2022

CLIMATE CHANGE AND NATURAL HAZARDS VULNERABLITY ASSESSMENT FOR THE MID-EAST REGION

MID-EAST Commission

NCORR RISE
Regions Innovating for Strong Economies and Environmen t

N★C DPS DEPARTMENT OF PUBLIC SAFETY

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U.S. ECONOMIC DEVELOPMENT ADMINISTRATION

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LAND ACKNOWLEDGEMENT

We wish to acknowledge and honor the Indigenous communities native to this region and recognize that this vulnerability assessment covers communities and structures that are built on Indigenous homelands and resources. We recognize the Chowanoke, Lumbee, Meherrin, Moratok, Pamlico (Pomouik), Secotan, and the Skaruuhreh/Tuscarora people as past, present, and future caretakers of this land. We also recognize the unnamed tribes that once oversaw these lands and have since relocated or been displaced.

MID-EAST COMMISSION

People Working Together

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Dear residents:

Our region, encompassing Beaufort, Bertie, Hertford, Martin, and Pitt Counties, is known for its beautiful creeks and rivers, destination dinning and tourist locations, charming and welcoming towns, and their resilient and hardworking residents. Yet, over the past decade hurricanes, increased both in frequency and strength, surprise flooding in areas never know to flood in the past, and extreme heat and drought conditions, have delt overwhelming conditions. Homes and businesses have been destroyed, never to be built back. Crops have been deemed a complete loss. Workers dependent on outside work are being forced to work shorter days and are still faced with the challenge of protecting their workforce from the dangers of working in extreme heat conditions. Many of these conditions and their impacts on our region can be avoided or diminished.

Considering these challenges, our goal for the Mid-East Region is to take action to strengthen our resilience. This work includes reducing the immediate and long-lasting risks that natural and climate disasters pose for people, property, infrastructure, and natural resources. The Mid-East Region Vulnerability Assessment uses rigorous technical analysis combined with local knowledge to outline the major gaps in our region's preparedness for future natural hazards, climate events and their impacts. The report is the result of numerous meetings with residents, elected officials, local leaders, the North Carolina Office of Recovery and Resiliency, North Carolina Rural Center, and Tetra Tech. These findings help us identify and prioritize efforts to become more resilient. In the coming months, we will use this Vulnerability Assessment to develop a suite up to 10 resilience projects for our 5-county region. However, the Vulnerability Assessment is made available for any use by the public, including the development of independent resilience efforts and grant applications.

As you read through this review of our region's susceptibility to climate impacts, I hope you will think about ways you can prepare neighborhoods, communities, and the region.

Sincerely,

Lisa Williams
Disaster Recovery Specialist

DEFINITIONS

Vulnerability assessments involve the discussion of technical information and scientific information. While technical jargon was avoided, the following terms are defined in order to aid in the reader's understanding of the information presented in this vulnerability assessment document.

Accretion: The buildup of sediment within a certain location such as that occurring naturally across a beach/dune system (opposite of erosion) (Federal Emergency Management Agency n.d.).

Base Flood: The flood having a 1 percent chance of being equaled or exceeded in any given year. This is the regulatory standard also referred to as the "100-year flood." The base flood is the national standard used by the National Flood Insurance Program (NFIP) and all Federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development. Base Flood Elevations (BFEs) are typically shown on Flood Insurance Rate Maps (FIRMs) (Federal Emergency Management Agency n.d.).

Mitigation: Capabilities necessary to reduce loss of life and property by lessening the impact of disasters. Mitigation capabilities include but are not limited to community-wide risk reduction projects; efforts to improve the resilience of critical infrastructure and key resource lifelines; risk reduction for specific vulnerabilities from natural hazards or acts of terrorism; and initiatives to reduce future risks after a disaster has occurred (Federal Emergency Management Agency n.d.).

Climate Resilience: The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation (Federal Emergency Management Agency n.d.).

