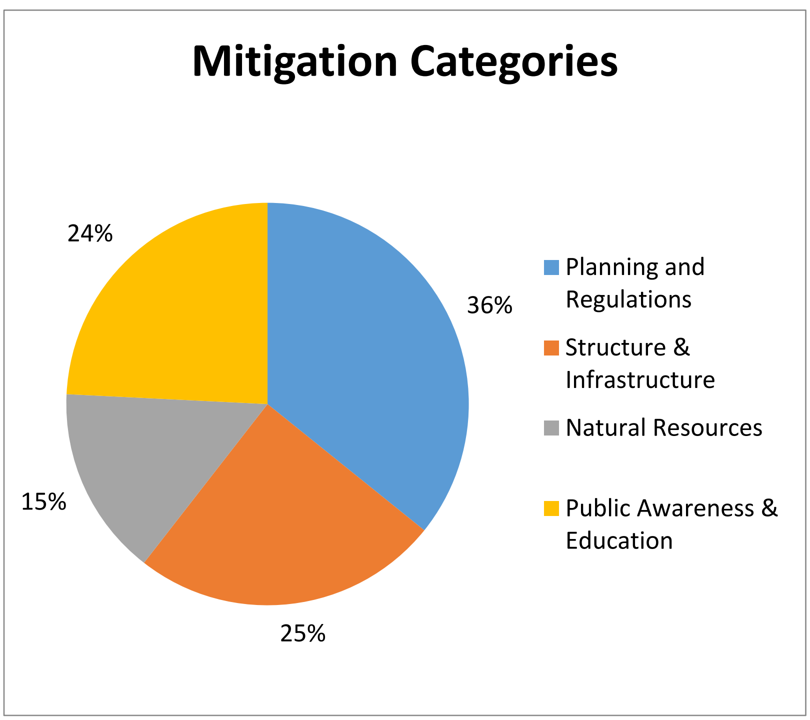
TABLE 3.2: CATEGORIES OF MITIGATION ACTIONS

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 2023, BY MITIGATION TYPE



While the majority of workshop participants favored "planning and regulation" and "education and awareness," there are some notable exceptions. The top chosen action fits within the "Structure and Infrastructure" category, while the 2nd and 3rd actions are "Planning and Regulations" and "Public Education and Awareness" actions. Generators, previously the #3 chose action is now the top choice. Building codes, previously the top chose action, is now the #2 choice. The biggest change within the top 3 choices is evacuation routes, previously the 6th choice, is now the #3 choice among workshop participants. 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 2019 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 2019 strategy. Thus, they are “new” to the updated mitigation action plan.

During the last few updates to the 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 118 of the 2019 plan included development and update 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. In addition, the Georgia Forestry Commission has developed an online user interface that allows a community to create and download risk assessment data and maps that can be used as part of their local mitigation plan updates.

    b. Action items within the 2014 and 2019 plans related to Risk MAP studies the Georgia Department of Natural Resources (DNR) has initiated in various locations in Georgia. RiskMap studies have been completed and products delivered in the following watersheds:
        - Etowah
        - Upper Chattahoochee
        - Upper Middle Chattahoochee
        - Upper Ocmulgee
        - Upper Savannah (Hart and Lincoln Counties only)
        - Middle Savannah
        - Newport
        - Turtle
        - St Marys

       In addition, the DNR Floodplain Management Unit is in the process of conducting studies in over 27 additional watersheds throughout the state. 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. While these upgrades were a significant improvement in the user-friendliness of the system, additional gaps have since been identified. The State is, once again, in the process of upgrading the system to improve it's user-friendliness, as well as improve data quality at the data entry point.

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. Recently, however, new restrictions on access to the data have hampered this effort. While FEMA has provided a temporary work around for the purposes of meeting planning requirements, GEMA/HS is in the process of completing the legal requirements to re-gain access to the full data. Once complete, GEMA/HS staff will need to take the time to learn the exactly how the data can be used, given the new re

2. 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. Since the completion of the 2019 plan, the State has continued in each of these efforts to increase awareness about mitigation planning assistance, as well as tie-ins with other planning activities. 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.

3. 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. During the 2019 and 2024 update process, the staff reached out to each state agency that had mitigation actions identified in the then current plan and/or was invited to the workshops described in Chapter 1, asking them to provide updates on their mitigation actions if they had any and/or provide information on new actions to include in the 2024 plan. Based on feedback received, 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.

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. During the 2019 update process, the State realized the workshops did not provide an effective 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. Unfortunately, due to a number of factors, including staff limitations and the Covid pandemic, the State has not been able to pursue this action. However, the State realizes it does need to be done and will pursue it as time and resources allow.

The State of Georgia first reviewed the 2019 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 2019 GHMS were listed as ongoing. Upon review, the State found many of these actions were still ongoing. One key finding, since the 2019 plan was completed, which had to do with the State's Emergency Management Accreditation Program (EMAP) re-certification process, the mitigation strategy needed to also include non-natural hazards. Given that Federal mitigation program only requires natural hazards to be identified and addressed in the plan and only funds mitigation projects for natural hazards, the State had not previously included non-natural hazards in the Georgia SHMS. Through the EMAP process, the State realized it would be better served by including all mitigation activity for all hazards identified in the state's separate Hazard Identification and Risk Assessment (HIRA). GEMA/HS staff was able to identify mitigation actions being undertaken to reduce potential impacts from non-natural hazards by various agencies. A key change with the 2024 plan update was to include non-natural hazards in the risk assessment workshops (workshops 1 and 3). The State's goal, going forward, is to continue to refine the methodology for incorporating non-natural hazards in the mitigation strategy update, as well as ensuring that the mitigation strategy remains consistent with the state's other primary documents and processes that identify and profile hazards.

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 2024 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 2019 to 2024 GHMS in the percentage of counties identifying each action. During the 2014 update, staff had 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, in the 2019 plan, this trend appeared 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. The trend for Planning and codes type actions now appears to have reversed itself and has increased to 95%. This could be a sign communities are recognizing the value and effectiveness of implementing and enforcing codes during development and construction as means of avoiding, or reducing the potential of, damages in the event of future disasters. Staff also noted increases in multiple other types of mitigation actions, such as generators, wetland protection, drought management, property acquisitions, property elevations, etc. Likely, this is the result of increased interested on the part of communities in light of recent disasters.

TABLE 3.3: LOCAL MITIGATION ACTIONS BY MITIGATION TYPE

Mitigation Type	Percentage of counties identifying Action		Change from 2019
	2024 GHMS	2019 GHMS	
Public Outreach	99%	93%	6%
Preparedness Efforts	96%	88%	8%
Flood Programs	95%	92%	3%
Flood Control / Drainage	95%	84%	11%
Planning / Codes	95%	79%	16%
Warning / Communications	94%	94%	0%
Equipment Acquisition	93%	75%	18%
Emergency Response Operations	91%	77%	14%
Fire Programs (Firewise, etc.)	91%	64%	27%
Structural Retrofit	90%	76%	14%
Drought Management	88%	64%	24%
Broad Cooperation	78%	59%	19%
Generators*	77%	12%	65%
Property Relocation / Elevation	65%	29%	36%
Dam Management	62%	30%	32%
Property Acquisition	60%	36%	24%
Additional Analysis	50%	51%	-1%
Wetland Protection	37%	22%	15%
Greenspace Preservation	22%	14%	8%

***Generators were not noted in the 2019 analysis, but were included in 12% of local plans at the time.**

TABLE 3.4: MITIGATION CATEGORIES FROM LOCAL PLANS

Mitigation Categories	% of counties identifying Action		Change from 2019
	2024 GHMS	2019 GHMS	
Planning and Regulation	96%	98%	-2%
Natural Resources	36%	22%	14%
Structure and Infrastructure Projects	94%	100%	-6%
Education and Awareness	97%	98%	-1%
Non-Mitigation Categories	96%	94%	2%

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 2019 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.

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 2019 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 3.2).

TABLE 3.5: MITIGATION ACTION TABLE

2019 MITIGATION ACTIONS												
2024 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	2024 - 2029	Ongoing as applicable	High	1-3	Severe Weather, Tornadoes	BOR	GBA	Agency Budget	1	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	2024 - 2029	Ongoing as applicable	High	1-3	Severe Weather, Wind, Hurricane Winds, Tornadoes	BOR	BOR	Agency Budget	2	Creates more wind resistant structures	Structure & Infrastructure
3	Backup all IT systems in multiple locations throughout the state	2024 - 2029	Ongoing Continually	High	1-3	All Hazards	BOR	TBA	Agency Budget	5	Provides redundancy in IT systems	Structure & Infrastructure
4	Increase hazard vulnerability identification training throughout the university system	2024 - 2029	Ongoing as applicable	High	1-3	All Hazards	BOR	GEMA/HS	Agency Budget	6	Improves risk analysis	Structure & Infrastructure
5	Complete DRU plans for remaining 12 universities	2024 - 2029	Ongoing as funding and other resources allow	High	1-3	All Hazards	BOR	GEMA/HS	Agency Budget	7	Expands mitigation planning	Structure & Infrastructure
6	Plot all financial institution locations on a map to determine the probability and impact of various hazards that they may face	2024 - 2029	Ongoing leveraging 3rd party (CSBS) resources updated as financial institutions open and close locations in line with business factors.	Medium	1-3	All Hazards	DBF	DBF	CSBS, FDIC, NCUA, FRB	8	Improves understanding of vulnerability	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
7	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	2024 - 2029	Ongoing as the Department maintains partnerships with federal counterparts that provide essential services to financial instiutions such as the Federal Reserve Bank of Atlanta.	Medium	1-3	All Hazards	DBF	DBF	FDIC, NCUA, FRB	9	Improves access to critical data and information after a disaster	Planning & Regulation
8	Emergency Preparedness Plan for Georgia State-Chartered Financial Institutions	2022 - 2024	New to 2024 Plan. Ongoing as lessons learned prompt updates to the plan.	Medium	3-Jan	All Hazards	DBF	DBF	FDIC, NCUA, FRB	New	Protects staff, customers and financial and other important resources	Planning & Regulation
9	Provide training, webinars, workshops on integration of local mitigation plans into local Comprehensive Plans	2024 - 2029	Ongoing as plans are created/upd ated	High	1-3	All Hazards	DCA	GEMA/HS	Agency Budget	10	Improves integration of local mitigation plans	Planning & Regulation
10	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.	2024 - 2029	Ongoing continually	High	1-3	All Hazards	DCA	DCA	Agency Budget	11	Improves resiliency of communities	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
11	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.	2024 - 2029	Ongoing continually	High	1-3	All Hazards	DCA	DCA	Agency Budget	12	Provides redundancy in IT systems	Structure & Infrastructure
12	Review DCS disaster plans for securing sensitive files during disasters	2024 - 2029	Ongoing	High	1-3	All Hazards	DCS	DCS	Agency Budget	13	Protects critical data and files	Planning & Regulation
13	DCS will conduct annual reviews of disaster plans and participate in GEMA/HS exercises.	2024 - 2029	Ongoing	High	1-3	All Hazards	DCS	DCS	Agency Budget	14	Improves disaster preparedness	Planning & Regulation
14	DCS has a Memorandum of Understanding with Savannah/Chatham to assist in evacuation and re-entry during disaster situations	2024 - 2029	Ongoing	High	1-3	All Hazards	DCS	DCS	Agency Budget	15	Assists with evacuation of Chatham County	Planning & Regulation
15	Disaster response and preparedness through agency Matrix that correlates with GEMA/HS timeline Matrix.	2024 - 2029	Ongoing	High	1-3	All Hazards	DCS	DCS	Agency Budget	16	Improves disaster preparedness	Planning & Regulation
16	Assess the current plan to track sex offenders during the evacuation and re-entry process.	2024 - 2029	Ongoing	High	1-3	All Hazards	DCS	DCS	Agency Budget	17	Improves the ability to keep track of registered sex-offenders	Planning & Regulation
17	Improve radio communications with other law enforcement agencies.	2024 - 2029	Ongoing	High	1-3	All Hazards	DCS	DCS	Agency Budget	18	Improves emergency communications	Planning & Regulation
18	Identify offices/buildings that may be vulnerable to natural hazards (State owned and leased)	2024 - 2029	Ongoing	High	1-3	All Hazards	DCS	DCS	Agency Budget	19	Improves understanding of agency vulnerability	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**Previous Item #**	**Contribution to Mitigation**	**FEMA Category**
19	Develop a plan to provide saferooms for all Department of Human Services offices throughout the state	2024 - 2029	Ongoing as funding resources and opportunities allow.	High	1-3	Tornadoes	DHS	GEMA/HS	Agency Budget	20	Protects people during tornadoes	Planning & Regulation
20	Develop plan to backup all computer files for the Department of Human Services in the event of a hazard event.	2024 - 2029	Ongoing continually	High	1-3	All Hazards	DHS	GEMA/HS	Agency Budget	21	Improves redundancy of IT systems.	Planning & Regulation
21	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.	2025 - 2029	Ongoing as opportunities allow, with major efforts in the aftermath of disaster with high demand for disaster and mitigation grants	High	3-Jan	Flood	DNR Floodplain Mgt	GEMA/HS	Agency Budget	22	Improves the communities' resiliency to flooding	Planning & Regulation
22	Develop and conduct Risk MAP meetings in various watersheds throughout Georgia, including Discovery and Resilience meetings.	2025 - 2029	As per FEMA Cooperating Technical Partner approved and funded Flood Risk Mapping Assessment and Planning Program	High	3-Jan	Flood	DNR Floodplain Mgt	GEMA/HS, FEMA	Agency Budget	23	Improves understanding of risks	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
23	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	2025 - 2029	As per FEMA Cooperating Technical Partner approved and funded Flood Risk Mapping Assessment and Planning Program	Medium	3-Jan	Flood	DNR Floodplain Mgt	GEMA/HS, DCA	HMA & Agency Budget	24	Improves understanding of risks	Planning & Regulation
24	Provide technical assistance to local governments in order to improve the enforcement of floodplain management requirements	2025 - 2029	As per FEMA approved and funded Community Assisgtance Program, State Support Services Element (CAP-SSSE)	High	3-Jan	Flood	DNR Floodplain Mgt	GEMA/HS	Agency Budget	30	Helps reduce vulnerability of development in the floodplain	Public Awareness
25	Minimize damage to natural resources through the study and implementation of green infrastructure projects and use of and compliance with greenspace, stream buffers, and zoning ordinances as actions to protect Georgia communities	2024 - 2029	Ongoing continually	Low	1-3	All Hazards	DNR Floodplain Mgt, Coastal Resources Division	GEMA/HS	HMA & Agency Budget	27	Protects development from flooding and provides natural storage areas for flood waters.	Natural & Cultural Protection
26	Develop flood information outreach resources, such as fact sheets and web pages that summarize flood hydrology for emergency managers and planners	2024 - 2029	Ongoing as resources allow	High	1-3	Flood	DNR Floodplain Mgt, Coastal Resources Division	FEMA	Agency Budget	29	Helps improve preparedness by improving awareness of flood related issues.	Public Awareness

2019 MITIGATION ACTIONS												
2024 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**Previous Item #**	**Contribution to Mitigation**	**FEMA Category**
27	Update Sea Level Affecting Marsh Model(SLAMM) for all 11 coastal counties with newest LiDAR. This is the statesmost consistant SLR model.	2024 - 2029	New	High	1-3	Coastal Flood	DNR Coastal Resources Division	NOAA	NOAA	N/A	Provides resources and tools for flood planning	Planning and Regulation
28	Update the Shoreline Change rates (AMBUR model) for the 6 coastal counties.	2024 - 2029	New	Medium	1-3	Coastal erosion (ocean front and back barrier island)	DNR Coastal Resources Division	NOAA	NOAA	N/A	Provides resources and tools for eroision mitigation and beach management	Planning and Regulation
29	Develop site suitability, standards and BMPs for living shorelines when used as a Nature-Based Solution.	2024 - 2029	New	High	1-3	Storm surge attenuation, eroision contraol	DNR Coastal Resources Division	NOAA	NOAA	N/A	Gives property owners guidance towards Nature -Based Solutions	Planning and Regulation
30	Run a Hazard Vulnerability Assessment for 11 coastal counties to include Fetch, SLOSH, SoVi,SLR,DFIRMS, AMBUR	2024 - 2029	New	High	1-3	Stormsurge, wind,SLR, eroision	DNR Coastal Resources Division	NOAA	NOAA	N/A	Provides an assessment of communities including underserved areas and their hazards on a priority level in the coast.	Planning and Regulation
31	Develop a Community Resiliency Reference Guide	2024 - 2029	New	Medium	1-3	Stormsurge, wind,SLR, eroision, upland flooding, high-tide flooding	DNR Coastal Resources Division	NOAA	NOAA	N/A	Provides coastal local governments with a set of resiliency tools in one single location for hazard mitigationa nd adaptation.	Planning and Regulation
32	Rehabilitate dams with known structural deficiencies	2024 - 2029	Ongoing based on grant funding	High	1-3	Flood and Dam Failure	DNR Safe Dams	GEMA/HS	HHPD & Agency Budget	26-A	Reduce potential of damages and loss of life resulting from failure of existing dams	Structure & Infrastructure

2019 MITIGATION ACTIONS												
2024 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**Previous Item #**	**Contribution to Mitigation**	**FEMA Category**
33	Update and improve dams with known downstream vulnerabilities	2024 - 2029	Ongoing based on grant funding	High	1-3	Flood and Dam Failure	DNR Safe Dams	GEMA/HS	HHPD & Agency Budget	26-B	Reduce potential of damages and loss of life resulting from failure of existing dams	Structure & Infrastructure
34	Develop Risk Based Prioritization system for mitigation of high hazard dams to meet HHPD program requirements.	2024 - 2029	Ongoing pending FEMA guidance	High	1-3	Flood and Dam Failure	DNR Safe Dams	GEMA/HS	HHPD & Agency Budget	26-C	Reduce potential of damages and loss of life resulting from failure of existing dams by helping the State focus it's efforts on those most likely to cause the heaviest losses in the event of failure	Structure & Infrastructure
35	Evaluate Category I dams to further identify and prioritize dams for inclusion in the HHPD program.	2024 - 2029	Ongoing annually	High	1-3	Flood and Dam Failure	DNR Safe Dams	GEMA/HS	HHPD & Agency Budget	26-D	Reduce potential of damages and loss of life resulting from failure of existing dams by helping the State focus it's efforts on those most likely to cause the heaviest losses in the event of failure	Planning & Regulation
36	Develop and maintain map inundation zones for dam failure	2024 - 2029	Ongoing as EAPs are developed	Low	1-3	Flood & Dam Failure	DNR Safe Dams & USACE	GEMA/HS	Agency budget, dam owners	31	Helps improve awareness of vulnerability to dam failures.	Planning & Regulation
37	Create and maintain state wide map layer that identifies important natural and cultural resources	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	DNR GIS	GEMA/HS	Agency Budget	28	Helps protect natural and cultural resources	Natural & Cultural Protection

