



REGIONAL ASSESSMENT OF COASTAL GEORGIA

The region has an opportunity to shape the scope and character of future development, identify existing and emerging needs and update the Regional Plan to assure that top issues are addressed and communities are able to continuously revitalize.

Coastal Regional Commission

Coastal Regional Commission

The Coastal Regional Commission (CRC) is the regional planning and intergovernmental coordination agency created by local governments in the region pursuant to legislation passed by the Georgia General Assembly. The CRC has authority under state law as a Regional Commission (RC), effective July 2009, as outlined by House Bill 1216 in 2008.

The CRC is the forum through which local governments in the region meet to solve mutual problems and decide issues of region-wide importance. Additionally, the CRC collaborates in programs of research and study, and engages in planning that affects the coastal region.

The CRC works closely with the region's counties and cities to address a wide range of issues, including infrastructure, resources, economic development, historic preservation, growth management, and the delivery of services to older adults, persons with disabilities, and their family caregivers. Over the course of decades, the CRC has maintained a strong working relationship with the members it serves and has achieved national recognition for its ability to develop and promote efforts that impact the region as a whole.

Regional Assessment Partners

The CRC works closely with higher education institutions as these institutions are aligned with and dedicated to the livability and economic vitality of the 10-county coastal region.

Leaders from regional partnerships include:

John F. Crowley III, PhD; J. Marshall Shepherd, PhD.; Stephen Ramos, Ph.D.; Rosanna Rivero, Ph.D.; and Ron Thomas, FAICP each from the College of Environment + Design, UGA;

Lissa Leege, Ph.D. from the Director Center for Sustainability Georgia Southern University;

Dr. Lambright from Savannah State University; and Michael W. Burns, Senior Advisor to Regional Administrator, EPA Region 4.

College of Environment + Design, UGA

In July 2013, the CRC created a formal partnership with University of Georgia. This partnership assessed how well existing planning tools address hazard risk and community resiliency with the goal of integrating resiliency guidelines and performance standards into the Update of the Regional Plan.



Graduate Students, Master in Environmental Planning + Design Spring 2014

Anna Averett
Shruti Agrawal
Robert Lee Bailey
Lauren Borchard
Hillary Essig

Hugh Harker
Chapin LaChance
Gail Miller
Stephen Morgan
Ebunoluwa Odeyemi

Yaowen Shi
Zhan Shi
Alex Smith

Rosanna Rivero, Assistant Professor, Master in Environmental Planning + Design,
University of Georgia

Graduate Students, Master in Environment Planning + Design Fall 2014

Andrew Bailey
Elizabeth Beak
Naomi Braff
Rachel Durham
Laura Duvekot

Yuanyuan Gong
ryan L. Hardman
Qi Li
Matt Nahrstedt
Ryan William Orear

Margit Pap
Eduardo J. Rendon
Jenna Wargo

Rosanna Rivero, Assistant Professor, Master in Environmental Planning + Design,
University of Georgia

Environmental Planning Studio

Graduate Students, Environmental Planning Studio College of Environment + Design,
University of Georgia Spring 2014

Jimmy Adams
Holly Alerman
James Bradley
Ashley Crain
Kelly Howard Jelani Linder

Professor Ron Thomas, FAICP, College of Environment + Design, University of Georgia

Center for Sustainability, Georgia Southern University (GSU) + EPA Region 4

The mission of the Center for Sustainability at Georgia Southern is to 1) increase education and awareness of sustainability issues, both on campus and in the community; 2) provide incentives for faculty, staff, and students to incorporate sustainability in research, teaching and service; 3) form partnerships with local community to improve sustainability; 4) implement best practices in sustainability. The Center is directed by Lissa M. Leege, PhD, Professor of Biology & Director, Center for Sustainability, Georgia Southern University, Statesboro, GA.

2015 GSU

Students Hans McIntosh, student, GSU worked on logistics data with Don Masisak and David Dantzler, CRC.

Elli Chapman, student GSU worked with Jenifer, Hilburn, Altamaha Riverkeeper and Hunter Key, CRC GIS in collecting and mapping data.

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Introduction

Georgia is home to one of the most pristine and undeveloped coastlines in the eastern seaboard. This eastern shore stretches almost 100 miles from Savannah at its northern point to St. Marys at its southern tip. It's here one finds abundant wildlife, beautiful beaches and over 2300 miles of tributaries and salt marsh.

Equally important, one finds historic towns, industries, major ports, and a thriving tourism trade, each driving some part of the region's economic engine. Positive growth is important in maintaining coastal Georgia as unique area of the state. Together, coastal leaders are meeting the challenges of how to encourage and plan for quality economic growth while protecting the integrity of the coastal region's natural resources.

Regional Assessment Purpose

The purpose of the Regional Assessment is to present a factual and conceptual foundation upon which the rest of the regional plan is built. Preparation of the Regional Assessment is largely a staff or professional function of collecting and analyzing data and information about the region and presenting the results in a concise, easily understood format for consideration by the public and decision-makers involved in subsequent development of the Regional Agenda.

The Regional Assessment is the first part of the regional plan initiative. It is an objective and professional assessment of data and information about the region intended to be prepared without extensive direct stakeholder involvement.

The Regional Assessment includes: (1) **a list of potential issues and opportunities** the region may wish to take action to address;(2) analysis of projected regional development patterns, including **a map of desired future development patterns for the region**; (3) **evaluation of current policies, activities, and development patterns** in the region for consistency with the Quality Community Objectives; and (4) **analysis of data and information** to check the validity of the above evaluations and the potential issues and opportunities.

The product of the Regional Assessment must be a concise and informative report for decision-making by stakeholders during development of the Regional Agenda portion of

the plan. The Regional Assessment identifies and confirms the region’s needs. In addition to meeting the requirements of the regional assessment for the Georgia Department of Community Affairs (DCA), the **Assessment also identifies critical findings that lay the groundwork for policy and program development** during the regional development planning process.

Regional Assessment

Since the first Regional Plan of Coastal Georgia was adopted in 2010, and updated to include the Regionally Important Resource Plan in 2012, Coastal Georgians continuously worked to create a region that is culturally vibrant, intellectually curious, innovative and beautiful. Coastal Georgia linked land use, transportation, economic development, green spaces and people, and poured effort and resources into developing regional leaders.

How do we develop the region, compete as a region, attract talent and ensure high-paying employment and maintain our regional identity?

We cleaned rivers, promoted new ways of managing stormwater and became a major player as the eastern seaboard’s growing port and distribution hub. Since the adoption of the Plan, Coastal Georgia has shown it can grow a vital economy, protect the natural environment and support vibrant places to live and work.

Today, despite these many successes, education, jobs, housing, and workforce development need attention, and there are major challenges on the horizon. As we update the Regional Plan we ask, “How do we develop the region, compete as a region, attract talent and ensure high-paying employment, and maintain our regional identity?”

To effectively tackle these challenges, we set a focused, strategic path forward – a path based on a clear understanding of conditions and trends, challenges and strengths.

Methodology

In July 2013, the CRC created a partnership with the College of Environment + Design from the University of Georgia. This partnership’s first task was to **assess how well existing planning tools addressed hazard risk and community resiliency**. Students from the

Environment and Design Studio were on site to collect data, establish contacts and present initial findings at the American Planning Association (APA) GA Chapter State Conference on Jekyll Island. A **Hazard and Resilience Assessment for the Coast of Georgia, February 2014** was completed and promulgated to propose Resilient Communities as a topic of importance in the Update of the Regional Plan. See Appendix A.

With continuing efforts to create *Resilient Communities* as a topic of regional importance, in **December 2014, the objective of defining how urban form impacts climate and how design could aid the process of adaptation was addressed and defended** by Mariana Barreto Alfonso. The research assessed how climate factors combined with physical landscapes interact; what are the different climatic responses between the built environment and the natural landscape; what key climate factors have direct impact in climatic perception and effect comfort; and what design solutions can be examined that could improve the effects of the built environment on climate. The methodological approach took into account three different scales including the regional scale, city scale, and the site specific scale.

The major professor for the **Planning with Climate: Urban Design as a Tool for Adaption** was Rosanna G. Rivero. The Dean of the Graduate School was Maureen Grasso and Committee Members were John F. Crowley III, J. Marshall Shepherd, and Lupita McClenning of the CRC. See Appendix B.

In the spring of 2014, a **Sustainable Communities Plan for Coastal Georgia** was completed over a 15 week period for a five-county study area including Bryan, Camden, Glynn, Liberty and McIntosh Counties. This project assessed existing conditions, development types and patterns, and the natural environment; and explored issues and opportunities. See Appendix C.

In March 2015, the effort to assess the resiliency of communities continued with the creation of **Resiliency Matrix to Test the Resilience of Planning Documents for Coastal Georgia**. A matrix was created by Shruti Agrawal to be used **as a checklist to evaluate the performance of planning documents for managing the conditions generated by the impact of a natural event and to help in identifying missing portions of documents**

that need to be completed in the future. According to the multi-hazard mitigation plan status by FEMA, of the 11 states in the country with the FEMA approved enhanced state mitigation plan, Florida and North Carolina have mandated it for the coastal cities. Although Georgia has a statewide hazard mitigation element in the plan, it is not adopted by cities in their comprehensive plan. **The matrix too can easily be used for evaluation of the planning documents and be updated depending upon the type of natural event. The resiliency matrix tool can be used as a simple framework for evaluating the performance of planning documents.** The major professor was Umit Yilmaz, PhD., committee members include John (Jack) Crowley III, PhD., Rosanna Rivero, PhD., Pratt Cassity and Lupita McClenning, CRC Director of Planning. See Appendix D.

The CRC also utilized the Quality Growth Effectiveness (QGE) Assessment Survey as an Evaluation and Monitoring tool to measure performance standards as they relate to ongoing implementation of the Regional Plan. The QGE survey compiles *A State of the Region* through responses from local jurisdictions regarding consistency with the Regional Plan of Coastal Georgia. These answers determine the Plan's effectiveness, identifies implementation barriers, areas of best practices and most importantly areas of the Regional Plan that may require modification moving forward.

The CRC assessed the region and the current Regional Plan's effectiveness through local government feedback during formal *Plan Implementation Meetings*. Feedback is garnered during DRI consultation, CRC Leadership programs such as city and county retreats, CRC Practicums, GIS technical assistance and support, grant exploring opportunities, and through participation with the Georgia Initiative for Community Housing (GICH).

Feedback from key staff and elected officials during *Plan Implementation Meetings* recommend that for the Update of the Regional Plan that performance standards be created with a threshold specific to rural areas. Feedback during Plan Implementation Meetings also recommend that the Agriculture Land performance standards be revised to include points for local farmers market, and local businesses who utilize local seafood and farmers' markets.

Additionally, it was discussed that the Plan should identify meaningful performance standards by more carefully selecting clear goals that can improve smaller local governments approach to best practices.

What did We Discover?

Coastal Georgia has distinct issues based on 1) unique topographies, 2) natural features, and 3) varying demographics. The region is geographically large, covering 5,863 square miles (15,185 square km); and consisting of ten counties including urban, suburban, and rural areas, 35 municipalities of varying population, and large areas of very low population density. Planning is essential for any region with a wide variety of development patterns in order to ensure that rural, suburban, and urban areas have equitable access to infrastructure and services. In addition, planning is important for any region with a large number of jurisdictions in order to encourage cooperation and collaboration.

List of Potential Issues and Opportunities

The issues facing the region continue to change and evolve, becoming more and more complex. In addition to the traditional issues related to housing, transportation, land use, and economic development, a series of new concerns have emerged. These include, but are not limited to, energy production and consumption, climate change, lifecycle costs of public investments, and community health.

Considering the impact of comprehensive planning, including the new generation of sustainability plans, on social, economic, and environmental conditions, there is a need to explore the ways in which jurisdictions include public health goals and objectives as part of the comprehensive planning process. Identifying local planning responses to important health issues and examining how comprehensive and sustainability plans can promote long-term community health can help planning staff and practitioners better understand the role of health in planning and help to identify tools and strategies for integrating public health-related goals and policies into the plan-making process.

Issues for adaptation include the need for information and data as a basis for understanding potential risks and vulnerabilities, meaningful and effective stakeholder engagement shaped by local contexts, and sustained financial and staff resources that are

sensitive to urban variability. Policy-makers working on issues of adaptation and resilience must facilitate processes of testing ideas, learning from experiences, and recalibrating as new information is obtained and lessons are learned.

Development of Key Theme

The **Evaluation and Monitoring Report** reports on recent changes and recommends amendments to the Plan as data is collected, trends emerge and best practices are explored. The region has an opportunity to shape the scope and character of future development, identify existing and emerging needs and update the Regional Plan to assure that top issues are addressed and communities are able to continuously revitalize. By this definition, built environments become livable; ecosystems become healthier; economic development becomes more responsive; and the benefits of improved environmental and economic development become more equitably distributed among the region.

Regional Assessment Key Finding – Community Resiliency



Resilience is important in a changing world. Coastal Georgia faces major uncertainties including competition for resources and the impacts of coastal risks and vulnerabilities. While these issues affect the entire region, some communities are more vulnerable. In order to recover from potential setbacks, Coastal Georgia must become more resilient in a variety of ways and at a variety of levels. The regional coast of Georgia needs a well-designed and strong social, ecological, and economic infrastructure to adapt to its evolving future.

States, counties and municipalities must have an approved Hazard Mitigation Plan in order to apply for and/or receive hazard mitigation grant funding. There are notable differences found in Comprehensive Plans and Hazard Mitigation Plans. Hazard Mitigation Plans are often developed without active participation of local community development and/or planning staff. Strategies often include a focus on structural projects versus non-structural measures such as land use or policy alternatives. Hazards Mitigation Plans are generally stand-alone documents that don't link to other community based plans. Including

community resiliency in the Regional Plan of Coastal Georgia as a topic of regional importance can mitigate longer-term risks by promoting suitable development patterns.

For the purposes of this Assessment, the factors that define “resilience” are identified for the field of urban planning specifically for events like hurricane and tropical storms in the coastal cities of the South Atlantic Coastal Region.

For a planning document to support the resilience of different factors such as demographic, infrastructure, and ecology it is important to be aware of the issues that define these factors.

Environment + Design, UGA reviewed academic literature, several case studies and planning documents and identified different factors and issues for which resilience is discussed when considering urban planning. A matrix listing all those factors and their issues was created called the *Resiliency Matrix*. This matrix was used to test the performance of the local governments planning documents.

The results indicate two things: (1) the resilience scores of the city, and (2) the missing sections of the documents that can be updated for enhancing its performance for mitigating the impact of natural event in future.

Analysis of Regional Development Patterns

Regional Mapping

Projected Development Patterns

Projected Development Patterns Map The Regional Projected Development Pattern Map is created by incorporating the **Regionally Important Resources** map with each jurisdiction's map from their adopted local Comprehensive Plans and analyzed for current trends as it relates to developing, developed, and rural development patterns. The Regional Projected Development Patterns Map reflects the most recent trends and projected land use patterns from local Comprehensive Plans created or updated under DCA's Local Planning Requirements and the most recent comprehensive inventory of the Region's natural and cultural resources.

Regional Development Patterns include:

- **Conservation:** Primary conservation areas include, but are not limited to, wetlands, flood plains, streams, endangered species and critical habitat, prime agricultural lands, and federal or state listed species. Conservation areas include essential buffers along streams and wetlands, and water bodies that require riparian buffers.

Identifying and preserving coastal Georgia's Green Infrastructure network supports biodiversity and functional ecosystems, protects native plant and animal species, lessens the disruption to natural landscapes, limits invasive species, which in turn will enhance and support water quality, provides for quality growth land use planning, support the implementation of stormwater management plans and regulations, encourages the creation of transportation corridors and connections, fosters ecotourism, tourism and outdoor recreation, enhances the business climate, and ensures a high quality of life for coastal residents.

Rural: Areas not expected to urbanize or require urban services.

Efforts to maintain the character of rural areas are encouraged to protect viewsheds by providing for tree buffers along roadways, endorsing landscaping and significant tree preservation plans, and regulating unsightly uses such as junk yards or outdoor storage of heavy equipment. Local governments should make a conscientious effort to

withstand pressure to provide water and sewer services to dispersed areas and discourage urban development from occurring in areas at substantial distances from existing urban areas, or leaping over undeveloped land suitable for development.

Developed: Areas demonstrating urban development patterns and also illustrate the areas where water and sewer services are being provided.

A coordinated land use and infrastructure planning policy encourages the concentration of new development in and around cities; promotes infill and redevelopment. Local governments should give top priority to repairing and reinvesting in existing infrastructure such as roads, water, sewer and utilities, by fixing and maintaining what exists. Funding for expansion, growth, and new purchases is limited and such a strategy helps communities avoid subsidizing sprawl. Exercising this approach promotes reinvestment in blighted areas and combats disappearing rural scenery. It also avoids excessive costs in providing public services and facilities for developments outside of urban boundaries.

Developing: Areas likely to become urbanized and require urban services in the next 20 years.

New development should be planned with mixed uses, blending residential development with schools, parks, recreation, retail business and services; linked in a compact pattern that encourages walking and minimizes the need for auto trips. Policies should include connectivity and continuity between planned developments. Safe and reliable vehicular and pedestrian or bicycle connections to retail and commercial services as well as internal street connectivity, connectivity to adjacent subdivisions, and multiple site access points are basic elements for establishing quality growth.

Areas Requiring Special Attention

Considering the **Projected Development Patterns Map** and other sources, land use trends are evaluated within the region to identify areas requiring special attention, including:

- Areas identified on the Regionally Important Resources map;
- Areas where significant natural or cultural resources are likely to be impacted by development;
- Areas where rapid development or change of land uses are likely to occur, especially where the pace of development has and/or may outpace the availability of community facilities and services, including transportation;
- Areas in need of redevelopment and/or significant improvements to aesthetics or attractiveness (including strip commercial corridors);
- Areas with significant infill development opportunities, including scattered vacant sites, large abandoned structures, or sites that may be environmentally contaminated; and
- Areas of significant disinvestment, levels of poverty, and/or unemployment substantially higher than average levels for the region as a whole.

Characteristics of an individual or a group can affect the manner in which they prepare for a potential disaster. Their level of response can have a significant impact on their personal well-being as well as the success of a community. The purpose of this Assessment identified and mapped the following areas of special attention, specifically the vulnerable populations as it relates to natural hazards and resiliency.

- Map 1 - County **population growth greater than the 15% regional average, 2000-2010**
- Map 2 – County **population growth greater than the projected 32% regional average, 2010-2030**
- Map 3 - County **population under 5 greater than the 8% regional average, 2010**

- Map 4 - County **population aged 65+** greater than the **11% regional average**, 2010
- Map 5 - Census tracts where **population aged under 5** is above county's average
- Map 6 - Census tracts where **population aged 65+** is above county's average
- Map 7 - Census tracts where **median family income rate** is below county's average low/mod income level
- Map 8 - Census tracts where **family poverty rate** is above county's average
- Map 9 - Census tracts where **percentage of households without vehicles** is above county's average
- Map 10 - Census tracts where **percentage of mobile homes** is above county's average

Supporting Analysis of Data and Information

Vulnerability Assessment

Like many coastal regions sea level rise and hurricanes present a prevailing issue within this developing coast. Because of Georgia's low coastal elevation, it is susceptible to the effects of detrimental flooding occurring due to storm surges from hurricanes.



Listed below are the region's coastal counties and each county's vulnerability as outlined by *FEMA, Task 5, and Section 4: Conduct Risk Assessment, Summarize Vulnerability*.

The vulnerability ranking is given a color coded system with red the most likely and most hazardous; and blue ranking as negligible with damage being unpredictable in severity. Each extent, location, and hazard probability utilized the description outlined in *FEMA Task 5-3, Conduct Risk Assessment Analyze Risk*. For the purposes of this assessment, sea level rise is assessed for a 6ft rise in 2100 as the extreme prediction by NOAA. (Appendix A).

Results are summarized by an index of risk, vulnerability, and resilience, which varies with each theme or topic (e.g. built environment, infrastructure, and natural environment) and based on a ranking system. This system addresses the level of risk and vulnerability by county or by hazard area, and provides how resilient a community is to any future hazards.

Natural Hazards

Bryan County

According to the research conducted by the College of Environment + Design, Bryan County is affected by the possibility of extreme drought to due to the low precipitation levels throughout the county. Only a small amount of the County is within the floodplain and flooding is only likely in that area.

Hurricanes, and storm surges are considered highly likely. The storm surge during a category 5 can reach up to 31 feet as predicted by National Oceanic and Atmospheric Administration (NOAA).

Hazard	County	Location	Maximum Probable Extent	Probability of Future Events	Overall Ranking
Drought	Bryan	county wide, extensive	extreme	Likely	Orange
Extreme Cold	Bryan	entire county, extensive	3°F, weak	unlikely	Light Blue
Extreme Heat	Bryan	entire county, extensive	105°F, moderate	occasional	Yellow
Flood	Bryan	part of county, significant	severe	Likely	Orange
Hurricane	Bryan	county wide, extensive	category 5, extreme	occasional	Red
Lightning	Bryan	negligible	weak to moderate	occasional	Dark Blue
Sea Level Rise	Bryan	county wide, extensive	6 ft, extreme	highly likely	Red
Storm Surge	Bryan	county wide, extensive	Category 5/ 31 ft, extreme	highly likely	Red
Wildfire	Bryan	parts of county, negligible	405.6 acres, weak	high in times of drought, likely	Light Blue

Ranking Color Code

	highly likely, covers a large extent, results in severe damage lasting weeks to months
	likely, covers a large to moderate extent, results in damage that can be severe, lasts weeks
	occasional to likely, covers a moderate extent, results in damage lasting days to weeks
	limited, covers a small extent, damages lasts hours to days
	negligible, covers a random small extent, damage is hit or miss in severity

Table 1.1.1 FEMA Hazard Summary Worksheet 5.1 for Bryan County.

Camden County

Natural Hazard

According to the research by the College of Environment + Design, flooding in Camden County is an extreme occurrence due to most of the county lying within the flood plain. However, during periods of drought due to low precipitation for the region, wildfires are a likely probability. A hurricane in Camden County can have severe repercussions with a Category 5 hurricane creating a 31 foot storm surge as predicted by NOAA.

Hazard	County	Location	Maximum Probable Extent	Probability of Future Events	Overall Ranking
Drought	Camden	County wide, extensive	Extreme	Likely	
Extreme Cold	Camden	Entire county, extensive	4°F, weak	Unlikely	
Extreme Heat	Camden	Entire county, extensive	104°F, moderate	Occasional	
Flood	Camden	Parts of county, significant	Severe	Highly Likely	
Hurricane	Camden	County wide, extensive	Category 5	Occasional	
Lightning	Camden	Negligible	Weak to moderate	Occasional	
Sea Level Rise	Camden	County wide, extensive	6 ft, extreme	Highly Likely	
Storm Surge	Camden	County wide, extensive	Category 5, 31 ft, extreme	Highly Likely	
Wildfire	Camden	Parts of county, negligible	No information available	High in times of extreme drought	

Ranking Color Code

	highly likely, covers a large extent, results in severe damage lasting weeks to months
	likely, covers a large to moderate extent, results in damage that can be severe, lasts weeks
	occasional to likely, covers a moderate extent, results in damage lasting days to weeks
	limited, covers a small extent, damages lasts hours to days
	negligible, covers a random small extent, damage is hit or miss in severity

Table 1.1.2 FEMA Hazard Summary Worksheet for Camden County.

Chatham County

Natural Hazards

According to the research by the College of Environment + Design, Chatham County's main natural hazard threats are hurricanes, flooding, sea level rise, and storm surges. Chatham County has risk of severe flooding especially during times of hurricanes, storm surges, and sea level rise as these factors increase the likelihood of county-wide flooding. Additionally, flooding is an extreme occurrence due to most of the county lying within the flood plain.

A hurricane of any category can make landfall on the county. The storm surge caused by hurricanes can reach levels of 31 feet as predicted by NOAA. These storm surges can cover most of the county during a Category 5 hurricane.

Hazard	County	Location	Maximum Probable Extent	Probability of Future Events	Overall Ranking
Drought	Chatham	county wide, extensive	extreme	Likely	Orange
Extreme Cold	Chatham	Savannah area-entire county, extensive	3°F, weak	unlikely	Light Blue
Extreme Heat	Chatham	Savannah area-entire county, extensive	105°F, moderate	occasional	Yellow
Flood	Chatham	significant, covers a large portion of county	severe	highly likely	Red
Hurricane	Chatham	county wide, extensive	Category 5, extreme	occasional	Red
Lightning	Chatham	negligible	weak to moderate	occasional	Light Blue
Sea Level Rise	Chatham	county wide, extensive	6 ft, extreme	highly likely	Red
Storm Surge	Chatham	county wide, extensive	Category 5/ 31 ft, extreme	highly likely	Red
Wildfire	Chatham	parts of county, negligible	1217.21 acres burned, moderate to severe	high in times of drought, likely	Light Blue

Ranking Color Code

	highly likely, covers a large extent, results in severe damage lasting weeks to months
	likely, covers a large to moderate extent, results in damage that can be severe, lasts weeks
	occasional to likely, covers a moderate extent, results in damage lasting days to weeks
	limited, covers a small extent, damages lasts hours to days
	negligible, covers a random small extent, damage is hit or miss in severity

Table 1.1.3 FEMA Hazard Summary Worksheet for Chatham County

Glynn County

Natural Hazards

According to the research by the College of Environment + Design, floods, hurricanes, storm surges, and sea level rise are highly likely and considered the most severe for Glynn County. A Category 5 hurricane can cause 31 foot storm surges as predicted by NOAA. These storm surges can flood cover most of the county. During periods of precipitation there is a likely risk of extreme drought.