Compound Flooding: Flooding arising from storms causing concurrent storm surge and precipitation. This compound flooding can severely affect densely populated low-lying coastal areas (nature.com 2020).

Critical Facility: A structure or other improvement that, because of its function, size, service area, or uniqueness, has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired. Critical facilities include health and safety facilities, utilities, government facilities and hazardous materials facilities (CRS Community Self-Assessment n.d.).

Critical Infrastructure: Critical infrastructure includes the vast network of highways, connecting bridges and tunnels, railways, utilities, and buildings necessary to maintain normalcy in daily life. Transportation, commerce, clean water, and electricity all rely on these vital systems (U.S. Department of Homeland Security 2022).

Ecology: The branch of biology that deals with the relations of organisms to one another and to their physical surroundings (Merriam-Webster 2022).

Erosion: The process by which tides, strong wave action, and flood waters wear down or carry away rocks and sediment (soils, sands) along a shoreline (U.S. Climate Resilience Toolkit 2022).

Exposure: The representative value of buildings (in dollars), population (in both people and population equivalence dollars), or agriculture (in dollars) potentially exposed to a natural hazard occurrence (Federal Emergency Management Agency n.d.).

Flood Insurance Rate Map (FIRM): Official map of a community on which Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Areas (SFHAs), the Base Flood Elevations (BFEs), and the risk premium zones applicable to the community (Federal Emergency Management Agency n.d.).

Floodplain: A regulatory term used by the FEMA (also termed the “floodway” or “regulatory floodway”) to describe historic-based flooding. Specifically, it is the area next to a waterbody that historically experiences flooding either via tidal water or in a riverine system when water comes out of the banks of the main channel. FEMA generally described a floodplain as: “any land area susceptible to being inundated by flood waters from any source,” which is the broader term that can include projected future conditions (Federal Emergency Management Agency n.d.).

Flood Zone: Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). SFHA are defined as the area that will be inundated by the flood event having a 1 percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30. Moderate flood hazard areas, labeled Zone B or Zone X (shaded), are also shown on the FIRM, and are the areas between the limits of the base flood and the 0.2-percent annual chance (or 500-year) flood. The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent annual chance flood, are labeled Zone C or Zone X (unshaded) (Federal Emergency Management Agency n.d.).

Geology: The science that deals with the earth's physical structure and substance, its history, and the processes that act on it (Merriam-Webster 2022).

Groundwater: Water that exists underground in saturated zones beneath the land surface. The upper surface of the saturated zone is called the water table (United States Geological Survey n.d.).

Hazard: A regulatory term used by FEMA to describe the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources (Federal Emergency Management Agency n.d.).

Hydrography: The science of surveying and charting bodies of water, such as seas, lakes, and rivers (Merriam-Webster 2022).

Hydrology: The branch of science concerned with the properties of the earth's water and especially its movement in relation to land (Merriam-Webster 2022).

Impact: Effects on natural and human systems. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the interaction of climate changes or hazardous climate events (Federal Emergency Management Agency n.d.).

Land Use: The human use of land. It represents the economic and cultural activities (e.g., agricultural, residential, industrial, mining, and recreational uses) that are practiced at a given place (United States Environmental Protection Agency 2021).

Land Cover: The surface components of land that are physically present and visible (United States Environmental Protection Agency 2022).

Mean High Water: The average of astronomical high tides (Federal Emergency Management Agency n.d.).

Mean Return Period: The interval between events of similar size or intensity (Federal Emergency Management Agency n.d.).

Non-Potable Water: Water that has not been examined, properly treated, nor approved by appropriate authorities as being safe for consumption (Federal Emergency Management Agency n.d.).

Potable Water: Water suitable for drinking (Federal Emergency Management Agency n.d.).

Runoff: That part of the precipitation that appears in surface streams (United States Geological Survey 2019).

Sea Level Rise: The increase currently observed in the average sea level trend, which is primarily attributed to changes in ocean volume due to two factors: ice melt and thermal expansion (NOAA 2020) (NOAA 2012).