2019 MITIGATION ACTIONS												
2024 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**Previous Item #**	**Contribution to Mitigation**	**FEMA Category**
38	EPD will conduct periodic reviews of all their natural disaster plans and participate in disaster exercises	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	DNR EPD	GEMA/HS	Agency Budget	32	Improves planning and preparedness for disaster events.	Planning & Regulation
39	Continue to provide technical assistance to facilities submitting TierII reports	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	DNR EPD	GEMA/HS	Agency Budget	33	Improves awareness and understanding of risks.	Planning and Regulation
40	Continue to provide Georgia counties with assistance in predetermination of temporary storm debris staging areas	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	DNR EPD	GEMA/HS	Agency Budget	34	Improves preparedness for future disasters.	Planning and Regulation
41	On EPD website, provide link to GEMA/HS website for hurricane and severe weather emergency preparedness data.	2024 - 2029	Ongoing continually	Low	1-3	All Hazards	DNR EPD	GEMA/HS	Agency Budget	35	Helps prevent losses and damages by Increasing public awareness	Public Awareness
42	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	2024 - 2029	Ongoing annually	High	1-3	All Hazards	DOT	DOT	FDOT	36	Improves training and preparedness for such events.	Planning & Regulation
43	Schedule and conduct dry run exercises on contra-flow and snow and ice operations annually	2024 - 2029	Ongoing continually	High	1-3	All Hazards	DOT	DOT	FDOT	37	Improves training and preparedness for such events.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
44	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	2024 - 2029	Ongoing continually	High	1-3	All Hazards	DOT	DOT	FDOT	38	Improves training and preparedness for such events.	Planning & Regulation
45	DPS will conduct annual reviews of all their natural disaster plans and participation in disaster exercises	2024 - 2029	Ongoing annually	Medium	1-3	All Hazards	DPS	GEMA/HS	Agency Budget	39	Improves training and preparedness for such events.	Planning & Regulation
46	Provide a link to the GEMA/HS website for hurricane and severe weather emergency preparedness data on the DPS website	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	DPS	GEMA/HS	Agency Budget	40	Helps prevent losses and damages by Increasing public awareness	Planning & Regulation
47	Strengthen and add support to Radio Towers at DPS buildings to prevent wind damage to a critical structure	2024 - 2029	Ongoing as funding and opportunitie s allow	Medium	1-3	All Hazards	DPS	GEMA/HS	Agency Budget	41	Reduces damages to critical equipment	Planning & Regulation
48	Purchase and install storm shutters for coastal DPS facilities	2024 - 2029	Ongoing as funding and opportunitie s allow	Medium	1-3	All Hazards	DPS	GEMA/HS	Agency Budget	42	Reduces damages to agency facilities	Planning & Regulation
49	The Department of Agriculture will conduct an annual review of all its natural disaster plans and participate in fully functional food emergency exercises annually	2024 - 2029	Ongoing annually	High	1-3	All Hazards	GDAg	GDAg	Ag Grant	43	Improves training and preparedness for such events.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
50	To activate the Agricultural Information Sharing and Analysis Center (AGISAC) to serve as a clearinghouse for information impacting agriculture	2024 - 2029	Ongoing as needed	High	1-3	All Hazards	GDAg	GDAg	Ag Grant	44	Helps make critical information available during disaster.	Planning & Regulation
51	To establish a system of pet friendly shelters in times of disaster	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GDAg	GDAg	Ag Grant	45	Provides families with pets a place to go during evacuations.	Planning & Regulation
52	To continue strengthening the foundation of the All Hazards State Agriculture Response Team	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GDAg	GDAg	Ag Grant	46	Improves training and preparedness for such events.	Planning & Regulation
53	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	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	GDAg	GDAg	Ag Grant	47	Helps make critical information available during disaster.	Planning & Regulation
54	Identify new funding sources to update local mitigation plans	2024 - 2029	Ongoing as funding opportunities allow.	High	1-3	All Hazards	GEMA/HS	FEMA	HMA	48	Helps improve mitigation planning	Planning & Regulation
55	Provide assistance to Georgia counties in obtaining grant funding to update local mitigation plans	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	FEMA,	HMA	49	Helps improve mitigation planning	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
56	Conduct plan kickoff meetings with local mitigation planning committees to provide overview of the mitigation planning process	2024 - 2029	Ongoing as needed	High	1-3	All Hazards	GEMA/HS	Local Communities	Local Budget	50	Helps improve mitigation planning	Planning & Regulation
57	Provide tools, such as fillable charts and templates to assist local planners with data collection for the completion of local mitigation plan documents	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	51	Helps improve mitigation planning Risk Assessments	Planning & Regulation
58	Provide updated mapping to local communities through GMIS for the Flood, Wildfire, Landslide, Seismic, SLOSH and Wind hazards	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	52	Helps improve mitigation planning Risk Assessments	Planning & Regulation
59	Provide and encourage the use of the best available historic, risk and vulnerability data and resources to counties for use in local mitigation plans.	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS, GFC, DNR, NWC, USGS, Other applicable	HMA, Agency and Local budgets	53	Helps improve mitigation planning Risk Assessments	Planning & Regulation
60	Encourage and assist local communities to include dam risks and all elements of HHPD program in local mitigation plan updates	2024 - 2029	New	High	1-3	Dam Failure	GEMA/HS	GEMA/HS, DNR Safe Dams	HMA, Agency and Local budgets	N/A	Helps improve mitigation planning Risk Assessments	Planning & Regulation
61	Provide training to local county EMA Directors, planners and state users on entering data into the Georgia Mitigation Information System (GMIS)	2024 - 2029	Ongoing as needed	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	54	Helps improve mitigation planning Risk Assessments	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
62	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	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	55	Helps improve integration of local plans into the State Plan	Planning & Regulation
63	Review local mitigation plans for compliance with Federal regulations prior to submittal to FEMA	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	FEMA	HMA	56	Helps improve mitigation planning	Planning & Regulation
64	Georgia will maintain Enhanced State Mitigation Plan status throughout SYF 2029	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	57	Encourages continued high quality program management and allows additional funding for mitigation projects.	Planning & Regulation
65	Identify potential funding assistance to implement mitigation measures for state agencies and local governments	2024 - 2029	Ongoing continually and as funding opportunitie s allow	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	58	Helps improve Hazard Mitigation throughout the State.	Planning & Regulation
66	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	2024 - 2029	Ongoing after every major disaster.	High	1-3	All Hazards	GEMA/HS	FEMA	HMA	59	Helps improve Hazard Mitigation throughout the State.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
67	Provide State Plan risk assessment data on GEMA/HS's Hazard Mitigation Website for local communities to utilize in their local mitigation planning processes	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	60	Helps improve integration of State and local plan data	Planning & Regulation
68	Georgia will achieve 100% federal approval for the second update of all 159 local mitigation plans by SFY 2029	2024 - 2029	New	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	N/A	Helps increase awareness of risk to natural hazards and benefits of mitigation and helps ensure continued eligibility for mitigation funding	Planning & Regulation
69	Georgia will achieve 100% federal approval for the third update of all 159 local mitigation plans by SFY 2029	2024 - 2029	New	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	N/A	Helps increase awareness of risk to natural hazards and benefits of mitigation and helps ensure continued eligibility for mitigation funding	Planning & Regulation
70	Update GMIS with the most current flood maps available from FEMA	2024 - 2029	Ongoing continually	High	1-3	Flooding	GEMA/HS	DNR & FEMA	HMA	63	Helps improve awareness of risk to flood hazards.	Planning & Regulation
71	Add and maintain tax parcel data to GMIS	2024 - 2029	Ongoing continually as parcel data is updated	Medium	1-3	All Hazards	GEMA/HS	DCA	HMA	64	Provide access to better data for better risk analysis	Planning & Regulation
72	Update GMIS with the most current Wildfire maps available from the Georgia Forestry Commission	2024 - 2029	Ongoing as maps are updated	High	1-3	Wildfire	GEMA/HS	GFC	HMA	65	Provide access to better data for better risk analysis	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
73	Determine effectiveness of mitigation programs through loss avoidance studies	2024 - 2029	Ongoing after major disasters	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	66	Helps ensure the most effective use of mitigation funding.	Planning & Regulation
74	Update repetitive loss data in GMIS and maintain database to track mitigation activities including mitigated properties and repetitive loss structures	2024 - 2029	Ongoing continually	High	1-3	Flood	GEMA/HS	GEMA/HS	HMA & Agency Budget	68	Helps provide the best information available for flood risk assessment.	Planning & Regulation
75	Conduct post disaster review of state and local hazard mitigation plans for evaluation and updating as appropriate	2024 - 2029	Ongoing after major disasters	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	69	Helps ensure risk assessments remain relevant as times change.	Planning & Regulation
76	Collect category one and two data from the Safe Dams Program	2024 - 2029	Ongoing continually	Low	1-3	Flood & Dam Failure	GEMA/HS	DNR	Agency Budget	70	Ensure the use of the most up to date data in risk assessments.	Planning & Regulation
77	Develop update a map for dams in the risk evaluation portion of the state hazard mitigation plan	2024 - 2029	Ongoing continually	Low	1-3	Flood & Dam Failure	GEMA/HS	DNR	Agency Budget	71	Ensure the use of the most up to date data in risk assessments.	Planning & Regulation
78	Determine non-human loss from dam failures, including population, structures and infrastructure at risk, as well as other relevant information.	2024 - 2029	Deferred due to staffing and time constraints	Low	1-3	Flood & Dam Failure	GEMA/HS	DNR	Agency Budget	72	Helps improve understanding of risks to dam failures.	Planning & Regulation
79	Provide technical assistance to local communities in identifying and developing hazard mitigation projects	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	73	Helps improve Hazard Mitigation throughout the State.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
80	Support cost effective mitigation activities that minimize damages and or provide uninterrupted operational capabilities to critical facilities, utilities and property	2024 - 2029	Ongoing as funding opportunities allow	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	74	Reduces damages and ensures continued operability of essential services.	Planning & Regulation
81	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 and reducing flood-loss claims against the NFIP	2024 - 2029	Ongoing as funding opportunities allow	Medium	1-3	Inland Flooding	GEMA/HS	Local Communities, DNR	HMA	67&75	Reduces damages and losses to flood prone properties and helps restore floodplains to a natural state.	Planning & Regulation
82	Utilize and share information on lessons learned from analysis of the mitigated properties database	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	76	Helps ensure the effective use of future mitigation funding.	Planning & Regulation
83	Investigate mitigation grant opportunities with Department of Agriculture	2024 - 2029	Ongoing as staff and funding resources allow	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	77	Help reduce losses to agricultural areas.	Planning & Regulation
84	Develop and maintain matrix of all local capabilities for next state strategy update	2024 - 2029	Deferred due to staffing and time constraints	Low	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	78	Helps improve integration of local plan information into the State Plan.	Planning & Regulation
85	Research feasibility and practicality of additional high priority projects identified in mitigation strategy workshop.	2024 - 2029	Deferred due to staffing and time constraints	Medium	1-3	All Hazards	GEMA/HS	Various	HMA and Agency Budget	79	Will help reduce future damages and losses from multiple hazards.	Planning and Regulation

2019 MITIGATION ACTIONS											
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
86	Integrate hazard mitigation into other state and local processes such as THIRA, Long-Term Recovery Plan, local comprehensive plans, CWPPs, and capital improvement plans	2024 - 2029	Ongoing as various plans are updated	High	1-3	All Hazards	GEMA/HS	DCA, GFC, Local Communities	HMA & Agency Budget	80	Helps improve the full integration of hazard mitigation into other operations.	Planning & Regulation
87	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	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	81	Help reduce damages to flood prone properties and to improve access to flood insurance.	Planning and Regulation
88	Assist local communities with eligible acquisition/elevation, floodproofing, and storm water projects	2024 - 2029	Ongoing continually	High	1-3	Inland Flooding	GEMA/HS	GEMA/HS	HMA & Agency Budget	82	Help reduce damages resulting from flooding.	Structure & Infrastructure
89	Promote the development of safe areas in public and private schools	2024 - 2029	Ongoing as opportunitie s allow	High	1-3	Tornadoes	GEMA/HS	BOR, DOE & Local Communities	HMA & Agency Budget	83	Protect people from tornadoes.	Structure & Infrastructure
90	Expand the use of safe rooms throughout Georgia communities	2024 - 2029	Ongoing as funding and opportunitie s allow	High	1-3	Tornadoes	GEMA/HS	GEMA/HS & GFC	HMA & Agency Budget	84	Protect people from tornadoes	Structure & Infrastructure
91	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	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA & Agency Budget	85	Reduce damages to state owned and operated facilities.	Structure & Infrastructure
92	Coordinate with local emergency management agencies to predesignate safe areas for at-risk population	2024 - 2029	Ongoing continually	High	1-3	Tornadoes	GEMA/HS	GEMA/HS	EMPG & Agency Budget	86	Protect people from tornadoes and severe weather.	Structure & Infrastructure

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
93	Identify historic sites that may be vulnerable to natural hazards	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	GEMA/HS	SHPO	HMA & Agency Budget	87	Improve understanding of risks to historic sites.	Natural & Cultural Protection
94	Ensure there are no adverse effects of any proposed mitigation projects on Georgia's natural resources and/or threatened or endangered species	2024 - 2029	Ongoing with each mitigation project	Low	1-3	All Hazards	GEMA/HS	FEMA, US Fish Wildlife	HMA & Agency Budget	88	Protect natural resources and endangered or threatened species.	Natural & Cultural Protection
95	Educate and promote the prevention of development in places such as flood plains, steep ravines, lands with underground caves, through news letters and workshops	2024 - 2029	Ongoing continually	Low	1-3	All Hazards	GEMA/HS	DCA, DNR	HMA & Agency Budget	89	Protect natural resources and endangered or threatened species.	Natural & Cultural Protection
96	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.	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	90	Improve public awareness of and encourage practices that help improve resilience to natural hazards.	Public Awareness
97	Support the use of state of the art warning technology and local and State warning projects with available initiative funds	2024 - 2029	Ongoing as funding allows	Medium	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	91	Help protect people by warning of incoming severe weather.	Public Awareness
98	Expand NOAA weather alert system by applying for grants to distribute radios to local communities	2024 - 2029	Ongoing as funding allows	Medium	1-3	All Hazards	GEMA/HS	Local Communities	HMA, Agency Budget	92	Help reduce loss of life by warning of incoming severe weather.	Public Awareness
99	Determine percentage of population coverage by current alert systems	2024 - 2029	Deferred due to time and staffing resources	Medium	1-3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	93	Help reduce loss of life by warning of incoming severe weather.	Public Awareness

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
100	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	2024 - 2029	Ongoing continually	Medium	1-3	All Hazards	GEMA/HS	GEMA/HS, NWS	Agency Budget	94	Improve public awareness of and encourage practices that help improve resilience to natural hazards.	Public Awareness
101	Promote and share Mitigation Ideas Guide (Jan 2013) with local communities and planners	2024 - 2029	Ongoing continually and as local plan updates are started.	High	1-3	All Hazards	GEMA/HS	FEMA	Agency Budget	95	Help improve mitigation throughout the State	Public Awareness
102	Make Georgia hazard data available on GEMA/HS webpage	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	96	Help improve awareness of natural hazards.	Public Awareness
103	Conduct post-disaster workshops for affected local communities	2024 - 2029	Ongoing after major disasters	High	1-3	All Hazards	GEMA/HS	NRCS	HMA, Agency Budget	97	Help encourage effective use of mitigation opportunities.	Public Awareness
104	Share mitigation project/plan success stories via media such as websites and newsletters	2024 - 2029	Ongoing as opportunitie s allow	Medium	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA, Agency Budget	98	Help improve awareness of the benefits of mitigation.	Public Awareness
105	Develop workshops and webinars to facilitate the update of the state plan risk assessment	2024 - 2029	Ongoing prior to the beginning of the State Plan major update process.	High	1-3	All Hazards	GEMA/HS	FEMA	HMA, Agency Budget	99	Help obtain the best available information for future updates to the State Plan.	Public Awareness

2019 MITIGATION ACTIONS												
2024 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**Previous Item #**	**Contribution to Mitigation**	**FEMA Category**
106	Increase local participation in flood hazard mitigation programs such as NFIP and CRS, through workshops and posted information on GEMA/HS and DNR websites	2024 - 2029	Ongoing as opportunitie s arise	High	1-3	Flood	GEMA/HS	DNR & FEMA	Agency Budget	100	Improve public awareness of and encourage practices that help improve resilience to natural hazards	Public Awareness
107	Increase local participation in hazard mitigation programs such as Firewise and Storm Ready Communities, through workshops and posted information on GEMA/HS website	2024 - 2029	Ongoing as opportunitie s arise.	High	1-3	All Hazards	GEMA/HS	FEMA & NWS	Agency Budget	101	Improve public awareness of and encourage practices that help improve resilience to natural hazards	Public Awareness
108	Distribute information via brochures, websites, webinars and workshops on community and household saferooms to Georgia communities	2024 - 2029	Ongoing as opportunitie s arise.	Medium	1-3	Tornadoes	GEMA/HS	GEMA/HS	Agency Budget	102	Help protect people from tornadoes.	Public Awareness
109	Support the Severe Weather Awareness Week and the Prescribed Fire Awareness Week campaigns in partnership with the Office of the Governor	2024 - 2029	Ongoing as applicable	High	1-3	Severe Weather, Wildfire	GEMA/HS	GEMA/HS	HMA, Agency Budget	103	Improve public awareness of and encourage practices that help improve resilience to natural hazards	Public Awareness
110	Increase community awareness of the negative impacts of repetitive loss properties and the benefits of mitigation actions	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	DNR	HMA, Agency Budget	104	Improve public awareness of and encourage practices that help improve resilience to flooding	Public Awareness

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
111	Participate with the Georgia Silver Jackets Team to promote flood risk management programs throughout the state.	2024 - 2029	Ongoing continually	High	1-3	Flood	GEMA/HS	USGS, NWS, USACE, FEMA, EPA, NRCS, FHA, USEDA	HMA, Agency Budgets	105	Bring together multiple agencies and funding sources to reduce the potential for losses from flooding	Planning & Regulation
112	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.	2024 - 2029	Ongoing as HMA assistance opportunitie s become available	Low	1-3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	106	Encourage practices that help improve resilience to natural hazards	Planning & Regulation
113	Promote safe room construction at all levels i.e. (individual residents, local governments and local school districts, and private industry).	2024 - 2029	Ongoing continually as opportunitie s arise	Low	1-3	Tornadoes	GEMA/HS	GEMA/HS	Agency Budget	107	Protect people from tornadoes.	Planning & Regulation
114	Continue education of local emergency managers on various mitigation activities and funding opportunities	2024 - 2029	Ongoing continually	Low	1-3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	108	Encourage practices that help improve resilience to natural hazards	Planning & Regulation
115	Promote mitigation activities on properties that are located in areas vulnerable to hazards	2024 - 2029	Ongoing continually	Low	1-3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	109	Encourage practices that help improve resilience to natural hazards	Planning & Regulation
116	Promote structural retrofits for structures that are vulnerable to wind events	2024 - 2029	Ongoing continually	Low	1-3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	110	Encourage practices that help improve resilience to wind related hazards.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
117	Develop working relationship with local floodplain managers to educate them on the FEMA's Flood Mitigation Assistance program	2024 - 2029	Ongoing continually	Low	1-3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	111	Improve awareness of flood mitigation programs	Planning & Regulation
118	Identify properties that might be eligible for cost effective mitigation measures and coordinate results with local governments	2024 - 2029	Ongoing continually	Low	1-3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget	112	Encourage practices that help improve resilience to flooding	Planning & Regulation
119	Assess all critical infrastructure for securing concerns.	2024 - 2029	Ongoing continually	High	1-3	Non-Natural Hazards	GEMA/HS	GEMA/HS	Agency Budget	112-A	Prevent failure of critical infrastructure from human causes.	Structure and Infrastructure
120	Coordinate the Radiological Emergency Preparedness program through planning, training, and exercises with licensees and other offsite response organizations in accordance with NUREG-0654/FEMA REP 1.	2024 - 2029	Ongoing continually	High	1-3	Non-Natural Hazards	GEMA/HS	GEMA/HS, DNR EPD	Agency Budget	112-B	Demonstrate "Reasonable Assurance" that offsite response organization in coordination with the licensee can protect the public..	Planning & Regulation
121	Provide robust training program ensuring first responders are able to plan for and respond to hazardous materials incidents.	2024 - 2029	Ongoing continually	High	1-3	Non-Natural Hazards	GEMA/HS	GEMA/HS DNR EPD	Agency Budget, HMEP	112-C	Reduce risk to life and property from hazardous materials incidents.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
122	Monitor and respond to alerts of potential radiological and hazardous material releases	2024 - 2029	Ongoing continually	High	1-3	Non-Natural Hazards	GEMA/HS	GEMA/HS	Agency Budget	112-D	Lessen damages and injuries by warning people and, where possible, halting further spread of radiological and hazardous material from releases.	Planning and Regulation
123	Assist Georgia Technology Authority in monitoring for Cyber threats	2024 - 2029	Ongoing continually	High	1-3	Non-Natural Hazards	GEMA/HS	GEMA/HS	Agency Budget	112-E	Prevent and/or reduce impacts from potential cyber-attacks.	Structure and Infrastructure
124	Conduct Active Shooter Training	2024 - 2029	Ongoing continually	High	1-3	Non-Natural Hazards	GEMA/HS	GEMA/HS	Agency Budget	112-F	Reduces losses of life by training citizens on how to best protect themselves, as well as training responders how to respond most efficiently and effectively.	Prevention
125	Monitor for threats of active shooter	2024 - 2029	Ongoing continually	High	1-3	Non-Natural Hazards	GEMA/HS	GEMA/HS	Agency Budget	112-G	Reduces likelihood of an active shooter situation	Prevention
126	Monitor alerts for infectious diseases	2024 - 2029	Ongoing continually	High	1-3	Non-Natural Hazards	GEMA/HS	GEMA/HS	Agency budget	112-H	Reduces potential loss of life by warning people and, where possible, halting further spread of the disease.	Prevention
127	Update GMIS database	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	ITOS	HMA	137	Provide best available data for risk assessments.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**Previous Item #**	**Contribution to Mitigation**	**FEMA Category**
128	Identify underserved populations, including their mitigation related needs, and explore methods to meet those needs as applicable	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GEMA/HS	GEMA/HS	Agency Budget, HMA, HMGP, Other	New	Provide weather radar service and improved warning capabilities throughout the State.	Structure and Infrastructure
129	Expand NWS Weather Radar system to achieve 100% coverage throughout the State.	2024 - 2029	Ongoing continually	High	1-3	All Hazards	NWS	GEMA/HS	Agency Budget, HMA, HMGP, Other	138-C	Provide weather radar service and improved warning capabilities throughout the State.	Structure and Infrastructure
130	Facebook Fans – Increase total number of fans by 20 percent over 2019 number	2024 - 2029	Ongoing	High	1-3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	113	Improve the awareness of the importance of individual resilience	Public Awareness
131	Twitter Followers – increase total number of followers by 20 percent over 2019 number	2024 - 2029	Ongoing	High	1-3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	114	Improve the awareness of the importance of individual resilience	Public Awareness
132	Distribute quarterly publication – The Dispatch	2024 - 2029	Ongoing	High	1-3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	115	Improve the awareness of the importance of individual resilience	Public Awareness
133	Dispatch Readers – increase total number of readers by 20 percent over 2019 number	2024 - 2029	Ongoing	High	1-3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	116	Improve the awareness of the importance of individual resilience	Public Awareness
134	Ready Georgia – increase total number of app users by 20 percent over 2019 number	2024 - 2029	Ongoing	High	1-3	All Hazards	GEMA/HS External Affairs	GEMA/HS	Agency Budget	117	Improve the awareness of the importance of individual resilience	Public Awareness
135	Develop and update Wildfire Protection Plans throughout the State	2024 - 2029	Ongoing continually as needed	High	1-3	Wildfire	GFC	GEMA/HS	Agency Budget	118	Improve assessment of wildfire hazard.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**Previous Item #**	**Contribution to Mitigation**	**FEMA Category**
136	Update Community Wildfire Protection (CWPP) in conjunction with Local Hazard Mitigation Plan (LHMP) update	2024 - 2029	Ongoing as LHMPs are updated	High	1-3	Wildfire	GFC	GEMA/HS	Agency Budget	119	Improve assessment of wildfire hazard.	Planning & Regulation
137	Continue developing the hazard, risk, and vulnerability assessments for CWPP and SWRA by utilizing updated technology and improved data	2024 - 2029	Ongoing continually	High	1-3	Wildfire	GFC	GEMA/HS	Agency Budget	120	Improve assessment of wildfire hazard.	Planning & Regulation
138	Support prescribed burning in CWPP plans	2024 - 2029	Ongoing continually	High	1-3	Wildfire	GFC	GFC	EMPG	121	Reduce risk of fires.	Planning & Regulation
139	Build future buildings to withstand high winds and other hazards	2024 - 2029	Ongoing as applicable	High	1-3	All Hazards	GFC	GBA	Agency Budget	122	Reduce damages to future GFC facilities	Structure & Infrastructure
140	Increase local participation in fire hazard mitigation programs such as FireWise, through workshops and posted information on GEMA/HS and GFC websites	2024 - 2029	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
141	Encourage local communities to review related planning processes such as CWPPs and Comprehensive Plans, when updating LHMPs	2024 - 2029	Ongoing when LHMPs are updated.	High	1-3	All Hazards	GFC & DCA	GEMA/HS	Agency Budget	124	Improve integration and consideration of wildfire hazard in other operations.	Planning & Regulation
142	Purchase 2 Single Engine Air Tankers for wildfire mitigation	2024 - 2029	In Process	High	1-3	Wildfire	GFC	GFC	Agency Budget	125	Improve preparedness for wildfire events.	Planning and Regulation
143	Wildfire Response fire dispatch system wtih equipment tracking	2024 - 2029	Ongoing	High	1-3	Wildfire	GFC	GFC	Agency Budget	126	Improve preparedness for wildfire events.	Planning and Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
144	Recommend and support creation of defensible space and hazardous fuels reduction activities, such as clearing of dead vegetation, greenstrips/firebreaks , prescribed burning, etc.	2024 - 2029	Ongoing	High	1-3	Wildfire	GFC	GFC	Agency Budget	126-A	Reduce risk of wildfire	Public Awareness / Planning and Regulation
145	Update Hurricane Procedure Manual and Preparedness Guide for the Georgia Port Authority	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GPA	GPA	Agency Budget	127	Improve preparedness for hurricane events.	Structure & Infrastructure
146	The Georgia Port Authority will participate in the development of Coastal County Hazard Mitigation Plan updates	2024 - 2029	Ongoing as hazard mitigation plans are updated.	High	1-3	All Hazards	GPA	GPA	HMA & Agency Budget	128	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation
147	The Georgia Port Authority has begun the procedure of stacking containers three high and tying the ends together to prevent property damage	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GPA	GPA	Agency Budget	129	Reduce risk of damages from hurricanes.	Structure & Infrastructure
148	Elevate flood prone areas at the Georgia Ports Authority Colonel's Island facility in Brunswick, GA	2024 - 2029	In Process. Mitigation funds applied for.	High	1-3	Flooding	GPA	GEMA/HS	HMGP/HMA, Agency Budget	130	Reduce risk of damages from storm surge.	Structure & Infrastructure
149	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	2024 - 2029	Ongoing continually	High	1-3	All Hazards	GPA	GPA	Agency Budget	131	Improve preparedness for severe weather type events.	Planning and Regulation