Hazard	County	Location	Maximum Probable Extent	Probability of Future Events	Overall Ranking
Drought	Glynn	County wide, extensive	Extreme	Likely	Orange
Extreme Cold	Glynn	Entire county, extensive	5°F, weak	Unlikely	Light Blue
Extreme Heat	Glynn	Entire county, extensive	106°F, moderate	Occasional	Yellow
Flood	Glynn	Part of county, significant	Severe	Highly Likely	Red
Hurricane	Glynn	County wide, extensive	Category 5	Occasional	Yellow
Lightning	Glynn	Negligible	Weak to moderate	Occasional	Light Blue
Sea Level Rise	Glynn	County wide, extensive	6 ft, extreme	Highly Likely	Red
Storm Surge	Glynn	county wide, extensive	Category 5, 31 ft extreme	Highly Likely	Red
Wildfire	Glynn	parts of county, negligible	No information available	High in times of extreme drought	Dark Blue

Ranking Color Code

	highly likely, covers a large extent, results in severe damage lasting weeks to months
	likely, covers a large to moderate extent, results in damage that can be severe, lasts weeks
	occasional to likely, covers a moderate extent, results in damage lasting days to weeks
	limited, covers a small extent, damages lasts hours to days
	negligible, covers a random small extent, damage is hit or miss in severity

Table 1.1.4 FEMA Hazard Summary Worksheet 5.1 for Glynn County

Liberty County

Natural Hazards

According to the research by the College of Environment + Design, Liberty County is likely affected by extreme drought due to its low precipitation levels. Hurricanes, sea level rise, and storm surges are highly likely within this area due to the large portion of the county that all three disasters can affect. A Category 5 hurricane can bring 31 foot storm surge as predicted by NOAA.

Hazard	County	Location	Maximum Probable Extent	Probability of Future Events	Overall Ranking
Drought	Liberty	county wide, extensive	extreme	Likely	
Extreme Cold	Liberty	entire county, extensive	3°F, weak	unlikely	
Extreme Heat	Liberty	entire county, extensive	105°F, moderate	occasional	
Flood	Liberty	part of county, significant	severe	highly likely	
Hurricane	Liberty	county wide, extensive	category 5, extreme	occasional	
Lightning	Liberty	negligible	weak to moderate	occasional	
Sea Level Rise	Liberty	county wide, extensive	6 ft, extreme	highly likely	
Storm Surge	Liberty	county wide, extensive	Category 5/ 31 ft, extreme	highly likely	
Wildfire	Liberty	parts of county, negligible	893.42 acres, weak to moderate	high in times of drought, likely	

Ranking Color Code

	highly likely, covers a large extent, results in severe damage lasting weeks to months
	likely, covers a large to moderate extent, results in damage that can be severe, lasts weeks
	occasional to likely, covers a moderate extent, results in damage lasting days to weeks
	limited, covers a small extent, damages lasts hours to days
	negligible, covers a random small extent, damage is hit or miss in severity

Table 1.1.5 FEMA Hazard Summary Worksheet 5.1 for Liberty County

McIntosh County

Natural Hazards

According to the research by the College of Environment + Design, McIntosh County can suffer from extreme drought due to the low precipitation levels of the region. Flooding is highly likely due to large portions of the county lying within the flood plain. Hurricanes can become a Category 5 with a 31 foot storm surge as predicted by NOAA.

Hazard	County	Location	Maximum Probable Extent	Probability of Future Events	Overall Ranking
Drought	McIntosh	County wide, extensive	Extreme	Likely	
Extreme Cold	McIntosh	Entire county, extensive	3°F, weak	Unlikely	
Extreme Heat	McIntosh	Entire county, extensive	105°F, moderate	Occasional	
Flood	McIntosh	Part of county, significant	Severe	Highly Likely	
Hurricane	McIntosh	County wide, extensive	Category 5	Occasional	
Lightning	McIntosh	Negligible	weak to moderate	Occasional	
Sea Level Rise	McIntosh	County wide, extensive	6 ft, extreme	Highly Likely	
Storm Surge	McIntosh	county wide, extensive	Category 5; 31 ft, extreme	Highly Likely	
Wildfire	McIntosh	parts of county, negligible	933.11 acres, severe	High in times of extreme drought, likely	

Ranking Color Code

	highly likely, covers a large extent, results in severe damage lasting weeks to months
	likely, covers a large to moderate extent, results in damage that can be severe, lasts weeks
	occasional to likely, covers a moderate extent, results in damage lasting days to weeks
	limited, covers a small extent, damages lasts hours to days
	negligible, covers a random small extent, damage is hit or miss in severity

Table 1.1.6 FEMA Hazard Summary Worksheet 5.1 for McIntosh County

Natural Environment

The assessment for the region includes the following natural features: hydrology, wetlands and riparian zones, water recharge areas, critical vegetation habitats, areas of development/disturbance, and conservation land. Through identification of valuable and critical areas, other key natural features and processes are addressed indirectly including: soil and erosion, storm water runoff, and continuous wildlife corridors.

Georgia tides represent a dynamic process for the marsh ecosystem. Incoming tides provide food for the grasses of the marsh while outgoing tides carry food and nutrients produced by the marsh to the sea. The coming together of these two water sources provides critical habitat for fish, turtles, birds, mammals and the fisheries of Georgia. Seventy percent of Georgia's fish, shrimp, crabs, and shellfish spend a portion of their life in the estuarine waters of the salt marshes. These estuaries are nutrient driven by tidal waters which average 6.5 feet twice a day. During king tides these tides can average 10 feet.

Maritime dunes lie landward of the coastal beaches and seaward of the maritime forests. The dunes closest to the beach are vegetated by salt-tolerant species that provide nesting habitat for a variety of animals, such as loggerhead and leatherback turtles. Maritime dunes are among the most picturesque and heavily visited environments of the coastal region; protecting their economic value depends on also conserving their ecological values. Sand sharing, sediment transport, and longshore currents are natural processes that sustain maritime dunes. Limiting coastal development, channelization of coastal rivers, upstream impoundment, and seawall/jetty construction protects from interference with the natural movement of sand, sediments, and currents.

Additionally the wetlands, marshes, and riparian zones act as buffers against offshore storms. The vegetation has a dissipating effect on wave intensity. Hurricanes and storm surges would have larger negative impacts to infrastructure without natural marshes and vegetation. Management of salt marshes, wetlands, and riparian zones should be integrated into coastal hazard mitigation plans and sea level rise adaptation policies.

Storm Surge and Development

Inundation zone 1, also referred to as storm surge zone, shows that Glynn County has the most coverage of developed area, approximately fifteen percent. All other counties reveal that development is below ten percent within storm surge zone 1.

Storm surge zone 2 shows that the percent of developed land increases. Camden, Chatham, and McIntosh contain twenty to thirty percent of developed land and Glynn County contains forty percent development.

Chatham and McIntosh show an increase in development at thirty percent for storm surge zone 3. Camden, Glynn and Liberty counties are fifteen to twenty-five percent developed.

In inundation zone 4, the development coverage decreases to fewer than twenty percent. In inundation zone 5, the development coverage is equal to or less than ten percent.

Tropical storm and inundation 1 zone should limit development. The inundation zone 2 and 3 have the most developed coverage that should be considered in resiliency planning as Figure 1.2.1.

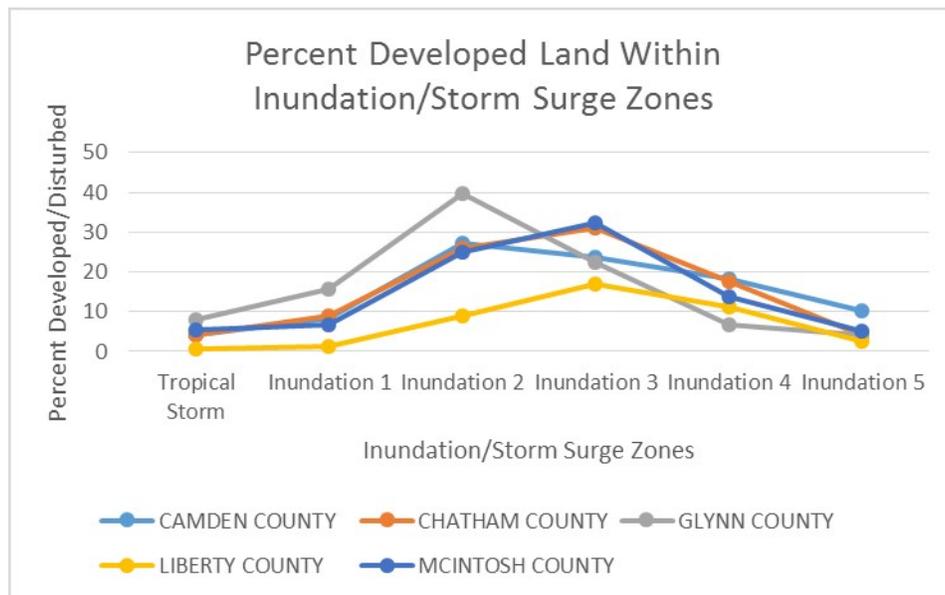


Figure 1.2.1

Vegetation/Open Water Buffers

Riparian buffers can be given a value based on their presence and allowance from open water and wetlands towards the built and developed environment. Three categories of consideration include: 100, 150, and 200-foot riparian buffers. A 100-foot riparian buffer is the recommended minimum based on literature reviews by the scientific community. As reported by the U.S. Agriculture and U.S. Environmental Protection agency in 1997, there are specific riparian widths that are associated with specific objectives. The recommended buffer width for flood control should be up 200 feet. This buffer width provides flood and sediment control as well as wildlife habitat.

Buffers narrower than 35 feet can provide some limited benefits but may require long-term maintenance since their ability to trap sediments is reduced (Giovengo, 2012). Currently, **The Soil Erosion and Sedimentation Act of Georgia** sets minimum standards for land-disturbing activities that counties enforce. Counties and municipalities must adopt comprehensive ordinances that establish procedures for controlling land-disturbing activities. One requirement is the installation of best management practices that avoid soil erosion caused by storm water runoff. Another aspect of the act requires that no land-disturbing activities be undertaken within 25 feet from state waters.

Five counties have approximately ninety percent vegetation within the 100-foot riparian buffer as noted in Figure 1.2.2. Within the 150-foot riparian buffer the vegetation coverage decreases slightly. The largest decrease in vegetation is within Glynn and Chatham Counties that declines from around eighty percent to seventy percent and sixty percent respectively. McIntosh and Liberty County's vegetation coverage does not change drastically, staying between ninety and eighty percent. This represents the effects of development and the importance of maintaining buffers on the riparian zone for protection of vegetation and hydrology. The expanding built environment continues to threaten the natural environment. The state currently mandates a 25-foot buffer from hydrology, which is inadequate for protecting the vital natural system.

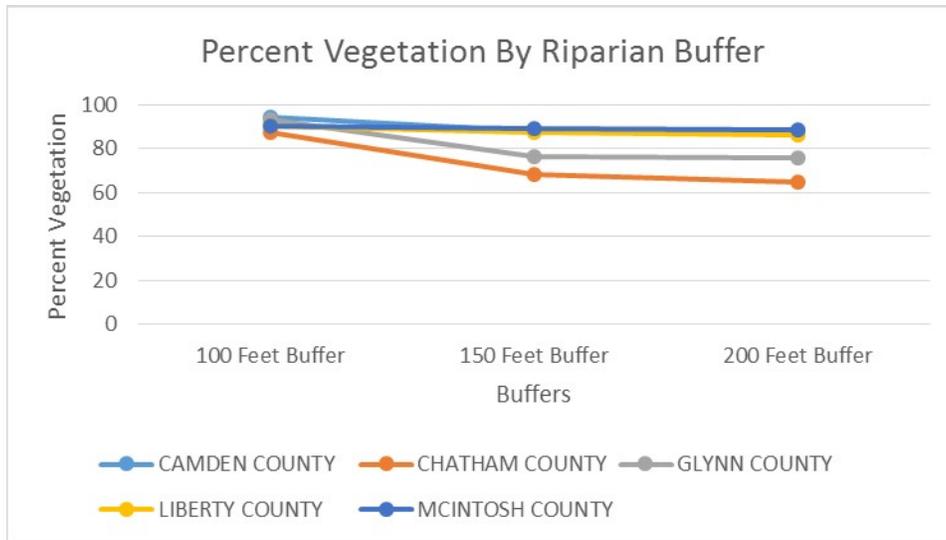


Figure 1.2.2 Data derived from GIS vegetation data provided by DNR. Bryan County is not included because there is no vegetation data provided.

Vulnerable Populations

A key factor in examining resiliency is understanding and quantifying vulnerable populations. These populations include not only those residents who live in vulnerable areas, the 100-year and 500-year flood plains, but also those who may have difficulty in heeding evacuation orders due to age, income, and mobility.

Provided below are county snapshots identifying these most vulnerable populations. These groups included children less than five years old, the elderly and frail elderly, persons living in poverty, and persons without reliable transportation that live in communities with limited public transportation. For elderly, we have identified the percentage of the population 65 and older. There is no specific age cohort for frail elderly, but the literature defines frailty in people 65 and older that called for the diagnosis when three or more of the following five criteria were present: unintentional weight loss of 10 pounds or more in the past year, self-reported exhaustion, weakness as measured by grip strength, slow walking speed and low physical activity. The frail elderly are individuals, over 65 years of age, dependent on others for activities of daily living, and often in institutional care.¹ For

¹ "A Firm Diagnosis of Frailty," New York Times, Karen Pennar, June 25, 2012; "Who Are the Frail Elderly," Quarterly Journal of Medicine, New Series 68, No. 255, pp. 505-506, July 1988.

evidence of reliable transportation we used U. S. Census data showing the percentage of households that do not have a vehicle available. Also included are percentages of families who live in mobile homes as these are considered particularly vulnerable in the event of a storm or other natural disaster.

Bryan County Snapshot

Population Growth

The population of Bryan County grew from 23,417 to 30,233 between 2000 and 2010. The population is projected to grow to 45,272 by 2020 and to 59,534 by 2030. This represents a growth rate of 23percent between the two most recent census counts, and a projected growth of 49percent from the current census count to 2030.

Bryan County Population Growth			
2000	2010	2020	2030
23,417	30,233	45,272	59,534
<i>Source: U. S. Census; Georgia Office of Planning and Budget</i>			

Age Vulnerable Populations

In Bryan County the percentage of children under 5 grew by 18percent from 2000 to 2010, while the percentage of persons 65 and older grew by 37percent during the same period.

Bryan County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	1,800	2,203	18percent
Persons 65 and older	1,703	2,715	37percent
<i>Source: U. S. Census</i>			

Income and Poverty Level

Income can directly relate to a family's ability to have reliable transportation, which then directly relates to a family's ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family's ability to secure temporary lodging (hotels or

motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census' American Community Survey 2013 - Economic Characteristics, Bryan County's Median Family Income (MFI) is \$74,513. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$59,610 for Bryan County. Poverty levels are established by the federal government and are based upon income and family size. For Bryan County, 31percent of the population is LMI and 8.6percent of families fall below the poverty level.

Means of Transportation

The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In Bryan County 3.1percent of households do not have a vehicle available.

Housing Type

Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In Bryan County 13.9percent of families live in mobile homes.

Bulloch County Snapshot

Population Growth

The population of Bulloch County grew from 55,983 to 70,217 between 2000 and 2010. The population is projected to grow to 88,071 by 2020 and to 109,034 by 2030. This represents a growth rate of 20percent between the two most recent census counts, and a projected growth of 36percent from the current census count to 2030.

Bulloch County Population Growth			
2000	2010	2020	2030
55,983	70,217	88,071	109,034
<i>Source: U. S. Census; Georgia Office of Planning and Budget</i>			

Age Vulnerable Populations

In Bulloch County the percentage of children under 5 grew by 22percent from 2000 to 2010, while the percentage of persons 65 and older grew by 19percent during the same period.

Bulloch County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	3261	4197	22percent
Persons 65 and older	5207	6401	19percent

Source: U. S. Census

Income and Poverty Level

Income can directly relate to a family's ability to have reliable transportation, which then directly relates to a family's ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family's ability to secure temporary lodging (hotels or motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census' American Community Survey 2013 - Economic Characteristics, Bulloch County's Median Family Income (MFI) is \$52, 100. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$41,680 for Bulloch County. Poverty levels are established by the federal government and are based upon income and family size. For Bulloch County, 35percent of the population is LMI and 16.3percent of families fall below the poverty level.

Means of Transportation

The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In Bulloch County 6.1percent of households do not have a vehicle available.

Housing Type

Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In Bulloch County 18.3percent of families live in mobile homes.

Camden County Snapshot

Population Growth

The population of Camden County grew from 43,664 to 50,513 between 2000 and 2010. The population is projected to grow to 70,548 by 2020 and to 96,743 by 2030. This represents a growth rate of 14percent between the two most recent census counts, and a projected growth of 48percent from the current census count to 2030.

Camden County Population Growth			
2000	2010	2020	2030
43,664	50,513	70,548	96,743

Source: U. S. Census; Georgia Office of Planning and Budget

Age Vulnerable Populations

In Camden County the percentage of children under 5 grew by 4percent from 2000 to 2010, while the percentage of persons 65 and older grew by 50percent during the same period.

Camden County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	3,804	3,983	4percent
Persons 65 and older	2,277	4,556	50percent

Source: U. S. Census

Income and Poverty Level

Income can directly relate to a family's ability to have reliable transportation, which then directly relates to a family's ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family's ability to secure temporary lodging (hotels or motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census' American Community Survey 2013 – Economic Characteristics, Camden County's Median Family Income (MFI) is \$60,101. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$48,081 for Camden County. Poverty levels are established by the federal government and are based upon income and family size. For Camden County, 39percent of the population is LMI and 13.7percent of families fall below the poverty level.

Means of Transportation

The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In Camden County 5.3percent of households do not have a vehicle available.

Housing Type

Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In Camden County 14.2percent of families live in mobile homes.

Chatham County Snapshot

Population Growth

The population of Chatham County grew from 232,048 to 265,128 between 2000 and 2010. The population is projected to grow to 290,615 by 2020 and to 324,098 by 2030. This represents a growth rate of 12percent between the two most recent census counts, and a projected growth of 18percent from the current census count to 2030.

Chatham County Population Growth			
2000	2010	2020	2030
232,048	265,128	290,615	324,098
<i>Source: U. S. Census; Georgia Office of Planning and Budget</i>			

Age Vulnerable Populations

In Chatham County the percentage of children under 5 grew by 15percent from 2000 to 2010, while the percentage of persons 65 and older grew by 9percent during the same period.

Chatham County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	15,663	18,526	15percent
Persons 65 and older	29,770	32,864	9percent

Source: U. S. Census

Income and Poverty Level

Income can directly relate to a family's ability to have reliable transportation, which then directly relates to a family's ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family's ability to secure temporary lodging (hotels or motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census' American Community Survey 2013 - Economic Characteristics, Chatham County's Median Family Income (MFI) is \$55,978. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$44,782 for Chatham County. Poverty levels are established by the federal government and are based upon income and family size. For Chatham County, 44percent of the population is LMI and 13.5percent of families fall below the poverty level.

Means of Transportation

The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In Chatham County 7.9percent of households do not have a vehicle available.

Housing Type

Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In Chatham County 4.6percent of families live in mobile homes.

Effingham County Snapshot

Population Growth

The population of Effingham County grew from 37,535 to 52,250 between 2000 and 2010. The population is projected to grow to 80,563 by 2020 and to 112,062 by 2030. This represents a growth rate of 28percent between the two most recent census counts, and a projected growth of 53percent from the current census count to 2030.

Effingham County Population Growth			
2000	2010	2020	2030
37,535	52,250	80,563	112,062

Source: U. S. Census; Georgia Office of Planning and Budget

Age Vulnerable Populations

In Effingham County the percentage of children under 5 grew by 22percent from 2000 to 2010, while the percentage of persons 65 and older grew by 37percent during the same period.

Effingham County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	2,857	3,668	22percent
Persons 65 and older	3,016	4,763	37percent

Source: U. S. Census

Income and Poverty Level

Income can directly relate to a family's ability to have reliable transportation, which then directly relates to a family's ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family's ability to secure temporary lodging (hotels or

motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census’ American Community Survey 2013 – Economic Characteristics, Effingham County’s Median Family Income (MFI) is \$69,450. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$55,560 for Effingham County. Poverty levels are established by the federal government and are based upon income and family size. For Effingham County, 32percent of the population is LMI and 7.9percent of families fall below the poverty level.

Means of Transportation

The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In Effingham County 3.6percent of households do not have a vehicle available.

Housing Type

Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In Effingham County 24percent of families live in mobile homes.

Glynn County Snapshot

Population Growth

The population of Glynn County grew from 67,568 to 79,626 between 2000 and 2010. The population is projected to grow to 93,461 by 2020 and to 109,771 by 2030. This represents a growth rate of 15percent between the two most recent census counts, and a projected growth of 27percent from the current census count to 2030.

Glynn County Population Growth			
2000	2010	2020	2030
67,568	79,626	93,461	109,771
<i>Source: U. S. Census; Georgia Office of Planning and Budget</i>			

Age Vulnerable Populations

In Glynn County the percentage of children under 5 grew by 18percent from 2000 to 2010, while the percentage of persons 65 and older grew by 18percent during the same period.

Glynn County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	4398	5352	18%
Persons 65 and older	9761	11976	18%

Source: U. S. Census

Income and Poverty Level

Income can directly relate to a family's ability to have reliable transportation, which then directly relates to a family's ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family's ability to secure temporary lodging (hotels or motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census' American Community Survey 2013 - Economic Characteristics, Glynn County's Median Family Income (MFI) is \$56,221. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$44,977 for Glynn County. Poverty levels are established by the federal government and are based upon income and family size. For Glynn County, 45percent of the population is LMI and 15.3percent of families fall below the poverty level.

Means of Transportation

The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In Glynn County 6percent of households do not have a vehicle available.

Housing Type

Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In Glynn County 12.7percent of families live in mobile homes.

Liberty County Snapshot

Population Growth

The population of Liberty County grew from 61,610 to 63,453 between 2000 and 2010. The population is projected to grow to 78,740 by 2020 and to 93,821 by 2030. This represents a growth rate of 3% between the two most recent census counts, and a projected growth of 32% from the current census count to 2030.

Liberty County Population Growth			
2000	2010	2020	2030
61,610	63,453	78,740	93,821
Source: U. S. Census; Georgia Office of Planning and Budget			

Age Vulnerable Populations

In Liberty County the percentage of children under 5 grew by 2% from 2000 to 2010, while the percentage of persons 65 and older grew by 39% during the same period.

Liberty County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	6,412	6,552	2%
Persons 65 and older	2,432	3,971	39%
Source: U. S. Census			

Income and Poverty Level

Income can directly relate to a family's ability to have reliable transportation, which then directly relates to a family's ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family's ability to secure temporary lodging (hotels or motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

Long County Snapshot

Population Growth

The population of Long County grew from 10,304 to 14,464 between 2000 and 2010. The population is projected to be 14,386 in 2020 and to grow to 17,171 by 2030. This represents a growth rate of 29percent between the two most recent census counts, and a projected growth of 16percent from the current census count to 2030.

Long County Population Growth			
2000	2010	2020	2030
10,304	14,464	14,386	17,171

Source: U. S. Census; Georgia Office of Planning and Budget

Age Vulnerable Populations

In Long County the percentage of children under 5 grew by 16percent from 2000 to 2010, while the percentage of persons 65 and older grew by 44percent during the same period.

Long County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	1,133	1,355	16%
Persons 65 and older	594	1,055	44%

Source: U. S. Census

Income and Poverty Level

Income can directly relate to a family's ability to have reliable transportation, which then directly relates to a family's ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family's ability to secure temporary lodging (hotels or motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census' American Community Survey 2013 - Economic Characteristics, Long County's Median Family Income (MFI) is \$50,522. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$40,418 for Long County. Poverty levels are established by the federal government and are based upon

income and family size. For Long County, 33percent of the population is LMI and 17percent of families fall below the poverty level.

Means of Transportation

The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In Long County 6.5percent of households do not have a vehicle available.

Housing Type

Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In Long County 49.2percent of families live in mobile homes.

McIntosh County Snapshot

Population Growth

The population of McIntosh County grew from 10,847 to 14,333 between 2000 and 2010. The population is projected to be 16,039 in 2020 and to grow to 20,686 by 2030. This represents a growth rate of 24percent between the two most recent census counts, and a projected growth of 31percent from the current census count to 2030.

McIntosh County Population Growth			
2000	2010	2020	2030
10,847	14,333	16,039	20,686

Source: U. S. Census; Georgia Office of Planning and Budget

Age Vulnerable Populations

In McIntosh County the percentage of children under 5 grew by 9percent from 2000 to 2010, while the percentage of persons 65 and older grew by 48percent during the same period.