Socially Vulnerable Populations: Populations with special needs that are especially at risk because of factors like socioeconomic status, household composition, minority status, or housing type and transportation (Agency for Toxic Substance and Disease Registry 2021).

Special Flood Hazard Area (SFHA): Areas designated by FEMA as historically having “special flood, mudflow, or flood-related erosion hazards, and shown on a Flood Hazard Boundary Map or a Flood Insurance Rate Map (Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30).” (Federal Emergency Management Agency n.d.).

Surface Water: Water sources above ground level, including streams and rivers, lakes and reservoirs, and oceans (United States Geological Survey 2019).

Topography: The arrangement of the natural and artificial physical features of an area (Merriam-Webster 2022).

Water Capacity: The ability of a water system to ensure it can provide safe and reliable drinking water now and into the future (Federal Emergency Management Agency n.d.).

Watershed: The land that water flows across or through on its way to a common stream, river, or lake (United States Environmental Protection Agency n.d.).

Water Quality: A measure of the suitability of water for a particular use based on selected physical, chemical, and biological characteristics (United States Geological Survey 2018).

Wildland-Urban Interface (WUI): The zone of transition between wilderness (unoccupied land) and land developed by human activity – an area where a built environment meets or intermingles with a natural environment (Federal Emergency Management Agency n.d.).

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (Federal Emergency Management Agency n.d.).

RISE PROGRAM OVERVIEW

A. North Carolina Office of Recovery and Resiliency Overview

In the wake of Hurricane Florence in 2018, the State of North Carolina established the North Carolina Office of Recovery and Resiliency (NCORR) to lead the state's efforts to rebuild smarter and stronger. At that time, eastern North Carolina communities were still recovering from Hurricane Matthew, which occurred in 2016. NCORR manages nearly $1 billion dollars in U.S. Department of Housing and Urban Development (HUD) funding in two grant types — Community Development Block Grant-Disaster Recovery (CDBG-DR) funds and Community Development Block Grant-Mitigation (CDBG-MIT) funds — aimed at making North Carolina communities safer and more resilient to future storms. Additional funding is provided through the State Disaster Recovery Acts of 2017 and 2018, the Storm Recovery Act of 2019, and the Economic Development Administration Disaster Supplemental Funds. NCORR manages programs statewide that include homeowner recovery, infrastructure, affordable housing, resiliency, and strategic buyouts. To learn more about NCORR programs, visit the ReBuild.NC.Gov website. NCORR is a division of the Department of Public Safety.