2019 MITIGATION ACTIONS												
2024 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**Previous Item #**	**Contribution to Mitigation**	**FEMA Category**
150	Purchase a cache of portable generators to make available to rural water systems during power outages.	2024 - 2029	In Process. Mitigation Funds applied for.	High	1-3	All Hazards	GRWA	GEMA.HS	Agency Budget / HMA, HMGP	131-A	Improve continual operating capabilities of rural water systems during power outages.	Structure and Infrastructure
151	Develop breach zone studies to mitigate potential loss of life in the event of dam failure	2024 - 2029	Ongoing as funding and opportunitie s allow.	Medium	1-3	Dam Failure	GSWCC	GSWCC	NRCS	132	Improve awareness of risks from dam failures.	Planning & Regulation
152	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	2024 - 2029	Ongoing as opportunitie s allow	Medium	1-3	Dam Failure	GSWCC	GSWCC	NRCS	133	Reduce potential for damages from future dam failure events.	Planning & Regulation
153	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	2024 - 2029	Ongoing continually	Medium	1-3	Dam Failure	GSWCC	GSWCC	NRCS	134	Improve awareness of risks from dam failures.	Planning & Regulation
154	Establish a procedure for District personnel to work with county EMGs in practice drills or preparedness during a dam failure simulation	2024 - 2029	Ongoing continually	Medium	1-3	Dam Failure	GSWCC	GSWCC	NRCS	135	Improve preparedness for dam failure events.	Planning & Regulation
155	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	2024 - 2029	Ongoing as funding opportunitie s allow.	Medium	1-3	Dam Failure	GSWCC	GSWCC	NRCS	136	Reduce potential for future dam failure events.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
156	Monitor current information and make recommendations regarding cyber security measures	2024 - 2029	Ongoing Continually	High	1-3	Non-Natural Hazards (Cyber Attacks)	GTA	GTA	Agency Budget	138-A	Reduce potential for future cyber-attack occurrences	Prevention
157	Monitor alerts and respond to requests in the event of cyber-attacks	2024 - 2029	Ongoing Continually	High	1-3	Non-Natural Hazards (Cyber Attacks)	GTA	GTA	Agency Budget	138-B	Reduce losses resulting from cyber-attack occurrences	Prevention
158	Add and upgrade culverts around Jekyll Island to improve drainage.	2024-2029	New	High	3-Jan	Flooding	Jekyll Island Authority	GEMA/HS, USACE, Other	Agency Budget, Grants	N/A	Reduces flooding by improving drainage throughout the Island	Structure and Infrastructure
159	Add firebreaks around Jekyll Island	2024-2029	New	High	3-Jan	Wildfire	Jekyll Island Authority		Agency Budget	N/A	Reduces potential for wildfires to spread to protected areas	Structure and Infrastructure
160	Create Comprehensive Fire Management Plan for Jekyll Island	2024-2029	New	High	3-Jan	Wildfire	Jekyll Island Authority		Agency Budget	N/A	Creates a comprehensve plan for increasing wildfire resilience	Structure and Infrastructure
161	Restore beach pond at Indian Mound Golf Course to retain fresh water during drought	2024-2029	New	High	3-Jan	Drought	Jekyll Island Authority		Agency Budget	N/A	Provides a resource for fresh water during times of drought.	Structure and Infrastructure
162	The Archives will provide training on disaster preparedness to local governments and other not-for-profit cultural organizations in Georgia	2024 - 2029	Ongoing continually as needed	High	1-3	All Hazards	SOS	SOS	IMLS	138	Improve preparedness for natural hazard events.	Planning & Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
163	The Archives will collect GIS information for all collection holding organizations in Georgia in a database to determine their level of emergency preparedness	2024 - 2029	Ongoing continually	High	1-3	All Hazards	SOS	SOS	IMLS	139	Improve preparedness for natural hazard events.	Planning & Regulation
164	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	2024 - 2029	Ongoing continually	High	1-3	All Hazards	SOS	SOS, FEMA	IMLS	140	Improve resiliency to natural hazard events.	Planning & Regulation
165	Expand the current Georgia Archives emergency plan to include provisions for business continuity and for water conservation	2024 - 2029	Ongoing continually	High	1-3	All Hazards	SOS	SOS	IMLS	141	Improve resiliency to natural hazard events.	Planning & Regulation
166	Annual revision of Hazard Vulnerability Assessments (System & 22 Individual colleges)	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency 'Budget	142	Help prevent damages to facilities by ensuring risk assessments remain up to date.	Planning and Regulation
167	Annual revision of Critical Mission Functions (System & 22 Individual colleges)	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	143	Improve preparedness for future hazard events.	Planning and Regulation
168	Implement orientation for any new College Emergency Operations Coordinators	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	144	Improve preparedness for future hazard events.	Planning and Regulation
169	Implement orientation for any new College Business Continuity Coordinators	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	145	Improve preparedness for future hazard events.	Planning and Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
170	NIMS training & credentialing all College (22) Emergency Operations Coordinators	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	146	Improve preparedness for future hazard events.	Planning and Regulation
171	NIMS training & credentialing all College (22) Business Continuity Coordinators	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	147	Improve preparedness for future hazard events.	Planning and Regulation
172	Biannual training and peer review Emergency Operations Coordinators	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	148	Improve preparedness for future hazard events.	Planning and Regulation
173	Biannual training and peer review Business Continuity Coordinators	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	149	Improve preparedness for future hazard events.	Planning and Regulation
174	Coordination with Local Hazard Mitigation Plan Groups across 22 Colleges' Service Delivery Areas (90+ counties)	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	150	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation
175	Periodic assessment of 22 College Emergency Operations and Business Continuity Plans	2023-2029	New	HIgh	3-Jan	All Hazards	TCSG	GEMA/HS	Agency Budget	N/A	Improve preparedness for future hazard events.	Planning and Regulation
176	Periodic assessment of 22 College Safety Committees and Community Safety Advisory Boards	2024 - 2029	New	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	N/A	Improve preparedness for future hazard events.	Planning and Regulation
177	Coordination of Mitigation Planning with TCSG System Office Facilities Management	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	152	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation
178	Coordination of Mitigation Planning with Colleges' (22) Facilities Management Peer Group	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	153	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation

2019 MITIGATION ACTIONS												
2024 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	Previous Item #	Contribution to Mitigation	FEMA Category
179	Coordination of Mitigation Planning with TCSG System Office Strategic Planning	2024 - 2029	Ongoing	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	154	Improve awareness and assessment of risks and vulnerabilities	Planning and Regulation
180	Expand the number of Flood Tracking Chart Projects to other river basins, ensuring greater availability of information to the emergency management community and public	2024 - 2029	Ongoing as funding and opportunities allow	Medium	1-3	Inland Flooding	USGS	GEMA/HS, DNR, NOAA	USGS, DNR, Local	155	Improve understanding for flood risks	Planning and Regulation
181	Improve statewide Digital Elevation Models	2024 - 2029	Ongoing continually	High	1-3	All Hazards	USGS	DNR	USGS	156	Improve understanding for flood risks	Planning and Regulation
182	Share and promote stream gauge historic crests database to local communities	2024 - 2029	Ongoing continually	High	1-3	Flood	USGS	GEMA/HS & NWS	HMA, Agency Budget	157	Provide best available information for awareness and local planning and preparedness.	Public Awareness
183	Increase the number of stream gauges in Georgia	2024 - 2029	Ongoing as funding allows	High	1-3	Flood	USGS	GEMA/HS	HMA, Agency Budget	158	Provide best available information for awareness and planning and preparedness	Public Awareness

TABLE 3.6: COMBINED OR DELETED MITIGATION ACTION TABLE

2019 COMBINED / DELETED MITIGATION ACTIONS										
2019 Item #	**Mitigation Actions**	**Timeline**	**Status**	**Priority**	**State Goal**	**Hazard**	**Lead Agency**	**Support Agency**	**Resources**	**FEMA Category**
25	Review state definition of loss categories in dam failure	2019 - 2024	Deleted	Low	3-Jan	Flood & Dam Failure	DNR Safe Dams	DNR	Agency Budget	Planning & Regulation
71	Reduce flood loss claims against NFIP through the mitigation of repetitive loss properties	2019 - 2024	Combined with Item 78	High	1-3	Flood	GEMA/HS	DNR & FEMA	Agency Budget	Planning & Regulatiuon

TABLE 3.7: COMPLETED MITIGATION ACTION TABLE

2019 COMPLETED MITIGATION ACTIONS										
2019 Item #	Mitigation Actions	Timeline	Status	Priority	State Goal	Hazard	Lead Agency	Support Agency	Resources	FEMA Category
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	Completed	Low	3-Jan	Flood & Dam Failure	DNR Safe Dams	GEMA/HS	Agency Budget	Planning & Regulation
65	Georgia will achieve 80% federal approval for the second update of all 159 local mitigation plans by SFY 2024	2019 - 2024	Completed	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	Planning & Regulation
66	Georgia will achieve 25% federal approval for the third update of all 159 local mitigation plans by SFY 2024	2019 - 2024	Completed	High	1-3	All Hazards	GEMA/HS	GEMA/HS	HMA	Planning & Regulation
171	Re-establishment of College Safety Committees and Community Safety Advisory Boards	2019 - 2024	Completed	High	1-3	All Hazards	TCSG	GEMA/HS	Agency Budget	Planning and Regulation

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 2019.

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.

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 managing development in the regulatory 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 Risk Determination (flood hazard mapping), Mitigation (floodplain management and regulation) and Flood insurance 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.

As of August 2023, there are 690 communities (counties, cities, and consolidated governments) in Georgia, of which 584 participate in the NFIP in all 159 counties. This is up from 561 in 2018. Of the 584 NFIP participating communities, 20 do not have any mapped Special Flood Hazard Areas (SFHAs) while there are 71 communities with mapped SFHAs that are not participating. Through the NFIP, there are now 61,283 policies in place, $17.6 billion total coverage, $38.2million total annual premium, 22,741 total number of claims since 1978 and $458.8 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 to residents and businesses through the NFIP.
- 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 (FIRM) 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 through the NFIP and;

    - Does not take positive steps to reduce the exposure of life and property in the face of authoritative scientific and technical data.

Repetitive Loss Structures

The National Flood Insurance Program (NFIP) maintains records of claims from flood damages to insured structures. Structures that are repetitively damaged by flooding and submit multiple claims are deemed to be either repetitive loss or severe repetitive loss. The NFIP defines these two categories as follows:

> **Repetitive Loss Structure:** An NIFP-insured structure that has had at least 2 paid losses of more than $1,000 each in any 10-year period since 1978
>
> **Severe Repetitive Loss Structure:** Any NFIP Insured single or multi-family residential structure that has incurred flood-related damage for which four or more separate claims payments have been made, with the amount of each claim (including building and contents) exceeding $5,000, and with the cumulative amount exceeding $20,000; or for which at least two separate claims (building only) have been made with the cumulative amount exceeding the market value of the structure.

The state, as part of its mitigation strategy, prioritizes mitigation and/or removal of repetitive loss and severe repetitive loss structures from flood prone areas. Nevertheless, the overall number of recognized repetitive loss structures has increased since 2018, going from 1,786 repetitive loss and 194 severe repetitive loss structures to 2,301 repetitive loss and 315 severe repetitive loss structures in 2023. As of 2017, the State has mitigated 302 repetitive loss properties and 74 severe repetitive loss properties. Unfortunately, the State has not specifically tracked this since 2017. Nevertheless, the state continues to prioritize these properties in mitigation projects it receives.

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 a CRS Class Rating of 9 (5% discount) up to a CRS Class Rating of 1 (45% discount). Additional information about the CRS is located in Section 3.4.2. In partnership with GADNR-EPD and Georgia 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. As of August 2023, there are 54 Participating in the CRS, with 5 communities attaining a CRS Class Rating of 5 representing a 25% discount, the highest rating in Georgia.

Georgia CRS User's Group Activity

As of August 2023, there are 35 communities considered coastal communities in 8 counties (Bryan, Camden, Chatham, Effingham, Glynn, Liberty, Long and McIntosh). Of these, there are 18 communities comprising Bryan, Camden, Chatham, Effingham, Glynn, and McIntosh counties, in addition to the local jurisdictions of Bloomingdale, Brunswick, Garden City, Hinesville, Jekyll Island, Pembroke, Pooler, Richmond Hill, Savannah, St. Marys, Thunderbolt and Tybee Island that have joined the CRS Program and are the focus of a Georgia Coastal CRS User's Group. The group typically meets every two (2) months and efforts are currently underway to encourage the remaining coastal communities to join.

The Coastal CRS User's Group supports several training initiatives 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, known as L273. Most recently In December 2022, the city of Savannah hosted the L273 training with over 30 participants.

GADNR-EPD and Georgia Silver Jackets team members, are currently looking at ways to promote the formation of other CRS User Groups through the State in an effort to encourage participation in the CRS and to assist existing CRS communities with maintaining and/or improving their CRS Class Rating.

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.

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 GADNR-EPD has a strong working relationship with GAFM and GEMA/HS. Individual staff members of GADNR-EPD have served in the past and continue to serve as executive board members of GAFM. 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 GADNR-EPD and GAFM to collaborate on 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. One of the key stipulations in the model ordinance mandates that local governments adhere to a 3-foot freeboard requirement for the elevation of the lowest floor above the base flood elevation (BFE) determined from effective FIRMs This provision will significantly reduce future flood damages and flood insurance premiums on new and substantially improved structures.

This District model flood damage prevention 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.

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.

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.

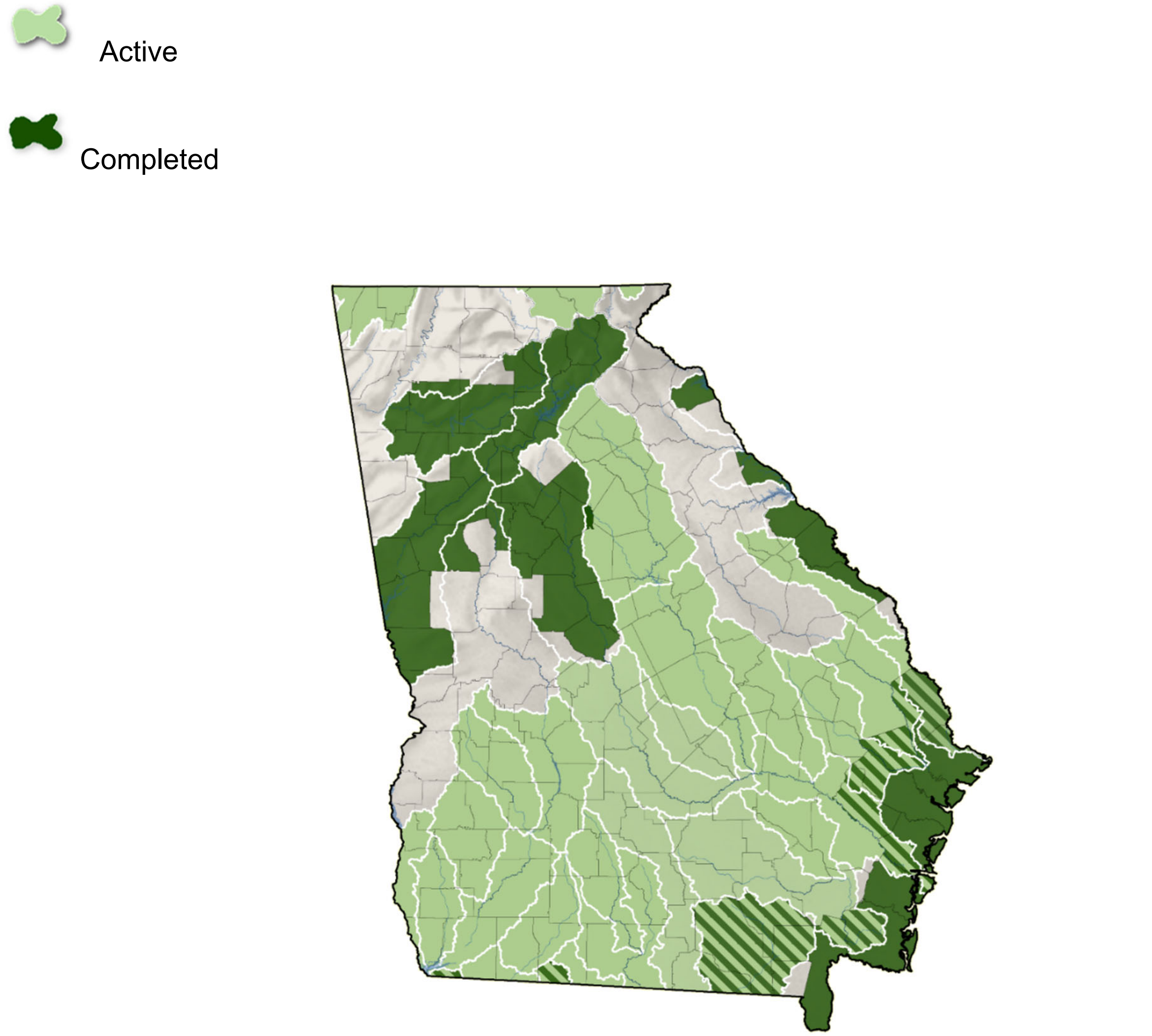
Building upon the goals and commitments of FEMA's Map Mod, FEMA implemented the Risk Mapping Assessment and Planning Process, known as Risk MAP. Risk MAP will produce products and services based on accurate and reliable data delivered through an integrated and collaborative approach. As shown in Figure 6.1, 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.

FIGURE 3.3: RISKMAP DIAGRAM

Since 2009, Since

GADNR-EPD has received about 57.4 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 completed Risk MAP projects in 35 Coastal Communities and 10 of the 52 HUC-8 watersheds in Georgia. Projects are active in a further 25 HUC-8 watersheds. Figure 6.2 following summarizes GADNR-EPD's Risk MAP activities.

FIGURE 3.4: 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, updated LiDAR data is now available statewide since the fall of 2022.

- 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). This information can be leveraged for watersheds benefitting from BLE studies.
- Hydraulic modeling to determine where flood waters will flow using computed peak flow values resulting from hydrologic modeling. This information can be leveraged for approximate studies for watersheds benefitting from BLE studies, further hydraulic modeling required for detailed studies.
- 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, including a virtual open house website mirrors the in-person open house setup, members of the public are able to determine their flood risk and book appointments to 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 present a Resilience Blueprint interactive tool that focuses on the 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

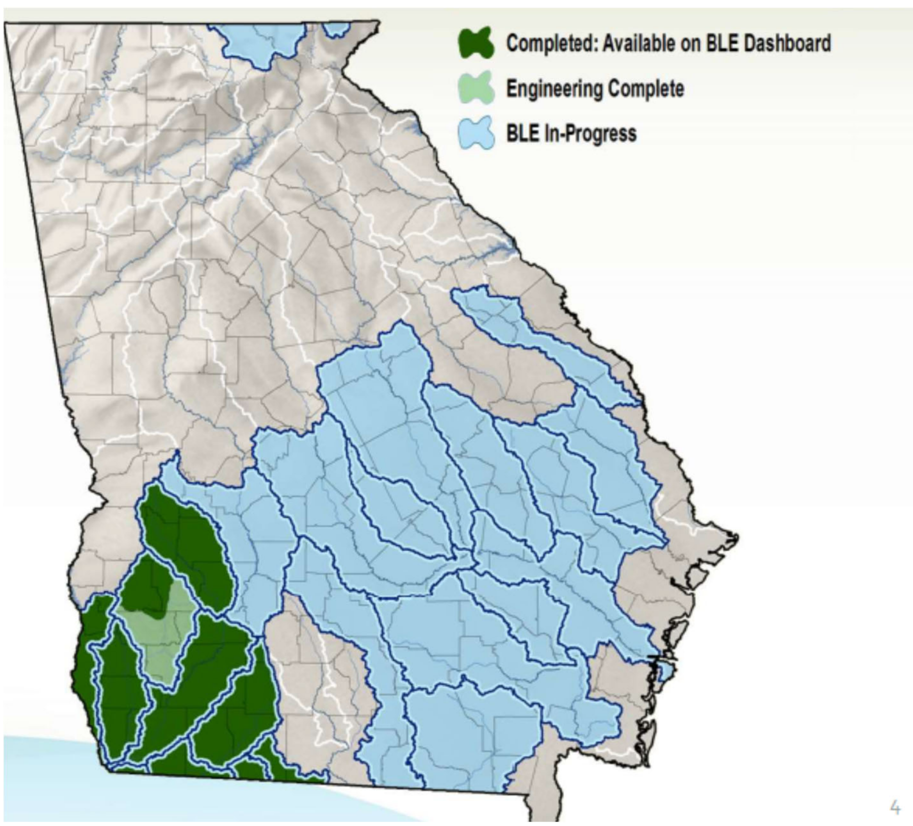
Base Level Engineering (BLE)

A significant portion of the effective FIRMs in Georgia represent a delineation of the regulatory floodplain (area inundated by the 1% annual chance flood) using approximate, as opposed detailed study methods. In this circumstance, the BFEs are not printed on the FIRMs. Although there is modelled back data generated from recent Risk MAP projects where BFEs can be computed, there are many areas where modelled back data is unavailable for use by local officials.

Consistent with Risk MAP, the BLE production approach combines high-resolution ground elevation data and modeling technology advancements to create engineering models and flood hazard data. These analyses are produced for large-scale areas, such as a watershed, as opposed to targeting individual streams for restudy. The resulting flood hazard information is based off engineering models that determine flood elevations along each stream studied within the watershed or area of interest. The data prepared provides flood hazard information to community officials and allows them to interact with analysis results and review areas identified as prone to flooding. The BLE data can be used as best available data where there are no effective detailed or modelled back studies. In addition, the results of the BLE studies can be used to prioritize funding and sequencing of Risk MAP projects through to the development of updated FIRMs.

GADNR-EPD has completed BLE studies in 10 HUC-8 watersheds (completed BLE data is hosted on GADNR-EPD website www.georgia dfirm.com) with studies ongoing in a further 15 HUC-8 watersheds.

FIGURE 3.5: STATUS BLE STUDIES



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 Audits, including Community Assistance Visits and Contacts

- Assistance with reviewing local flood ordinances to verify with NFIP requirements and adoption prior to effective date of FIRMs.

- Promoting participation in the NFIP and CRS.

- Continuing to build local capability, increase knowledge of the NFIP and understanding of floodplain management among local officials and stakeholders through workshops and training.

- Providing General Technical Assistance to communities, individuals and State agencies (i.e., Department of Transportation, Department of Education and Board of Regents).

- Upon completion of hydrology and hydraulic studies for Risk MAP projects, submitting summary reports of the results of these engineering studies to local community officials as a first indication of how flood risks may change based on the new studies.

- Prior to issue of Preliminary Digital Flood Insurance Rate Maps (DFIRMs) to a community, hosting flood risk review meetings with local officials where the proposed preliminary maps are presented to local officials, allowing them an opportunity to provide comments that could be incorporated into the preliminary products.

- Upon issuance of Preliminary DFIRMs) to a community, participating in Preliminary DFIRM Community Coordination (PDCC) meetings and Flood Risk Information Open Houses as well as providing guidance to local officials regarding ordinance update/adoption.

- After the issue of the Letter of Final Determination, hosting Resilience Meetings with local community officials to highlight the data and tools that will allow for communities to mitigate and respond to disasters associated with flooding. GADNR-EPD has developed a Resilience Blueprint, a collection that provides direct access to Flood Risk Datasets developed as part of state's Risk MAP Program activities. This collection of interactive map dashboards is intended to support local planning & mitigation activities.

- Providing assistance, both pre and post disaster, and supporting NFIP communities with technical assistance and training to implement and enforce the Substantial Damage and Substantial Improvement requirements of the NFIP. This includes hosting workshops to guide local communities in the development of Substantial Damage Administrative Procedures (SDAP) plan, particularly to address post disaster environments. Since flood risks and ordinance provisions change over time, a structure that was originally built in compliance, may become non-compliant later on. In this regard, the inventory of NFIP compliant structures is maintained through the Substantial Damage and Substantial Improvement provisions.

- Support for communities wishing to join and/or improve ratings within the Community Rating System.

- Environmental Planning Historic Preservation reviews for projects within or near the Special Flood Hazard Area.

- Review activities surrounding State owned or managed properties within or near the Special Flood Hazard Area

- Support implementation of the Disaster Recovery and Redevelopment Act in disaster declared areas.

- Community and Stakeholder workshops and trainings related to floodplain management.