McIntosh County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	715	785	9%
Persons 65 and older	1,280	2,478	48%
<i>Source: U. S. Census</i>			

Income and Poverty Level

Income can directly relate to a family’s ability to have reliable transportation, which then directly relates to a family’s ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family’s ability to secure temporary lodging (hotels or motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census’ American Community Survey 2013 – Economic Characteristics, McIntosh County’s Median Family Income (MFI) is \$54,036. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$43,229 for McIntosh County. Poverty levels are established by the federal government and are based upon income and family size. For McIntosh County, 25percent of the population is LMI and 10.5percent of families fall below the poverty level.

Means of Transportation

The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In McIntosh County 5.2percent of households do not have a vehicle available.

Housing Type

Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In McIntosh County 39.6percent of families live in mobile homes.

Screven County Snapshot

Population Growth

The population of Screven County decreased from 15,374 to 14,593 between 2000 and 2010. The population is projected to be 17,819 in 2020 and to grow to 20,036 by 2030. This represents a population loss of 5percent between the two most recent census counts, and a projected growth of 27percent from the current census count to 2030.

Screven County Population Growth			
2000	2010	2020	2030
15,374	14,593	17,819	20,036

Source: U. S. Census; Georgia Office of Planning and Budget

Age Vulnerable Populations

In Screven County the percentage of children under 5 decreased by 2percent from 2000 to 2010, while the percentage of persons 65 and older grew by 1percent during the same period.

Screven County Age Vulnerable Populations			
	2000	2010	Percent Change
Children under 5	1,012	993	-2%
Persons 65 and older	2,155	2,174	1%

Source: U. S. Census

Income and Poverty Level

Income can directly relate to a family’s ability to have reliable transportation, which then directly relates to a family’s ability to evacuate their homes in the event of an evacuation order. Income also impinges upon a family’s ability to secure temporary lodging (hotels or motels) beyond publically provided shelter, or to obtain replacement housing should they lose their homes due to a storm event or natural disaster.

According to the U. S. Census’ American Community Survey 2013 – Economic Characteristics, Screven County’s Median Family Income (MFI) is \$46,591. Low- and moderate-income (LMI) is defined as up to 80percent of MFI, which would be \$37,273 for Screven County. Poverty levels are established by the federal government and are based

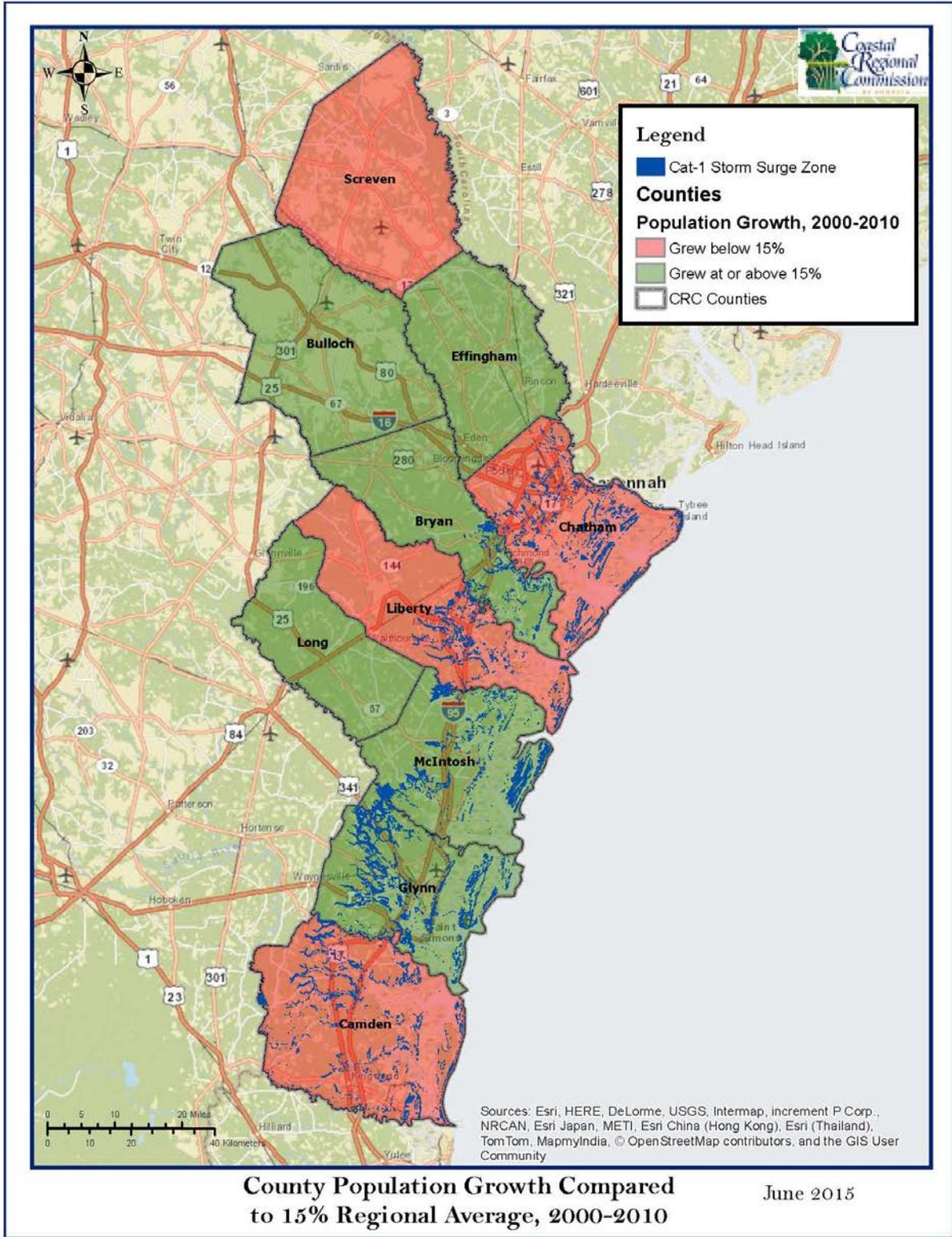
upon income and family size. For Screven County, 39percent of the population is LMI and 21percent of families fall below the poverty level.

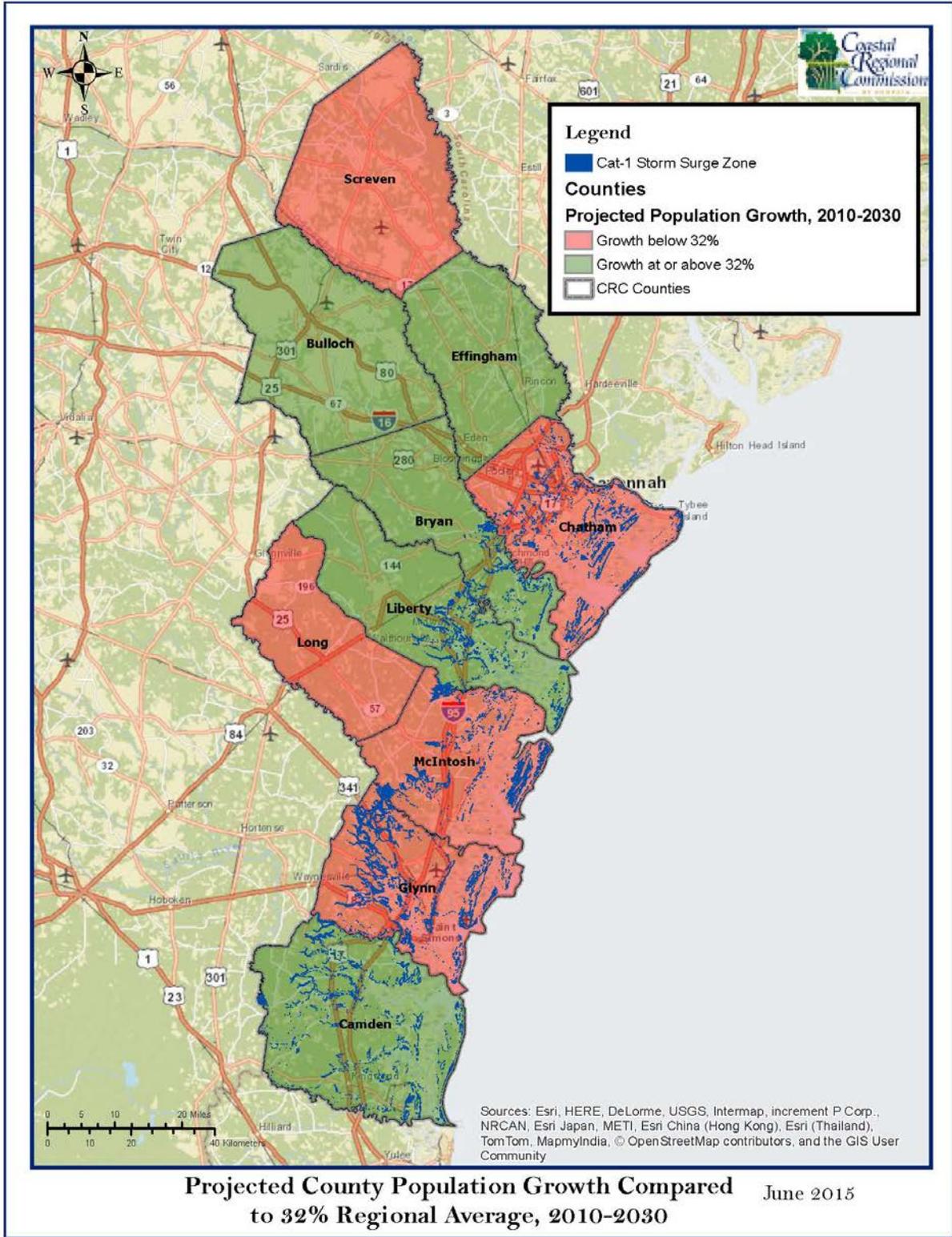
Means of Transportation

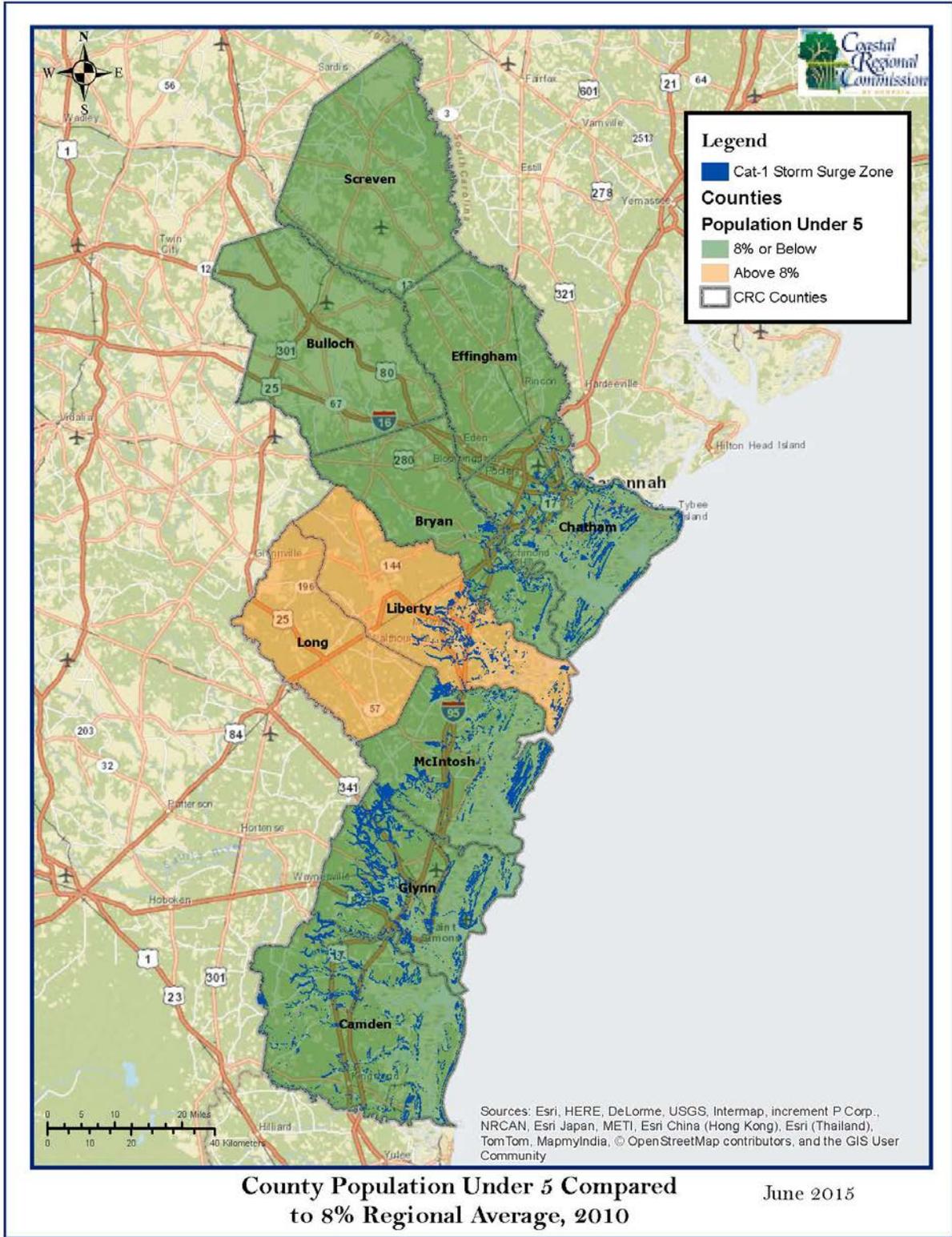
The U. S. Census reports on the number of vehicles available to households. This is an important indicator of the percentage of the population that has reliable transportation should they need to evacuate their homes in the event of a storm or other natural disaster. In Screven County 10.1percent of households do not have a vehicle available.

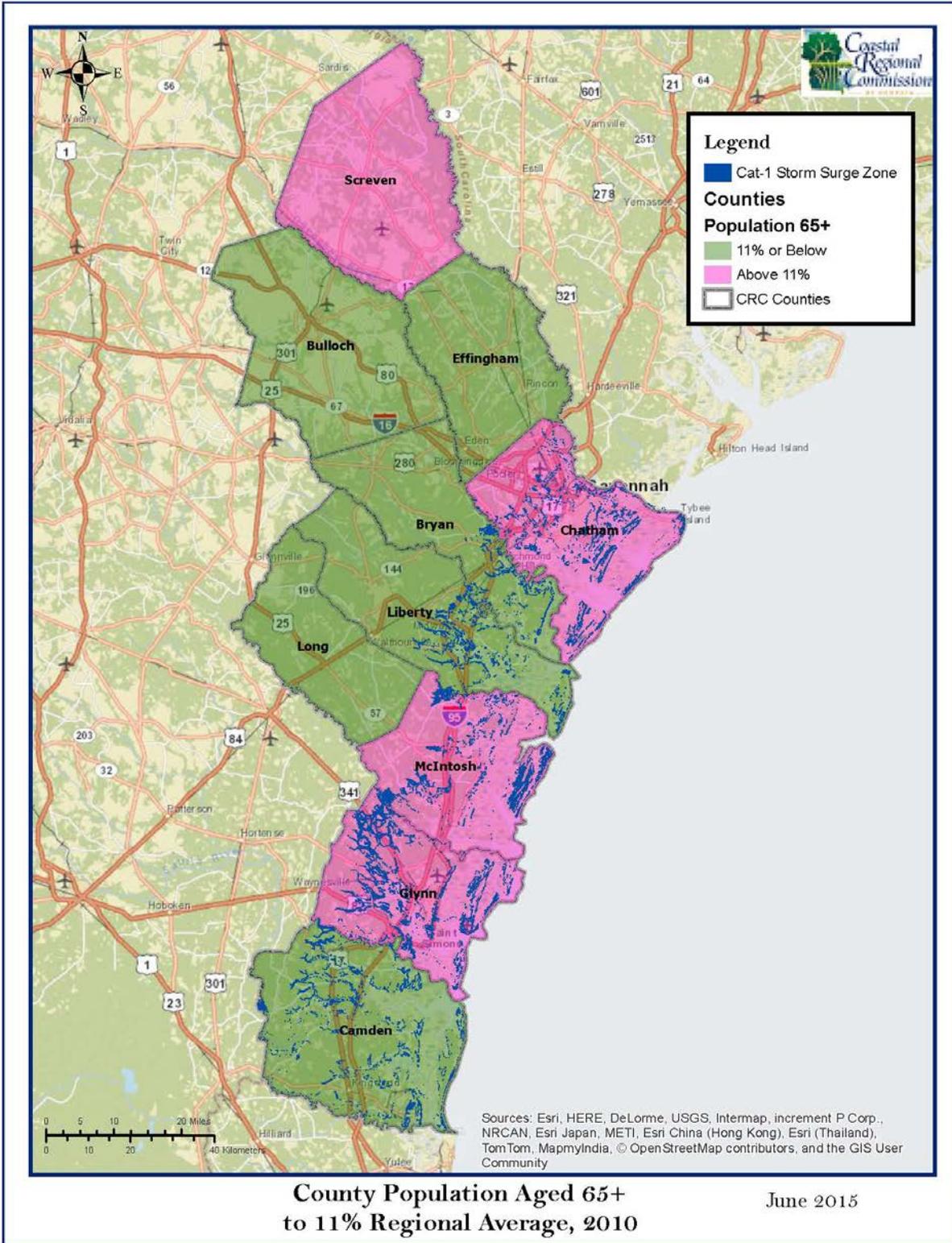
Housing Type

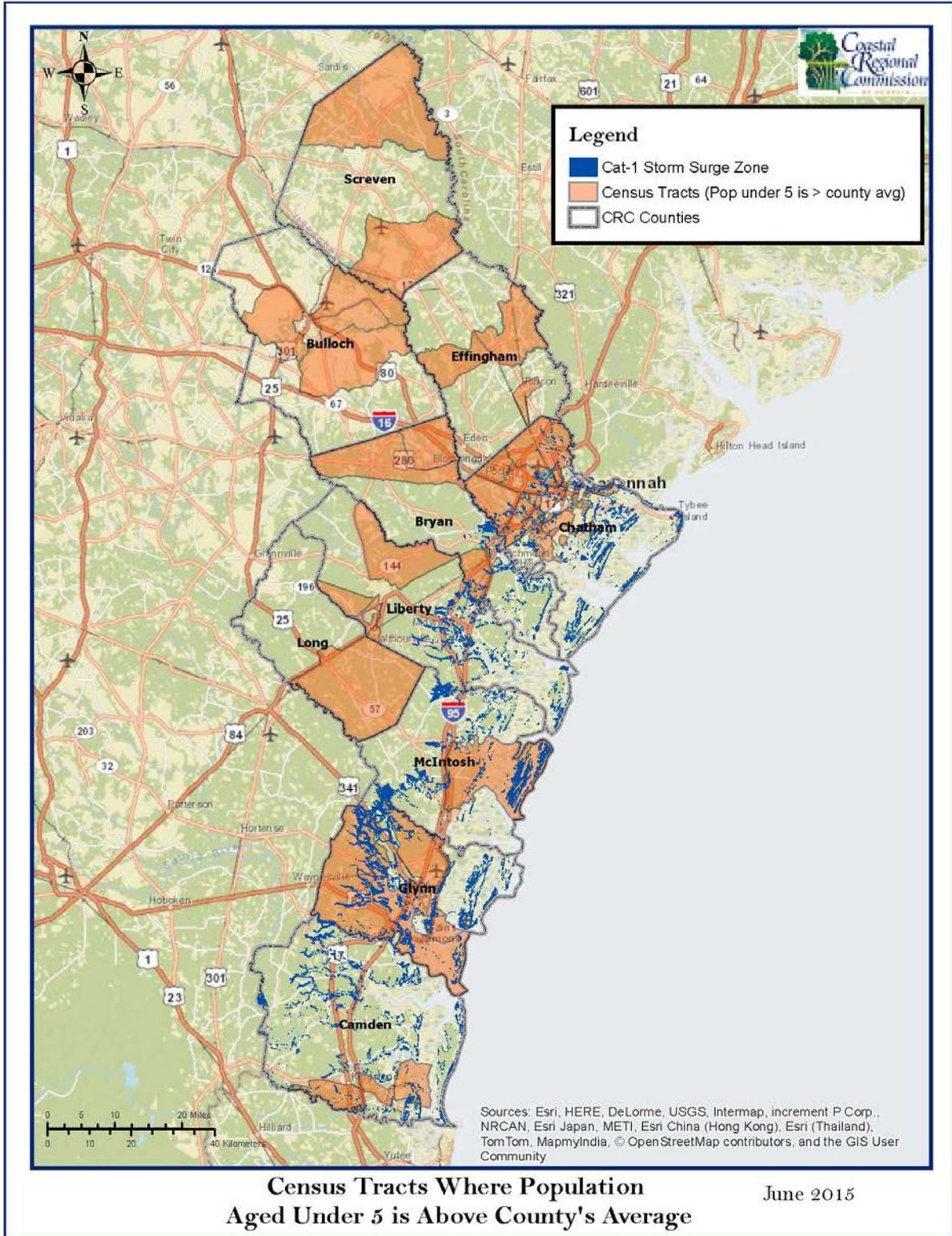
Mobile homes have been identified as a particularly vulnerable type of housing during storm events due to their susceptibility to damage caused by high winds and flying debris. In Screven County 34percent of families live in mobile homes.