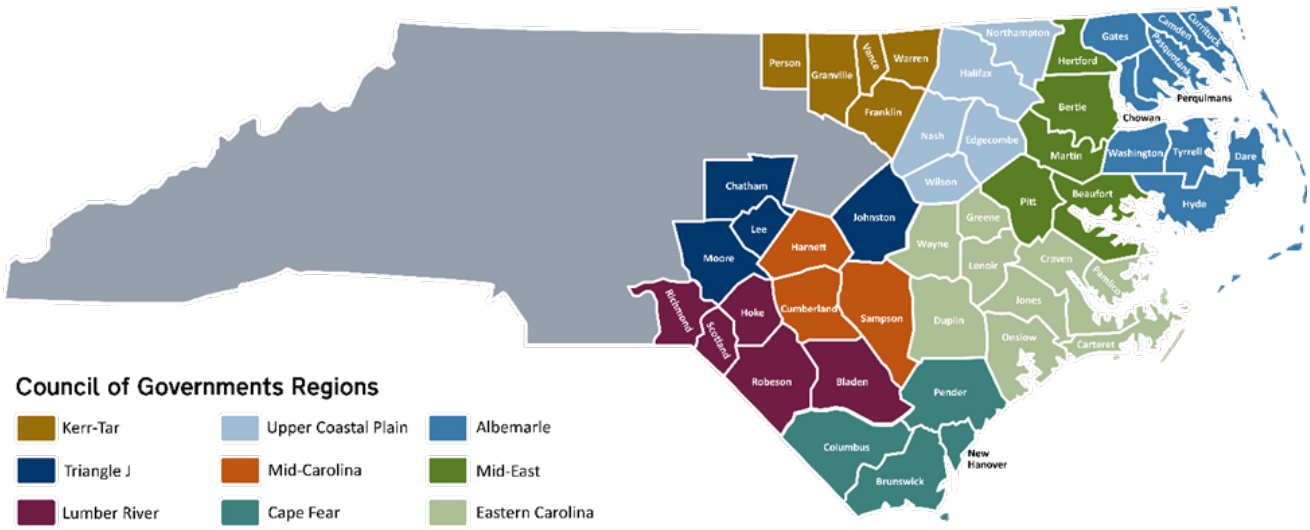
B. RISE Program Overview

Developed in partnership with North Carolina Rural Center, NCORR's Regions Innovating for Strong Economies and Environment (RISE) program supports resilience in North Carolina by:

- Facilitating the Regional Resilience Portfolio Program, which provides coaching and technical assistance to regional partners in the eastern half of the state to build multi-county vulnerability assessments, identify priority actions to reduce risk and enhance resilience in their region, and develop paths to implementation.
- Developing the North Carolina Resilient Communities Guide, a statewide resource that will provide tools, guidance, and opportunities for building community resilience.
- Hosting the Homegrown Leaders program, a NC Rural Center leadership training workshop, which operates in the eastern half of the state, which emphasizes resilience as a tool for community economic development.

This vulnerability assessment, which covers Beaufort, Bertie, Hertford, Martin, and Pitt Counties, fulfills the first deliverable of the Regional Resilience Portfolio Program for the Mid-East Region. The RISE Regional Resilience Portfolio Program covers nine areas, which align with the North Carolina Council of Government regions (***Figure 1***).

Figure 1. RISE Councils of Government



The second and final deliverable of each region's RISE Regional Resilience Portfolio Program will be a portfolio of 5–10 projects identified through community input and expert consultation. The portfolio document will outline funding opportunities and potential project partners to enable a clear path toward implementation for each project.

RISE is funded by the U.S. Economic Development Administration and the HUD's CDBG-MIT funds, with in-kind support from NCORR and the North Carolina Rural Center. In addition, the Duke Energy Foundation committed $600,000 in grant funding to support the Regional Resilience Portfolio Program.

I. EXECUTIVE SUMMARY

The RISE Mid-East Regional Resilience Portfolio Program is an initiative to support and expand resilience efforts throughout the Mid-East Region. This program addresses community concerns about vulnerabilities by engaging stakeholders and members of the public throughout the program's execution. The regional resilience projects developed in this program will increase safety among residents and visitors, support the regional economy, and protect valuable natural resources. This vulnerability assessment bridges science and local knowledge to identify current and future hazards impacting the region and analyzes the region's strengths and challenges when faced with those hazards.