Other Floodplain Management Information on website www.georgiadfirm.com

Floodplain unit also maintains a website, www.georgiadfirm.com that provides technical and outreach information for community officials and the public, The information available includes:

a. Flood Risk Snapshot “look up” tool that allows the public to enter their address and determine their flood risks.

b. The Flood Model Search where effective riverine hydraulic models can be searched and downloaded.

c. Risk MAP Process Overview

d. Digital Information Platform including:
    i. Resilience Blueprint comprising:
        1. Flood Loss Dashboard
        2. CRS Statistics
        3. Soil Data
        4. Future Conditions
        5. Freeboard Dashboard
        6. Approximate Dam Inundation Zones
        7. Inundated Structures Dashboard
        8. Changes Since Last FIRM
        9. Flood Probability

    ii. BLE information including:
        1. BLE Playbook
        2. BLE Viewer
        3. BLE Dashboard

e. Acronym and Abbreviation Table

f. Floodplain Management Quick Guide

g. Georgia DNR Outreach Planning Guidebook

h. Fact Sheets

i. Public Talking Points

j. Press Release Templates

k. Sample Property Owner Letters

l. Mapping Project Brochure Template

m. Example Mapping Web Page

n. Sample notification letters

o. Informational brochures/fact sheets

p. Phased suggested outreach schedule.

q. Greenspace and Flood Protection Guidebook

r. Flood Response Toolkit

s. Media Packets

t. Newsletters to help keep stakeholders informed

u. Model Ordinances

v. Community Contact Database

w. Risk MAP Project Status

x. Educational Videos

    i. An Outreach Guide for Community Officials
    ii. A Georgia Property Owner's Guide to Assessing Flood Risks

GEMA/HS continues to work closely with state floodplain management staff 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, flood risk products and BLE data 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 and BLE results to select future flood mitigation projects.

TABLE 3.8: MITIGATION-RELATED STATE AND FEDERAL PROGRAMS

Department	Program	Description
Georgia Environmental Finance Authority	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.

Department	Program	Description
Georgia Department of Natural Resources	Land and Water Conservation Fund	The Land and Water Conservation Fund (LWCF) Program is a federal program authorized by Congress for the purpose of acquiring federal lands and assisting states and local governments with funds to acquire lands and develop and renovate outdoor recreation facilities. LWCF funds are appropriated by Congress to the U. S. Department of the Interior, National Parks Service (NPS), and NPS allocates the funds through state agencies as a grant program to state and local governments. Grantees must match the grant award dollar for dollar. The LWCF Program, first authorized in 1965, has resulted in Georgia receiving over $120 million in matching grant funds. The program was reauthorized and received permanent funding in fiscal years 2019 and 2020 respectively. With the permanent funding, it is anticipated that Georgia will receive $5-7 million annually. In order to efficiently administer the grant funds, LWCF moved to a bi-annual grant cycle. With two years of allocations to award, an estimate of $10 million will be available to local governments during the 2022-2023 grant cycle.
	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 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

Department	Program	Description
		resilience projects is the Coastal Incentive Grants.
	Georgia Safe Dams	The Georgia Safe Dams program regulates and inspects dams throughout the State, The program has the ability to fund, through the High Hazard Potential Dam (HHPD) program, mitigation projects related to reducing the impact of failure of dams
	National Flood Insurance Program	
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.
	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

Department	Program	Description
		connection with the state-required preparation and 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, Homebuyer Mortgage Revenue Bond, Homeless and Special Needs Housing, HOME Investment Partnership, Georgia Housing Search, Redevelopment Fund, Environmental Educational and Assistance, and Construction Codes, and Planning. DCA

Department	Program	Description
		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
	Building Resilient Infrastructure and Communities Program	The BRIC 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. BRIC grants are to be awarded on a competitive basis.
	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.
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.

Department	Program	Description
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 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.

Department	Program	Description
		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.
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

Department	Program	Description
		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.
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.

Department	Program	Description
	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.
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.

Department	Program	Description
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 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)	National Water Information System	The National Water Information System (NWIS) provides access to water-related data at over 1.5 million sites in the United States and its territories. The sites are grouped into five categories: surface water, groundwater, springs, atmospheric, and other. At any given site, one or more types of data may be available. Where data collection is continuous, data may be available in real time, as individual observations, or as daily summaries. Some sites may have data from water quality samples. At stream sites, data may be available for flood peaks. For surface water and groundwater sites, data may be available for individual field measurements. For many active or recently active sites, there may also be an online annual summary report.

Department	Program	Description
United State Geological Survey (USGS)	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.
		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

Department	Program	Description
		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.
	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.

Department	Program	Description
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 o 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 departmental policy and local operating procedures

Department	Program	Description
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.
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

Department	Program	Description
		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, 2018 Edition, with Georgia Amendments (2020), (2022)
- International Residential Code, 2018 Edition, with Georgia Amendments (2020)
- International Fire Code, 2018 Edition (Contact State Fire Marshal Below)
- International Plumbing Code, 2018 Edition, with Georgia Amendments (2020), (2022), (2023)
- International Mechanical Code, 2018 Edition, with Georgia Amendments (2020)
- International Fuel Gas Code, 2018 Edition, with Georgia Amendments (2020), (2022)
- National Electrical Code, 2020 Edition, with Georgia Amendments (2021)
- International Energy Conservation Code, 2015 Edition, with Georgia Supplements and Amendments (2020), (2022), (2023)
- International Swimming Pool and Spa Code, 2018 Edition, with Georgia Amendments (2020)

Permissive Codes:

- Disaster Resilient Building Code IBC Appendix (2013)
- Disaster Resilient Building Code IRC Appendix (2013)
- International Property Maintenance Code, 2018 Edition, with Georgia Amendments (2021)

- International Existing Building Code, 2018 Edition, with Georgia Amendments (2021)
- 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)). Note, the 2018 codes listed above were adopted since the development of the 2019 update.

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)).

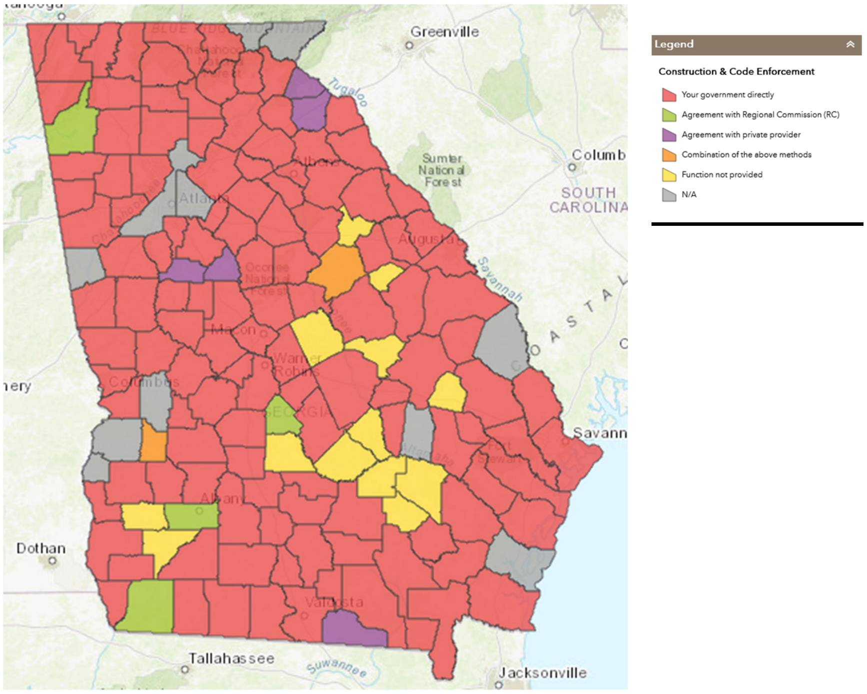
There are several requirements local governments must meet in order to enact a local code amendment. These requirements are as follows:

- 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.

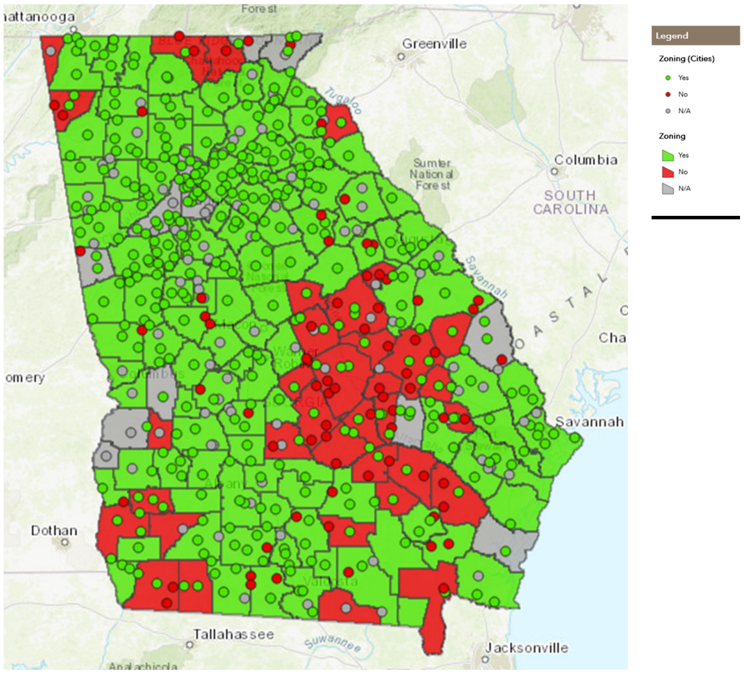
Figure 3.3 is a DCA map showing Georgia communities' enforcement of construction codes as of 2022. As the map illustrates, at least 135 of Georgia's 159 counties enforce some level of the state minimum construction codes. Notably, this is based on a survey, in which 146 out of 159 counties provided responses. Noting the size and capabilities of some of the non-responding counties, it is highly likely some of them have adopted the most up to date construction codes and enforce them through permitting and inspection services. One challenge in implementing codes is in communities that have not historically offered inspection or permitting services. While all construction is required to meet minimum codes, regardless of local enforcement, non-compliant construction can go unnoticed until a related problem arises. To address this, all local communities are encouraged to implement some system of code enforcement, whether that be in house staff, private contractors or intergovernmental agreements.

FIGURE 3.6: CONSTRUCTION CODES IN GEORGIA AS OF 2022



2022 Government Management Indicator Data

FIGURE 3.7: COMMUNITIES IN GEORGIA WITH ZONING AS OF 2022



2022 Government Management Indicator Data

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, 113 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 September 2023, 584 of Georgia's 690 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 85% (up from 82% in 2018) 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.

Another area local communities have varying capabilities in is regulation and management of dams within their borders. Every community has the authority to regulate dams within their jurisdictions. However, many communities lack the capacity, due to various limitations including funding, staffing, etc. to manage such programs. Generally, the larger cities and counties surrounding Metropolitan Atlanta are more capable of managing these type programs and have functional regulatory capabilities, including staff and resources. Notably, Cobb and Gwinnett Counties have previously had staff that had prior experience with dams and dam management programs. Therefore, they were able to capitalize on that experience and build robust dam management programs. For example, Cobb County has instituted a stormwater purchase program, where the county is able to purchase storage capacity through privately owned dams by paying the owner for lowering the pool level of the affected lake. Henry County has recently enacted local legislation allowing for Special Purpose Tax Districts to help pay for projects within an area by taxing properties specifically located within the affected area and benefitting from the project. In addition, prior to any community issuing a construction permit for a structure potentially below a Category II dam, the community must provide information on the development, as well as a dam break model, to Georgia Safe Dams in order for the State to determine if the development would change the dam's classification. Gwinnett County has also taken a proactive approach to dam safety issues and have been able to address issues with several dams, including ones they own. The County now contracts with consulting firms to do inspections, maintenance and designs of dams within the county. Notably, as identified in Chapter 2, Table 2.9, 65% of Georgia counties identify Dam Failure as a hazard in their community. As of 2023, 98 counties have identified some sort of dam management activities in their local mitigation strategies. While the above consist of broad based analysis with a couple of specific examples, further analysis will be necessary to fully assess each community's capabilities, policies and programs. GIS capabilities is a noted area for potential improvement in terms of most counties' capabilities. Many rural communities don't have GIS systems, while many of the more urban communities that have GIS, don't tend to focus much attention on dams within their borders. Having this type information would help communities better understand their risk and better prioritize efforts to reduce any risks from dam failure.

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 September, 2023, 158 counties had completed the second update to their local hazard mitigation plans and 64 counties had completed their third 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**	**2023**
Albany, City of	9	9	8	8	7	7
Atlanta, City of					7	6
Augusta-Richmond County						7
Austell, City of				8	8	7
Bloomingdale, City of					8	8
Brunswick, City of	9	9	9	9	9	6
Bryan County					6	6
Camden County				8	6	6
Cartersville, City of		9	9	9	7	7
Catoosa County				8	8	9
Chatham County	7	7	6	6	5	5
Cherokee County		8	8	8	8	8
Cobb County	8	8	8	8	8	8
College Park, City of	6	6	6	6	6	6
Columbia County	8	8	7	7	7	6
Columbus, City of	8	8	8	8	8	8
Covington, City of	9	9	9	9	9	8
Coweta County				8	8	10
Crisp County		9	9	9	9	8
Decatur, City of	8	7	6	6	7	7
DeKalb County	8	8	7	7	7	7
Dougherty County	7	7	6	6	6	6
Douglas, City of				9	9	7
Douglas County	8	8	8	8	7	9
Duluth, City of	9	9	8	8	8	8
East Point, City of					7	7
Effingham County				7	7	7
Fayette County	7	7	6	6	6	6
Fayetteville, City of		8	8	7	7	6
Forest Park, City of				9	9	9
Fulton County	9	9	9	8	8	10
Garden City, City of					8	6
Glynn County	8	8	8	7	7	5
Griffin, City of			6	5	5	6

CRS Class by Year of Data						
Community Name	**2004**	**2007**	**2010**	**2013**	**2017**	**2023**
Gwinnett County	8	8	8	8	7	7
Henry County				8	8	8
Hinesville, City of				7	7	6
Jekyll Island, State Park Authority	7	6	6	6	5	5
Johns Creek, City of					8	7
Lake City, City of				9	9	8
Marietta, City of					8	7
McIntosh County						7
Morrow, City of				9	9	7
Paulding County	10	10	10	10	10	10
Peachtree City, City of	7	7	7	7	7	7
Peachtree Corners, City of						7
Pembroke, City of					9	9
Pooler, Town of	8	8	8	7	6	6
Powder Springs, City of					6	6
Richmond Hill, City of					7	7
Roswell, City of	7	7	7	7	7	6
Savannah, City of	8	8	8	6	5	5
St. Marys, City of					7	6
Thunderbolt, Town of					6	6
Tifton, City of			8	8	8	8
Tybee Island, City of	8	8	7	7	5	5
Waynesboro, City of	10	10	10	10	10	10
Worth County	9	9	9	9	9	9
Total Participating	**26**	**30**	**32**	**43**	**55**	**58**

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
Hazard Mitigation Grant Program – Post Fire	FEMA	The funds provided to states, territories, Indian Tribal governments, local governments, and eligible private non-profits (PNPs) following a Fire Management Assistance Grant (FMAG) declaration	Only available after FMAG declaration and varies depending on size and scope of disaster	State and local fire mitigation projects
Community Development Block Grant (CDBG)	HUD, DCA	Provides communities with resources to address a wide range of unique community development needs.	In Georgia: 2021 approximately $43 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; $324 million in FY2022 Nationwide	Funding Community Wildfire Protection Planning (CWPP) for GA
Building Resilient Infrastructure and Communities (BRIC)	FEMA	Annual, nationally competitive grant program for hazard mitigation	Prescribed by Congress each year: $2.3 billion for FY2022 Nationwide	State and local planning, state and local mitigation projects

Program	Source	Description	Estimated Annual Funding	How It Is Used
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; $800 million allocated in FY2022 Nationwide	Flood mitigation projects, flood mitigation planning
National Dam Safety Program (NDSP)	FEMA	Provides assistance to state dam safety programs for strengthening their programs to improve their program, prevent dam failures and reduce the impacts on lives and property that may be at risk of dam failure.	$131,412 allocated to Georgia in 2022 through State Assistance Grants.	Management of State dam regulatory program.
Natural Resource Conservation Service (NRCS) Watershed dams	NRCS	Provides assistance in the repair and upgrade of locally managed NRCS watershed dams.	$585.5 million nationwide in FY2022.	6 Watershed and Flood Prevention projects and 3 Watershed Rehabilitation Projects in Georgia in FY2022.
Emergency Watershed Protection (EWP) Program	NRCS	Provides funding to repair watershed dams damaged during a flood event	$1.17 million provided in 2019-2020.	Repair and clearing of impacted watershed drainage areas due to flood disasters.
Cobb County Stormwater Purchase Program	Cobb County	Provides funding to private dam owners in Cobb County for increasing the storage capacity of existing private dams.	17 cents per cubic foot of storage space added as of 2020. Funding has ranged from $175,000 to $500,000	Increases storage capacity in the event of excessive rainfall.
High Hazard Potential Dam (HHPD)	FEMA Dam Safety	Provides funds to address State, Local and non-profit owned dams that have been identified to pose significant risk to downstream populations and development in the event of failure.	$3 million provided to State of Georgia in FY2022	Flood and dam failure mitigation projects.

TABLE 3.13: POTENTIAL FUNDING SOURCES

Program	Source	Description	Estimated Annual Funding	Potential Uses
Building Resilient Infrastructure and Communities (BRIC)	FEMA	Annual, nationally competitive grant program for hazard mitigation	Prescribed by Congress each year: $2.3 billion for FY2022 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 organizations	Prescribed by Congress; $324 million in FY2022 Nationwide	Funding Community Wildfire Protection Planning (CWPP) for GA
Community Development Block Grant (CDBG)	HUD, DCA	Provides communities with resources to address a wide range of unique community development needs.	In Georgia: 2021 approximately $43 million	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; $800 million allocated in FY2022 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
Hazard Mitigation Grant Program – Post Fire	FEMA	The funds provided to states, territories, Indian Tribal governments, local governments, and eligible private non-profits (PNPs) following a Fire Management Assistance Grant (FMAG) declaration	Only available after FMAG declaration and varies depending on size and scope of disaster	State and local fire mitigation projects

Program	Source	Description	Estimated Annual Funding	Potential Uses
Public Assistance Mitigation	FEMA	Funding available through the Public Assistance program to assist with mitigation activities to damaged facilities by re-building / repairing them in a manner to make them more resilient to future occurrences similar hazards.	Only available after disaster declaration and varies depending on size and scope of disaster	Mitigating damaged facilities, making them more resilient to future occurrences.
High Hazard Potential Dam (HHPD)	FEMA Dam Safety	Provides funds to address State, Local and non-profit owned dams that have been identified to pose significant risk to downstream populations and development in the event of failure.	$3 million provided to State of Georgia in FY2022	Flood and dam failure mitigation projects.
National Dam Safety Program (NDSP)	FEMA	Provides assistance to state dam safety programs for strengthening their programs to improve their program, prevent dam failures and reduce the impacts on lives and property that may be at risk of dam failure.	$131,412 allocated to Georgia in 2022 through State Assistance Grants.	Management of State dam regulatory program.
Natural Resource Conservation Service (NRCS) Watershed dams	NRCS	Provides assistance in the repair and upgrade of locally managed NRCS watershed dams.	$585.5 million nationwide in FY2022.	6 Watershed and Flood Prevention projects and 3 Watershed Rehabilitation Projects in Georgia in FY2022.
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Program	Source	Description	Estimated Annual Funding	Potential Uses
Cobb County Stormwater Purchase Program	Cobb County	Provides funding to private dam owners in Cobb County for increasing the storage capacity of existing private dams.	17 cents per cubic foot of storage space added as of 2020. Funding has ranged from $175,000 to $500,000	Increases storage capacity in the event of excessive rainfall.
Special Purpose Tax Districts	Local Taxes	Localized special purpose taxes that can be used to fund projects within the local area by adding a special purpose tax to affected property owners, such as those surrounding a lake in the event of repairs or upgrades to the dam.	Determined based on the cost of the project.	Can be used to improve resilience of infrastructure, including drainage, dams, etc.

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 2019 approval.

TABLE 4.1: SUMMARY OF CHANGES TO CHAPTER 4

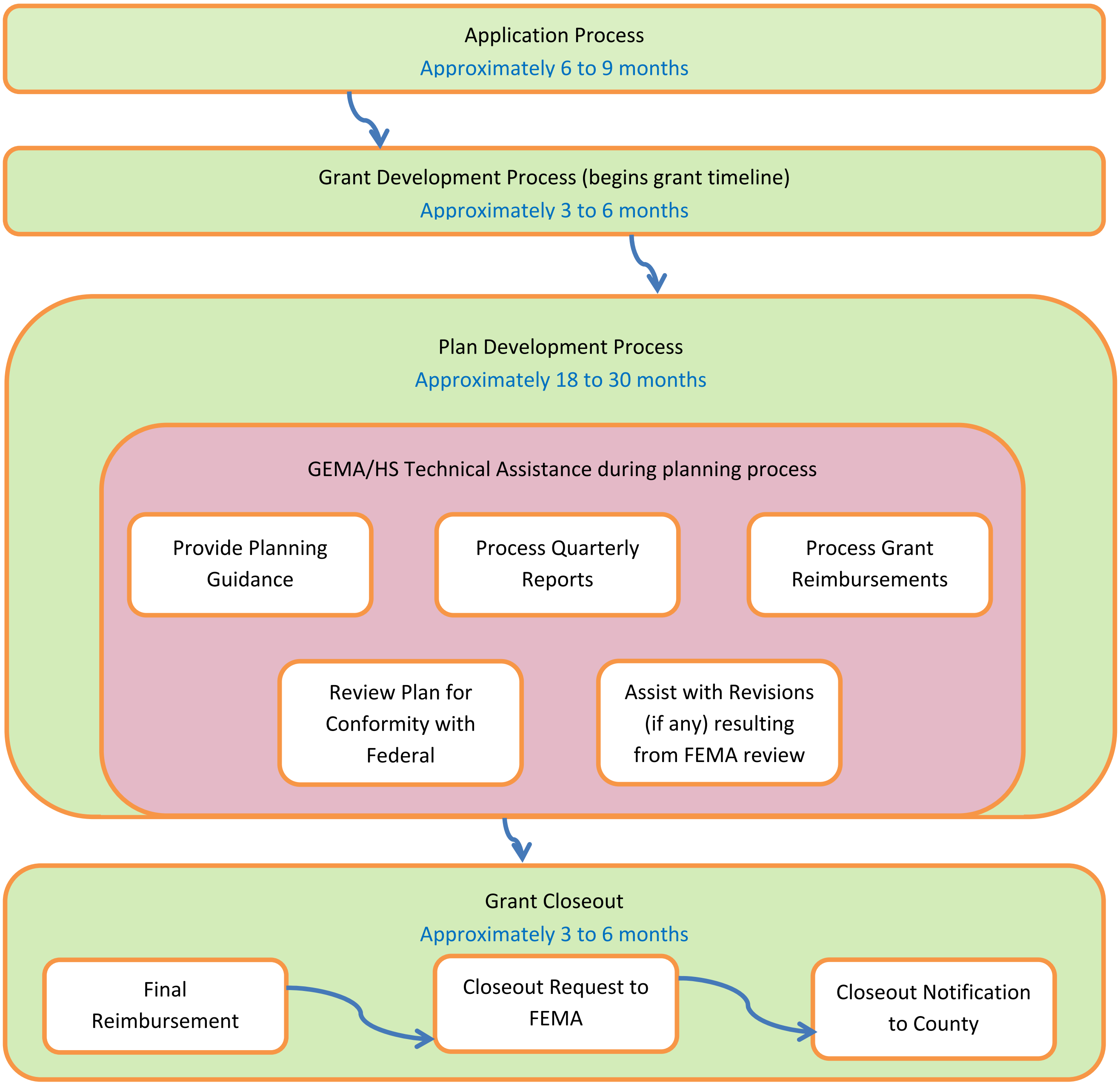
Chapter 4 Section	Updates to Section
4.1 Local Technical Assistance	• Updated Text. • Updated Figures 4.2 and 4.4
4.2 Local Funding	• Updated text, tables, and figures.
4.3 Local Plan Integration	• Updated text, tables, and figures.
4.4 Prioritizing Local Assistance	• Updated text, tables, and figures.