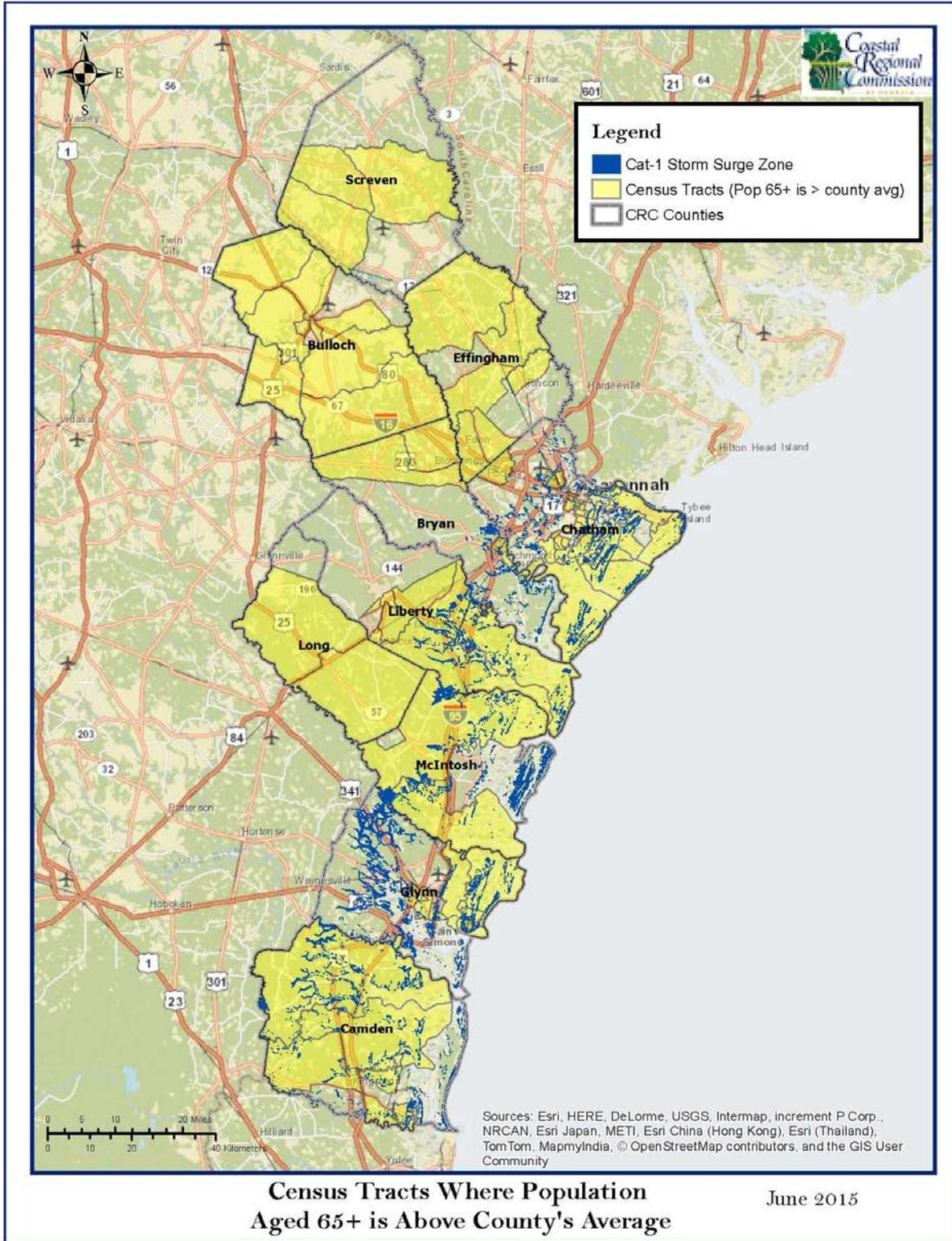


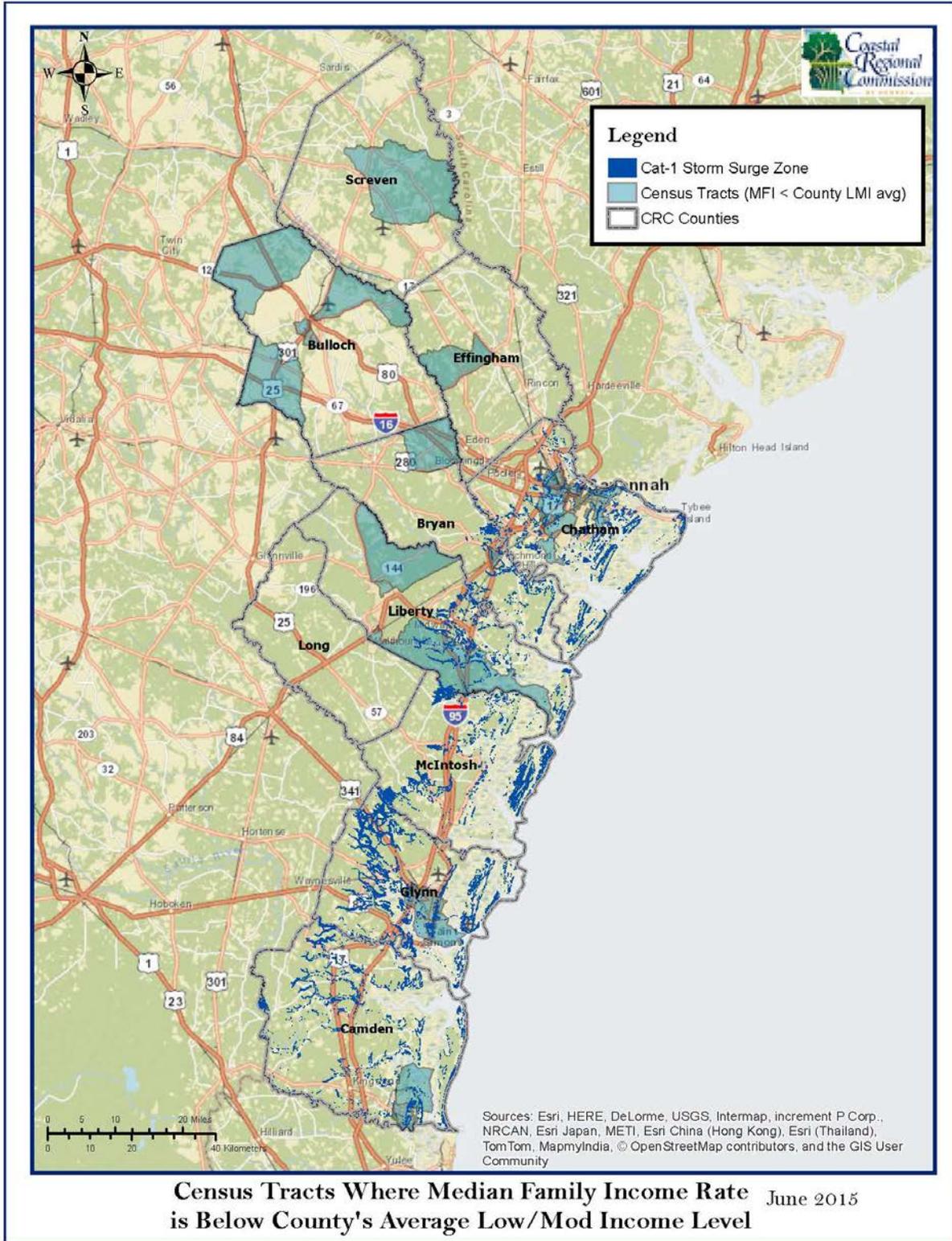


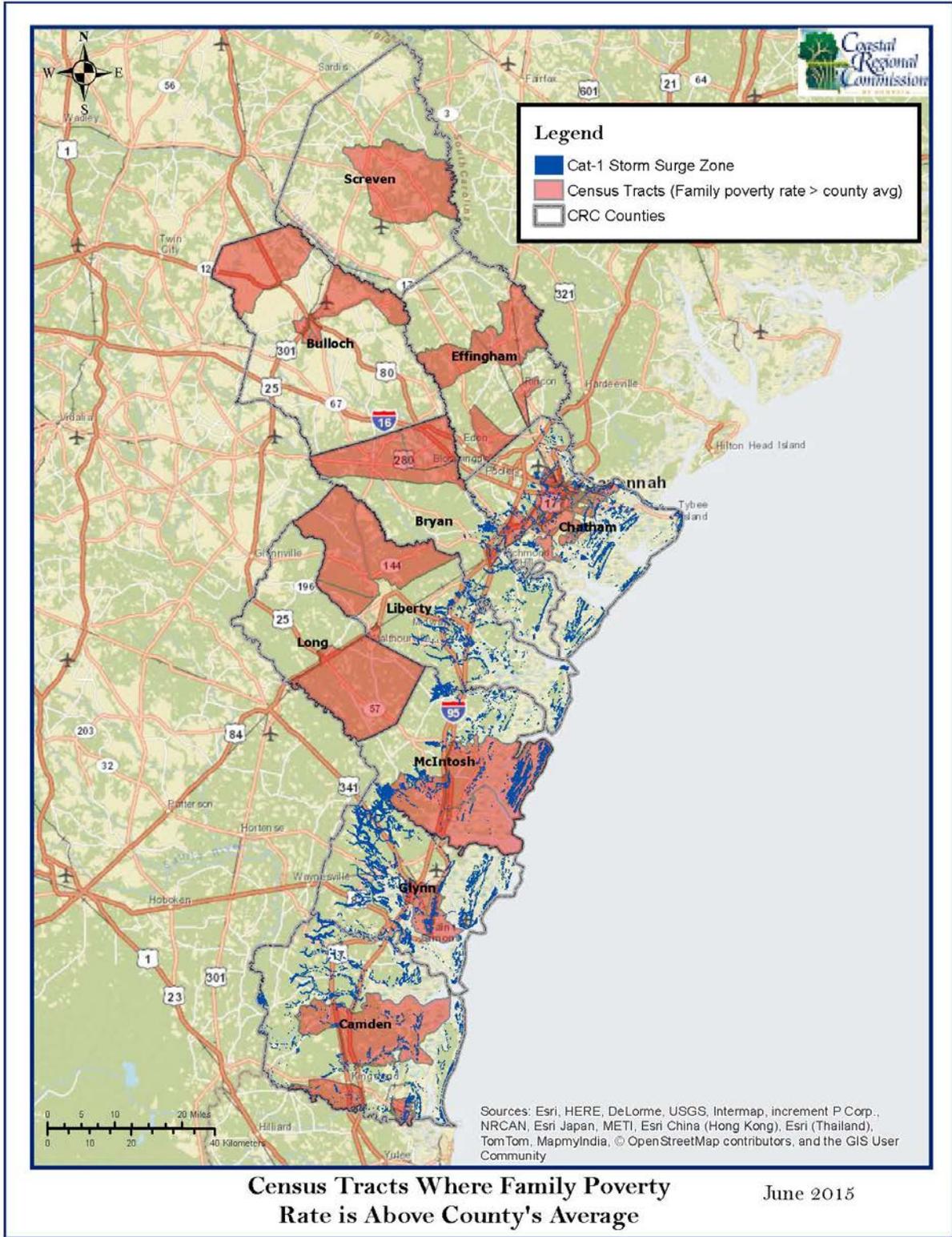


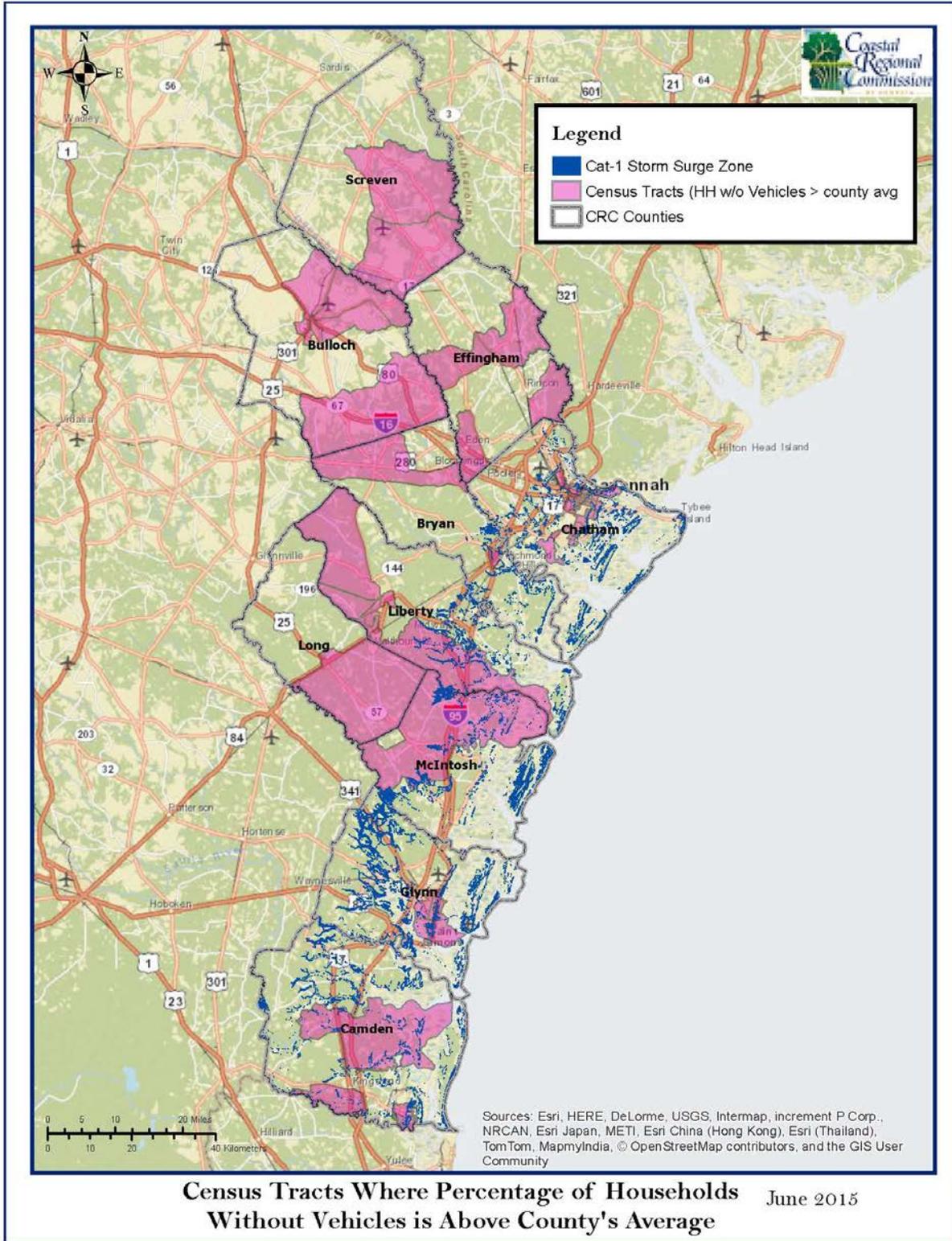


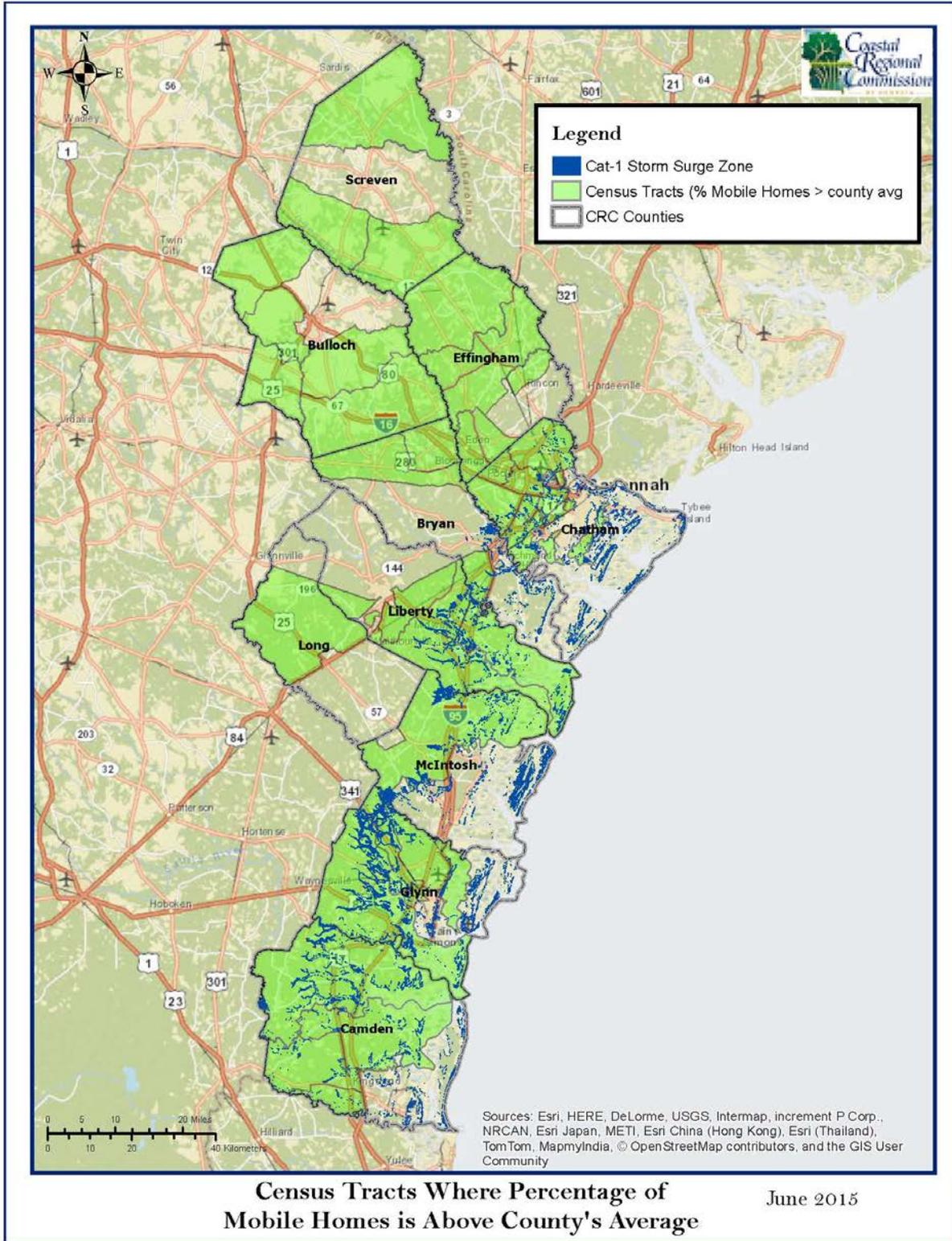












Regional Growth Trends

Coastal Counties Percent Change in Population 1980 - 2030								
County	1980-1990	1990-2000	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025	2025-2030
Bryan	52%	52%	22%	6%	11%	20%	31%	13%
Bulloch	21%	30%	10%	14%	11%	11%	13%	11%
Camden	126%	45%	5%	10%	13%	-7%	58%	16%
Chatham	7%	7%	3%	11%	8%	7%	0%	5%
Effingham	40%	46%	25%	11%	11%	11%	49%	17%
Glynn	14%	8%	6%	11%	6%	6%	14%	8%
Liberty	40%	17%	-7%	14%	7%	8%	14%	9%
Long	46%	66%	8%	31%	17%	16%	-19%	9%
McIntosh	7%	26%	2%	29%	8%	7%	10%	13%
Screven	-1%	11%	0%	-5%	1%	0%	29%	5%
Region	19%	17%	5%	12%	9%	7%	15%	10%

Adapted from Coastal Georgia RDC Regional Plan Update 2004 to include six coastal counties.

Coastal Counties Population Growth 1980 - 2030

County	1980	1990	2000	2005	2010	2015	2020	2025	2030
Bryan	10,175	15,438	23,417	28,549	30,233	33,510	40,097	52,466	59,534
Bulloch	35,785	43,125	55,983	61,454	70,217	78,019	86,985	98,387	109,034
Camden	13,371	30,167	43,664	45,759	50,513	56,836	52,935	83,431	96,743
Chatham	202,226	216,935	232,048	238,410	265,128	285,022	306,088	307,506	324,098
Effingham	18,327	25,687	37,535	46,924	52,250	58,232	64,553	96,094	112,062
Glynn	54,981	62,496	67,568	71,874	79,626	84,632	89,307	101,441	109,771
Liberty	37,583	52,745	61,610	57,544	65,327	70,032	75,540	86,448	93,821
Long	4,254	6,202	10,304	11,083	14,464	16,861	19,498	15,744	17,171
McIntosh	8,046	8,634	10,847	11,068	14,333	15,525	16,644	18,375	20,686
Screven	14,043	13,842	15,374	15,430	14,593	14,773	14,809	19,036	20,036
Region	398,791	475,271	558,350	588,095	656,684	713,442	766,456	878,928	962,956

Business Vulnerability

Using Nielsen business facts point data in conjunction with storm surge data provides a picture of what damage can be expected from various types of storms on coastal counties. This data provided the geo position for every business as well as an estimated number of employees and sales. This data is then combined with storm surge data to best understand the immediate impact of the various types of catastrophic events.

Storm Type	Businesses Effected	% Total Regional Businesses	Jobs Effected	% Total Regional Jobs	Sales Effected \$	% of Regional Sales Effected
Tropical Storm	665	2%	5,388	2%	1,542,195,000	3%
Category 1	2,323	8%	23,270	8%	3,796,970,000	7%
Category 2	8,435	29%	84,079	28%	17,498,820,000	32%
Category 3	16,135	56%	158,000	53%	33,881,203,000	61%
Category 4	21,453	75%	205,758	69%	46,208,863,000	83%
Category 5	22,667	79%	229,344	77%	48,539,801,000	88%

Economic Damage by Hurricane Surge for Coastal Georgia. Information provided by Claritas Nielsen (2013).

Business Facts 2013. Part 1 [Data file]. NOAA and FEMA

Infrastructure

Infrastructure and Critical Facilities

The guidelines presented in Task 5 of the FEMA Hazard Mitigation Handbook were followed to assess the infrastructure of the following six Coastal Counties: Chatham, Bryan, Liberty, McIntosh, Glynn, and Camden County. According to FEMA guidelines, the most critical infrastructure systems and facilities to evaluate for mitigation opportunities include transportation, communication, power water and wastewater, and emergency services.

County data for many of these types of infrastructure is unavailable, so the focus of the assessment is transportation, emergency evacuations routes, and communication networks. Throughout the assessment process, an evaluation on the dependencies between infrastructure systems, critical facilities, and the populations they serve was conducted. Proposals for effective mitigation strategies are general and serve as guidelines, which can be tailored for specific applications which conform to the county's need.

The following chart from the FEMA Hazard Mitigation Handbook summarizes these critical areas:

Example **Infrastructure and Critical Facilities**

Critical Facilities	High Potential Loss Facilities	Infrastructure Systems
Hospitals and medical facilities	Nuclear power plants	Water and wastewater
Police and fire stations	Dams	Power utilities
Emergency operations centers	Military and civil defense installations	Transportation (roads, railways, waterways)
Evacuation shelters	Locations housing hazardous materials	Communication systems/centers
Schools		Energy pipelines and storage
Airports/heliports		

FEMA Hazard Mitigation Handbook, page 57

Methodology

Data was collected from the following sources: FEMA, GEMA, NOAA, Georgia Department of Transportation, Dewberry Consulting, CRC, and the six coastal counties.

Informational maps were created in ArcGIS by the overlaying of different types of infrastructure with storm surge and population data. This method allowed for the quick identification of areas of higher risk in the event of a tropical storm or hurricane.

An assessment of the vulnerability of infrastructure systems for each county by hurricane category was conducted. In order to create an assessment, FEMA guidelines and CRC documents were examined; criteria were formed based on this structure.

Infrastructure was divided into three main categories: transportation, communication, and critical facilities. The categories were further divided into subcategories.

A number of infrastructure items affected by hurricane category were calculated.

For single item infrastructure, such as cell towers and bridges, a count of each item was conducted. For infrastructure such as roads and railroads, mileage per hurricane category was conducted. These calculations, along with the GIS analysis, allowed for identification of

areas within each county whose infrastructure is more vulnerable to storm surge and flooding. From this information 3 Scenarios were created.

After quantifying data in GIS, a chart was created to illustrate how numbers demonstrate a pattern reflective of the overall vulnerability of each county in terms of their infrastructure systems. This chart is divided into three scenarios, each representing the different hurricane category.

- Scenario 1 represents a tropical storm, which is its own category, since this storm is most likely to occur and cause excessive flooding.
- Scenario 2 represents hurricane Categories 1 and 2, which reflects a remarkable increase in potential inundation; and
- Scenario 3 represents hurricane Categories 3, 4, and 5 which reflects the catastrophic inundation caused by a major storm.

In order to visually display the change in impact from one scenario to another, a rating of *high, medium, or low* is assigned to each feature. These ratings were based on a total percentage of 100 divided into three equal parts. A “low” rating shows that less than 33 percent of an infrastructure type would be affected, “medium” shows that less than 67 percent would be affected, and the “high” rating means that over 67 percent of the infrastructure would be potentially inundated. If the range between hurricane categories resulted in two different ratings, the higher rating was applied.

The initial vulnerability assessment of infrastructure for each county identifies a number of infrastructure types per county affected by tropical storms up to a Category 5 hurricane. Critical areas were based on categories from Task 5 in the FEMA document. The counties with the highest number reflect highly vulnerable areas that should be noted as “Critical Areas.” Major roads, bridges communication tower and water facilities are most important in terms of resilience as they serve the core daily needs of the population. Based on the assessment charts below, Chatham, Glynn, and Camden counties have the highest number of infrastructure features, and have the largest amount of critical infrastructure that would be affected by a storm.

Each of these counties also contain inhabited barrier islands which play a crucial role in protecting the mainland, but are becoming more susceptible to damage as urban development increases. Such areas are especially susceptible during large storms. Flash flooding may inundate important transportation routes, or block emergency evacuations. For example, each of these barrier islands, Tybee, Saint Simons, and Jekyll are at sea level or a few feet above and have a single road leading off the island. During an evacuation, road inundation causes major problems. Adequate planning is needed to insure transportation routes can be integrated with existing routes. From this initial assessment a second chart was created to reflect the overall vulnerability of each county's infrastructure, and determine any patterns.

An initial table was created to show the vulnerability assessment of critical infrastructure systems in each county. Some counties did not have public data available for certain types of infrastructure, which is noted with "N/A." The totals reflect the levels of vulnerability of counties and their infrastructure networks to the effects of storm surge. McIntosh County has no emergency evacuation route data, which means that their hazard mitigation plans need to be updated or McIntosh County needs to develop appropriate evacuation routes that can be integrated with existing routes.

The tables below reemphasize the vulnerability of each county with the three different scenarios. Chatham, Glynn, and Camden County mitigating infrastructure networks in these areas should be a priority in a regional resiliency plan. Data was gathered from NOAA, the Georgia Department of Transportation, FEMA, GEMA, and each individual county website. Based on sets of data, it is determined that transportation is a top concern in all six counties. Transportation routes, such as U.S. Highway 17, connect hubs to one another, and critical areas along major arterials must be highlighted. The threat of flooding throughout the region is of concern, especially along U.S. Highway 17, where bridges and roads are near sea level elevation. Another major concern are the condition and location of evacuation routes. The infrastructure connected to these routes should be reevaluated by each county to ensure that the age and condition of major arterials and bridges meets quality performance standard. Traffic counts and populations in these areas are especially

important when developing mitigation strategies and prioritizing infrastructure based on quality and use.

Transportation infrastructure is especially important in the port cities of Savannah and Brunswick. As one of the busiest ports in North America, the port of Savannah requires an intricate network of infrastructure to support and maintain its services; thus, these two cities will always have a higher vulnerability rating. The failure of port services, due to the failure of transportation routes, will have detrimental effects on the economy.

The results of Scenario 1 (Tropical Storm) are shown in the table below. Though the vulnerability rating seems low, it is important to remember that flooding still occurs and a “low” rating does not mean there no damage, only that the storm surge levels and threat for inundation is lower. However, the most critical infrastructure for a certain county may be inundated, even with this low rating. It is a county or city decision to assess which of their structures, especially along the coastline, should receive priority in mitigation strategies. The location, usage, and condition of the structure needs consideration when assessing their priority. The recommendation section of this report describes the process of creating a “priority” list in more detail. Since this scenario involves mostly flood damage possibilities, high attention should be paid to storm water management mitigation to keep roads, houses and business from being flooded. Flood gates, such as those in Tybee Island, are a possible solution to managing flood water in a coastal community. Effectively managing flood water subsequently protects most other forms of critical infrastructure.