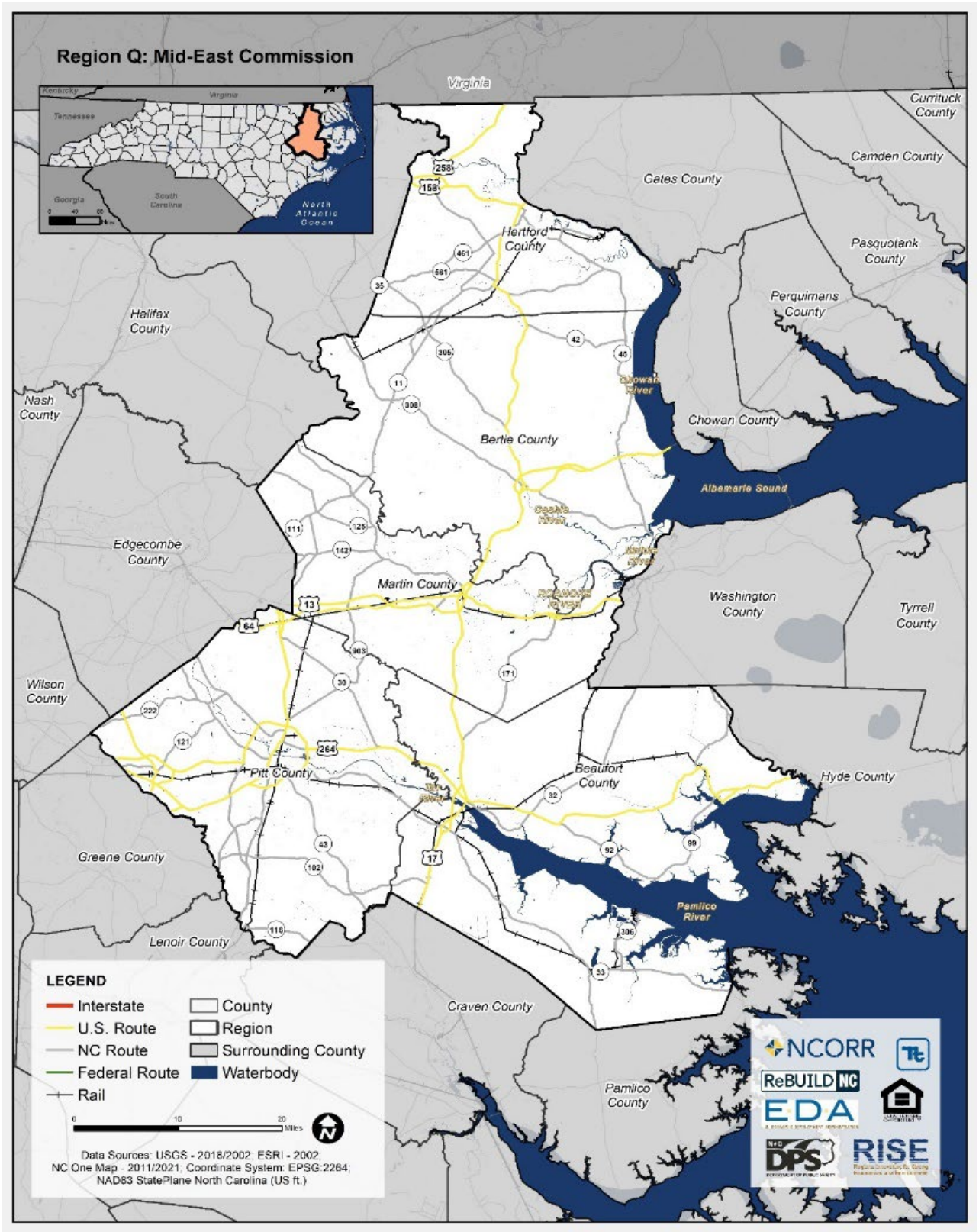
Partner organizations in this project include:

- The Mid-East Commission
- North Carolina Office of Recovery and Resiliency
- North Carolina Rural Center
- Tetra Tech, Inc.

A. The Mid-East Region

The Mid-East Region is composed of Beaufort, Bertie, Hertford, Martin, and Pitt Counties. It is a wide, essentially flat, coastal plain lying within the inner coast along the Albemarle and Pamlico Sounds, as seen in ***Figure 2*** below. With 276,412 people, the region is dominated by rural, undeveloped, agricultural lands and woodland that is sparsely populated (US Census n.d.).

Figure 2. Map of Mid-East Region



Project Team

The planning effort in the Mid-East Region is led by a project team composed of an NCORR representative, the Mid-East Commission, Tetra Tech, Inc., and a regional facilitator. The Mid-East Commission offered project guidance, and Tetra Tech, Inc. provided technical assistance. The North Carolina Rural Center hired a local leader to provide facilitation support at the many stakeholder and public meetings held during the planning process.