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

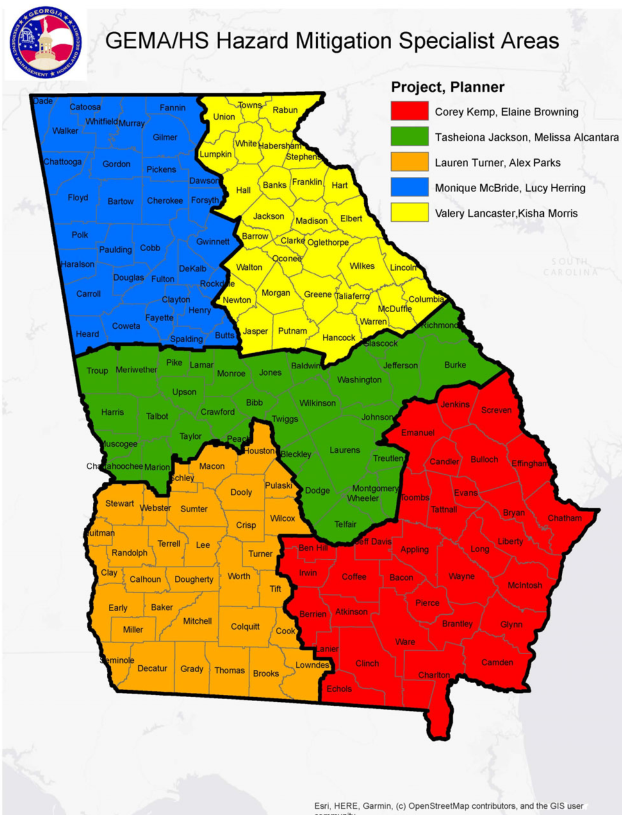
FIGURE 4.1: GRANT PROCESS FLOW CHART



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.

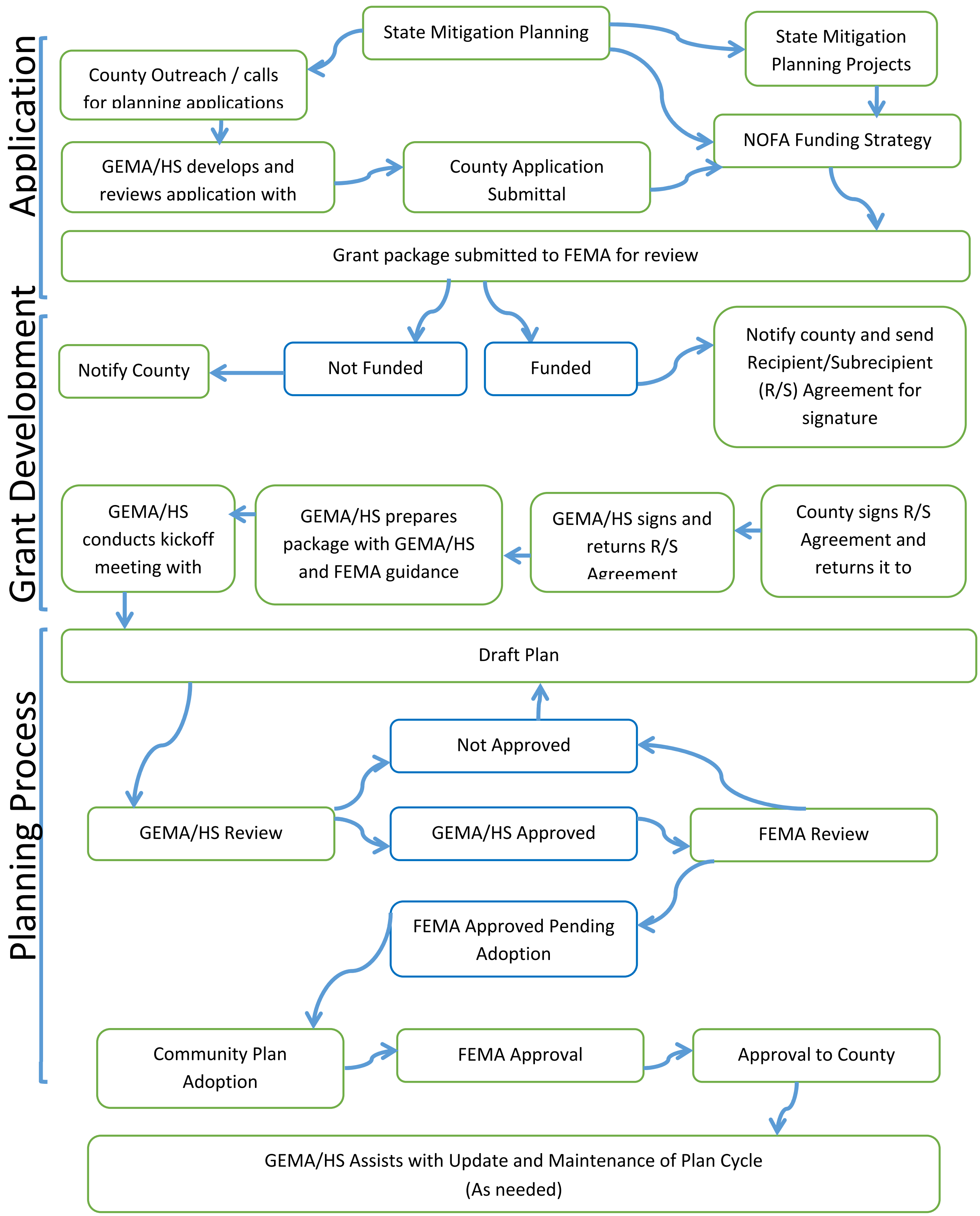
FIGURE 4.2: GEMA/HS MITIGATION PLANNER AREAS, 2023

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 five planners that cover five geographic areas in the state, as shown in Figure 4.2. Three 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

Element H Requirements	Location in Plan (section and/or page number)	Met / Not Met
This space is for the State to include additional requirements		
H1. Does the plan document opportunities for participation by neighboring communities, businesses and other interested parties? (Invitation letters, sign in sheets, etc.)	Click or tap here to enter text.	Choose an item.
H2. Does the plan document opportunities for public input and participation? (copies of meeting notices, sign in sheets, or other applicable documentation)		
H3. 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		
H4. Has the Critical Facilities Inventory been completed online?		
H5. Have the GMIS Critical Facilities reports and maps, or maps from a superior system, been provided?		
H6: Has the county included/incorporated their state-provided Hazus-MH report (if available).		
H7: Has the county included the GEMA/HS Worksheet 3a's or an equivalent process for determining each jurisdictions building inventory within the affected hazard area for the spatially and non-spatially defined hazards that could impact the community?		

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 2019 SHMS, 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, the Pre-Disaster Mitigation (PDM), Hazard Mitigation Grant Program (HMGP), and now Building Resilient Infrastructure and Communities (BRIC) funding sources (all 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. The Covid pandemic caused a significant work stoppage on many ongoing projects. Also, FEMA issued new local planning guidance that became effective 2023. In that time, the State has worked to overcome both of these issues.

In March, 2020, the Covid pandemic began have significant impacts on the State of Georgia. Namely, this caused significant work stoppage for many projects, including local plan updates. Part of the local hazard mitigation plan update process involves a series of meetings to obtain input from the public and community partnerships. For a period of several months, almost all in-person meetings were put on hold. In the initial months of the pandemic, many local emergency management agencies were stretched thin responding to the public health crisis. As the initial crisis began to ease, and communities could turn their attention back daily work activities, due to public health concerns, these activities still needed to be done in a remote, or socially distanced, environment, many communities did not have the capability to hold virtual meetings, meaning some projects were still on hold, or further delayed, until the necessary capabilities and resources could be obtained.

Also, in April 2022, FEMA released new local planning guidance, which would become effective April 2023.

While this gave the state a year to try to learn and understand the guidance, as noted above, local plan updates can sometimes take 1.5 - 2 years to complete. The State worked in that time to learn and understand the guidance, and get information out to communities with plan updates already in process, encouraging them to adjust their plan updates to either submit with sufficient time to get approved before the April 2023 deadline, or meet the new guidance. The State was fortunate to have several local plans approved prior to the new guidance becoming required. This gave the state a bit of a lull in local planning activity, with significantly few plans expiring, while the new planning guidance became effective and communities were adjusted to the new guidelines.

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.

One additional roadblock the state has observed is in smaller communities not participating with their county in the completion or adoption of a local hazard mitigation plan. Often, these communities are ones that do not have a history of applying for mitigation funds. This can be due to a number of reasons – including lack of need, lack of interest, lack of knowledge about mitigation, or lack of resources – either to meet the cost share requirements or to manage a relatively large project. The State has investigated methods to address this, including making communities aware of the need, including awareness that, even if they aren't currently interested in a project, should a disaster occur, their interest may change, given the opportunity and realized need. The State is continuing to investigate methods to increase awareness of the opportunities and the need to have a local plan in place.

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 FEMAGo systems, and should be found acceptable by FEMA. Appendix G 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 21 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 PRESENT)

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
4165	3/2014	8	$320,098	146,810
4215	4/2015	5	$173,844	130,383
4259	2/2016	11	$357,000	267,750
4284	10/2016	44	$1,612,933	1,209,700
4294	1/2017	2	$48,000	$36,000
4338	9/2017	31	$1,490,320	$1,117,740
4400	10/2018	22	$1,568,451	$1,176,338
Total		**278**	**$9,098,829**	**$6,720,181**

TABLE 4.3: FUTURE PLAN UPDATES INCLUDED IN RECENT DISASTERS (2020 - PRESENT)

Disaster #	Month/Year	# Counties	Total Project Costs	Federal Share
4501	3/2020	63	$2,268,057	$2,041,251
4685	1/2023	22	$712,293	$534,220
4738*	8/2023	Available	N/A	N/A
Total		**85**	**$2,980,350**	**$2,575,471**

*DR 4738 figures not available as of September 16, 2023

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). Eight disasters, DRs4165, 4215, 4259, 4284, 4294, 4297, 4338, and 4400, occurred between 2014 and 2019. The State used funding from all but 4297 for plan updates, including this update to the State Hazard Mitigation Strategy. Since the completion of the 2019 SHMS, the State has experienced 4 declared disasters (DRs 4501, 4600, 4579 and 4738). Georgia obtained funding for 63 plan updates through 4501 and is pursuing funding for an additional 22 local plan updates from DR 4685. While DR 4738 is a new disaster, the State will consider local plan funding through this disaster based on priorities and available funding.

TABLE 4.4: APPROVED MITIGATION PROJECT FUNDING INCLUDED IN RECENT DISASTERS (2015 PRESENT)

Disaster #	Federal Funds Awarded	State Funds Provided
HMGP 4259	$4,320,129.67	$581,390.40
HMGP 4284	$9,499,842.39	$1,278,852.09
HMGP 4294	$2,485,665.54	$357,585.60
HMGP 4297	$4,119,090.61	$607,206.85
HMGP 4338	$16,536,748.80	$2,655,664.80
HMGP 4400	$8,172,866.00	$921,084.60
HMGP 4501*	$1,176,627.10	$55,456.60
HMGP 4579	$274,415.79	$4,774.21
HMGP 4600	$283,834.00	$8,170.40
FMAG-HM 5163	$1,188,774.50	$158,037.35
Grand Total	**$48,057,994.40**	**$6,628,222.90**

***Indicated State funds is likely an undercount due to the number of pending projects in HMGP 4501.**

TABLE 4.5: APPROVED MITIGATION PROJECT FUNDING INCLUDED IN RECENT NON-DISASTER PROGRAMS (2020 PRESENT)

Grant Cycle	Federal Funds Awarded	State Funds Provided
BRIC 2020	$435,787.00	$14,985.75
BRIC 2021	$451,508.56	
Grand Total	**$887,293.56**	**$14,985.75**

Tables 4.4 and 4.5 show the currently approved projects and compiled approved funding for Disasters from 2015 to September 2023, as well as the BRIC 2020 and 2021. In addition, as of September 2023, the State has projects pending in the following grants:

- FMA 2020 and 2022
- BRIC 2020, 2021 and 2022
- HMGP 4284, 4338, 4400, 4501, 4579, and 4600
- HHPD

For counties involved in a disaster, the State 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 or local jurisdiction has a current FEMA approved and adopted Hazard Mitigation Plan.
- The County or local jurisdiction is a current participant in the National Flood Insurance Program.
- The County or local jurisdiction has a current locally approved and adopted Debris Removal Plan.
- The County or local jurisdiction has a current locally approved and adopted Point of Distribution Plan.
- The County or local jurisdiction has a current locally approved and adopted Disaster Volunteer Assistance and Management Plan.
- The County or local jurisdiction has a current Disaster Awareness and Preparedness Program.
- The County or local jurisdiction has a current trained Local Damage Assessment Team.
- The County or local jurisdiction is a certified Storm Ready Community by the National Weather Service.
- 10. The County or local jurisdiction has adopted model emergency powers ordinances available through the Association of County Commissioners of Georgia, the Georgia Municipal Association or equivalent.

In many cases this takes a large burden off the counties struck by disaster and whose assets have been depleted in their recovery. Since 2015, the State has allocated at least $10 million in state funds for declared counties as a portion of their project costs.

4.2.2 NON-DISASTER-RELATED MITIGATION PROGRAMS

TABLE 4.6: PLAN UPDATES INCLUDED IN NON-DISASTER GRANTS (2013 - 2019)

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.

TABLE 4.7: PLAN UPDATES INCLUDED IN NON-DISASTER GRANTS (2020 - PRESENT)

Grant Cycle #	# Counties	Total Project Costs	Federal Share Approved
BRIC 2020	9	$326,643	$246,156
BRIC 2023	Available	Available	Available
Total	**9**	**$326,643**	**$246,156**

Historically, Georgia has used three non-disaster-related mitigation programs to help local communities develop and update their mitigation plans. These are the Pre-Disaster Mitigation (PDM) grant program, the Building Resilient Infrastructure and Communities (BRIC) 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. The State then utilized PDMs 2013, 2014, 2015, and 2016 to fund 108 mitigation plan updates, with 2016 being the last time the State used PDM to fund mitigation plans. Beginning in 2017, once again, due to a string of Federally declared disasters between 2018 and 2023 (DRs 4284, 4294, 4338, 4400, 4501, and 4685) it was not necessary to use PDM funding for mitigation planning. Beginning in 2020, the PDM program was replaced by the BRIC program. Due to uncertainty of funding availability at the time, the State used BRIC 2020 to fund 9 plan updates.

In 2008, Georgia used FMA funds for a limited number of FMA stand-alone plans. One of these (Glynn County) was 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 BRIC 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.

By 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. All public 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.

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 4.8 below shows the relationship between the hazards identified in the State Plan and the hazards gleaned from review of the local plans.

TABLE 4.8: HAZARDS IDENTIFIED IN LOCAL PLANS

State Plan Hazard	Hazards in Local Plans	% of Counties identifying
Tornadoes	Tornadoes	99%
Inland Flooding	Inland Flooding	99%
Wildfire	Wildfire	97%
Drought	Drought	94%
Wind	Wind	90%
Severe Winter Weather	Winter Storms	84%
Severe Weather	Hailstorm	82%
	Lightning	79%
	Severe Weather	49%
Hurricane Wind	Hurricane/Tropical Storm	82%
Dam Failures	Dam Failure	65%
Earthquake	Earthquake	47%
Extreme Heat	Heat	42%

State Plan Hazard	Hazards in Local Plans	% of Counties identifying
Coastal Hazards	Coastal Flooding	9%
Geologic Hazards	Landslide	15%
	Sinkhole	5%

In addition to the above, the matrix also analyzes the mitigation strategies of all local mitigation plans. Review of the data indicates greater than 94% of all local plans include mitigation actions that fall into 3 of the 4 basic mitigation categories. Tables 3.3 and 3.4 in Chapter 3 show the breakdown of mitigation actions and categories identified in local plans. 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 all 159 counties in obtaining funding assistance through HMGP, PDM, and BRIC to update their local mitigation plans. As of September 2023, all 159 counties had completed their 1st update. 158 of those counties have completed their second update with 64 of those 158 having completed their third update.

In addition, as of September, 2023, GEMA/HS has 19 local plans updates currently in process, has recently received approval for an additional 30 and is pursuing funding assistance for the next 55 counties on the priority list. For all of these counties, this would be either the third or fourth update to their plans. GEMA/HS anticipates receiving approval and holding kickoff meetings to initiate the planning processes for these counties in 2024.

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 4.9 gives the priority of the various counties in terms of plan updates by six-month period beginning in January of 2024. In each five-year update cycle, the factor driving the priority listings will be the counties’ plan expiration dates.

TABLE 4.9: LOCAL PLAN PRIORITY UPDATE SCHEDULE BY EXPIRATION DATE

County	Plan Expiration	Priority
Crawford	4/24/2024	1
Wilkinson	1/1/2025	1
Twiggs	3/10/2025	1
Lamar	3/17/2025	1
Jefferson	4/1/2025	1
Macon	4/20/2025	1
Burke	5/5/2025	1
Meriwether	7/19/2025	1
Clinch	11/15/2025	1
Peach	12/17/2025	1
Fayette	1/11/2026	2
Screven	1/12/2026	2
Jones	1/18/2026	2
Montgomery	1/18/2026	2
Chatham	2/18/2026	2
Telfair	3/11/2026	2
Marion	4/14/2026	2
Macon-Bibb	5/19/2026	2
Thomas	7/26/2026	2
Wilcox	8/3/2026	2
Dodge	8/4/2026	2
Newton	8/26/2026	2
Randolph	8/26/2026	2
Upson	9/1/2026	2
Harris	9/6/2026	2
Stewart	10/18/2026	2
Webster	12/21/2026	2
Wheeler	12/21/2026	2
Cherokee	1/4/2027	3
Talbot	1/5/2027	3
Evans	2/1/2027	3
Emanuel	2/2/2027	3
Mitchell	2/2/2027	3
Lowndes	2/6/2027	3
Colquitt	3/16/2027	3
Worth	3/16/2027	3
Calhoun	3/20/2027	3
Spalding	3/23/2027	3
Dade	3/27/2027	3
Paulding	4/5/2027	3
Lumpkin	4/19/2027	3
Treutlen	5/2/2027	3
Monroe	5/30/2027	3
Chattooga	5/31/2027	3
Decatur	6/16/2027	3
Clayton	7/5/2027	3
McDuffie	7/5/2027	3
Pierce	7/5/2027	3
Crisp	7/6/2027	3
Elbert	7/6/2027	3
Bartow	7/11/2027	3
Morgan	7/11/2027	3
Early	7/19/2027	3
Tift	8/17/2027	3
Catoosa	10/5/2027	3
Richmond	10/25/2027	3
Fulton	11/6/2027	3
Laurens	11/20/2027	3
Fannin	11/30/2027	3
Gordon	11/30/2027	3
Forsyth	12/20/2027	3
Heard	1/3/2028	4
Wayne	1/23/2028	4
Whitfield	1/23/2028	4
DeKalb	2/5/2028	4
Murray	2/8/2028	4
Charlton	2/20/2028	4
Brantley	2/29/2028	4

County	Plan Expiration	Priority
Polk	3/6/2028	4
Hall	3/7/2028	4
Dooly	3/15/2028	4
Schley	3/20/2028	4
Bacon	3/22/2028	4
Putnam	3/30/2028	4
Ware	4/3/2028	4
Long	4/9/2028	4
Warren	4/11/2028	4
Glascock	4/12/2028	4
Seminole	10/3/2028	4

County	Plan Expiration	Priority

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 Department 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 BRIC, demonstrates the ability of the GEMA/HS Hazard Mitigation staff to complete accurate BCAs. The State of Georgia has submitted a total of 347 HMGP projects since 2015, 249 of which have been approved, an additional 3 have been partially approved and 91 projects are pending review as of September 2023. Since 2020, The State has submitted 43 BRIC and FMA projects, 15 of which have been approved and an additional 17 are pending as of September 2023.

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.

The Department of Natural Resource's Georgia Safe Dams program manages the States dam safety program, including all activities regarding permitting, inspecting and classification of dams throughout the State. Recently, FEMA's Dam Safety program has developed the High Hazard Potential Dam program (HHPD) to help States and local communities rehabilitate and improve dams, which have been identified as having a significant risk of failure with the potential for major losses in the event of such failure. Currently, the State uses it's inspection program to identify deficiencies with existing dams and has prioritized mitigation projects for category I dams – those identified as having the potential for loss life in the event of failure - based on the potential for failure identified by the most recent inspection, including identified seepage, stability, spillway capacity, etc, and recent overtopping events. Notably, the HHPD program is a new program and the State is in the process of developing a more thorough and robust system for prioritizing HHPD projects, as indicated by Action Step 36 in Chapter 3.

Chapter 5: Plan Maintenance

The purpose of Chapter 5 is to identify and evaluate the process used to monitor, evaluate, and update the 2019 Georgia Hazard Mitigation Strategy (GHMS) over the previous five years, as well as to outline the mechanism for updating the 2024 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 2019 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 Department. 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 2027 and to be completed and approved in 2029.

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 Department 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 2019 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 2027 and 2028.

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, as well as reflecting any changes in federal or state laws or statutes.

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. 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 2029), and the first submission occurs six months prior (September 2028) 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 Department and the SHMPT.

The 2019 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 2019 GHMS, the SHMPT has used the process described in Table 5.2. The plan was approved in March 2019.

Since the approval of the 2019 GHMS, the State has received four disaster declarations, including Hurricane Zeta, two severe weather / tornado events, and Covid-19. With the exception of Covid-19, after each event, the SHMPT conducted post-disaster reviews of the 2019 plan. Note, a post disaster review was not held after the Covid-19 disaster, due to it being a public health disaster, which is not considered a natural disaster per the Stafford Act requirements. In addition, each year included a scheduled annual review. In Summer 2022, the Mitigation Planning staff began the process of reviewing the 2019 plan to kick off the five-year update process. The next mandatory five-year update is currently scheduled for final approval in March 2029. A schedule of each task leading up to final approval of the 2029 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 2027. 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 2019 Plan Review and Update Schedule

Update Event	Timeframe
Presidential Disaster Declaration Hurricane Michael	October 2018
State Plan Approval	March 2019
Annual Review	October 2019
Annual Review	August 2020
Presidential Disaster Declaration Tropical Storm Zeta	October 2020
Post Disaster Review	March 2021
Presidential Disaster Declaration Severe Storms, Flooding	March 2021
Annual Review / Post Disaster Review	June 2021
Annual Review	June 2022
Presidential Disaster Declaration Severe Storms	January 2023
Workshop 1	January 2023
Workshop 2	March 2023
Workshop 3	March 2023
Workshop 4	April 2023
Plan Review and Update	Fall 2022–October 2023
Annual Review / Post Disaster Review	July 2023
Standard Plan Submission to FEMA	October 2023
Enhanced Plan Submission to FEMA	November 2023
State Plan expires	March 2024

Table 5.3 2024 Plan Review and Update Schedule

Update Event	Timeframe
State Plan Approval	March 2024
Annual Review	May 2025
Annual Review	May 2026
Annual Review	May 2027
Annual Review	May 2028
Post Disaster Review	As needed after each major disaster
Begin State Plan Update	Summer 2027

Update Event	Timeframe
Plan Review and Update	Fall 2027-September 2028
Risk Assessment and Mitigation Workshops	December 2027 – April 2028
Plan Submission to FEMA	Fall 2028
State Plan expires	March 2029

5.2 MONITORING PROGRESS OF MITIGATION ACTIVITIES

GEMA/HS's Hazard Mitigation Department is responsible for monitoring implementation of projects and activities identified in the state mitigation strategy. The Mitigation Department Manager 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.