Scenario 1: Tropical Storm											
County	Critical Infrastructure										Overall Vulnerability Rating
	Communication		Transportation				Ports*	Water Facilities*	Waste Facilities*	Power Stations*	
	Cell Towers*	Antenna Towers*	Roads**	Railroads**	Bridges*	Evacuation Routes**					
Chatham	2/12	8/127	139.4 /1778.1	16.43/179.5	60/265	1.11/79.9	1/1	1/8	N/A	N/A	9
Bryan	0/8	0/31	21 /528.4	1.33/38.7	8/88	0.15/64.6	N/A	N/A	N/A	N/A	6
Liberty	0/5	0/40	69.8 /1238.6	1.64/42.3	25/75	0.24/56.5	N/A	N/A	N/A	N/A	7
McIntosh	0/5	0/18	149.3 /961.5	0/18.5	26/71	N/A	N/A	N/A	N/A	N/A	10
Glynn	0/8	15/63	130.8 /855.4	3.06/88.4	30/90	0.25/50	1/1	N/A	N/A	N/A	10
Camden	1/10	2/39	106.1 /763.6	5.8/54.7	44/133	0.31/24.47	N/A	N/A	N/A	N/A	7
Total	48	318	6125.5 mi	421.8 mi	724	275.5	2	N/A	N/A	N/A	
LEGEND	Low	Medium	High		* Calculated by count ** Calculated in miles			Sources: NOAA, GDOT, FEMA, GEMA, Individual County Data & Documents			

Scenario 2 (Category 1 & 2 Hurricanes) shows the increase in risk in the affected area from a tropical storm shown in Scenario 1. These are hurricane categories that may not seem as threatening as larger storms, but in fact cause potential damage due to storm surge and aggressive flooding. Glynn and McIntosh counties have high vulnerability ratings, since the majority of their critical infrastructure may be affected. Chatham and Camden Counties have medium ratings, but could be considered high-risk since most of the population lives near a river or the ocean. Each of these counties also have inhabited barrier islands which should be marked as highly vulnerable areas due to their limited access to the mainland. Though Liberty and Bryan Counties still show a “low” rating, they are vulnerable, as they serve as connection hubs between the northern and southern parts of the region, especially connecting the highest populated port cities of Savannah and Brunswick.

Scenario 2: Category 1 & 2 Hurricane											
County	Critical Infrastructure										Overall Vulnerability Rating
	Communication		Transportation				Ports*	Water Facilities*	Waste Facilities*	Power Station*	
	Cell Towers*	Antenna Towers*	Roads**	Railroads**	Bridges*	Evacuation Routes**					
Chatham	7.9/12	14.38/127	295.5.695.15 /1778.1	24.85.71.28/179.5	69.114/265	2.71.14.07/79.9	1/1	N/A	N/A	N/A	13
Bryan	0.1/8	1.12/31	50.8.171.9 /528.4	1.63.7.55/38.7	12.17/88	0.98.7.80/64.6	N/A	N/A	N/A	N/A	7
Liberty	0/5	1.9/40	105.8.273.6 /1238.6	2.67.10.38/42.1	29.45/75	1.11.6.53/56.5	N/A	N/A	N/A	N/A	7
McIntosh	0/5	3/18	224.8.539.3 /961.5	0.78.6.58/18.5	49/71	N/A	N/A	N/A	N/A	N/A	13
Glynn	4/8	46/63	280.3.611.5 /855.4	13.86.55.47/88.4	54/90	2.38.17.93/50	1/1	N/A	N/A	N/A	17
Camden	3/10	10/39	165.7.371.9 /763.6	5.85.18.95/54.7	85/133	0.80.2.63/24.47	N/A	N/A	N/A	N/A	10
Total	48	318	6125.5 mi	421.8 mi	724	275.5	2	N/A	N/A	N/A	
LEGEND	Low	Medium	High				* Calculated by count ** Calculated in miles	Sources: NOAA, GDOT, FEMA, GEMA, Individual County Data & Documents			

Scenario 3 (Category 3, 4, & 5 Hurricanes) reflects the highest threat to the coastal region. In this scenario, the majority of counties are at high risk. In a Category 3 hurricane, the majority of the coastal population and urban development areas are affected. Though this scenario seems less likely than the others, it should be planned for and considered when updating existing infrastructure systems or building new ones. Planning for the highest level threat is an efficient mitigation strategy that increases overall resilience of this region.

Scenario 3: Category 3, 4, & 5 Hurricane											
County	Critical Infrastructure										Overall Vulnerability Rating
	Communication		Transportation				Ports*	Water Facilities*	Waste Facilities*	Power Stations*	
	Cell Towers*	Antenna Towers*	Roads**	Railroads**	Bridges*	Evacuation Routes**					
Chatham	11-12/12	90-119/127	1236.5-1634.2 /1778.1	132.35-170.48/179.4	172-250/265	37.45-72.19/79.9	1/1	N/A	N/A	N/A	21
Bryan	3/8	16/31	227.8-240.4 /528.4	14.08-18.04/38.7	36-52/88	20.44-26.93/64.58	N/A	N/A	N/A	N/A	12
Liberty	4/5	19-24/40	520-636.2 /1238.6	22.04-28.50/42.1	54-58/75	13.25-23.96/56.5	N/A	N/A	N/A	N/A	14
McIntosh	3/5	11-14/18	810.4-915.95 /961.5	17.3-18.5/18.5	65-69/71	N/A	N/A	N/A	N/A	N/A	17
Glynn	8/8	60-63/63	751.9-822 /855.4	82.1-87.28/88.4	72-76/90	40.58-47.68/50	1/1	N/A	N/A	N/A	18
Camden	3-10/10	20-37/39	545.7-716.4 /763.6	38.73-51.49/54.7	103-129/133	9.34-22.1/24.5	N/A	N/A	N/A	N/A	18
Total	48	318	6125.5 mi	421.8 mi	724	275.5	2	N/A	N/A	N/A	
LEGEND	Low	Medium	High					* Calculated by count ** Calculated in miles		Sources: NOAA, GDOT, FEMA, GEMA, Individual County Data & Documents	

Built Environment

Community Agendas represent the most important part of local governments Comprehensive Plans as it presents the community's vision for the future and key issues and opportunities that communities choose to address along with the implementation program. The Community Agenda updates the material in the Community Assessment based on public input and includes a vision, a short and long term work program and list of policies for decision making.

Methodology

- 1) Review/Inventory of current hazard mitigation plans, comprehensive plans, and community agendas at a city and county scale.
- 2) Identify gaps within each plan
 - What year was the document created?
 - Number of pages in document? (Provide a sense of the thoroughness of each document)
 - Make an inventory of "key words" throughout document.
- 3) Create a ranking system based upon above criteria for each county and city.
- 4) Display all information on an easy to read chart.

Evaluation of Current Policies, Activities, and Development Patterns

Comprehensive Plans, Community Agendas and Hazard Mitigation Plans

Though individual city plans were assessed, the results are examined on a county scale. McIntosh County scores the highest on the assessment of the County Comprehensive Plans and Community Agendas. Liberty scores the second highest followed by Chatham, Glynn, Camden, and finally Bryan county. The three counties with updated Hazard Mitigation Plans receive the same overall ranking.

There are common gaps in the County Comprehensive Plans, Community Agendas, and Hazard Mitigation Plans. The majority of the County Comprehensive Plans and Community Agendas lack specificity when addressing concerns related to infill development, the presence of aquifers and/or reservoirs, and shoreline, riparian and estuary protection.

In the three available hazard mitigation plans there is little or no mention of aquifers or reservoirs. Furthermore, major issues related to protecting vulnerable areas from potential hazards are ignored. In all three of the available Hazard Mitigation Plans there is a necessity for more detailed plans relating to the protection of estuaries, wetlands, and riparian and coastal zones.

1) Comprehensive plans, community agendas, and hazard mitigation plans: key words were identified for each Comprehensive Plan, Community Agenda and Hazard Mitigation plan, which include:

- Beach
- Dune
- Shore,
- Buffer
- Riparian
- "Estuar"
- Marsh
- Swamp
- Wetland
- Erosion
- "Sediment"
- Soil
- Flood
- Storm
- Aquifer
- Reservoir
- Brownfield
- Grey/Greyfield
- Infill
- Disaster
- Hazard,
- Risk
- Prevention
- Prevention (in relation to crime)
- Protection
- "Mitig"
- "Re-mediat"

All key words listed in quotes are due to variations of the word being present within certain documents. For example, “mitig” would identify every time the words mitigate, mitigates, and mitigation are mentioned. Similar words are grouped together on the, “Review of Community Agendas & Hazard Mitigation Plans,” chart. The keyword groupings are as follows:

- | | |
|--------------------------|---------------------------------|
| 1. Beach/Dune/Shore | 8. Brownfield/Greyfield /Infill |
| 2. Buffer | 9. Disaster/Hazard/Risk |
| 3. Riparian/Estuaries | 10. Prevention |
| 4. Marsh/Swamp/Wetland | 11. Protection |
| 5. Erosion/Sediment/Soil | 12. Mitigation/Remediation |
| 6. Flood/Storm | 13. Overall Ranking |
| 7. Aquifer/Reservoir | |

With the above findings, two different assessments were completed:

A) Color Coding:

Color code ranks the documents based on how well the identified issues were addressed in various documents adopted by counties for community improvement. The analysis scanned documents for key words and determined how well these issues were addressed.

B) Numerical Ranking:

After assessing the details and evaluating the various documents for the issues identified, a numerical ranking was assigned (ranging from 0-3) to each issue depending on how well the topic was addressed by the counties. The map below shows the diagrammatic representation of this ranking system. Red symbolizes that the issue needs critical attention in the planning document; yellow symbolizes that the issue has been addressed but still needs improvement in some parts, and green symbolizes that the issue has been well addressed. Ranking zero represents missing information or is an irrelevant issue. On the basis of the ranking provided to each issue, an overall ranking was calculated for each county which is shown in the last column of the table. A similar assessment with the same criteria was done for the hazard mitigation plans for all the counties which is shown in table.

County	City	Year	Pages in Document	Beach	Dune	Shore	Buffer	Riparian	"Estuar"	Marsh
	<u>Community Agendas/Comprehensive</u>									
Bryan	Bryan County and the Cities of Pembroke and Richmond	Oct- 2008	Last 41 of 140	0	0	0	9	0	0	1
Bryan	Bryan County and the Cities of Pembroke and Richmond	Oct- 2008	First 99 of 140	0	0	0	18	0	0	3
Camden	Camden- Joint Comprehensive Plan	Oct- 2008	150	2	0	2	13	0	0	29
Chatham	Chatham County/Savannah-Tricentennial Plan	Nov- 2006	149	0	0	4	46	8	13	44
Chatham	Garden City- Community Agenda	Oct- 2008	117	0	0	0	17	1	0	2
Chatham	Port Wentworth- Community Agenda	Oct- 2008	137	0	0	0	4	0	0	5
Chatham	Tybee Island Master Plan-Community Agenda	Jan-2008	169	121	25	0	14	2	0	52
Glynn	Glynn County Comprehensive Plan Update	Oct- 2008	59	11	0	0	5	0	0	13
Glynn	Brunswick- Community Agenda	May-2008	98	3	0	3	1	0	0	33
Liberty	Liberty Community Assessment Consolidated	June-2008	331	0	2	0	18	0	0	36
McIntosh	McIntosh & City of Darien Community Assessment Joint	Oct- 2007	190	8	11	16	3	0	20	71

Table: Evaluation of different documents including Comprehensive Plan and Community Agenda Documents by a color-coding system to understand how and in what depth the individual issues are addressed by individual counties.

County	City	Year	Pages in Document	Swamp	Wetland	Erosion	"Sediment"	Soil	Flood	Storm
	<u>Community Agendas/Comprehensive</u>									
Bryan	Bryan County and the Cities of Pembroke and Richmond	Oct- 2008	Last 41 of 140	1	11	0	0	0	0	7
Bryan	Bryan County and the Cities of Pembroke and Richmond	Oct- 2008	First 99 of 140	0	16	3	2	1	3	6
Camden	Camden- Joint Comprehensive Plan	Oct- 2008	150	1	13	0	0	6	1	10
Chatham	Chatham County/Savannah-Tricentennial Plan	Nov- 2006	149	0	16	4	4	9	18	38
Chatham	Garden City- Community Agenda	Oct- 2008	117	0	6	6	6	2	7	34
Chatham	Port Wentworth- Community Agenda	Oct- 2008	137	4	4	3	3	0	9	30
Chatham	Tybee Island Master Plan-Community Agenda	Jan-2008	169	0	3	4	3	0	5	34
Glynn	Glynn County Comprehensive Plan Update	Oct- 2008	59	0	37	1	0	4	38	26
Glynn	Brunswick- Community Agenda	May-2008	98	0	26	1	0	5	29	40
Liberty	Liberty Community Assessment Consolidated	June-2008	331	0	35	21	16	21	37	17
McIntosh	McIntosh & City of Darien Community Assessment Joint	Oct- 2007	190	18	62	3	4	16	40	21

Table: Evaluation of different documents like Comprehensive Plan and Community Agenda Documents by a color-coding system to understand that how and in what depth the individual issues are addressed by individual counties.

County	City	Year	Aquifer	Reservoir	Brown-field	Grey/Gray-field	Infill	Disaster	Hazard	Risk	Prevention	(in relation to crime)	Protection	"Mitig"	"Remediat"	RANKING
	Community Agendas/Comprehensive															
Bryan	Bryan County and the Cities of Pembroke and Richmond	Oct-2008	0	0	5	5	8	0	0	0	0	0	36	5	0	1
Bryan	Bryan County and the Cities of Pembroke and Richmond	Oct-2008	2	0	0	0	8	0	3	1	0	0	99	2	0	1
Camden	Camden- Joint Comprehensive Plan	Oct-2008	0	0	0	0	37	2	1	0	1	0	129	9	0	1
Chatham	Chatham County/Savannah-Tricentennial Plan	Nov-2006	4	1	4	4	16	0	4	5	27	2	138	7	0	1
Chatham	Garden City- Community Agenda	Oct-2008	0	0	3	3	23	1	1	0	4	0	55	4	0	1
Chatham	Port Wentworth- Community Agenda	Oct-2008	0	0	0	1	29	1	2	0	8	0	50	1	0	1
Chatham	Tybee Island Master Plan-Community Agenda	Jan-2008	3	0	0	0	60	4	1	0	6	0	83	3	0	1
Glynn	Glynn County Comprehensive Plan Update	Oct-2008	0	0	0	1	19	0	4	0	14	0	29	0	0	1
Glynn	Brunswick- Community Agenda	May-2008	2	0	15	7	0	0	8	8	11	7	57	13	7	1
Liberty	Liberty Community Assessment Consolidated	June-2008	0	0	23	23	69	1	0	9	8	0	251	0	0	2
McIntosh	McIntosh & City of Darien Community Assessment Joint	Oct-2007	17	0	2	2	18	1	1	0	2	1	142	4	0	2

Evaluation of different documents like Comprehensive Plan and Community Agenda Documents by a color-coding system to understand that how and in what depth the individual issues are addressed by individual counties.

	= Need to address the issue
	= Needs to be addressed further
	= Not necessarily significant
	= Good score
	= A score of zero that is irrelevant because issue is ultimately addressed

Assessment criteria's defining tables

	Year	Number of Pages in Document	Beach	Dune	Shore	Buffer	Riparian	"Estuar"	Marsh	Swamp	Wetland	Erosion	"Sediment"	Soil	Flood
Hazard Mitigation Plan															
Bryan County			0	0	0	0	0	0	0	0	0	0	0	0	0
Camden County	?	185	5	4	3	3	0	1	27	1	10	52	10	3	225
Chatham County	Dec-2010	240	5	3	3	9	0	0	6	1	7	5	0	2	246
Glynn County			0	0	0	0	0	0	0	0	0	0	0	0	0
Liberty County	2010	120	4	4	4	4	0	0	6	0	10	8	3	4	234
McIntosh County			0	0	0	0	0	0	0	0	0	0	0	0	0

Evaluation of different documents of hazard mitigation plans, by a color-coding system to understand how and in what depth the individual issues are addressed by individual counties.

	Year	Number of Pages in Document	Storm	Aquifer	Reservoir	Brown-field	Grey/Gray-field	Infill	Disaster	Hazard	Risk	Prevention	(in relation to crime)	Protection	"Mitig"	"Remediat"	RANKING
Hazard Mitigation Plan																	
Bryan County			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Camden County	?	185	274	6	0	0	0	0	106	642	74	25	0	95	529	0	1
Chatham County	Dec-2010	240	236	0	0	0	0	0	513	996	158	19	0	103	997	0	1
Glynn County			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liberty County	2010	120	175	1	6	0	0	0	44	569	147	20	0	54	608	0	1
McIntosh County			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Evaluation of different documents of hazard mitigation plans by color-coding system to understand how and what depth the individual issues are addressed by individual counties.

	= Need to address the issue
	= Needs to be addressed further
	= Not necessarily significant
	= Good score
	= A score of zero that is irrelevant because issue is ultimately addressed

Assessment criteria's defining table

Building Construction Codes

2) Building construction codes:

Building construction codes were assessed utilizing the criteria from, "Home Builder's Guide to Coastal Construction" document by FEMA based on:

- A) Do counties have a well laid-out building construction code for the whole county?
- B) Does the construction code comply with the FEMA's builder's guide specifically in terms of:
 - o Designation of Conservation areas.
 - o Construction below base flood elevation
 - o Consideration of Flood Plain Elevation
 - o Enclosures below BFE (Base flood elevation)
 - o Identification of Different Flood Zone
 - o Addition and Reconstruction
 - o Relocation\Alteration of Utilities like water lines, gas lines
 - o Building forms
 - o Foundation specifications
 - o Building construction standards and materials
 - o Lowest floor level
 - o Bottom horizontal structure level

A chart utilizing a color coded system with a color coding of red (not in compliance with FEMA's Document); yellow (discussed but not in detail); and, green (complies with FEMA's Building Code) that specifies the depth to which each county considered the FEMA builder's code. An assessment and overall ranking (from 0-3) was given to each county for efforts incorporating FEMA's standards in their building construction codes.

NOTE: All the assessments were done on the basis of available resources. Low rankings in any category for counties can also be a result of missing or inaccessible data.

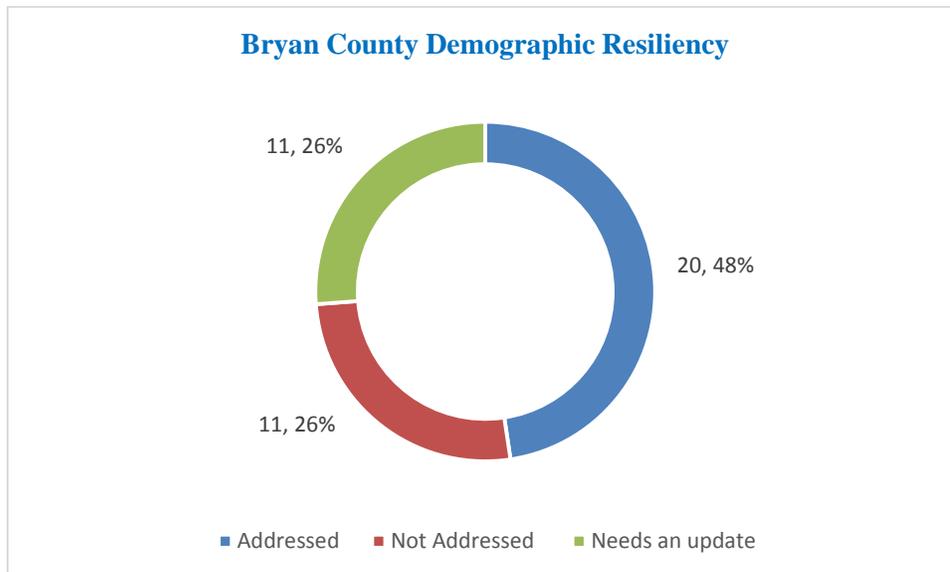
	Camden	Bryan	Chatham	Glynn	Liberty	McIntosh
Have a building construction code						
Compliance with FEMA						
1) Designation of conservation areas.						
2) Consideration of Flood Plain Elevation						
3) Identification of Different Flood Zone						
4) Relocation\Alteration of Utilities like Water lines, gas lines						
5) Foundation specifications						
6) Lowest floor level						
7) Bottom horizontal structure level						
8) Construction below base flood elevation						
9) Enclosures below BFE (Base flood elevation)						
10) Addition and Reconstruction						
11) Building form						
12) Construction Standards and material						
Documents Reviewed	Camden unified development codes	Bryan county building code ordinances, Bryan County Engineering Design Standards	Flood damage Prevention Ordinance	Comply with Flood plain Management in Georgia by Georgia department of Natural Resources	liberty county chapter , Building construction and other activities	No specific documents available
No of Pages	570	27, 128		23	76	103
Special Notes				No specific ordinance found in Glynn County Website, but it seems to comply with GDNRL	Compliance with : 1) International Building Codes 2) International Mechanical Code 3) International Gas Codes 4) International Plumbing codes 5) International Electrical Code 6) International Fire prevention Code	Couldn't Find any document specifically dealing with or explaining the construction codes.
RANKING	3	2	2	3	3	1
	Not in compliance with FEMA's Document					
	Have discussed but not in detail					
	Comply with FEMA's Building Code					

Chart that refers to different documents relating to building construction codes and compares it with FEMA's guidelines to assess the missing gaps for each county.

Regional Summary Report Resilience

Bryan County Summary

1) Demographic Resilience

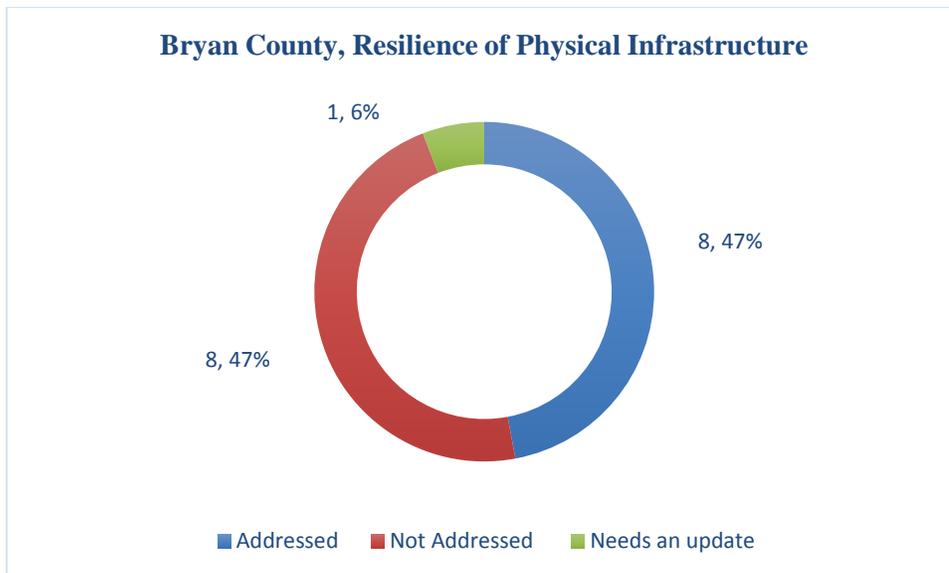


Note: The total number of issues identifies for demographic resilience are 42

- **Sections of planning document that needs an update are:**
 - a) Calculating the boundary of natural disasters
 - b) Addressing different population types in the hazard management plan
 - c) Considering critical populations (population above the age group of 65 years, and below 5 years of age), and population with chronic diseases.
 - d) Considering special needs, and evacuation plans required for the critical population, population with chronic disease.
 - e) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
- **Missing sections of planning documents:**
 - a) Emergency medical center's locations for both general public, and critical population
 - b) Animal rescue centers.
 - c) Mapping the major concentration (hot-spot) of economic center
 - d) Relocation plans for critical infrastructure in the natural hazard zone.

- e) Special arrangements like, early evacuation facility, food supply, medical care, etc. for critical section of population.
- f) Special insurance program for the critical section of population during the recovery process
- g) Special education and outreach program for the critical section of population.