Stakeholder Partnership

The planning effort in the region is informed by a Stakeholder Partnership to ensure the vulnerabilities identified reflect local priorities. The Stakeholder Partnership:

- Steer the implementation of the project by providing local input and perspective;
- Review project materials to ensure materials reflect local priorities and address local concerns; and
- Attend monthly meetings.

The Stakeholder Partnership, consisting of 34 local subject-matter experts, represents a cross-section of stakeholders from the region, including representatives from all counties and sectors. Development of the Stakeholder Partnership also considered diversity in race, gender, abilities, and age.

Public Workshops

Public workshops were held in the Mid-East Region to gather input on local concerns. Due to the continued impacts of the COVID-19 pandemic and a surge of cases in the spring of 2022, these workshops were held virtually on April 14 and 23, 2022. Despite efforts to encourage attendance through offering multiple workshops on different dates and times, attendance at these workshops was limited. Nonetheless, the public comments collected during these workshops provided valuable information to inform this vulnerability assessment.

B. Summary of Findings

The need for a greater focus on building resilience has been demonstrated by feedback from the Mid-East regions' stakeholders and the public. When surveyed, 85 percent of stakeholders agreed or strongly agreed that natural disasters will impact the region more severely and frequently over the next 30 years. These results indicate the need for long-term solutions that strengthen the capacity of the region's households, communities, businesses, infrastructure, and natural environment to prevent, withstand, respond to, and recover from natural disasters and climate hazards.

This vulnerability assessment provides detailed insight regarding the susceptibility of the region to the impacts of climate change and its population, assets, and resources. Summary points for each impact area are listed below.

Social Vulnerability and Equity, Health, and Safety

- Roughly 16% of the population of the Mid-East Region live at or below the poverty level. A lack of access to resources and opportunities can make disaster preparedness and recovery more difficult for people experiencing poverty than others in the community.

Housing, Critical Infrastructure, and Community Support Systems

- Limited safe and affordable housing options throughout the region increases recovery time post-disaster and exacerbates pre-existing disparities and social vulnerabilities. Disasters are felt more severely in communities that are already facing challenges with accessing safe and affordable housing.
- Roadway infrastructure throughout the region is vulnerable to multiple hazards. Past flooding and hurricane events have resulted in extended closures and put the population at risk when evacuation routes are inaccessible. High tide events and extreme rainfall events both cause regular road closures preventing travel to and from work, impacting school transportation, and disrupting the flow of goods and services throughout the region.

Economy

- Agriculture accounts for a significant sector of the regional economy. Flooding, extreme heat, erosion, sea level rise, and drought all threaten the farming and livestock operations which are fundamental to the Mid-East Region's economy.

Natural Environmental Systems

- Projected population increases will drive new development, particularly in areas that are currently suburban and rural. This development will reduce the number of natural lands available to absorb rainwater and will result in increased flooding.

Summary points for each of the hazards of concern are included below.

Drought

- The areas surrounding Williamston and west of Greenville are reliant on surface water and are at higher risk of the impacts of severe drought.
- Droughts could pose significant risk to the region's agricultural industry.

Extreme Temperature

- Due to climate change, extreme heat events are likely to become more frequent and severe in the region, while extreme cold events should become less frequent and less severe.
- Populations that lack proper heating and cooling are most at risk of extreme temperature events.
- Droughts associated with extreme heat events could pose significant risk to the region's agricultural industry.

Flood

- The region is exposed to various types of flooding, with coastal flooding and stormwater flooding being the largest concerns.
- Heavy rainfall is becoming more frequent in the Mid-East Region.
- Stormwater components are not designed to handle larger rainfall and can be damaged or contribute to stormwater flooding.

Hurricane and Severe Storms

- The region experiences a variety of severe weather events including numerous secondary hazards like wind, lightning, and hail.
- These events have led to significant damages and impacts, many taking years to recover from.
- The frequency and severity of these events are likely to increase in the future due to climate change.