Prior to 2020, GEMA/HS used a software program specifically developed to manage all grant projects called the Grants Management System (GMS). The Hazard Mitigation Department used the GMS to manage all aspects of project grants, including monitoring mitigation measures and closeouts. The system was 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 2019 plan was approved. In 2020, the State migrated to a new software program - EMGrants. Modules have been built to help the State manage all facets of the grants management process, including applications, reimbursements, quarterly reports, etc. EMGrants will continue to be used to monitor all grant funded mitigation activities for the foreseeable future in effort to continue managing and administering all FEMA funding in accordance with all applicable federal statutes and regulations.

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 OVERVIEW

According to the 2022 State Hazard Mitigation Planning Policy Guide, a FEMA approved enhanced state mitigation plan documents a sustained, proven commitment to hazard mitigation. Enhanced status not only means the State is able to describe a well-rounded, well integrated, statewide mitigation program, but also the State has proven its ability to manage an effective and efficient mitigation program according to all federal mitigation program guidelines. Finally, maintenance of a state's enhanced status results in increased federal funding through the HMGP program.

The State received its initial enhanced plan approval in November 2008. The enhanced plan follows the same expiration and update timeframes as the standard plan. Consequently, the enhanced Georgia Hazard Mitigation Strategy (GHMS) has been updated every 3 years through 2014 and every 5 years since. The State has maintained it's enhanced status with each plan update with the most recent approval in March 2019.

As with the standard GHMS, the State began the major 5-year update in 2022 in order to complete the update by the March 2024 deadline. The State has reviewed the enhanced plan based on the 2022 State Hazard Mitigation Planning guidance, including its HMA program management capability, integration throughout other planning initiatives, its commitment to a comprehensive state mitigation program, the effectiveness of its use of mitigation funding, and its implementation capability. Table 6.1 shows the changes that have been made to this chapter.

Table 6.1 Changes to Chapter 6

Chapter 6 Section	Updates to Section
6.1 Overview	• New section.
6.2 Program Management Capability	• Moved from Section 6.3 • Updated the description and history showing the State's capability to manage the Hazard Mitigation Program. • Updated all Tables
6.3 Integration with Other Panning Initiatives	• Moved from Section 6.1 • 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
6.4 Commitment to a Comprehensive Mitigation Program	• Moved from Section 6.6 • Updated the description of the State's commitment to a comprehensive mitigation program. • Updated all tables

Chapter 6 Section	Updates to Section
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 Project Implementation Capability	• Moved from Section 6.2 • Updated the description and history showing the State's capability for successful project implementation. • Updated all Tables • Combined with former Section 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

6.2 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 Department 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 Deputy Manager and 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. The current HMGP Administrative Plan details how the Hazard Mitigation Department 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 over 50 years combined experience and the program staff has a combined 15 years.

Table 6.2 summarizes the program management activities for each of the open allocations for this grant update cycle for the period of October 1, 2018 through September 30, 2023. Timelines vary among the different types of grant programs. For example, the BRIC program is designed to assist states, territories, Indian tribal governments, and local communities in implementing a sustained pre-disaster natural hazard mitigation program to build capacity and 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 September and ending in January. Awards for this type of grant typically are announced in following year. BRIC grants have a 3 year Period of Performance once the award is made. The total amount allocated to BRIC 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 starting on the date of the declaration and lasting 12 months with extensions possible where justified.

Sections 6.2.1 through 6.2.4 provide additional detail to document each of the program management capability requirements shown in Table 6.2.

Table 6.2 Program Management Project Summary October 1, 2018 – September 30, 2023

Program	Meet HMA Application Timeframe	Projects Submitted	Projects with Environmental	Projects w/ BCA	Quarterly and Financial Reports	Project Closeouts Submitted within grant timelines
DR4165	N/A	N/A	N/A	N/A	Yes	16
DR4215	N/A	N/A	N/A	N/A	Yes	5
DR4259	N/A	N/A	N/A	N/A	Yes	21
DR4284	N/A	N/A	N/A	N/A	Yes	27
DR4294	N/A	N/A	N/A	N/A	Yes	10
DR4297	N/A	N/A	N/A	N/A	Yes	6
DR4338	18 months	46	14	12	Yes	21
DR4400	24 months	67	42	22	Yes	10
DR4501	18 months	105	41	15	Yes	N/A
DR4579	15 months	10	9	5	Yes	N/A
DR4600	12 months	4	3	2	Yes	N/A
FMAG-HM 5163	12 months	3	1	1	Yes	N/A
PDMC10	N/A	N/A	N/A	N/A	Yes	2
PDMC14	N/A	N/A	N/A	N/A	Yes	4
PDMC15	N/A	N/A	N/A	N/A	Yes	4*
PDMC16	N/A	N/A	N/A	N/A	Yes	4*
PDMC17	N/A	N/A	N/A	N/A	Yes	1*
PDMC18	3 months	2	1	1	Yes	N/A
PDMC19	3 months	3	1	1	Yes	N/A
LPDM22	3 months	2	1	1	Yes	N/A
FMA13	N/A	N/A	N/A	N/A	Yes	1
FMA14	N/A	N/A	N/A	N/A	Yes	2
FMA16	N/A	N/A	N/A	N/A	Yes	3

Program	Meet HMA Application Timeframe	Projects Submitted	Projects with Environmental	Projects w/ BCA	Quarterly and Financial Reports	Project Closeouts Submitted within grant timelines
FMA18	N/A	N/A	N/A	N/A	Yes	N/A
FMA20	3 months	3	2	2	Yes	N/A
FMA21	3 months	3	2	2	Yes	N/A
FMA22	3 months	2	2	2	Yes	N/A
BRIC20	3 months	14	2	2	N/A**	N/A
BRIC21	3 months	7	3	3	N/A***	N/A
BRIC22	3 months	13	10	10	N/A**	N/A
Totals		**276**	**131**	**78**		**128**

*Closeouts submitted and pending FEMA approval

**Projects pending as of October 2023.

***Projects not selected

NA = No activity during this timeframe.

6.2.1 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 the majority of Georgia's grant applications. Since the completion of the 2019 SHMS, the State has submitted grant applications through the HMGP (DR4338, DR4400, DR4501, DR4579, DR4600, FMAG-HM5163), PDMC (2018 and 2019), LPDM (2022), FMA (2020, 2021, and 2022), and BRIC (2020, 2021, and 2022) grant programs. Of the 276 projects submitted, only three were not selected for funding in the FMA 2021 program.

Figure 6.1 HMA Application Process.

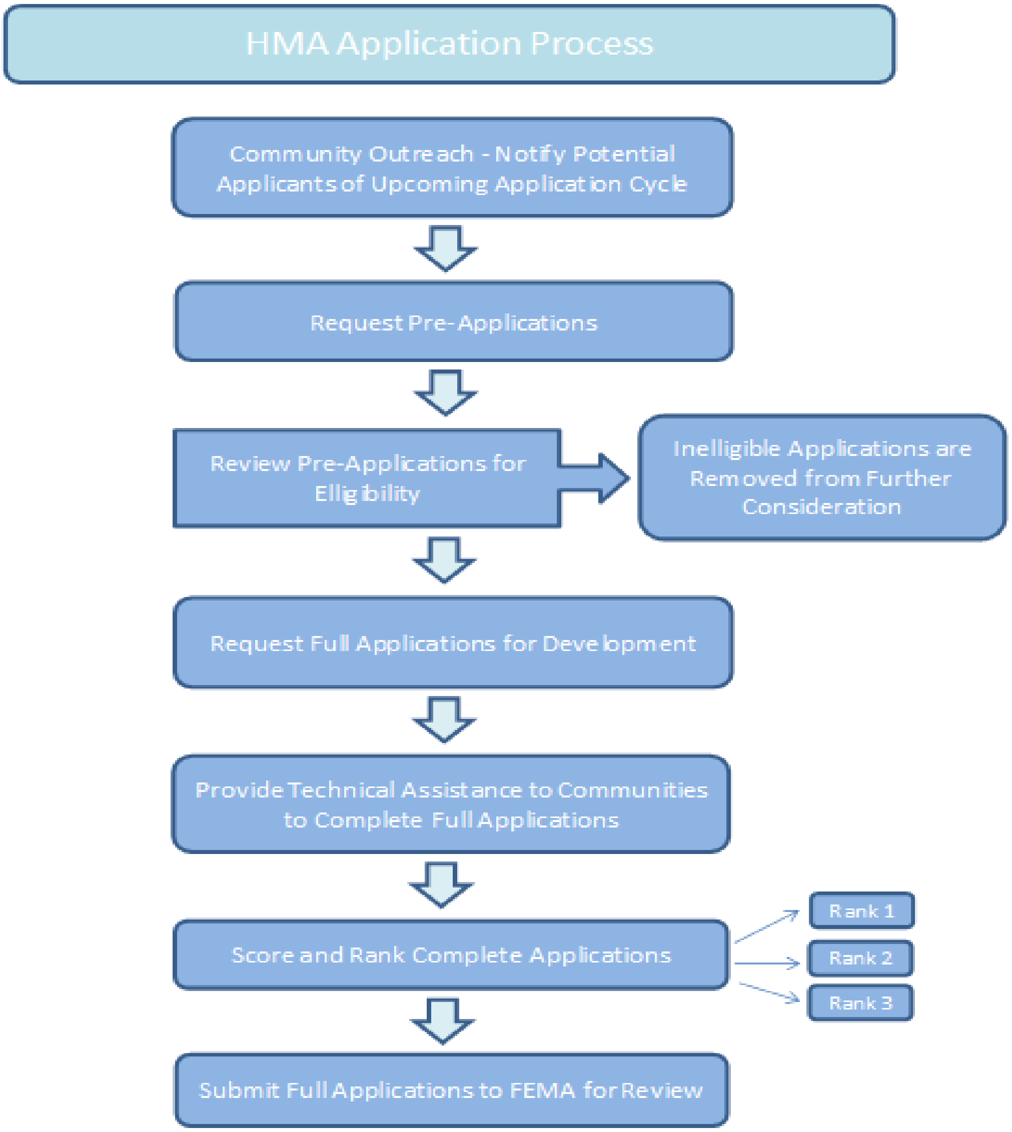


Figure 6.3 shows the steps the State takes in working with potential applicants on the development and submittal of eligible project applications. The application process starts with either a disaster declaration for HMGP or a Notice of Funding Opportunity for the non-disasters programs (FMA and BRIC). 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 G provides information on the 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. BRIC 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 Review Tool (ART) 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 6.6.3 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, previously, the GMIS database allowed GEMA/HS to identify communities that are eligible for a particular program such as the FMA program, which targets SRLPs and RLPs, with the new restrictions on Repetitive Loss data, the State is working through the process of regaining access to the data and determining how to best use it.

HMGP Performance

Within the past five years (October 1, 2018 to September 30, 2023), the State has implemented the HMGP for five new Presidential Disaster Declarations and has continued to manage the HMGP for seven 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 DRs 4294, 4297, 4338, 4400, 4501, 4579, and 4600 and FMAG-HM 5163, 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 most allocations to take advantage of any de-obligated funds.

For DR4685, the State is still working with local governments to complete the application process. DR4783 is a new disaster and the State is in the beginning stages of implementing the program.

Table 6.3 provides a snapshot as of September 30, 2023 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 19 disasters declared prior to 2018. 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, 2018. An asterisk after the disaster number indicates that the disaster is closed. Disasters 4165 and 4215 were closed during this update cycle. All work on Disaster 4259 has been completed and the disaster is projected to close in the next federal fiscal year. The federal funds expended column includes Recipient and Subrecipient administrative funds. Since the last update, the State has received approval on 177 additional projects, closed 79 projects, and processed expenditures of more than$21 million.

Table 6.3 Hazard Mitigation Grant Project Summary October 1, 2018 – September 30, 2023

Disaster	Approved Projects		Open Projects	Closed Projects		Federal Funds Expended	
	Last 5 Years	Total	Total	Last 5 Years	Total	Last 5 Years	Total
DR4165*	0	64	0	16	64	$1,696,345	$7,813,896
DR4215*	0	10	0	5	10	$1,160,748	$1,741,942
DR4259	0	35	11	13	24	$2,454,745	$2,664,859
DR4284	20	75	41	34	34	$5,499,166	$5,505,721
DR4294	7	14	12	2	2	$1,575,601	$1,575,601
DR4297	4	7	6	1	1	$822,670	$822,670
DR4338	44	44	44	5	5	$6,027,874	$6,027,874
DR4400	54	54	54	0	0	$1,093,542	$1,093,052
DR4501	35	35	35	0	0	$40,392	$40,392
DR4579	8	8	8	0	0	$21,214	$21,214
DR4600	2	2	2	0	0	$7,424	$7,424
FMAG-HM 5163	3	3	3	3	3	$793,595	$793,595
Subtotal	**177**	**351**	**216**	**79**	**143**	**$21,193,316**	**$28,108,240**

* Indicates the disaster is closed.

Non-Disaster Programs Performance

Within the past four years (since October 1, 2018), the State has taken advantage of the non-disaster programs within the Hazard Mitigation Assistance (HMA) Program. Prior to 2020, the application intake was managed through FEMA's eGrants system. In 2020, FEMA released the new FEMAGo grant management system. All new non-disaster grant applications are new managed through FEMAGo. 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. The vast majority of the project applications submitted to FEMA had sub-applications that were reviewed and either approved or selected for further review by FEMA Regional/HQ staff.

Tables 6.4 and 6.5 provide snapshots as of September 30, 2018, 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 FMA13, closed out the PDM program for 10 allocations prior to 2018, 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 five years, the State submitted applications for the FMA program in 4 of the 5 funding cycles. Two projects were selected in the FMA2018 grant cycle. Projects submitted in the FMA21 grant cycle were not selected. Projects in the FMA 2020 and 2022 cycles are still pending FEMA review and approval. Grant announcements have been received for the FMA23 grant cycle.

Table 6.4 Flood Hazard Mitigation Assistance Project Summary October 1, 2018 – September 30, 2023

Program Year	Approved Projects		Open Projects	Closed Projects		Federal Funds Expended	
	Last 5 Years	Total	Total	Last 5 Years	Total	Last 5 Years	Total
FMA13	0	4	1	1	1	$0	$784,900
FMA14	0	3	2	2	2	$0	$1,131,774
FMA16	0	3	3	2	2	$1,450,528	$1,494,990
FMA18	2	2	2	0	0	$6,127	$6,127
FMA20	Pending	Pending	Pending	N/A	N/A	N/A	N/A
FMA21*	N/A	N/A	N/A	N/A	N/A	N/A	N/A
FMA22	Pending	Pending	Pending	N/A	N/A	N/A	N/A
Subtotal	**2**	**12**	**8**	**5**	**5**	**$1,456,655**	**$3,417,791**

*Projects were not selected

PDM Project Summary

In 2018 and 2019, the State completed the grant submission for the final two PDMC funding cycles (PDMC2018 and PDMC2019). All five of the PDMC applications submitted to FEMA for PDMC2018 and PDMC2019 were complete, technically feasible, and eligible project applications, and all five were approved. In addition, the State received funding for 2 projects with LPDM2022 funding.

Over the past five years, all work has been completed for the PDMC13 through PDMC16 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 seven additional projects, closed seven projects, and processed expenditures of $1.6 million.

The State has received funding for a total of 93 competitive applications in the Pre-Disaster Program since its inception in 2002 through 2022. Table 6.5 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 6.5 Pre-Disaster Mitigation Program Summary October 1, 2018 – September 30, 2023

Program Year	Approved Projects		Open Projects	Closed Projects		Federal Funds Expended	
	Last 5 Years	Total	Total	Last 5 Years	Total	Last 5 Years	Total
PDMC10	0	3	2	2	2	$0	$1,378,484
PDMC13	0	5	5	2	5	$0	$710,055
PDMC14	0	4	4	4	4	$0	$608,830
PDMC15	0	4	4	0*	0	$239,089	$846,594
PDMC16	0	5	5	0*	0	$450,843	$607,975
PDMC17	0	2	2	0*	0	$341,129	$341,129
PDMC18	2	2	2	0	0	$9,679	$9,679
PDMC19	3	3	3	0*	0	$523,774	$523,774
LPDM22	2	2	2	0	0	$0	$0
Subtotal	**7**	**30**	**29**	**8**	**11**	**$1,564,514**	**$5,026,520**

* Indicates closeouts have been requested.

BRIC Project Summary

Beginning in 2020, the FEMA replaced the PDM program with the Building Resilient Infrastructure and Communities (BRIC) program. Since that time, the State has completed the grant submission for the BRIC 2020, BRIC 2021, and BRIC 2022 funding cycles. 12 of 14 BRIC 2020 and 3 of 7 BRIC 2021 projects were complete, technically feasible, and eligible project applications, of which all 15 were approved. The remaining 2 BRIC 2020 and 4 BRIC 2021 projects, as well as all 13 BRIC 2022 projects, are still under FEMA review as of October 2023. Table 6.6 shows the current status of BRIC projects.

Table 6.6 Building Resilient Infrastructure and Communities Program Summary October 1, 2018 – September 30, 2023

Program Year	Approved Projects		Open Projects	Closed Projects		Federal Funds Expended	
	Last 5 Years	Total	Total	Last 5 Years	Total	Last 5 Years	Total
BRIC20*	12	12	12	0	0	$4,678	$4,678
BRIC21*	3	3	3	0	0	$0	$0
BRIC22	Pending	Pending	Pending	0	0	$0	$0
Subtotal	**15**	**15**	**15**	**0**	**0**	**$4,678**	**$4,678**

*Additional projects pending FEMA review.

6.2.2 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 6.6 on project implementation capability, the State has an excellent track record of submitting accurate BCAs that meets FEMA criteria for hazard mitigation projects. During the planning period, the State submitted 78 projects with BCAs. This does not count the hundreds of BCAs completed for each individual subrecipient. For example, for DRs 4400, 4501, 4579, and 4600, the State completed BCAs on over 600 generator sites alone. All were submitted to FEMA with many still pending review.

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.

6.2.3 QUARTERLY REPORTS

The State of Georgia provides timely, complete, and accurate quarterly progress and financial reports on all funded HMA grants, meeting all requirements of 2 CFR §§ 200.301 through 200.-309. Separate financial reports are submitted quarterly by the State 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 EMGrants. 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 Subrecipient Progress Report generation;
- The ability to track correspondence tailored by subgrants; and
- The ability to generate dozens of standard reports and user-created ad hoc reports.

Upon project approval notification from FEMA, a State/Local Recipient/Subrecipient Agreement is prepared by GEMA/HS and sent to the Subrecipient for signature. Upon receipt of the signed agreement, the GEMA/HS Director signs the agreement and a fully executed agreement is sent to the Subrecipient with instructions to start the project. The signed agreement requires the Subrecipient 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 EMGrants to generate the Subrecipient quarterly report. When the report is generated, the system emails the grant Point of Contact letting them know the report is ready to be completed online. 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 submit the reports to their assigned planner or specialist, who then reviews the information and submits it for approval. As an incentive to receiving timely quarterly reports from each Subrecipient, 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. All quarterly reports are submitted to FEMA via Excel spreadsheets with one for disaster grants and a separate one for non-disaster projects. Also included in the quarterly report submission 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 budget comparison reports, Excel spreadsheets, and HMA Portfolio Manager complete the quarterly report package.

In addition to the quarterly report submitted for each of the open projects, the State submits the SF425 Federal Financial 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.

6.2.4 GRANT COMPLETION AND CLOSEOUT

For this update cycle, the State closed 79 HMGP projects in 12 disasters and 13 projects in six non-disaster programs. Two disaster and five 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. State staff ensures all submitted expenses are consistent with the approved project Scope of Work and are within all approved budgetary allowances. All projects are submitted for closeout within the required liquidation timeframe based on project completion. There have been no major findings on any single audit related to HMA programs during the planning timeframe.

The State/Local Recipient/Subrecipient Agreement now referred to as the Recipient/Subrecipient agreement that is signed by both GEMA/HS and the Subrecipient (now subrecipient) requires the Subrecipient (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 Subrecipient 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 a time performance extension from FEMA. 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 Recipient-Subrecipient 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 Subrecipient.

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 Subrecipient and Recipient 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 Subrecipients have adhered to the required deed restrictions. This information is also utilized to support Risk MAP Discovery and Resilience workshops.

6.3 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 (Emergency Management, Economic Development, Land Use Development, Housing, Health and Social Services, Infrastructure, Natural and Cultural

Resources) 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.

6.3.1 INTEGRATION WITH OTHER PLANNING INITIATIVES

GEMA/HS's Hazard Mitigation Department 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, federal, and other 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 6.7 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 6.7 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

Agency	Initiative	Public Sector	Description of GHMS Integration into Initiative	Contribution to Hazard Mitigation Goals
				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.
DCA	CDBG-DR	Economic Development, Housing, Infrastructure, Land Use Development	In the aftermath of the 4294, 4297, 4338, and 4400 disasters, the Department of Community Affairs implemented the CDBG-DR program to provide funds to assist in the recovery for communities in South Georgia impacted by these disasters. Mitigation staff presented at the program kickoff meetings throughout the region, and provided input into the goals for the program. Mitigation staff has also been present during local recover planning meetings funded by this program.	Contributes to the preservation of life and reduction of potential damages and losses by including mitigation into these planning opportunities and seeking to enhanced capabilities throughout the area. Including mitigation into the recovery planning encourages recovery in a way to reduce damages in the event of future events.
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	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

Agency	Initiative	Public Sector	Description of GHMS Integration into Initiative	Contribution to Hazard Mitigation Goals
			include RiskMAP products into GMIS to give ease of access.	hazards, including flooding, winds, earthquakes, landslides and wildfires.
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 Floodplain Management	Risk MAP	Land Use Development, Natural and Cultural Resources	GEMA/HS mitigation staff provided data to support discovery meetings 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.
DNR Safe Dams	High Hazard Potential Dam Program	Land Use, Development, Natural and Cultural Resources	GEMA/HS is working with GA Safe Dams to integrate mitigation planning requirements into State and local mitigation plans.	Contributes to the preservation of life and prevention of damages and losses from dam failure by identifying dam structures at risk of failure causing significant damage and/or loss of life and proposing actions to strengthen identified dams.
DNR Coastal Resources Division	Flood Terminology	Land use, Development, Natural and Cultural Resources,	GEMA/HS mitigation staff participated as part of a working group developing a set of standardized terms and definitions related to flooding.	Contributes to education and awareness of flooding terminology.
DNR Coastal Resources Division	Sea Level Rise Studies and modeling	Land use, Development, Natural and Cultural Resources, Climate Change and Reslience	The Coastal Resources Division develops and maintains a library of resources related to sea level rise, including studies on impacts of hurricanes before and after sea level rise, models of impacts on coastal marshlands, etc.	Contributes to preservation of life and prevention of damages by increasing knowledge and awareness of sea level rise and its impacts and integration of this information into other planning initiatives throughout the region.

Agency	Initiative	Public Sector	Description of GHMS Integration into Initiative	Contribution to Hazard Mitigation Goals
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, Elderly and Disabled	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.
Ga Rural Water Authority	Workshops, Emergency Power	Water Infrastructure	Presentations at annual GRWA conferences. Helped obtain funding for generator cache to provide emergency backup power	Contributes to the preservation of life by supplying backup power to rural water systems.

6.3.2 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 and one in 2018, Georgia has been allocated $122.4 million 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 Recipient to primarily consider and address its unmet housing recovery needs.

Georgia's allocation will affect 30 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 2023, all 11 coastal counties, have developed post-disaster recovery and redevelopment plans. Counties in Southwest Georgia are now beginning the process of developing their own versions of these 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 updating 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.