2) Resilience of Physical Infrastructure:

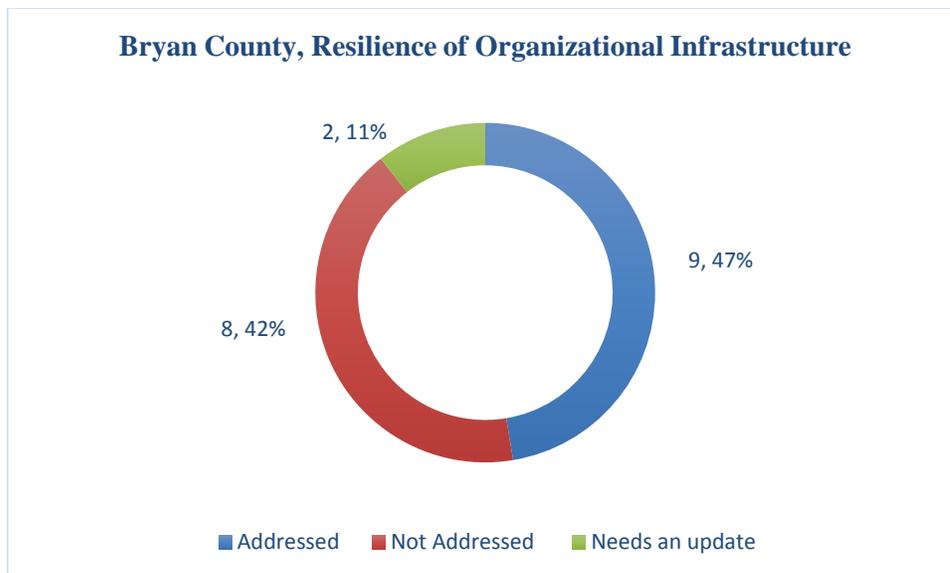


Note: The total number of issues identifies for resiliency of physical infrastructure are 17

- **Sections of planning document that needs an update are:**
 - a) Understand the type of impacts caused by different forms of (Solid, liquid, or gas) natural event.
- **Missing sections of planning documents:**
 - a) Validating the identified critical infrastructure identified for the city with the standard list of documents provided by Federal or national agencies.
 - b) Calculating social, and economical impact of disturbance in functioning of few major infrastructure like, electricity, water, food supply, and road conditions.
 - c) Map the identified critical infrastructure in hazard zone, to understand the potential damage.
 - d) Evaluate the physical condition of critical infrastructure
 - e) Relocation policy for critical infrastructures
 - f) Programs for alternate way of communication during the recovery period

- g) Special health care facility for the population group associated with the critical infrastructure

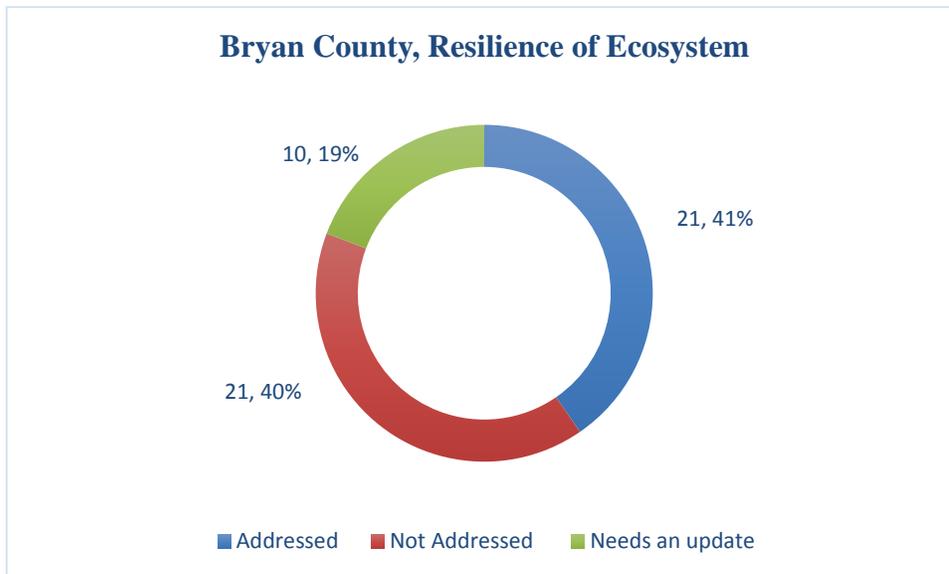
3) Resilience of Organizational Infrastructure:



Note: The total number of issues identifies for resiliency of organizational infrastructure is 19

- **Sections of planning document that needs an update are:**
 - a) Policies for post-disaster child care facility
 - b) Emergency communication facility at the time for disaster
- **Missing sections of planning documents:**
 - a) Partnership with the response team to assist during the disaster
 - b) Disaster management program
 - c) Awareness, supply management, and public outreach programs
 - d) Temporary shelter, and health care facility for the local population during the disaster
 - e) Post-disaster cleanup program
 - f) Post disaster recovery plan

4) Resiliency of Ecosystem:



Note: The total number of issues identifies for resiliency of ecosystem is 52.

- **Sections of planning document that needs an update are:**
 - a) Air quality index for the counties
 - b) Data on energy, and oil consumption
 - c) Urban growth rate of the cities/ county
- **Missing sections of planning documents:**
 - a) Description of existing land cover
 - b) Ground water quality
 - c) Total urban, and rural population
 - d) Geomorphological study of the area
 - e) Measuring the change in natural buffer
 - f) Shore line protection policies (if valid)
 - g) Consideration for green power/ clean power production, and usage
 - h) Measuring the increase in heat island effect in the area

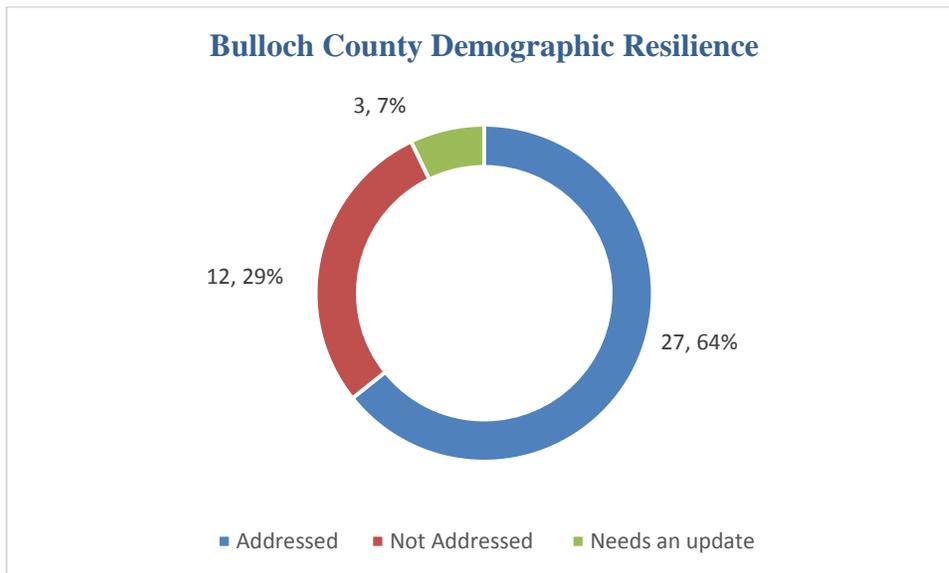
The final resilience score of the Bryan County (based on the available documents for review) is:

- Total number of issues: 130
- Addressed: 58 (1 point each) = 58 points
- Needs update: 24 (0.5 points each) = 12 points

Resilience score of Bryan county, GA = 70 points

Bulloch County Summary

1) Demographic Resilience

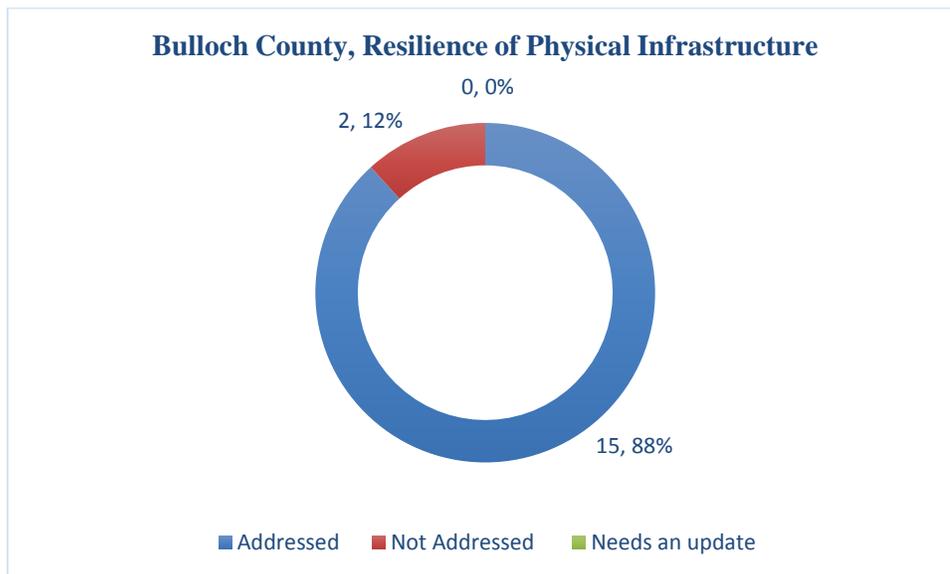


Note: The total number of issues identifies for demographic resilience are 42

- **Sections of planning document that needs an update are:**
 - a) Location of county with respect to the proximity to natural disaster
 - b) Types of natural event occurring in the study area
 - c) Calculating the estimate loss by natural event by calculating the property value in the hazard zone
 - d) Considering special needs, and evacuation plans required for the critical population, population with chronic disease.
- **Missing sections of planning documents:**
 - a) Calculating the boundary of natural disasters
 - b) Percentage of city under the estimated boundary of natural event
 - c) Percentage of population under the estimated hazard zone
 - d) Percentage of critical group pf population (population above age group of 65 years, or below 5 years of age group, along with the people suffering from chronic disease) under natural hazard zone
 - e) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)

- f) Mapping the major concentration (hot-spot) of economic center
- g) Special arrangements like, early evacuation facility, food supply, medical care, etc. for critical section of population.
- h) Special insurance program for the critical section of population during the recovery process
- i) Special education and outreach program for the critical section of population

2) Resilience of Physical infrastructure:

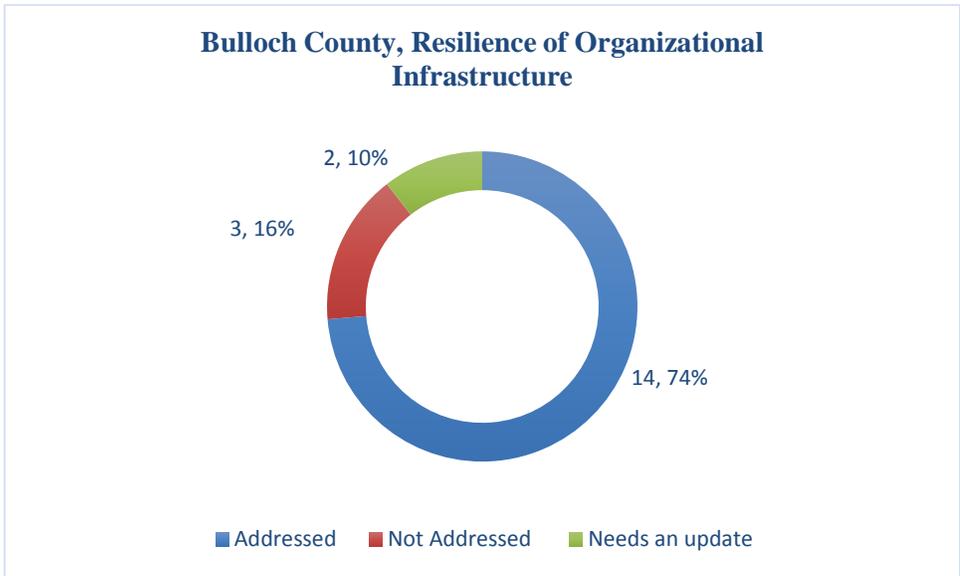


Note: The total number of issues identifies for resiliency of physical infrastructure are 17

- **Missing sections of planning documents:**

- a) Evaluate the physical condition of critical infrastructure
- b) Special health care facility for the population group associated with the critical infrastructure

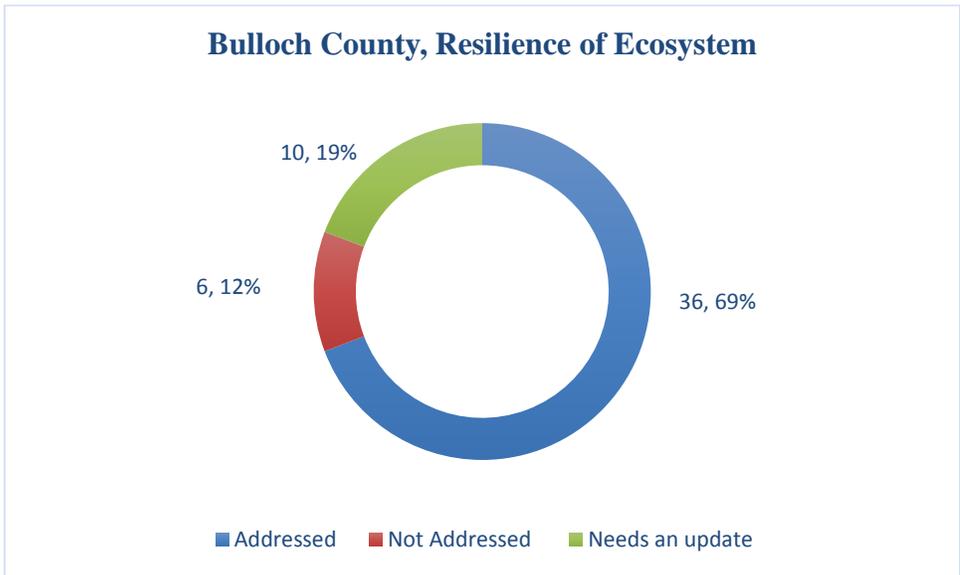
3) Resilience of organizational infrastructure:



Note: The total number of issues identifies for resiliency of organizational infrastructure is 19

- **Sections of planning document that needs an update are:**
 - a) Disaster warning system
 - b) Partnership with the response team to assist during the disaster
- **Missing sections of planning documents:**
 - a) Awareness, supply management, and public outreach programs
 - b) Post disaster, child care facility
 - c) Post-disaster cleanup program

4) Resiliency of ecosystem:



Note: The total number of issues identifies for resiliency of ecosystem is 52.

- **Sections of planning document that needs an update are:**
 - a) Air quality index for the counties
 - b) Data on energy, and oil consumption
 - c) Ecosystem management program
 - d) Consideration for green power/ clean power production, and usage

- **Missing sections of planning documents:**
 - a) Measuring the change in natural buffer
 - b) Shore line protection policies (if valid)
 - c) Measuring the increase in heat island effect in the area

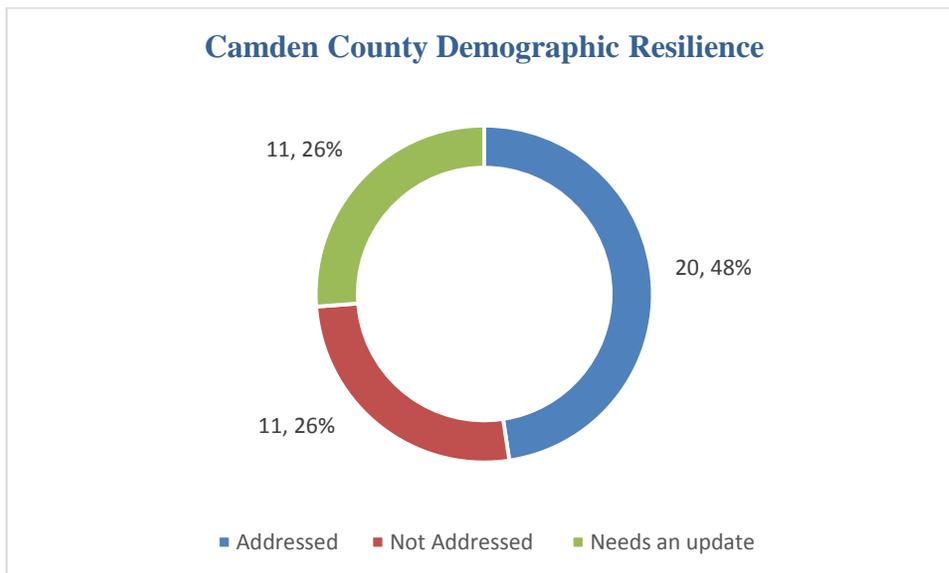
The final resilience score of the Bulloch County (based on the available documents for review) is:

- Total no of issues: 130
- Addressed: 92 (1 point each) = 92 points
- Needs and update: 15 (0.5 points each) = 7.5 points

Resilience score of Bulloch County, GA = 99.5 points

Camden County Summary Report

1) Demographic Resilience

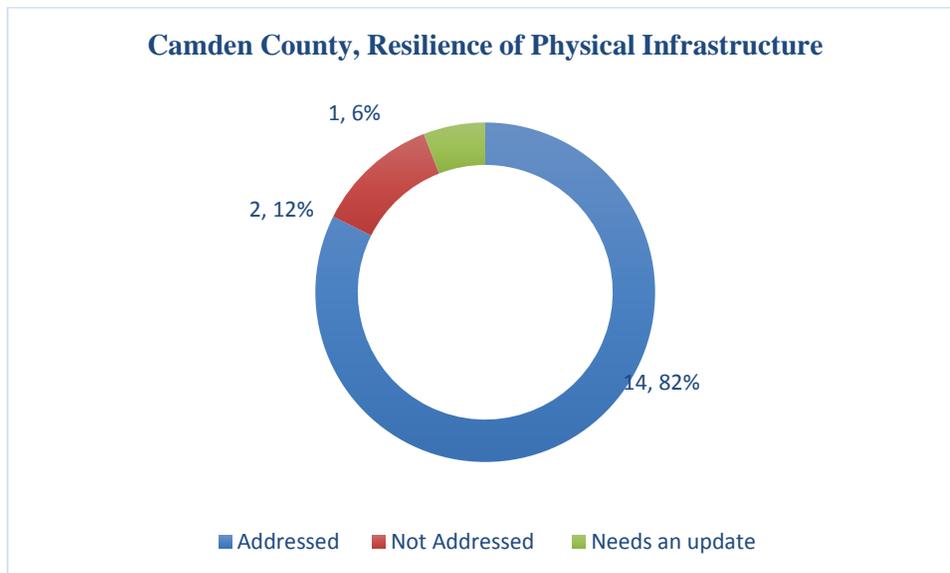


Note: The total number of issues identifies for demographic resilience are 42

- **Sections of planning document that needs an update are:**
 - a) Addressing different population types in the hazard management plan
 - b) Emergency medical center's locations for both general public, and critical population
 - c) Back-up plans for the emergency supply in the medical centers
 - d) Temporary shelter, and health care facility for the local population during the disaster
 - e) Calculating the estimate loss by natural event by calculating the property value in the hazard zone
 - f) Considering special needs, and evacuation plans required for the critical population group, and the vulnerable population like, population under poverty line
- **Missing sections of planning documents:**
 - a) Percentage of critical group pf population (population above age group of 65 years, or below 5 years of age group, along with the people suffering from chronic disease) under natural hazard zone
 - b) Animal rescue centers

- c) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
- d) Mapping the major concentration (hot-spot) of economic center
- e) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
- f) Special insurance program for the critical section of population during the recovery process
- g) Special education and outreach program for the critical section of population

2) Resilience of Physical infrastructure:



Note: The total number of issues identifies for resiliency of physical infrastructure are 17

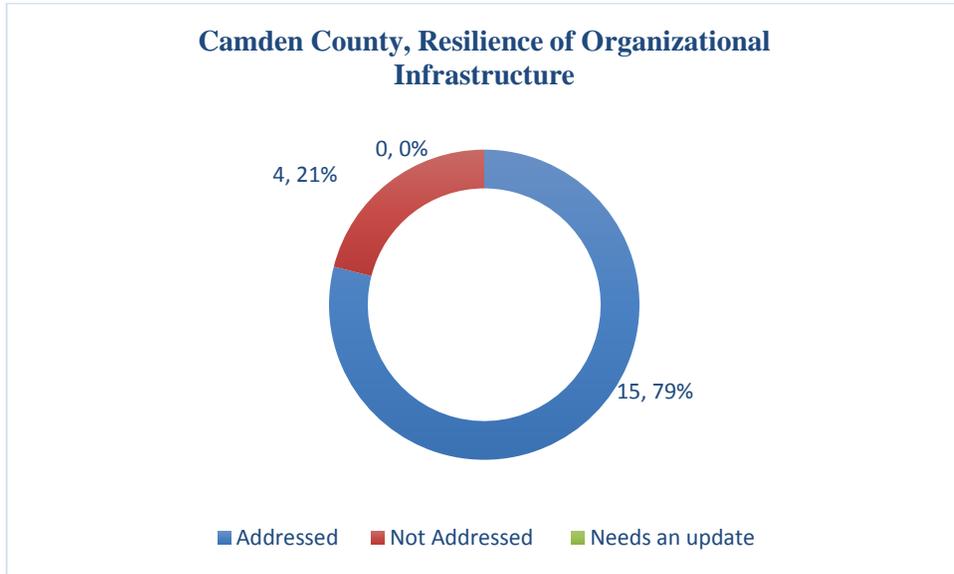
- **Sections of planning document that needs an update are:**

- a) Relocation policy for critical infrastructures

- **Missing sections of planning documents:**

- a) Map the identified critical infrastructure in hazard zone, to understand the potential damage.
- b) Calculating social, and economical impact of disturbance in the identified critical infrastructure

3) Resilience of Organizational Infrastructure:

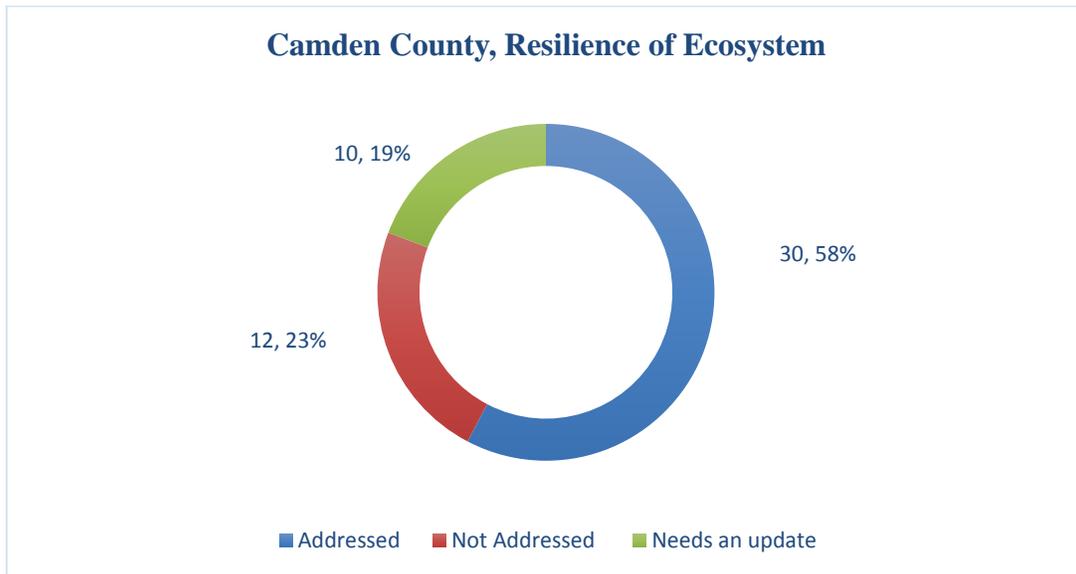


Note: The total number of issues identifies for resiliency of organizational infrastructure is 19

- **Missing sections of planning documents:**

- a) Disaster warning system
- b) Post disaster, child care facility
- c) Post-disaster cleanup program

4) Resiliency of ecosystem:



Note: The total number of issues identifies for resiliency of ecosystem is 52.