Sea Level Rise

- Sea level rise is likely to increase the frequency and severity of coastal flooding. Flood maps do not account for sea level rise and therefore under-represent future risk. The region's rate of sea level rise (roughly 0.18 inches per year) is higher than the global average and roughly twice the rate of the southern portions of the state (NC Climate Science 2020).

Tornado

- All of the Mid-East Region is exposed to tornadoes and high wind. The Mid-East Region is located in FEMA Wind Zone III, where wind speeds can reach up to 200 mph (NIST 2011).
- Climate change is warming the atmosphere in the Mid-East Region, meaning storms have potential to be more intense and occur more often.

Wildfire

- Increasing frequency and severity of wildfire will lead to increased damage to natural systems and potential damage to structures.
- Projected increases in wildfire risks and associated emissions can have harmful impacts on health.

II. METHODOLOGY

As illustrated in ***Figure 3*** below, the project team followed a detailed process for developing this report.

Figure 3. Methodology for Developing the Vulnerability Assessment

Following a review of existing plans, policies, and programs developed for the Mid-East Region, stakeholders were surveyed to identify the hazards that pose the greatest risk to the region. Respondents ranked hurricanes and coastal storms as posing the greatest risk, followed by tornadoes, thunderstorms, and flooding.

Throughout the stakeholder and public engagement process, strong concern for the vulnerability of infrastructure across the region was noted. 69 percent of stakeholders agreed or strongly agreed that critical infrastructure in the region is at risk from natural or human-caused disasters. Stakeholders noted the following concerns:

- “The majority of the power grid and infrastructure in the five (5) counties we serve is more than 30 years old or older. Failing equipment that is not capable of withstanding the high winds and effects of natural disasters results in frequent and prolonged power outages. These power outages result in a[n] increased number of people being evacuated to shelters or sheltering in place in often dangerous circumstances.”
- “Underfunded replacement of infrastructure; infrastructure within a floodplain.”
- “Some areas in the region are very remote and if critical infrastructure is damaged in a disaster, repairs may be difficult to complete.”

Additionally, most stakeholders indicated that natural disasters are impacting the region more frequently today than they were in the past (85 percent strongly agree or somewhat agree) and that the region is likely to become more vulnerable to natural disasters in the future (69 percent strongly agree or somewhat agree). Specifically, stakeholders noted:

- “Flooding has caused severe water damage to my church, families' homes and businesses. The cost of repairs is hard, especially without flood insurance which most people can't afford or don't have. The emotional toll of losing your home and other possessions, not to mention having to relocate is very hard to bear.”
- “A total of 79 tropical or subtropical cyclones affected North Carolina between 1950 and 1979. The period from 1980 to the present encompasses 120 tropical or subtropical cyclones that affected the state.”

- "It appears natural disasters are covering larger areas of the country, and the region is impacted by portions of events that might have completely missed the area before."
- "As sea levels rise and hurricanes intensify/become more frequent, inland flooding will become more of a problem, and events will increase in severity as more coastal barriers are eroded."
- "Each season, the weather seems more intense and different."

A. Geographic Information System Methodology

2022 Resilience Portfolio

- The risk assessment was updated using best available information.
- Hazard data published between 2014 and 2022 was referenced in the risk assessment.
- 2020 Decennial Census population data and 2015–2019 American Community Survey 5-year estimates were utilized.
- The risk assessment used best available building footprint and parcel data from NC OneMap.
- The critical infrastructure inventory was compiled from NC OneMap and supplemented with Homeland Infrastructure Foundation-Level Data (HIFLD).
- An updated version of Hazus (v5.1) was used to estimate potential impacts to the wind hazards.
- Best available hazard data was used as described in this section.

The following summarizes the asset inventories, methodology, and tools used to support the risk assessment process.