Floodplain Management

The State of Georgia has a robust floodplain management program managed by the Georgia Department of Natural Resources Floodplain Management Unit. The Hazard Mitigation Department supports and coordinates with the Floodplain Unit in multiple aspects of both agencies' activities, including supporting workshops, supporting and assisting with activities, etc. Additional details related to the State's multiple floodplain management programs, many of which are coordinated through the state's floodplain management program, including the following, are provided in Section 3.3.2 in Chapter 3 of this plan:

- National Flood Insurance Program (NIFP)
- Repetitive Loss Structures
- Community Rating System
- Georgia CRS Users Group
- Georgia Association of Floodplain Management (GAFM)
- Metropolitan North Georgia Water Planning District
- Georgia Flood Mapping, Assessing, and Planning Program (RiskMAP)
- Base Level Engineering (BLE)
- Community Assistance Program (CAP SSSE)
- Other

Underserved Communities

Many state agencies already work with underserved populations to meet their needs. For example, GEMA/HS mitigation staff has helped multiple nursing homes and care facilities obtain generators to provide emergency backup power in the event of power outages, thereby helping to ensure elderly and disabled residents of those facilities can continue to receive the care they need during times of severe weather. The State will continue to support cost effective, eligible mitigation grant activities, as well as any mitigation activity not requiring FEMA mitigation funding, across all communities and elements of the population.

As part of the update process, the State met with representatives of multiple agencies and organizations that work with and serve underserved populations throughout the State. The list of these agencies and organizations is included in Chapter 1. One of the purposes of the meeting was to identify who the underserved populations are throughout the state. The State will continue to explore ways to identify underserved or unreached communities, understand what their needs are as it relates to mitigation, and work to meet those needs based on available resources.

6.3.3 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 6.8 summarizes the federal programs or planning initiatives and how GHMS is integrated into them.

Table 6.8 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 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 $160 million in Federal funds 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 $60 million for planning and projects designed to reduce or eliminate hazard caused damages throughout the State.
BRIC	Projects must be identified in local mitigation plans. More than $1 million for planning and projects designed to reduce or eliminate hazard caused damages throughout the State.
EMPG	Provides funding that can be used for local warning and communication system enhancements.
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 155 counties, including their cities, 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.

FEDERAL PROGRAM OR PLANNING INITIATIVE	INTEGRATION INTO INITIATIVE
EMAP	Integration of EMAP standards including hazard vulnerability and risk assessments, state and local mitigation plans, grant administration and public education and outreach.
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.
HHPD	Support GA DNR's Georgia Safe Dams program in implementation of the High Hazard Potential Dams program by working to incorporate HHPD information into the State and local hazard mitigation plans.
HMEP	The Hazardous Materials Emergency Preparedness Program

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 some mitigation measures to be implemented during the intermediate 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, DR4338, DR4400, DR4501, DR4579 and DR4600. This has made additional funds available to meet the plan update funding needs in Georgia. Since the initial local plans were completed, HMGP has been used to fund almost 340 local mitigation plan updates. 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 16 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 2019 GHMS, the State has funded 87, or approximately 91% of all local mitigation plan updates using HMGP funding. Going forward, the State is applying for all local plan updates for the FY 23 cycle using HMGP funding from DR4685 and will likely use DR4738 to fund most of the FY 24 cycle.

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 utilized the PDM program to fund the initial development of multi-jurisdictional planning grants for 136 counties. The State then utilized PDM funds through the FY08, FY13, FY14, FY15, and FY16 application cycles to fund the three local plan 1st updates, as well as 98 2nd updates. Section 6.5 includes further discussion on the use of the PDM program since its inception in 2002. Due to the large number of large disaster declarations since 2016 and the subsequent availability of HMGP funding, it was not necessary to use additional PDMC funding cycles for mitigation plan updates. The Disaster Recovery Reform Act (DRRA) of 2018 eliminated the PDMC program after FY'2019.

Building Resilient Infrastructure and Communities (BRIC)

The BRIC program was created by the DRRA, replacing PDMC as FEMA's competitive multi-hazard non-disaster mitigation grant program. The goal of the program is to reduce vulnerability to future hazards by investing in researched supported, proactive measures to increase community resiliency. While BRIC continues to fund traditional mitigation activities, the program expanded on mitigation possibilities by focusing on increasing resilience and building community capability and capacity.

The State utilized the initial BRIC2020 funding cycle to fund nine local mitigation plan updates and one generator project. In addition, BRIC has allowed the State to pursue projects it hasn't historically pursued in the past, including one flood resiliency study, a smart sea level sensor project, and dam and bridge rehabilitations. Each of these other projects are currently pending approval. A notable project funded through BRIC 2021 is a flood resiliency study, including the effectiveness of green infrastructure in increasing resiliency. Also, the state submitted its largest single project ever using BRIC 2021, which is currently pending partial award as of September 2023.. The State will continue to pursue funding through the BRIC program in order to continue to increase resiliency and build capacity throughout its communities.

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 6.3.2, 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 2013 and again in 2018. Georgia received its latest full reaccreditation on the 67 standards in 2020. The Georgia programs continue to meet national standards for disaster preparedness and response.

Another activity funded through EMPG pass through funds is improvements to local warning and communications capabilities. While this is one of many eligible activities with EMPG funds, local communities are able to use these funds to implement projects to improve warning and communication in their communities.

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. Data was compiled on PA Categories C-G for the following disasters, which were active as of January 16, 2024: DRs 4284, 4338, 4400, 4600, and 4685. Note, the following disasters were not included in the compiled report:

- DRs 4294 and 4297. Closed previously.
- DR 4501 (Covid). Only included Category B work.
- DR 4738. Declared September 2023. Funding amounts not yet available.

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. 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 4294 through 4685, which were pulled from FEMA's EMMI System and FEMA PA Portal, can be viewed in Appendix J. These reports show a significant amount of Section 406 mitigation completed for DRs 4294, 4297, 4338, 4400, 4579, 4600, and 4685.

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 RiskMAP program 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 J contains a copy of the charter along with GEMA/HS's adoption.

Team activities over the past several 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, the Ocmulgee River at Macon, and the Flint River at Bainbridge. 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, Peachtree Creek at Atlanta, and Yellow River near Snellville and Lithonia.

Two FIM libraries are nearing completion by USACE at Chattahoochee at Helen and Etowah River near Canton. Two new FIMs are in process for Thomas Creek near Reidsville and Town Branch in Summerville.

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, more than $25 million has been approved on Emergency Watershed Protection (EWP) measures, and the State has provided more than $5.7 million as a match for this program. Since the last plan update, all work has been completed on NRCS-EWP projects for DR4400. GEMA/HS and the NRCS continue to promote the EWP at HMGP applicant 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 13 since the completion of the 2019 GHMS, presently reaching 107 total counties. Also, one county is a designated Tsunami Ready 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.

Georgia Safe Dams Program

On November 6, 1977, the Kelly Barnes Dam, located in Stephens County, Georgia failed causing catastrophic damage to the downstream area and the College at Toccoa Falls. Barnes Lake, a 40-acre reservoir was created by the dam. The dam failed after a period of heavy rainfall. The resulting flood from the dam failure killed 39 people, mostly students and employees of the college, and caused $2.8 million in damages. The failure was the catalyst for Georgia to pass legislation creating a dam safety program in 1978. Further, this tragedy was also the basis for several other states to create a dam safety program and for the federal government to take action including creating the national dam safety program.

The Georgia Safe Dams Act (Act) was passed in 1978 and became effective on July 1, 1978. Pursuant to O.C.G.A. Secs. 12-5-370 et seq., the Safe Dams Program is responsible for developing and maintaining an inventory of dams, classifying dams, and ensuring compliance of all regulated dams. To be considered a dam under the Act, a structure must either be at least 25 feet tall (vertical height, with a minimal storage of at least 15 acre-feet) or store at least 100 acre-feet (volume, with a dam at least 6 feet tall) at maximum storage. Category I structures are those where it has been determined, should the dam ever fail, there is a probable loss of life from that failure. Consequently, Category II are those dams where no occupied structure has been identified to be in the dam failure zone. If the structure also meets the criteria for a Category I dam, it is regulated under the Act and a permit is required from EPD. Dams owned or operated by the Federal Government are specifically exempted from the Act. Likewise, dams associated with aggregate surface mining are also exempted. It should be pointed out that unlike most states and federal agencies, Georgia only uses High Hazard (Category I) and Low Hazard (Category II) and does not have a Significant Hazard classification.

In Georgia, dams are owned by state or local governments, public utilities, and private entities. In many cases, a dam may be owned by multiple entities such as a private individual and a local government. In Georgia, as well as on the national level, around 60 to 70% of the dams are considered privately owned. Due in large part to the issue of multiple owners, it is difficult to provide an exact percent breakdown of ownership categories. Around 30% of the currently regulated dams in Georgia are considered state owned. A majority of these dams are classified as flood control dams. These flood control dams were designed and built by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) (formerly known as the Soil Conservation Service) to mitigate downstream flooding. These flood control dams were built on private land and once constructed the operation and maintenance of the dam was turned over to state and/or local government entities via easement agreements.

There are currently around 5,600 structures in Georgia that meet the definition of a dam. Of that total inventory, around 510 of those dams are classified as Category I and are thus regulated. Due to ongoing development combined with continual efforts by the Program, the number of Category I dams is anticipated to continue to rise.

The total number of watershed dams in Georgia is 365. However, at least 8 of these structures have had their easements expired or revoked and the ownership has flipped to private entities such as a private individual or a homeowners association. Of the 365 current watershed dams, 236 are classified as Category I. Efforts continue with evaluating the classification of all structures including these watershed dams. There are approximately 40 additional watershed dams that are being studied at this time that could become Category I.

In 2016, the Georgia DNR Environmental Protection Division modified the Rules for Dam Safety in two important areas. These changes clarified existing language in the Rules and helped clarify that the responsibility for the dam lies with the dam owner and not the Division. Specifically, the rule modifications require the owner to perform quarterly inspections of the dam and to retain an engineer once every two years for an inspection. The modifications also clearly defined the requirement for all Category I dam owners to have an Emergency Action Plan (EAP). Prior to the rule change in 2016, there were approximately 10 percent of the Category I dams with an EAP. As a result of the rule change and efforts by the program, the percent of dams with a current EAP is now around 75%. A portion of those 25% out of compliance are dams that have recently been classified and thus they have not met their deadline for submission of an EAP. The Program was so successful in increasing the percent of high hazard dams with an EAP that FEMA published an article recapping the efforts and success.

A consequence of these EAPs being developed is that local governments became aware and more involved with these dams since the local Emergency Manager is required to sign off on the concurrence page for the EAP.

National Dam Safety and High Hazard Potential Dam (HHPD) Programs
The Georgia Safe Dams 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. The program manages the State Assistance Grant Program, which provides assistance to encourage the establishment and maintenance of effective State programs intended to ensure dam safety, to protect human life and property, and to improve State dam safety programs. In Georgia, these funds are awarded to the Safe Dams Program (SDP) of the Environmental Protection Division, Georgia Department of Natural Resources. These funds are used by the SDP to provide dam safety training to employees of the SDP, to aid in development of Emergency Action Plans for dams, and to determine proper classification of low hazard dams. Additionally, the funds have been used for outreach to dam owners to provide training with regards to dam maintenance and safety. The program also manages the HHPD program for the State of Georgia. This program provides funds for the rehabilitation and strengthening of state, local and non-profit owned dams that have been determined to have a significant risk of failure, leading to major damages and loss of life. The HHPD program has a mitigation planning requirement for both state and local plans. Therefore, the State is working to incorporate this program into the SHMS, as well as developing a methodology for incorporating local planning requirements into local mitigation plans as applicable.

Hazardous Material Emergency Preparedness
The purpose of the Georgia Hazardous Materials Emergency Preparedness (HMEP) Program is to protect against the risks to life, property, and the environment that are inherent in the transportation of hazardous material in intrastate and interstate commerce (Title 49 U.S.C. § 5101). The HMEP Program supports the emergency preparedness and response efforts of the State and local authorities that deal with hazardous materials emergencies, specifically those involving transportation within the State of Georgia.

Through local authorities' participation in the HMEP training program, GEMA/HS seeks to increase the effectiveness of hazardous materials response and preparedness efforts, and reduce the risks associated with the bulk transport of highly flammable liquids, and other hazardous materials, throughout the State of Georgia.

Georgia utilizes our HMEP Grant funding to conduct the training courses shown below to ensure both State and local authorities are trained to properly inspect, monitor and respond to Hazardous Material incidents. The enhanced training of teams across the State results in a reduction of incidents and the mitigation of the results of any Hazardous Materials spillage or releases. For additional information, see the HMEP Application in Appendix H.

- **Hazardous Materials Awareness (R303)**, 8-hr: Level I awareness training for first responders to comply with OSHA 29 CFR 1910.120(q).

- **Hazardous Materials Contingency Planning (G311R)**, 24-hr: A three-day course that's seeks to improve hazardous materials planning skills for emergency management. Topics include local, state and federal mechanisms to assist in planning and response, hazardous materials characteristics, transportation and regulatory compliance.

- **Resource Management (G276)**, 16-hr: A two-day course that provides participants with the knowledge and skills to effectively identify, develop and manage a resource management system within the EOC and to better direct response resources to transportation-related hazardous materials incidents.

- **Incident Command System/Emergency Operations Center Interface (R400)**, 8-hr: An 8-hour course designed to illustrate the emergency management directors and first responder agencies the advantages and need for integrating incident command system (ICS) and emergency operations center (EOC) operations. Additionally, the course focuses on integrating command and resource coordination to hazardous materials incidents.

- **Hazardous Material Symposium,** 24-hr: A three-day meeting of HazMat team members from all across Georgia to present the latest trends in Hazardous Material transportation; latest equipment and technics used and identify the latest training available.

- **Hazardous Materials Technician (F103)**, 80-hr: A two-week course based on the EPA course Emergency Response to Hazardous Materials Incidents (165.15). and NFPA 472. It is designed to follow-up operations level training by providing the next level of training for personnel assigned to hazardous materials response teams, their supervisors, and training officers.

- **Hazardous Materials Technician Refresher**, 8-hr: A one-day course designed to retrain current hazardous materials technicians on competencies based on NFPA 472 and those based on agency having jurisdiction requirements.

- **Hazardous Materials First Responder Operations (F101R40)**, 40-hr: This one-week course will provide the Hazardous Materials Responder with the basic information to respond safely and efficiently to hazardous materials/weapons of mass destruction incidents. The responder will be able analyze, plan a response, implement the planned response and evaluate progress for the purpose of protecting nearby persons, the environment, or property from the effects of the release.

- **Pressurized Container Fire Control (F118)**, 8-hr: a one-day course designed for firefighters and officers who may be called upon to handle emergencies involving pressurized containers. This course presents lifesaving information about fires involving pressurized containers, and how to control or when not to control these fires. Topics include tactics, behavior of pressurized containers exposed to fire, physical properties of common substances stored under pressure and control of LP gas fires. Especially useful are the practical exercises involving LP gas fires in simulated pressure containers or piping.

- **Handling Flammable and Combustible Liquid Incidents (F119-12)**, 12-hr: This course is designed to give firefighters as well as fire officers the basic knowledge, skills and confidence needed to safely control and extinguish flammable liquids fires. Included are definitions of the properties of both flammable and combustible liquids, types of storage containers and their hazards, tactics for modes of attack, as well as discussions and demonstrations of different types of extinguishing agents.

- **NIMS ICS 300- Intermediate ICS for Expanding Incidents (M-180-24),** 24-hr., 3 day course that describes the incident and event management process for supervisors and expanding incidents as prescribed by the Incident Command System. It also describes how the NIMS command and management component supports the management of expanding incidents.

- **NIMS ICS 400-Advanced ICS for Command and General Staff (N400-16),** 16-hr, 2 day course that is intended to provide training on and resources for personnel who require advanced application of the Incident Command System (ICS). It is designed for senior public safety personnel and will provide information on how they are expected to perform in a management capacity in an Area Command or Multiagency Coordination Entity.

- **Risk-Based Response to Battery Emergencies (Battery-HM)** An 8-hour course, including classroom and hands-on training, to prepare responders to conduct risk-based responses to batter emergencies for multiple types of batteries including Lithium-Ion (Li-Ion). The course covers batteries found in transportation including passenger vehicles, ground transport, air and sea shipping, and residential, commercial, and industrial settings.

- Annual Conference for Georgia LEPC/Haz-Mat leaders to meet and discuss recent trends and issues and the planning process in Georgia.

6.4 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.

6.4.1 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.

6.4.2 STATEWIDE PROGRAM OF HAZARD MITIGATION

GEMA/HS and the Hazard Mitigation Department 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 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

Mitigation Councils

Georgia State 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 has provided 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. GISCC membership includes representatives from all levels of government, private industry, educational institutions, and nonprofit and private groups. 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.

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. In 2017, the General Assembly passed H.B. 183 (O.C.G.A. §50-8-300 and 50-8-301), further defining the roles of the GGAC and placing it within the Georgia Department of Community Affairs. The GGAC is charged with advising the Geospatial Information Officer (GIO) on matters geospatial data, resources and applications across all levels of government and geospatial stakeholders across the State. The GGAC is composed of 15 representatives from state departments and agencies, local governments, the private sector, academia, regional commissions, and others.

Training and Capability Building

The State has undertaken multiple activities with the goal of building the capabilities of its communities. As noted in Section 6.3.2, the Department of Community Affairs (DCA), in 2012 – 2013, conducted initial training on Hazus-MH for planning professionals, including Regional Commission, throughout the State. Since that time, the State has contracted with the University of Georgia Carl Vinson Institute's Information Technology Outreach Service (ITOS) to provide Hazus-MH services as part of local mitigation planning efforts. ITOS has, in turn, partnered with capable Regional Commissions (RCs) for Hazus-MH services, and works with other RCs as they increase their capacity.

The GEMA/HS Training Section has developed a state provided Hazard Mitigation Planning Course (G-318) Local Hazard Mitigation Planning. This course is offered to all emergency management and planning professionals throughout the State.

The State has a history of supporting local and regional capability and capacity building efforts, including, but not limited to, flood and drainage master plans, local recovery and redevelopment planning, and Risk Map including the update of regulator Special Flood Hazard Areas and development of non-regulatory flood products. Table 6.9 includes much of the capacity building related work the State has undertaken over the previous few years and is continuing to pursue.

Table 6.9 Mitigation Capacity Building efforts

Initiative	Lead Agency	Initiative Purpose
Local and State Hazard Mitigation Planning	GEMA/HS, local communities	Updates State and Local Hazard Mitigation Plans to continue to meet current planning requirements and remain eligible for mitigation funding.
Risk Map	GaDNR Floodplain Unit	Updates regulatory Special Flood Hazard Areas. Develops non-regulatory flood products, including 10%, 4%, and 2% flood products
Local Mitigation Planning Training	GEMA/HS	Trains interested planning professionals and emergency management staff in the development of local hazard mitigation plans to meet current local planning standards.
Green Infrastructure Flood Resiliency	DNR CRD, Glynn County	Study the impacts of green infrastructure mitigation on flood resiliency and develop mitigation strategies using green infrastructure in Glynn County.
Community Recovery and Redevelopment Planning	DNR CRD in Coastal areas, GEMA/HS for remainder	Helps Communities develop plans for recovery and redevelopment efforts to be undertaken in the aftermath of hazard events. Work has been completed with some updates underway in all 6 coastal counties and 5 counties located one county inland from the coast. Initial development is underway in South Georgia counties impacted by declared disasters in 2017 and 2018.

6.4.3 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 6.10 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, 2023.

Table 6.10 HMGP Cost Shares for Open Disaster Declarations

Disaster	Total Approved	Federal Share	State Share	Local Share
DR4165	$11,817,946	$8,813,801	$1,474,749	$1,529,397
DR4215	$2,592,790	$1,944,593	$270,508	$377,689
DR4259	$5,671,530	$4,320,130	$581,390	$770,010
DR4284	$12,608,828	$9,499,842	$1,278,852	$1,830,134
DR4294	$3,241,749	$2,465,666	$357,586	$418,534
DR4297	$5,412,110	$4,119,091	$607,207	$685,813
DR4338	$22,022,974	$16,854,393	$2,655,665	$2,830,560
DR4400	$17,069,978	$13,198,225	$947,076	$2,927,278
DR4501	$1,452,418	$1,327,558	$62,098	$62,762
DR4579	$717,680	$655,984	$4,774	$56,922
DR4600	$304,260	$283,834	$8,170	$12,256
FMAG-HM 5163	$1,566,559	$1,188,775	$158,037	$219,747
Total	**$84,478,823**	**$64,671,890**	**$8,406,112**	**$11,721,102**
Percentage		**76.6%**	**10%**	**13.9%**

*Federal cost share includes Subrecipient Mgt Costs, where approved, which are 100% Federal cost share.

6.4.4 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. DCA has, since, updated to the 2018 IBC and IRC, retaining the DRBCs as appendices to the new codes.

6.4.5 MITIGATING RISKS TO CRITICAL AND ESSENTIAL FACILITIES AND

COMMUNITY LIFELINES

"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 and other medical care facilities, fire and police stations, rescue and other emergency service facilities, Emergency Operations Centers, and schools.

Community Lifelines are services vital to the stability of the community. They include critical and essential facilities, but also, simply, the ability to provide those services and can often be interconnected. Community Lifelines include safety and security; food, water, and shelter; health and medical; energy; communications; transportation; and hazardous materials.

Chapter 2 of the Standard Plan addresses both state-owned and operated facilities, critical facilities, and community lifelines 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. 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. They are often connected to community lifelines. For example, police / law enforcement facilities are considered an essential facility, and thereby a critical facility. The "Safety and Security" community lifeline is largely provided by by law enforcement, which is managed through police / law enforcement facilities. Also, while not defined as essential per FEMA definitions, water facilities – a type of community lifeline - are deemed to be critical.

Because of their importance to the survival and recovery of the community, GEMA/HS aims mitigation efforts toward critical facilities that are also community lifelines as well. An example of this is the bevy of generators the state has helped obtain funding for to provide backup power to health care facilities and water systems. In other words, the State has helped improve the resilience of health and medical facilities and water facilities by increasing the availability of reserve energy sources for those community lifelines.

In addition to GEMA/HS, other agencies often have primary responsibility for some community lifelines that are also deemed by the state and many local communities to be critical. For example, GDOT has primary responsibility for state roads. GDOT currently has multiple improvement projects in process throughout the State, including multiple interchange enhancement projects, multiple road widening and safety improvement projects, and several projects to replace and upgrade bridges over waterways.

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.

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.

6.4.6 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 – 4685, 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.

6.5 EFFECTIVE USE OF AVAILABLE FEMA FUNDING

44 CFR 201.5(b)(3) states that the Enhanced Plan must demonstrate that the State effectively uses existing FEMA programs to achieve its mitigation and other 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) (ended in 2019, but the State is still working through funded projects), the new Building Resilient Infrastructure and Communities Program (BRIC) 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. In addition, the State has utilized funding through the Public Assistance (PA) program to assist with recovery efforts in the aftermath of every Federally declared disaster.