- **Sections of planning document that needs an update are:**

- a) Air quality index for the counties

- b) Data on energy, and oil consumption
- c) Percentage of urban and rural development
- **Missing sections of planning documents:**
 - a) Effects of change in landscape pattern on Agriculture production (if valid)
 - b) Change in precipitation level
 - c) Measuring the change in natural buffer
 - d) Clean air and water act
 - e) Shore line protection policies (if valid)
 - f) Measuring the increase in heat island effect in the area

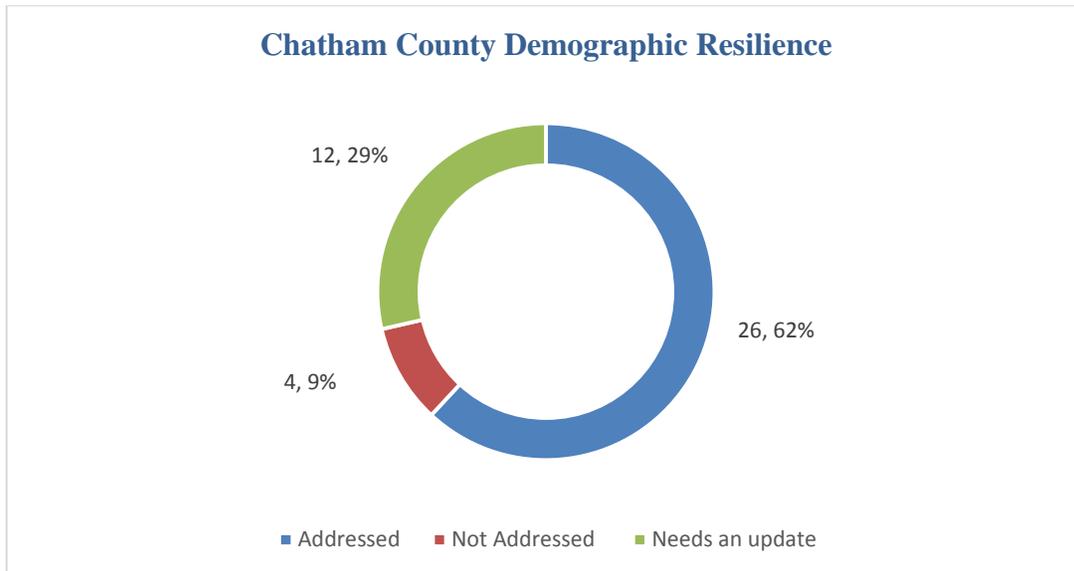
The final resilience score of Camden County (based on the available documents for review) is:

- Total number of issues: 130
- Addressed: 79 (1 point each) = 79 points
- Needs and update: 22 (0.5 points each) = 11 points

Resilience score of Camden County, GA = 90 points

Chatham County Summary Report

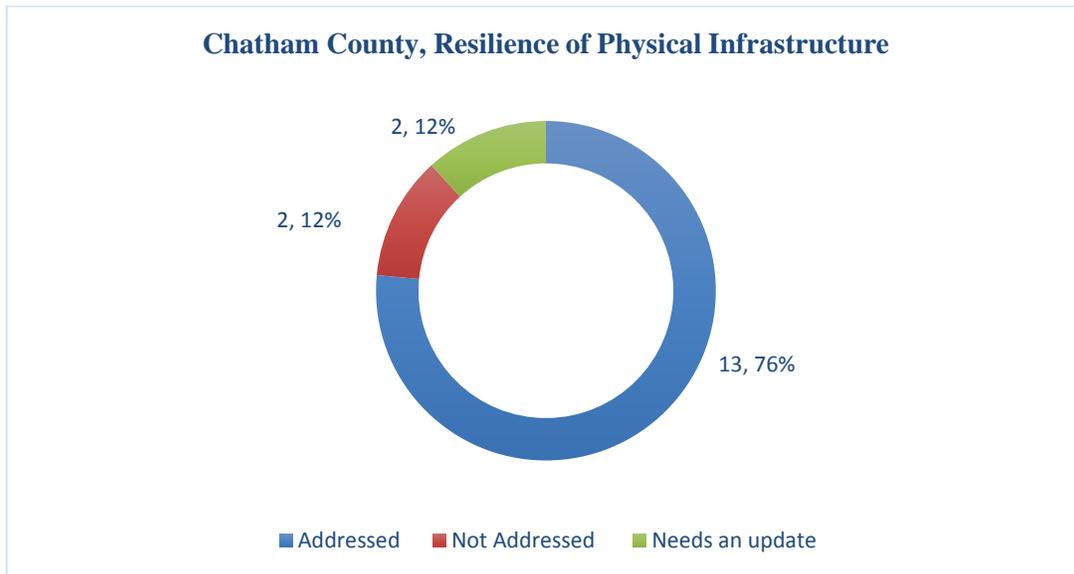
1) Demographic Resilience



Note: The total number of issues identifies for demographic resilience are 42

- **Sections of planning document that needs an update are:**
 - a) Critical facilities provided in hospitals for the case of emergency
 - b) Back-up plans for the emergency supply in the medical centers
 - c) Temporary shelter, and health care facility for the local population during the disaster
 - d) Calculating the estimate loss by natural event by calculating the property value in the hazard zone
 - e) Child care center
 - f) Construction standards/ codes
 - g) Insurance policies for buildings under hazard zone
 - h) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
- **Missing sections of planning documents:**
 - a) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
 - b) Awareness and disaster relief programs
 - c) Relocation plans for the critical infrastructure from the hazard zone

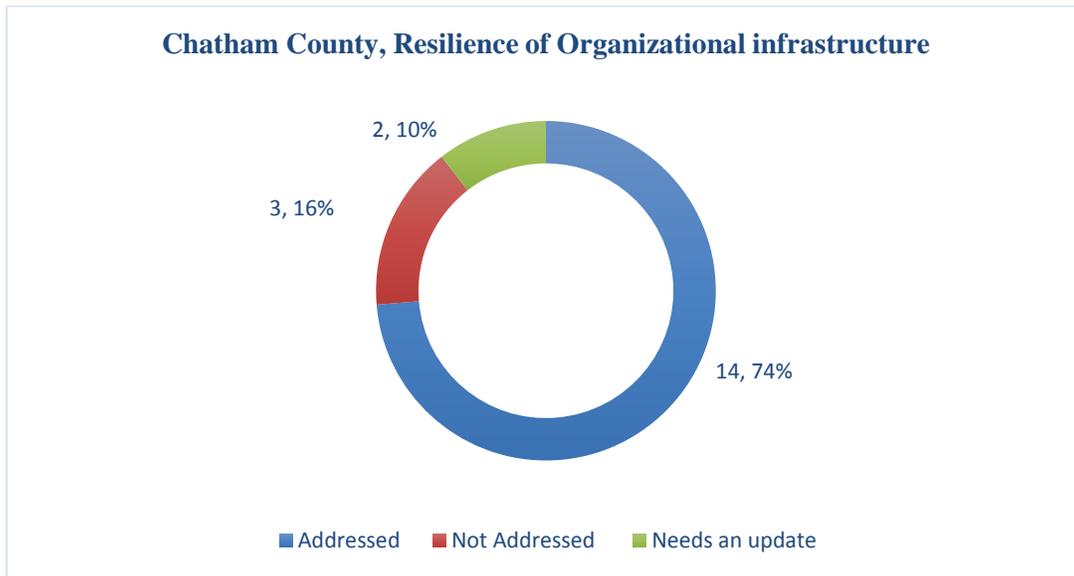
2) Resilience of Physical infrastructure:



Note: The total number of issues identifies for resiliency of physical infrastructure are 17

- **Sections of planning document that needs an update are:**
 - a) Evaluate the physical condition of critical infrastructure
 - b) Funding, and policies for improving the condition of critical infrastructures
- **Missing sections of planning documents:**
 - a) Map the identified critical infrastructure in hazard zone, to understand the potential damage.
 - b) Special health care facility for the population group associated with the critical infrastructure

3) Resilience of Organizational Infrastructure:

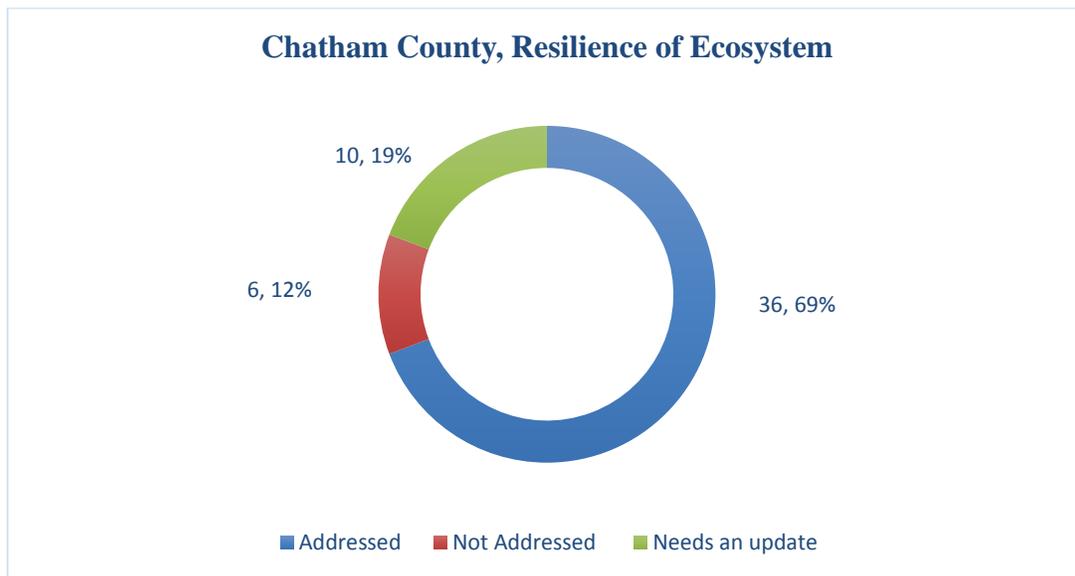


Note: The total number of issues identifies for resiliency of organizational infrastructure is 19

- **Sections of planning document that needs an update are:**
 - a) Disaster warning system
 - b) Partnership with the response team to assist during the disaster

- **Missing sections of planning documents:**
 - c) Awareness program
 - d) Post disaster, child care facility
 - e) Post-disaster cleanup program

4) Resiliency of Ecosystem:



Note: The total number of issues identifies for resiliency of ecosystem is 52.

- **Sections of planning document that needs an update are:**
 - a) Air quality index for the counties
 - b) Data on energy, and oil consumption

- **Missing sections of planning documents:**
 - a) Measuring the change in natural buffer
 - b) Shore line protection policies (if valid)
 - c) Measuring the increase in heat island effect in the area

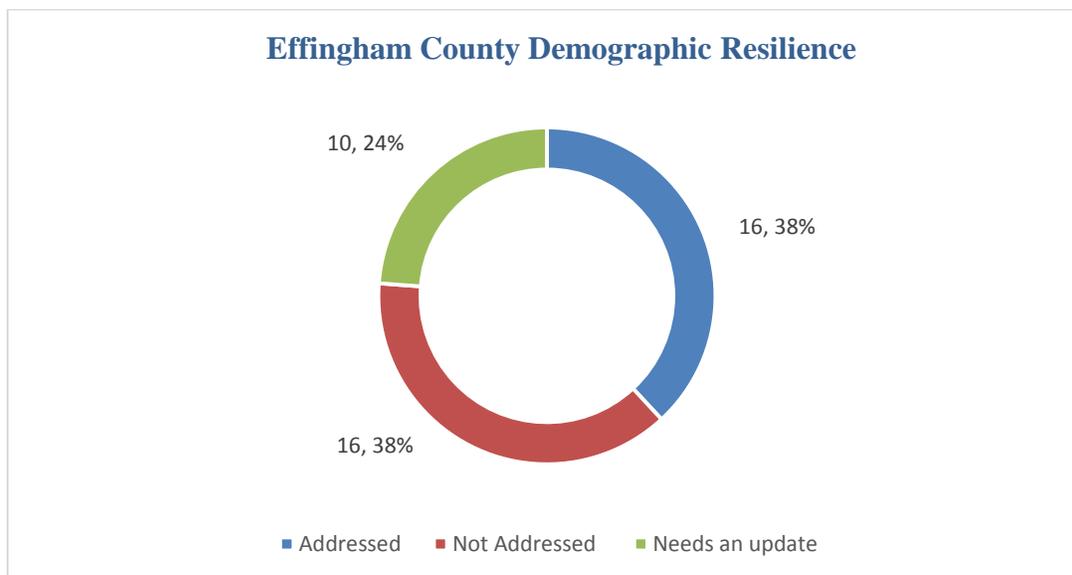
Thus the final resilience score of Chatham County (based on the available documents for review) is:

- Total no of issues: 130
- Addressed: 89 (1 point each) = 89 points
- Needs and update: 28 (0.5 points each) = 14 points

Resilience score of Chatham County, GA = 103 points

Effingham County Summary Report

1) Demographic Resilience

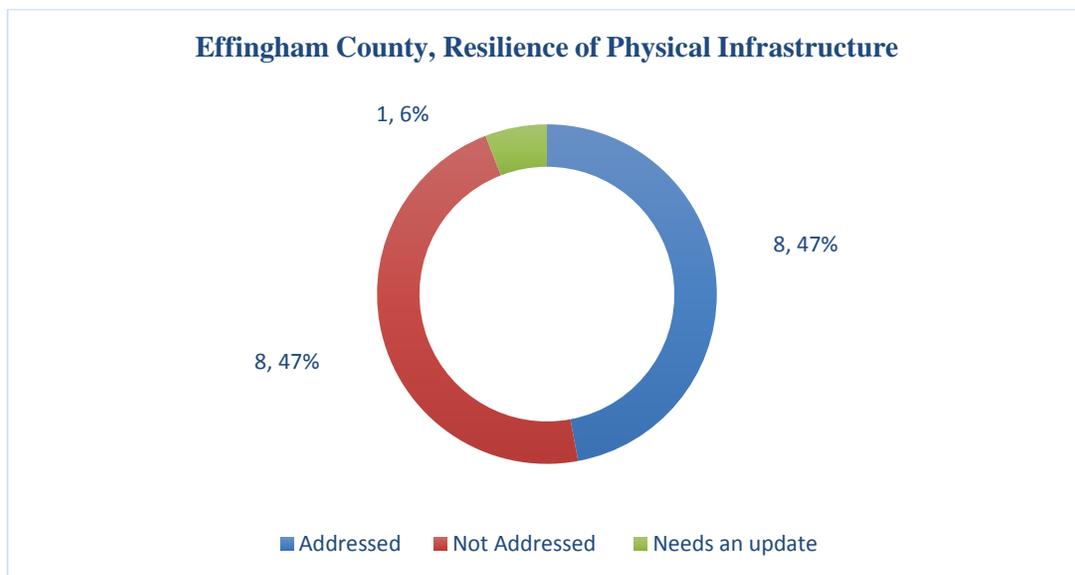


Note: The total number of issues identifies for demographic resilience are 42

- **Sections of planning document that needs an update are:**
 - a) Zone of impact of natural event
 - b) Addressing different population types in the hazard management plan
 - c) Critical facilities provided in hospitals for the case of emergency
 - d) Considering critical populations (population above the age group of 65 years, and below 5 years of age), and population with chronic diseases.
 - e) Understanding the census data of the city/ County
 - f) Construction standards/ codes
 - g) Relocation plans for the critical infrastructure from the hazard zone
 - h) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
- **Missing sections of planning documents:**
 - a) Emergency medical center's locations for both general public, and critical population
 - b) Critical facilities provided in the medical center for emergency situations
 - c) Back-up plans for the emergency supply in the medical centers

- d) Child care center
- e) Animal rescue center
- f) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
- g) Mapping the major concentration (hot-spot) of economic center
- h) Special arrangements like, early evacuation facility, food supply, medical care, etc. for critical section of population.
- i) Special insurance program for the critical section of population during the recovery process
- j) Special education and outreach program for the critical section of population.

2) Resilience of Physical infrastructure:

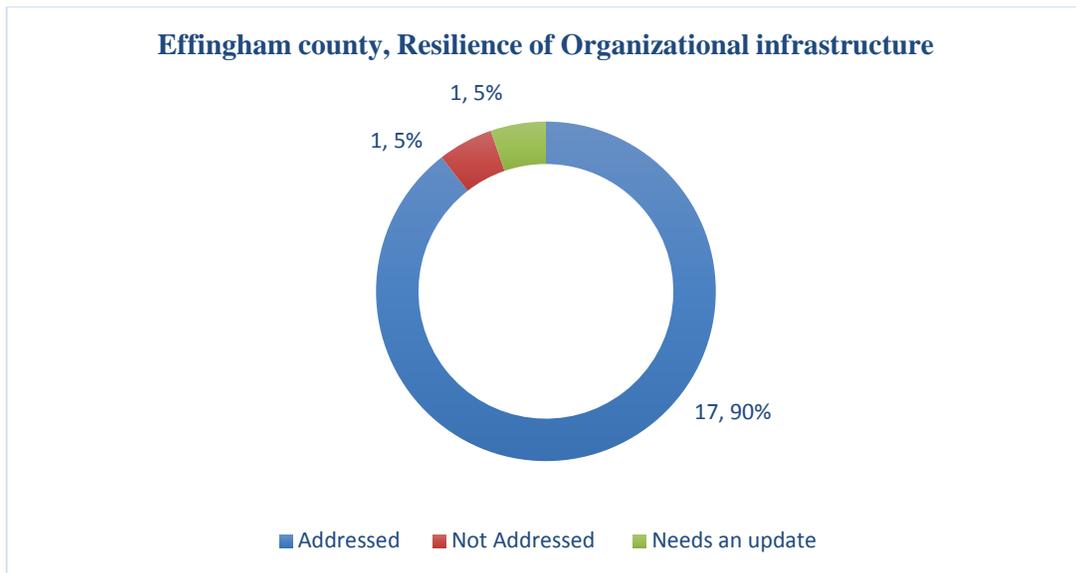


Note: The total number of issues identifies for resiliency of physical infrastructure are 17

- **Sections of planning document that needs an update are:**
 - a) Calculating social, and economical impact of disturbance in functioning of few major infrastructure like, electricity, water, food supply, and road conditions.
- **Missing sections of planning documents:**
 - a) Validating the identified critical infrastructure identified for the city with the standard list of documents provided by Federal or national agencies

- b) Map the identified critical infrastructure in hazard zone, to understand the potential damage.
- c) Evaluate the physical condition of critical infrastructure
- d) Special insurance policies for the critical infrastructure under the Hazard zone
- e) Relocation policy for critical infrastructures
- f) Special health care facility for the population group associated with the critical infrastructure

3) Resilience of organizational infrastructure:



Note: The total number of issues identifies for resiliency of organizational infrastructure is 19

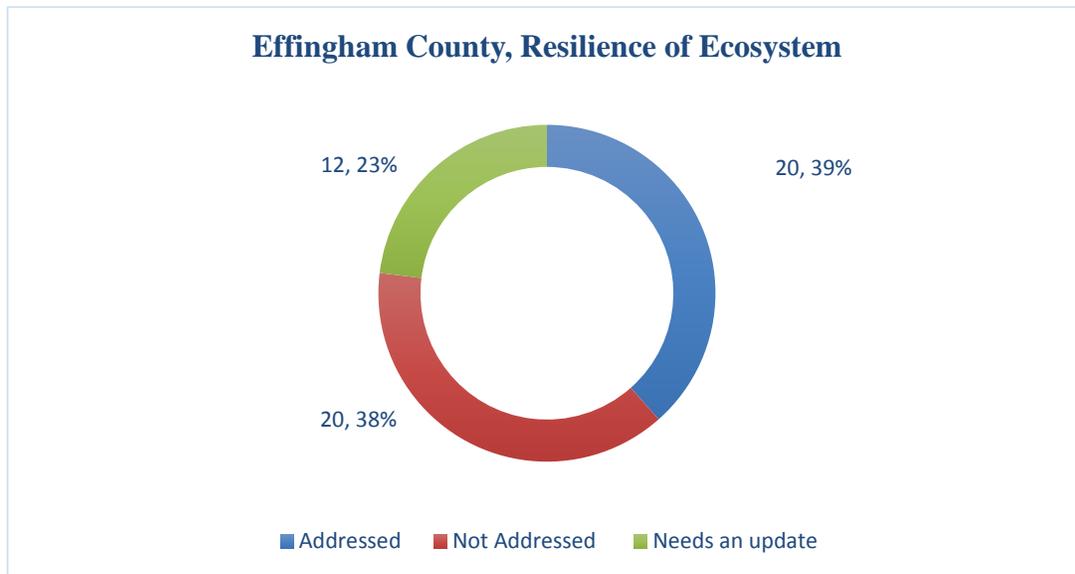
- **Sections of planning document that needs an update are:**

- a) Policies for defining critical infrastructure

- **Missing sections of planning documents:**

- a) Post disaster, child care facility

4) Resiliency of ecosystem:



Note: The total number of issues identifies for resiliency of ecosystem is 52.

- **Sections of planning document that needs an update are:**

- a) Air quality index for the counties
- b) Data on energy, and oil consumption
- c) Water quality

- **Missing sections of planning documents:**

- a) Existing land use pattern
- b) Change in land use pattern
- c) Urban and Rural areas
- d) Measuring the change in natural buffer
- e) Change in temperature and precipitation
- f) Change in ground water level and annual sea level rise
- g) Clean air act
- h) Shore line protection policies (if valid)
- i) Tools for producing green power for the city/county
- j) Measuring the increase in heat island effect in the area
- k) Coastal mapping

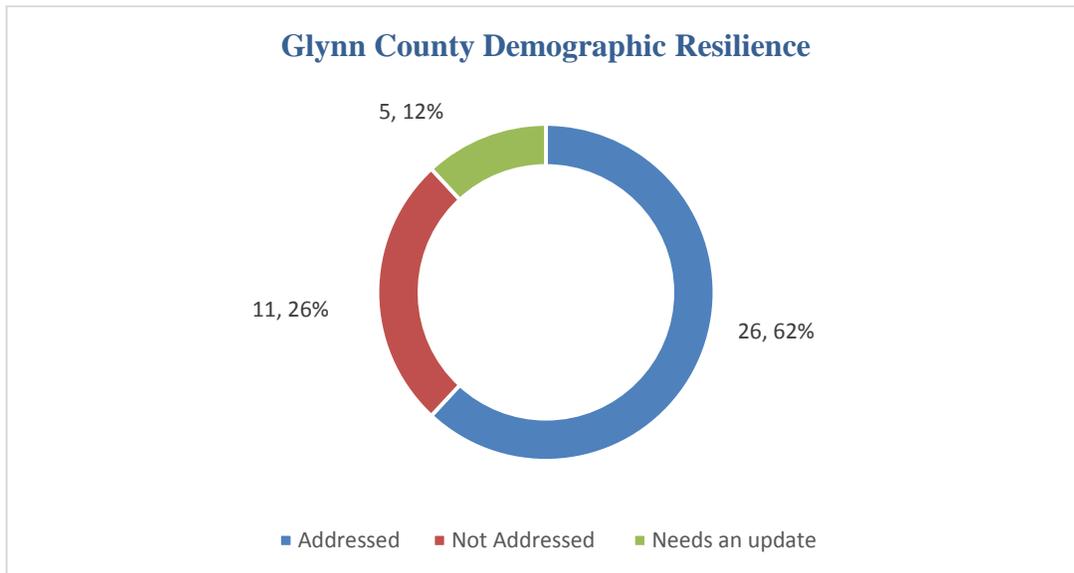
The final resilience score of Effingham County (based on the available documents for review) is:

- Total no of issues: 130
- Addressed: 61 (1 point each) = 61 points
- Needs and update: 24 (0.5 points each) = 12 points

Resilience score of Effingham county, GA = 73 points

Glynn County Summary Report

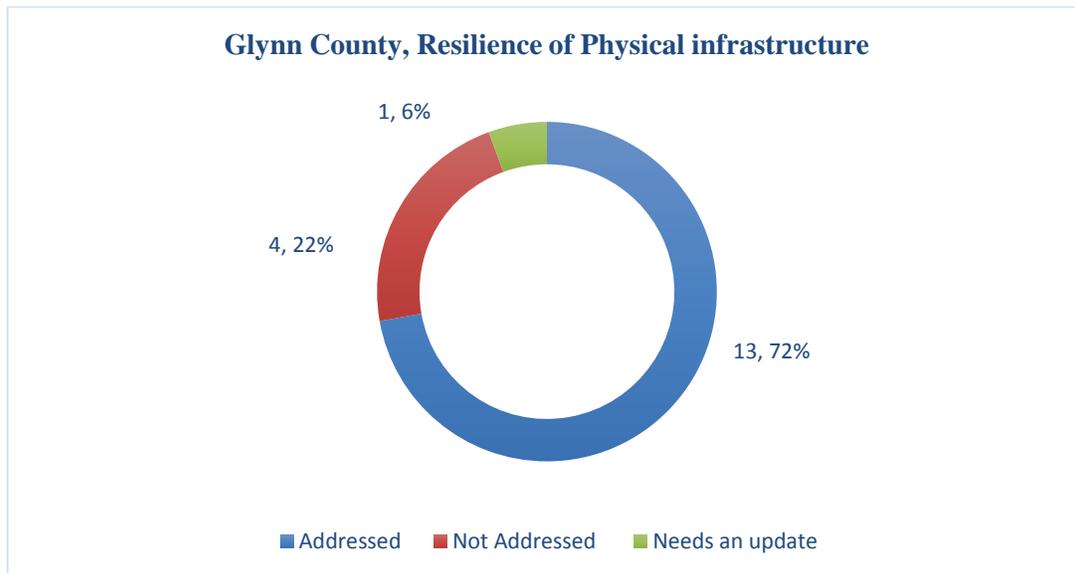
1) Demographic Resilience



Note: The total number of issues identifies for demographic resilience are 42

- **Sections of planning document that needs an update are:**
 - a) Relocation plans for the critical infrastructure from the hazard zone
 - b) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
- **Missing sections of planning documents:**
 - a) Mapping the major concentration (hot-spot) of economic center
 - b) Emergency medical center's locations for both general public, and critical population
 - c) Critical facilities provided in the medical center for emergency situations
 - d) Back-up plans for the emergency supply in the medical centers
 - e) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
 - f) Special arrangements like, early evacuation facility, food supply, medical care, etc. for critical section of population.
 - g) Special insurance program for the critical section of population during the recovery process

2) Resilience of Physical infrastructure:

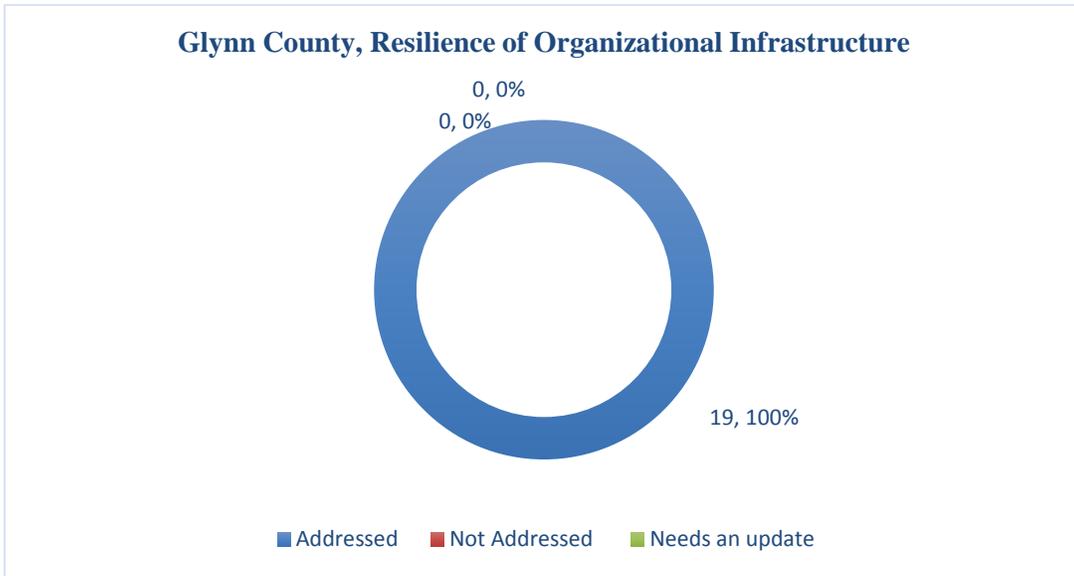


Note: The total number of issues identifies for resiliency of physical infrastructure are 17

- **Missing sections of planning documents:**

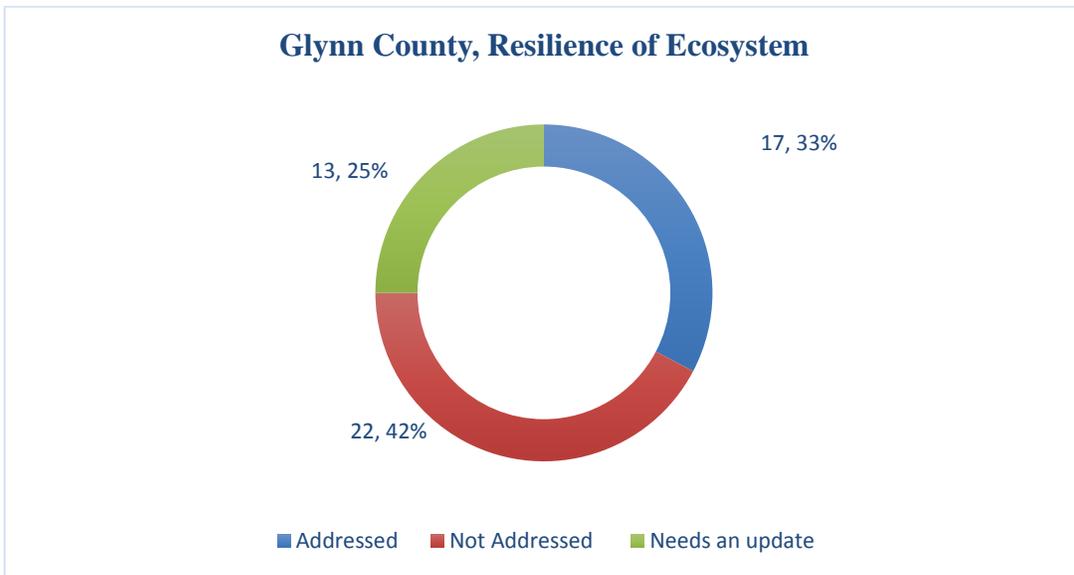
- a) Evaluate the physical condition of critical infrastructure
- b) Special insurance policies for the critical infrastructure under the Hazard zone
- c) Special health care facility for the population group associated with the critical infrastructure

3) Resilience of organizational infrastructure:



Note: The total number of issues identifies for resiliency of organizational infrastructure is 19

4) Resiliency of Ecosystem:



Note: The total number of issues identifies for resiliency of ecosystem is 52.