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 6.11 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 6.11 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

Project Type	Level of Effectiveness	Rationale
Generators for Critical Facilities	High	Reduces damages by maintaining operational capability of critical infrastructure and resources
Dam Rehabilitation	Medium	Reduces damages by rehabilitating / repairing dam structures, but has residual risk.
Management	High	Technical support for developing and implementing mitigation measures
Advance Assistance	High	Technical support for developing mitigation measures

Table 6.12 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. HMGP-FM program information is included with HMGP, 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 6.12 FEMA Funding Programs Used for Mitigation Projects

Program	Number of Projects	Federal Obligation	% of Total Funds Allocated to GA	Effectiveness	Applicable Goals
RFC	4	$3,243,615	1.17%	High	1-3
HMGP	922	$205,427,375	74.19%	High	1-3
PDM	93	$46,114,583	16.65%	Medium	1-3
FMA	55	$9,911,953	3.58%	Low	1-3
BRIC	15	$890,696	0.32%	Medium	1-3
HMA Subtotal	**1,089**	**$265,588,222**	**95.92%**		
PA	943	$7,065,862	2.55%	High	1-3
HHPD	1	$141,995	0.05%	Medium	1-3
EMPG	152	$4,230,000	1.53%	Low	1
Non-HMA Subtotal	**1,096**	**$11,437,857**	**4.13%**		
Total	**2,185**	**$277,026,080**	**100.00%**		

Hazard Mitigation Grant Program (HMGP)

Table 6.13 lists information about the HMGP and the funds approved for each federally declared disaster from 1990 through September 30, 2023.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 DR1973.

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 Department will continue to provide technical assistance to all counties, their municipalities, and state agencies.

Table 6.13 HMGP Funding by Disaster Through September 30, 2023

Disaster	Federal Obligation	Federal Share Expended	State Share Expended	Local Share Expended	Approved Projects	% of Funds Used
DR857 - DR1973	$140,755,485	$132,499,310	$10,592,184	$5,955,305	600	94.13%
DR4165	$8,813,801	$7,813,896	$1,218,929	$2,241,718	35	**88.66%**
DR4215	$1,944,593	$1,741,942	$221,955	$576,128	10	**89.58%**
DR4259	$4,320,130	$2,664,859	$351,630	$543,548	35	**61.68%**
DR4284	$9,499,842	$5,505,721	$865,533	$1,015,400	75	**57.96%**
DR4294	$2,465,666	$1,587,601	$215,183	$312,661	14	**64.39%**
DR4297	$4,119,091	$822,674	$103,496	$154,449	7	**19.97%**
DR4338	$16,854,393	$6,027,874	$957,041	$744,165	44	**35.76%**
DR4400	$13,198,225	$1,093,052	$149,660	$88,544	54	**8.28%**
DR4501	$1,327,558	$40,392	$3,307	$0	35	**3.04%**
DR4579	$655,984	$21,214	$618	$927	8	**3.23%**
DR4600	$283,834	$7,424	$0	$0	2	**2.62%**
FMAG-HM5163	$1,188,775	$793,595	$105,813	$158,718	3	**66.76%**
DR4165 - DR4600*	$64,671,890	**$28,120,244**	**$4,193,165**	**$5,836,258**	322	**43.48%**
Total	**$205,427,375**	**$160,619,554**	**$14,785,349**	**$11,791,563**	**922**	**78.19%**

***Includes FMAG-HM 5163.**

Table 6.13A reflects the allocations and Federal funds requested from Disasters 4259 – 4738. As the table shows, the State has a consistent history of using a high percentage of the available funds, with only a couple of exceptions. A notable element of the HMGP program is the method with which FEMA makes states aware of HMGP allocation amounts. Estimates are released at the 30 day and 6-month timeframes from the date of the declaration with the final amount determined at the 12-month mark from the disaster declaration. Notably, the standard application period also ends at 12 months after the declaration. For DR4600, the allocation increased significantly – almost tripling – between the 6-month estimate and the 12-month lock-in. The State did not receive the 12-month lock-in amount until a month after the end of the application period and did not anticipate the sizeable increase. Therefore, the State was not prepared to adjust its strategy within the allotted time to make full use of the program. Based on that lesson learned, the State will make efforts to improve its ability to make full use of every disaster allocation, including more carefully monitoring damage estimates for its planning purposes and make full use of its ability to request extensions to application periods where necessary. DRs 4685 and 4738 are relatively new disasters with the application periods still open as of February 2024. The State is still accepting and submitting applications for these two disasters and expects to make full use of both of these grant cycles.

Table 6.13A HMGP Disaster Allocations

Disaster	Total Allocation	Federal Funds Requested	% Requested
DR4259	$4,289,893.00	$4,162,441.00	97.03%
DR4284	$19,490,976.00	$18,028,530.06	92.50%
DR4294	$2,837,977.00	$2,920,095.75	102.89%
DR4297	$5,148,638.00	$3,894,090.36	75.63%
DR4338	$30,271,227.00	$23,614,732.75	78.01%
DR4400	$65,822,652.00	$55,643,738.83	84.54%
DR4501	$78,691,416.00	$67,455,895.82	85.72%
DR4579	$2,790,575.00	$2,751,854.11	98.61%
DR4600	$12,746,329.88	$4,332,327.22	33.99%
Subtotals	**$222,089,683.88**	**$182,803,705.90**	**82.31%**
DR4685	$10,563,319.00	$679,001.44	6.43%
DR4738	$6,207,491.00	$25,650.75	0.41%
Total	**$238,860,493.88**	**$183,508,358.09**	**76.83%**

Program Highlights

Through the HMGP, local governments have permanently mitigated losses through the acquisition of over 1,326 flood-prone properties. Another 88 flood-prone properties have been elevated, 32 retrofits (predominantly wind related) have been completed, and four safe rooms have been constructed. Rounding out the activities, 511 initiative projects have been completed, 20 drainage improvement projects completed, and 43 generators for critical facilities. The program also funded the initial development of 20 local mitigation plans, 360 local mitigation plan updates, and the initial development of and three updates to the State Mitigation Plan. Table 6.14 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 DR4600, 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 DR4600, the Enhanced Plan provided an additional $16.2 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 flood prone properties through property acquisition and/or structure elevation.

Table 6.14 Cumulative Projects Funded with HMGP through September 30, 2023

Project Type	Number of Projects	Goal
Acquisition	94	2
Elevation	9	2
Retrofit (Wind, Flood, Lightning)	15	1,2
Drainage Improvement	54	2
Warning/Initiative	288	1
Planning	363	1,3
Safe Room	10	1,2
Generators	16	2
Management	33	1,2,3
Advance Assistance	8	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. Tables 6.15 and 6.16 lists information through September 30, 2023, 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 6.17 summarizes the number of projects and project types funded through the FMA and their associated State Mitigation Goal. The FMA program does not have individual State allocations. All projects submitted through the FMA program are entered in a national competition. Nevertheless, the State has requested approximately $42 million in Federal funds through the FY 2020, 2021 and 2022 FMA funding cycles.

Table 6.15 FMA Funding prior to 2016

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	$738,415	$738,415	$0	$0	4
FMA14	$1,198,931	$1,198,931	$0	$0	3
Total	**$13,480,056**	**$10,903,978**	**$170,703**	**$2,405,375**	**56**

Table 6.16 FMA Funding 2016 to September 30, 2023

Fiscal Year	Federal Obligation	Federal Share Expended	State Share Expended	Local Share Expended	Approved Projects	% of Federal Funds Used
FMA16	$2,326,513	$1,477,159	$0	$111,973	2	63.49%
FMA18	$277,650	$6,127	$1,307	$0	2	2.21%
Total	**$2,604,163**	**$1,483,286**	**$1,307**	**$111,973**	**4**	**44.38%**

Table 6.17 Cumulative Projects Funded with FMA through September 30, 2023

Project Type	Number of Projects	Applicable Goal
Acquisition	24	2
Elevation	2	2
Planning	13	1,3
Drainage Improvement	2	2
Management	15	1,2,3
Technical Assistance	2	1,2,3

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 program was eliminated in 2018 with the last funding cycle in FY2019. Prior to this, the State provided 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. Tables 6.18 and 6.19 list information through September 30, 2023, 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 Prior to FY2014

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
Total	**$54,051,796**	**$38,019,806**	**$1,100,260**	**$15,931,731**	**72**

Table 6.19 PDMC Funding 2014 to September 30, 2023

Fiscal Year	Federal Obligation	Federal Share Expended	State Share Expended	Local Share Expended	Approved Projects	% of Federal Funds Used
PDMC14	$534,127	$365,129	$305	$121,783	4	68.36%
PDMC15	$1,537,781	$728,859	$145,508	$179,188	4	47.40%
PDMC16	$910,705	$669,227	$18,549	$205,064	5	73.48%
PDMC17	$485,501	$340,235	$372	$113,038	2	70.08%
PDMC18	$98,447	$9,679	$3,226	$0	2	9.83%
PDMC19	$840,812	$523,774	$314	$174,278	3	62.29%
LPDM22	$2,906,250	$0	$0	$0	1	0.00%
Total	**$7,313,623**	**$2,636,904**	**$168,273**	**$793,350**	**21**	**36.05%**

Table 6.20 Cumulative Projects Funded with PDMC through September 30, 2023

Project Type	Number of Projects	Goal
Planning	23	1,3
Acquisition	28	2
Drainage Improvement	7	2
Drainage Master Plan	1	1,3
Generators	1	2
Elevation	1	2
Safe Room	1	1,2
Management	17	1,2,3
Acquisition (LPDM)	1	2
Warning/Initiative	5	1

Project Type	Number of Projects	Goal
(LPDM)		
Management (LPDM)	4	1,2,3
Safe Room (LPDM)	3	1,2
Drainage Improvement (LPDM)	2	2

Program Highlights
Through the PDM-C and LPDM, local governments have permanently mitigated losses through the acquisition of over 140 flood-prone properties. Another 117 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. Table 6.20 summarizes the number of projects and project types funded through the PDM-C and their associated State Mitigation Goal.

Building Resilient Infrastructure and Communities (BRIC) Program
The Building Resilient Infrastructure and Communities was created as a replacement for the PDMC program by the Disaster Recovery and Redevelopment Act of 2018 with the first funding cycle available in FY2020. The State has provides technical assistance to local governments in the development of fundable PDM applications. Since the program's inception in 2020, the State has been successful in getting federal approval for ten planning related projects, one acquisition project, and one generator project, among others. Tables 6.21 and 6.22 list information through September 30, 2023, about the BRIC funds approved since the program began.

Table 6.21 BRIC Funding 2020 to September 30, 2023

Fiscal Year	Federal Obligation	Federal Share Expended	State Share Expended	Local Share Expended	Approved Projects	% of Federal Funds Used
BRIC2020	$439,187	$13,981	$4,660	$0	12	3.18%
BRIC2021	$451,509	$0	$0	$0	3	0.00%
Total	**$890,696**	**$13,981**	**$4,660**	**$0**	**15**	**1.57%**

Table 6.21A BRIC Allocations

Fiscal Year	State Set Aside	Federal Funds Requested	Federal Funds Submitted to National Competition
2020	600,000	20,090,086	19,490,086
2021	1,000,000	106,819,518	105,819,518
2022	2,000,000	13,114,484	11,114,484
2023 Standard	2,000,000	In Process	In Process

Fiscal Year	State Set Aside	Federal Funds Requested	Federal Funds Submitted to National Competition
2023 Building Code Plus Ups	2,000,000	In Process	In Process
Total	**$7,600,000.00**	**$140,024,088.57**	**$132,424,088.57**

Table 6.21A highlights the amount of funds the State of Georgia has requested through the BRIC program between FYs 2020 and 2023 as of February 2024. Notably the State exceeded its state allocation in each of the 2020 – 2022 fiscal years by significant amounts. Those projects that pushed funding over the state allocation amount were submitted to the national competition portion of the BRIC program.

Table 6.22 Cumulative Projects Funded with BRIC Through September 30, 2023

Project Type	Number of Projects	Goal
Planning	11	1,3
Acquisition	2	2
Drainage Improvement	1	2
Generators	1	2
Management	2	1,2,3
Warning/Initiative	1	1

Other Mitigation Programs

In addition to the above, the State has previously worked with other FEMA mitigation programs, which are no longer in use, including the Repetitive Flood Claims (RFC) and Severe Repetitive Loss Properties (SRLP) programs. As indicated by their names, both of these programs focused on mitigation of flood prone Repetitive Loss and Severe Repetitive Loss Properties. While the State was unable to utilize the SRLP program for a variety of reasons, the State was able to use 2006 and 2007 RFC funds for the development of local acquisition projects to permanently mitigate flood damages to NFIP-insured structures. The Biggert Waters Flood Insurance Reform Act of 2012 eliminated, both, the RFC and SRLP program. The State has continued to pursue RL and SRL properties through the previously mentioned programs. Nevertheless, Table 6.23 lists information about funding received through older programs that are no longer in existence through September 30, 2023.

Table 6.23 Funding from Former Mitigation Programs

Fiscal Year	Total Approved	Project Types	Federal Share	State Share	Local Share	Approved Projects
RFC06 - RFC07	3,243,615	Acquisition, Management	3,243,615	0	0	4

Conclusion
The GEMA/HS Hazard Mitigation Department has administered 1089 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 6.24 summarizes the information for all four of the FEMA mitigation grants programs and the funding received in Georgia through September 30, 2023.

Table 6.24 Total Funding all HMA Grant Programs through September 30, 2023

Program	Total Approved	Federal Share	State Share	Local Share	Approved Projects
RFC	$3,243,615	$3,243,615	$0	$0	4
HMGP	$280,551,725	$205,427,375	$19,884,287	$55,560,644	922
PDM	$66,378,591	$46,114,583	$2,083,191	$18,180,650	93
FMA	$12,559,516	$9,911,953	$196,294	$2,451,273	55
BRIC	$1,176,865	$890,696	$14,986	$274,590	15
Total	**$363,910,313**	**$265,588,222**	**$22,178,758**	**$76,467,158**	**1,089**

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, 2023, 1,590 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. Over 2,000 mitigation projects have been completed, including acquisition and/or elevation of flood prone properties, drainage improvements, warning and communication systems, and other permanent mitigation project work. The State will continue to target Repetitive Loss and Severe Repetitive Loss 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.

Public Assistance Program
As noted in section 6.3.3, the State has made use of the Public Assistance Program Categories A-G as part of its efforts to assist both local communities and State agencies in their recovery efforts in the aftermath of each Federally declared disaster. PA uses all categories of FEMA PA funding including the following:

- Emergency Work
    - Category A Debris Removal – Clearing and removal of debris caused by the declared disaster when necessary for the public interest
    - Category B Emergency Work – immediate emergency work to protect the public and reduce immediate threat of additional damage
- Permanent Work
    - Category C – Repair of roads and bridges
    - Category D – Repair of Water Control Facilities
    - Category E – Repair of Public Buildings and Equipment
    - Category F – Repair of Public Utilities
    - Category G – Repair of Public Parks, Recreation Facilities and Other.

Table 6.25 identifies PA Category C-C grants active as of January 16, 2024, as well as grants closed within the previous 5 years. The State will continue to use the PA program to assist with recovery activities for all future disaster for the foreseeable future.

Table 6.25 Public Assistance Category C-G (Permanent Work) Grant Activity as of January 2024

Disaster	Total Projects	Eligible Amount	Federal and Admin Obligated	Date Closed in the last 5 Years
1858	Closed*	Closed*	Closed*	12/7/2020
4165	Closed*	Closed*	Closed*	6/9/2020
4215	Closed*	Closed*	Closed*	1/17/2020
4259	Closed*	Closed*	Closed*	10/17/2023
4284	195	$22,892,869	$17,169,652	
4294	Closed*	Closed*	Closed*	11/8/2021
4297	Closed*	Closed*	Closed*	11/9/2021
4338	346	$61,866,112	$46,399,938	
4400	155	$90,455,439	$67,898,852	
4579	23	$12,175,592	$10,958,033	
4600	57	$6,975,972	$6,278,374	
4685	29	$15,053,235	$11,289,926	
4738	Pending**	Pending**	Pending**	
Total	**805**	**$209,419,218**	**$159,994,776**	

***All projects completed and the disaster was closed in the last 5 years.**

****New disaster with projects being developed and funding being developed.**

In addition, as noted in Table 6.12 above, the Public Assistance program also participates in mitigation activities funded by Section 406 of the Stafford Act. This program allows for mitigation of damaged facilities during the recovery and reconstruction phase after a declared disaster. As part of its recovery efforts from declared disasters the State has worked with several communities to utilize Section 406 mitigation to mitigate damaged facilities as they are being repaired or re-built. To improve on these efforts, both, the Hazard Mitigation and Public Assistance Departments, are working to develop newer strategies, based on lessons learned, to encourage and assist communities in becoming more resilient to future disasters. For example, both departments have planned cross-training opportunities so that staff from both departments have a fundamental understanding of both mitigation programs and their capabilities.

Georgia Safe Dams Program

As noted in section 6.3.3, the State has made use of two grant programs through the National Dam Safety Program – the State Assistance Grant Program and the High Hazard Potential Dam Program. The Georgia Safe Dams Program has used the State Assistance Grant Program annually, historically receiving $70,000 - $80,000 per year, to assist with training, development of Emergency Action Plans, and classification of low hazard dams. The State has requested funds through the High Hazard Potential Dam to improve high hazard dams at risk of failure with potentially significant impacts. As noted in Table 6.12, to date, the State has received $142,000 to begin the rehabilitation of at risk high hazard dams.

Floodplain Management Unit
As described in Chapter 3, Section 3.3, the Georgia Department of Natural Resources has developed a robust Floodplain Management program. The program utilizes Federal funds through the Community Assistance Program – State Support Services Element (CAP-SSSE) to oversee all aspects of floodplain management at the state level, as well as provide guidance to local communities on all aspects of local level floodplain management. Example activities funded by the CAP-SSSE program are highlighted in Chapter 3. For State fiscal year 2024, the unit received $562,000 in CAP-SSSE funds to assist with the program's activities. According to the CAP-SSSE Tiered State Framework, every 3 years, FEMA measures state programs based on the program's capability, capacity, performance measures, and planning and coordination. States are ranked into one of the following three categories:

- Foundational – Score of 17-28. The state program meets the minimum requirements for grant eligibility
- Proficient – Score of 29-57. The state program is considered to be functioning well and performing to expectations and is eligible for 50% additional funding over base level.
- Advanced – The state program is considered to be "best in class" and performing above expectations

As of 2023, Georgia is rated as "Proficient," receiving a score of 51 out of 57. Currently, Georgia is ranked #15 out of 48 states in its ranking.

6.6 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 Department staff has overall responsibility for implementation of the Hazard Mitigation Assistance programs. These programs include the HMGP, FMA, PDM, and BRIC programs. The Disaster Recovery and Redevelopment Act of 2018 replaced the PDM program with the BRIC program beginning in 2020. The State will continue to implement and manage the PDMC program for projects approved through the FY2019 cycle and earlier through their closeout. 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 March 2023 for the DR4685 disaster. The HMGP Administrative Plan was approved by FEMA in July 2023. See Appendix J for the HMGP Administrative Plan.

6.6.1 ELIGIBILITY CRITERIA

Applications that are received by the Hazard Mitigation Department for funding consideration through the HMGP, FMA, and BRIC 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;
  - Planning related activities;
  - 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;
  - Other all-hazard resilient infrastructure projects that may include floodplain and stream restoration, and aquifer storage and recovery;
  - Non-Financial Direct Technical Assistance;
  - Post Fire Soil Stabilization
  - Codes and Standards; and
  - Innovative mitigation projects – these will be considered on a case by case basis.
- 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); The applicant and/or local government that is receiving the mitigation benefit must be in good standing in the 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; and
- The applicant has the ability to provide for the non-federal cost share;

The eligibility requirements were reviewed and updated to account for additional project types deemed eligible per the 2023 HMA guidance.

6.6.2 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 at least 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 6.26 HMA Projects with BCA

Project Type	Approved Projects with BCAs	Approved Projects with BCAs Since Last Plan Update
Acquisition w/ (Demolition or Relocation)	132	10
Acquisition and Elevation	3	0
Acquisition and Drainage Improvements	2	0
Elevation	9	2
Retrofit (Wind, Flood, Lightning)	16	1
Drainage Improvement	60	2
Safe Room	13	3
Dam Rehabilitation	1	1
Generator Projects	18	6
Other	1	1
Totals	255	26

The approval rate of projects submitted in the Pre-Disaster Mitigation—Competitive (PDM-C) program since its inception in 2003 was 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 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 31 Presidential Declared Disasters on 723 projects since 1990. In addition, similar types of reviews are done for the FMA and BRIC programs. The projects submitted have been diverse in nature and include drainage improvements, acquisition, elevation, wind retrofit, tornado safe room construction, planning, planning related, 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.

6.6.3 SYSTEM TO RANK PROJECTS

6.6.3A Hazard Mitigation Assistance Projects

GEMA/HS Hazard Mitigation Department manages all HMA grants for the State, including HMGP, BRIC and FMA. GEMA/HS 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. Initial ranking consists of the following:

Project Eligibility: The project must be an eligible activity and meet minimum requirements, including but not limited to the minimum benefit/cost ratio where the cost of the project does not exceed the benefits. An ineligible project cannot be funded.

Application Completeness: Each application must have the necessary information for FEMA to determine whether or not to approve the funding.

Funding Source Availability: Once the State determines a project is eligible and the application is complete, the State will then determine which of the 3 funding sources is the best fit. This is based on a number of factors, including eligibility within the specific funding sources, funds available within the funding sources, and whether the community was part of a recent disaster declaration and the project relates to the disaster. Related projects in recently declared areas receive priority over similar projects in non-declared communities.

Type of project: Hazard Mitigation Plans are a basic eligibility requirement for all other HMA project types. Within the HMGP and BRIC programs, there are funding amounts within the overall allocations (7% for HMGP, determined each year for BRIC). Within those funding limits, mitigation plan update projects take precedence over all other project types.

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, or multiple disaster types (flooding, wind, tornado), 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 G. 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.

6.6.3B High Hazard Potential Dam Projects

Georgia DNR's Georgia Safe Dams program manages all HHPD projects. The HHPD program is new to the State of Georgia. The State has used a combination of results of recent inspections, noted performance and damage issues from recent overtopping events and known downstream vulnerabilities to prioritize dams to target for rehabilitation work. Also, the State has identified the need to further evaluate all potential HHPD dams and develop a more thorough, robust methodology for prioritizing future HHPD projects to meet current HHPD funding program requirements.

6.6.4 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 Department is currently populating the database for all completed and closed projects within the HMA programs. As of September 30, 2023, the databased has 2,455 records in the system. The State continues to populate the database with information from older disaster allocations. The database is updated by State Hazard Mitigation Department 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. Previously, GEMA/HS's Hazard Mitigation staff utilized the GMIS to track mitigation actions on repetitive loss properties. When data was entered into GMIS for each mitigated property record, GEMA/HS staff reviewed the NFIP repetitive loss data base and added the repetitive loss property number to the record if the property was in FEMA's database. Authorized users of GMIS could run a report to determine the history of mitigation actions on repetitive loss properties. However, FEMA has recently placed greater restrictions on access to repetitive loss property information. GEMA/HS is in the process of re-obtaining access to repetitive loss property data. Once access is re-acquired, and the State has a full understanding of the new restrictions, the State will then determine whether to using the GMIS system as it previously did, or with changes to meet the confines of the agreement articles, or to develop a new system should that be necessary. One change that will likely be necessary would be the state may no longer be able to allow system users to access and run reports based on repetitive loss property data.

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 Subrecipient 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 Subrecipient 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. GEMA/HS Hazard Mitigation staff utilizes GMIS to pull a list of acquired properties needing certification. This list is sent to the Subrecipient (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.

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. The State is, once again, in the process of upgrading GMIS with the goal of enhancing system capabilities, functionality, and overall user friendliness. The upgrades are projected to be complete by the end of 2024.

6.6.5 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.

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 J) 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 J) 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 6.27 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 J.

Table 6.27 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
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

Applicant	Buildings in Analysis	Project Investment	Total Loss Avoided	Return on Investment
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.

Since September 2017, there have been 5 declared natural disasters, however all have been primarily wind related disasters. The State has not conducted loss avoidance studies on these disasters. However, the State is currently exploring methodologies to conduct a potential loss avoidance study for the DR4738 Hurricane Idalia disaster.

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.