- **Sections of planning document that needs an update are:**

- a) Air quality index for the counties
- b) Data on energy, and oil consumption
- c) Water quality
- d) Ecosystem management program

- **Missing sections of planning documents:**

- a) Existing land use pattern
- b) Change in land use pattern
- c) Urban and Rural areas
- d) Measuring the change in natural buffer
- e) Change in temperature and precipitation
- f) Clean air act
- g) Shore line protection policies (if valid)
- h) Tools for producing green power for the city/county
- i) Measuring the increase in heat island effect in the area

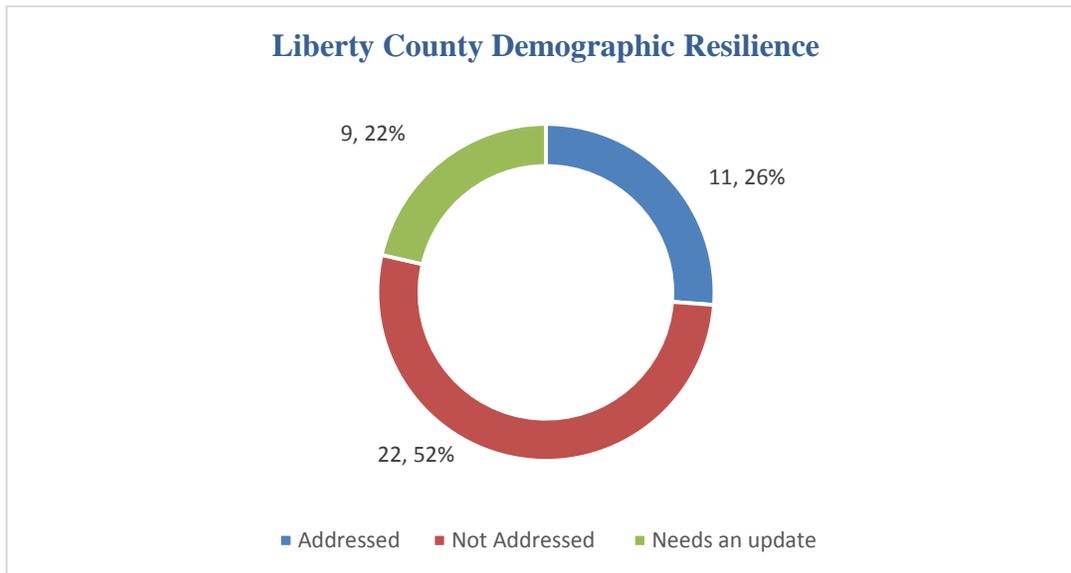
The final resilience score of the Glynn County (based on the available documents for review) is:

- Total no of issues: 130
- Addressed: 75 (1 point each) = 75 points
- Needs and update: 19 (0.5 points each) = 9.5 points

Resilience score of Glynn County, GA = 84.5 points

Liberty County Summary Report

1) Demographic Resilience



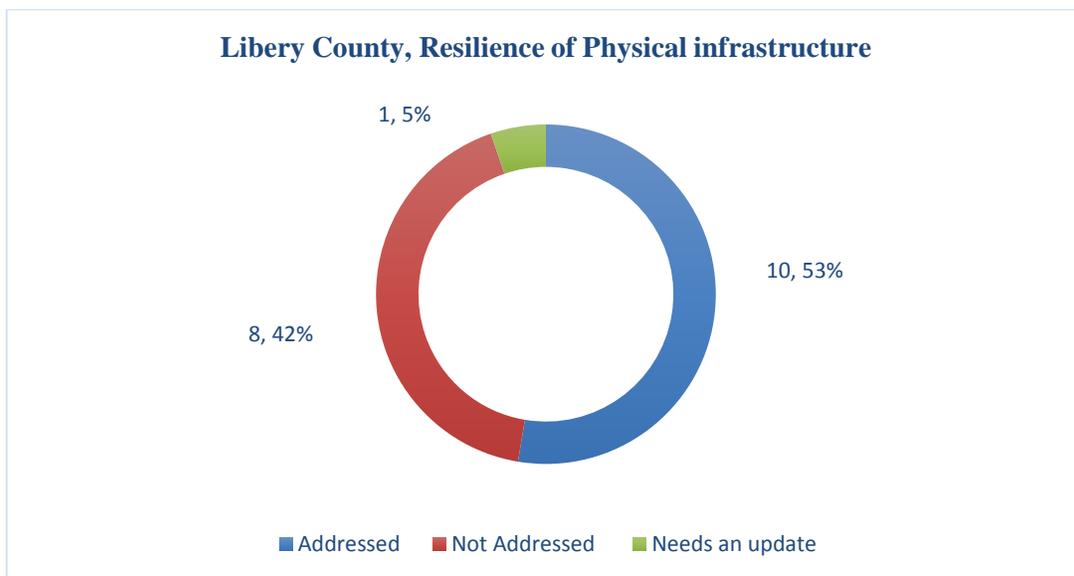
Note: The total no of issues identifies for demographic resilience are 42

- **Sections of planning document that needs an update are:**
 - a) Understanding the population type
 - b) Emergency medical center's locations for both general public, and critical population
 - c) Construction codes
 - d) Special insurance policy for the buildings in the estimated zone of natural event
 - e) Calculating the estimate loss by natural event by calculating the property value in the hazard zone
 - f) Special arrangements like, early evacuation facility, food supply, medical care, etc. for critical section of population

- **Missing sections of planning documents:**
 - a) Evaluation of percentage of critical population within the hazard zone
 - b) Mapping the major concentration (hot-spot) of economic center
 - c) Emergency medical center's locations for both general public, and critical population
 - d) Back-up plans for the emergency supply in the medical centers
 - e) Education and outreach program for both general public and critical population

- f) Location of evacuation shelters for the local population
- g) Child care facility
- h) Animal rescue center
- i) Special evacuation plan for tourist (if that is one of the major economic source for the cities, and county)
- j) Relocation plan for critical infrastructures
- k) Special arrangements like, early evacuation facility, food supply, medical care, etc. for critical section of population.
- l) Special insurance program for the critical section of population during the recovery process

2) Resilience of Physical infrastructure:

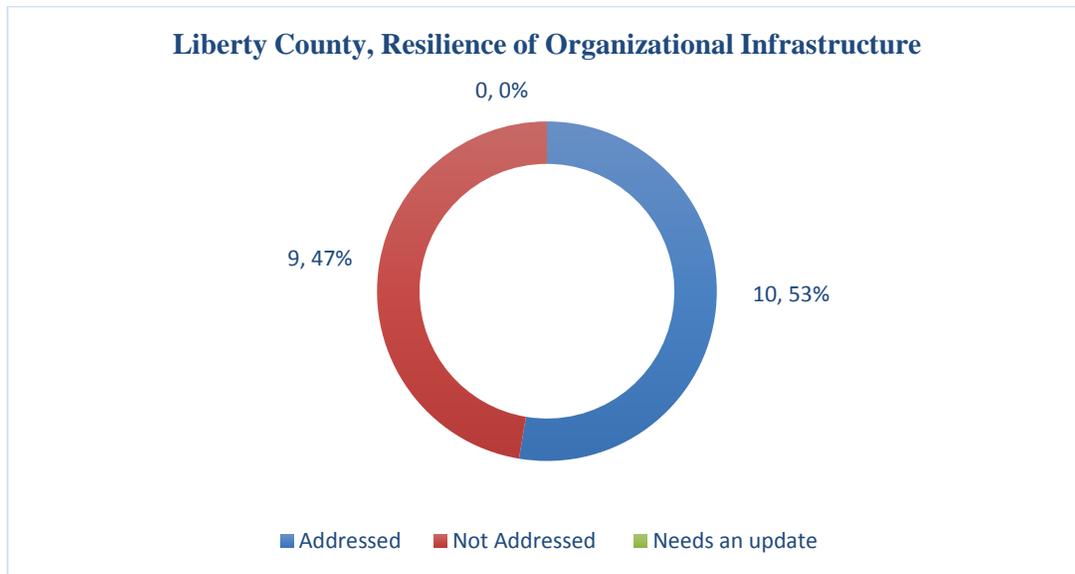


Note: The total number of issues identifies for resiliency of physical infrastructure are 17

- **Sections of planning document that needs an update are:**
 - a) Understanding the zone of impact of natural disaster
- **Missing sections of planning documents:**
 - a) Identification of frequently used infrastructure
 - b) Validating the identified critical infrastructure identified for the city with the standard list of documents provided by Federal or national agencies
 - c) Mapping the identified critical infrastructure in the hazard impact zone

- d) Evaluate the physical condition of critical infrastructure
- e) Special insurance policies for the critical infrastructure under the Hazard zone
- f) Identification of group of people associated with the critical infrastructure
- g) Special health care facility for the population group associated with the critical infrastructure

3) Resilience of organizational infrastructure:

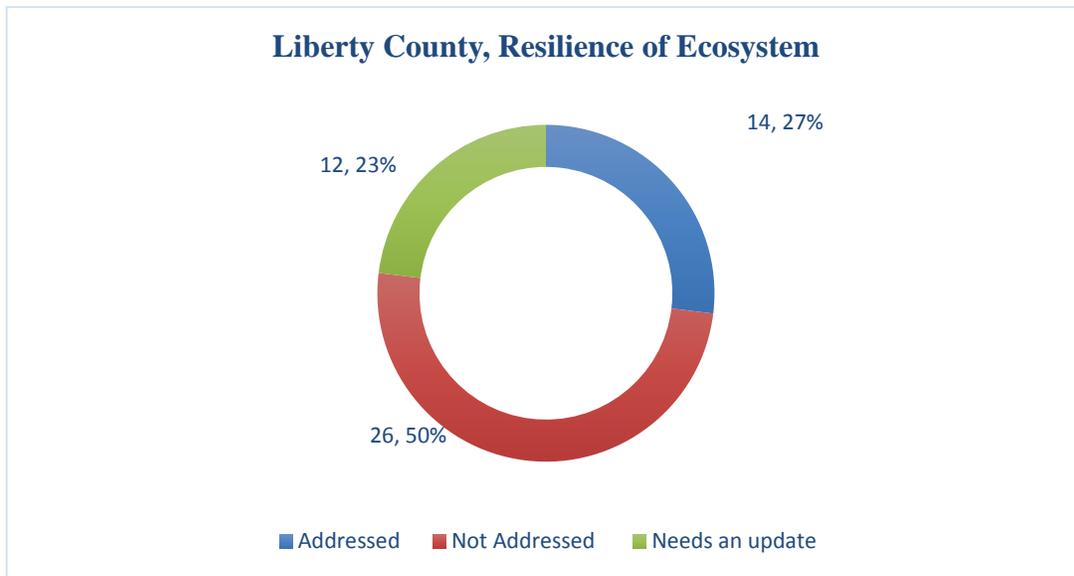


Note: The total number of issues identifies for resiliency of organizational infrastructure is 19

- **Missing sections of planning documents:**

- a) Social impact of the disaster event
- b) Identification of critical infrastructure
- c) Awareness, supply management, and public outreach programs
- d) Partnership with the response team to assist during the disaster
- e) Temporary shelter, and health care facility for the local population during the disaster
- f) Child care facility
- g) Post-disaster cleanup program
- h) Post-disaster recovery program

4) Resiliency of ecosystem:



Note: The total number of issues identifies for resiliency of ecosystem is 52.

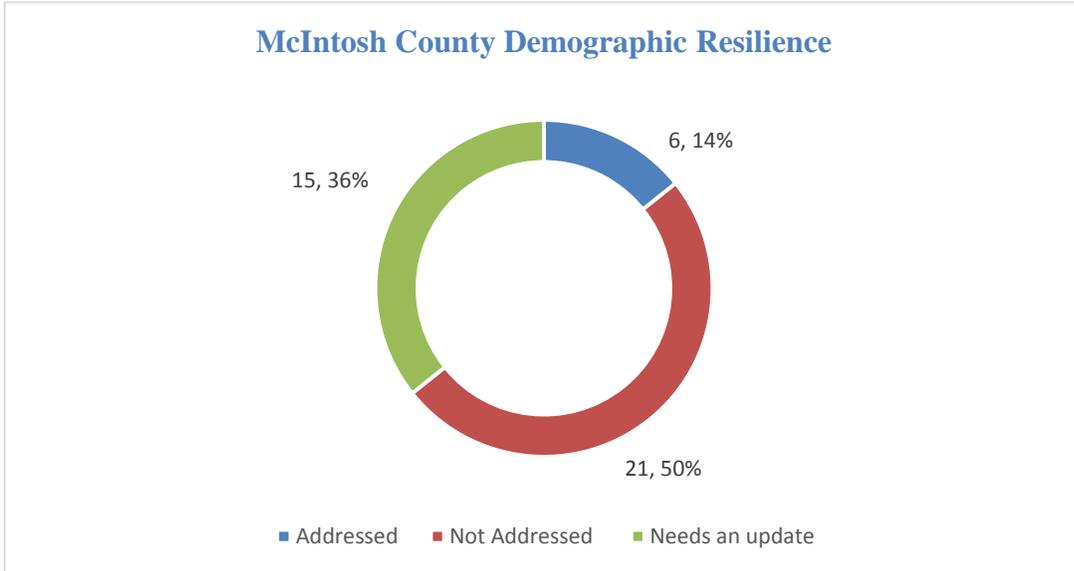
Thus the final resilience score of the Liberty County (based on the available documents for review) is:

- Total no of issues: 130
- Addressed: 45 (1 point each) = 45 points
- Needs and update: 22 (0.5 points each) = 11 points

Resilience score of Liberty County, GA = 56 points

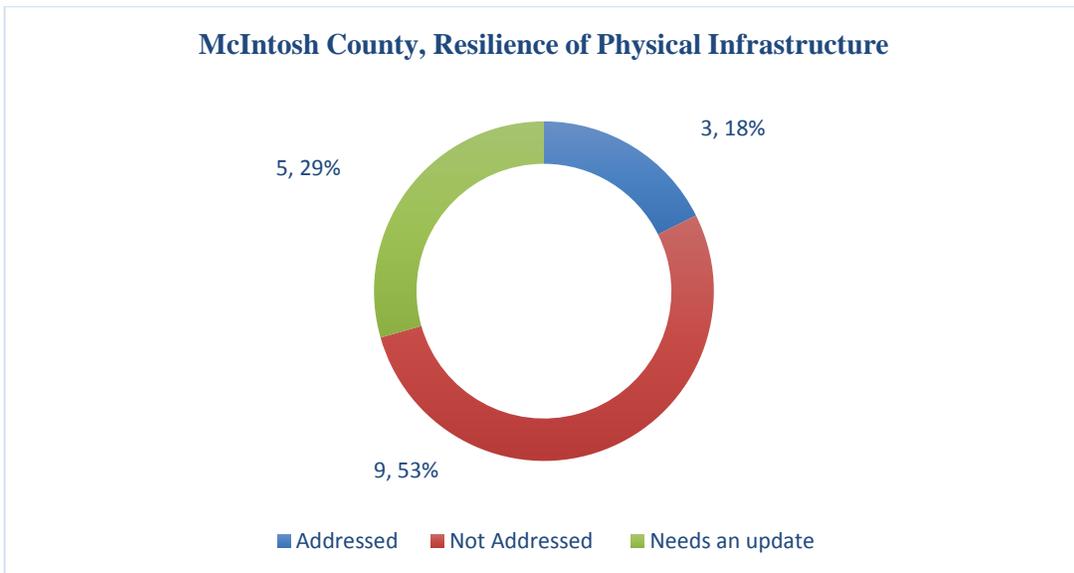
McIntosh County Summary Report

1) Demographic Resilience



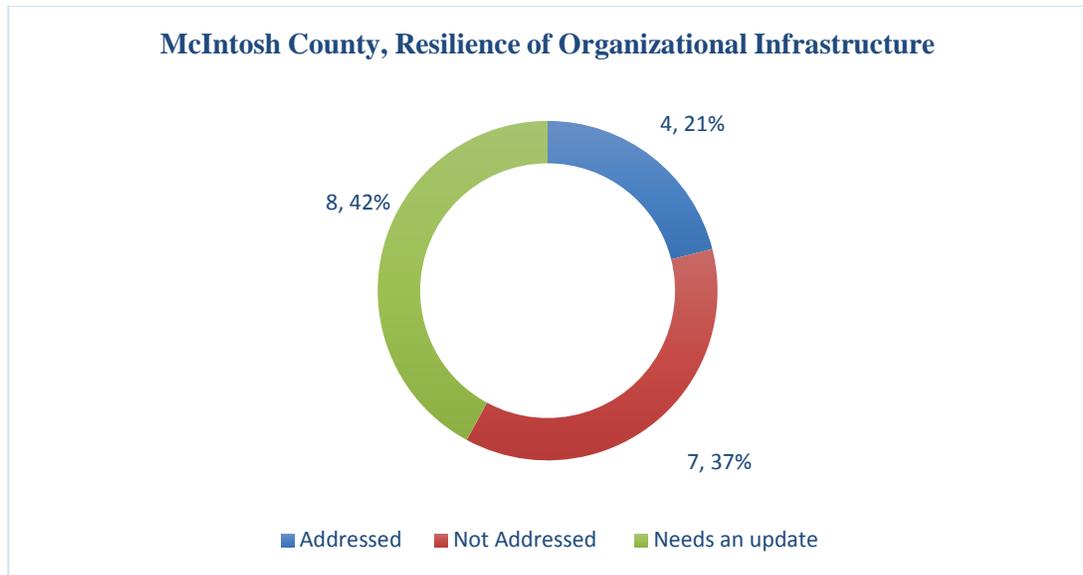
Note: The total number of issues identifies for demographic resilience are 42

2) Resilience of Physical infrastructure:



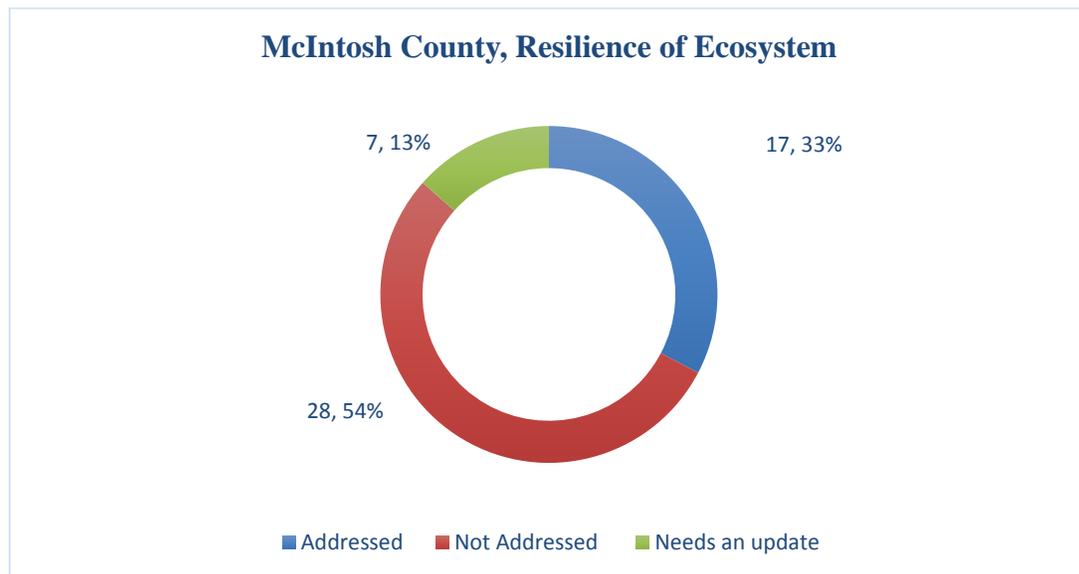
Note: The total number of issues identifies for resiliency of physical infrastructure are 17

3) Resilience of organizational infrastructure:



Note: The total number of issues identifies for resiliency of organizational infrastructure is 19

4) Resiliency of Ecosystem:



Note: The total number of issues identifies for resiliency of ecosystem is 52.

The final resilience score of the McIntosh County (based on the available documents for review) is: Total no of issues: 130

- Addressed: 30 (1 point each) = 45 points
- Needs and update: 35 (0.5 points each) = 17.5 points

Resilience score of McIntosh county, GA = 61.5 points

Conclusion

Next Step Regional Agenda

The CRC is armed with the data, maps, and checklists that evaluate the performance of planning documents specifically for managing the conditions generated by the impact of a natural event. The identified missing portions of documents and the *Resiliency Matrix Tool* are a straightforward framework for evaluating the performance of planning documents. Although the State of Georgia has a statewide hazard mitigation element it is not adopted by cities in their comprehensive plan. The matrix can both be easily used for evaluation of planning documents and be updated depending upon the type of natural event. Additionally, the Assessment and matrix can be used in conjunction with the Georgia Department of Community Affairs (DCA) **2014 Best Practice Guidebook: *Community Disaster Resilience***. This guidebook was created to assist Georgia counties and cities with preparedness for natural hazards and disaster resiliency. DCA studied 20 Georgia counties that were impacted by flooding, severe storms and tornadoes in 2008, and the report describes recommended strategies for coordinating land use planning with hazard mitigation planning. According to DCA, these best practices can be incorporated into planning activities and include specific actions to implement plans and policies.

GA DCA and the CRC Council recognize the benefits and opportunities of integrating hazard mitigation into planning through updates of comprehensive plans, as it promotes consistency between plans; increases the visibility of mitigation goals, objectives and policies; properly guides future development and land use; and, improves coordination between planners and emergency managers.

One of the CRC Planning & Government Services Department aim is to continue to provide access to GIS data and spatial tools to each jurisdiction. This vision puts the data and tools in the hands of economic developers, planners, elected officials, emergency management to better facilitate access in real time. Providing tools and access to GIS data and spatial tools helps stakeholders make better informed decisions. The following categories can be included as part of the resilient community's discussion:

Re-Entry Analysis

- Decision Making
- Communication Process
- Storm Damage Impact Analysis
- Roadway Network

Business Mitigation & Recovery Analysis

- Impact Assessment
- Mitigation Assessment
- Economic Impact Study
- Recovery Analysis
- Redevelopment Planning

Community Storm Impact Analysis

- Coastal Erosion Mapping
- Inland Flood Analysis
- Critical Facility and Utility

Recovery Analysis

- Debris Management Planning
- Public Health
- Temporary Housing

Communication Assessment

- Public Information Process Analysis
- Interoperability Communications Planning Analysis

Technology Analysis

- GIS Applications
- Enhanced Decision Tool Updates

Disaster Mitigation Analysis

- Building Code Impact Analysis
- Zoning Analysis
- Community Rating System Analysis
- HAZUS Implementation
- Public Education and Outreach

The CRC's Regional Assessment is an evidence-based and peer reviewed planning process with clear methodology from a vigorous science basis. The University of Georgia College of Environment + Design presented initial findings at the American Planning Association (APA) GA Chapter State Conference on Jekyll Island. The CRC Regional Assessment, the Resiliency Matrix Tool, DCA's Best Practices, FEMA's Comprehensive Hurricane Emergency Management Strategies, and access to data and GIS applications, together can assist groups, stakeholders, policy makers, state and federal agencies in crafting appropriate guiding principles, effective work programs and operative performance standards in the Regional Plan Update to reduce risk to citizens, account for the long-term health of the ecosystems and ensure the continued delivery of services.