Asset Inventories

Mid-East Region assets were identified to assess potential exposure and loss associated with the hazards of concern. For the Resilience portfolio, Mid-East Region assessed exposure vulnerability of the following types of assets: population, buildings and critical facilities/infrastructure and the environment. Some assets may be more vulnerable because of their physical characteristics or socioeconomic uses. To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate, without details about specific individual personal or public properties.

Population

Total population statistics from the 2020 Decennial Census Bureau and 2015–2019 American Community Survey 5-year estimates were used to estimate the exposure and potential impacts to the region's population. Population counts from Census tracts in the region were totaled to estimate total population. The North Carolina State 2018 CDC/ATSDR Social Vulnerability Index (CDC/ATSDR SVI) was also used to identify Census tracts within the region with an SVI ranking of 0.5001 to 0.75 and more than 0.75001. These tracts represented areas of moderate to high social vulnerability and were referenced to assess the region's population at greatest risk to impacts. Limitations of these analyses are recognized, and thus the results are used only to provide a general estimate for planning purposes.

As discussed in Section III (Regional Profile), research has shown that some populations are at greater risk from hazard events because of decreased resources or physical abilities. Vulnerable populations in Mid-East Region included in the risk assessment are children, elderly, population below the poverty level, population with a disability, population with limited English proficiency, population without a vehicle, and population commuting to work.

Buildings

The building stock inventory was updated regionwide. To develop the building inventory, data was compiled from NC OneMap, i.e., 2021/2022 State Parcels, and North Carolina Emergency Management (NCEM), i.e., 2010 State Building Footprints and 2020 State Building Footprints. The 2010 State Building Footprints with risk assessment attributes were referenced to assign attributes, i.e., year built, general occupancy class, and square footage, to the building footprints using the BLDG_ID field. Once building footprints were assigned attributes, the data was spatially joined to the 2021/2022 parcel data. The parcel data was used to fill in the gaps for building attributes. If a parcel intersected multiple building footprints, square footage was assigned based on parcel data or building footprint geometry. If the building footprint was the largest building that intersected the parcel, it was assigned the square footage from the parcel data. Otherwise, the square footage was assigned based on the area geometry of the building footprint. If a building footprint intersected multiple parcels with different occupancy classes, general occupancy classes were assigned based on the following priority: (1) residential, (2) government, (3) commercial or industrial, and (4) all other general occupancy classes.

Furthermore, a mobile home inventory was updated regionwide. To develop the mobile home inventory, data was taken from the updated building stock inventory and the Homeland Infrastructure Foundation-Level Data (HIFLD), i.e., 2022 mobile home parks. Using the updated building stock inventory, mobile homes were extracted using general occupancy class attributes referenced from the 2010 state building footprint data with attributes, as well as the spatially joined 2021/2022 parcel data, i.e., PARUSECODE, PARUSEDESC, and PARUSEDSC2 fields. To explore the location of critical facilities within the Mid-East Region, visit Mid East Region - Resilience Portfolio Web Map (arcgis.com).

Critical Infrastructure

Critical infrastructure was compiled from NC One Map, Homeland Infrastructure Foundation-Level Data (HIFLD), and United States Department of Transportation. Critical infrastructure was categorized into eight major sectors: education facilities; facilities with impacts to public health and environmental systems; healthcare facilities; historic and cultural resource facilities; public service facilities; transportation facilities; utilities; and vulnerable population facilities. The critical infrastructure was assigned attributes such as year built, renovated year, capacity of services, and whether backup power is available (if known). To explore the location of critical infrastructure within the Mid-East Region, visit Mid East Region - Resilience Portfolio Web Map (arcgis.com).

Environment

Land use land cover data was referenced in this risk assessment to analyze changes in the environment for the Mid-East Region. The 2021 Multi-Resolution Land Characteristics (MRLC) National Land Cover Database (NLCD) dataset was used to summarize land use exposure aggregated by agricultural land cover types. Additionally, the 2016 National Oceanic and Atmospheric Administration (NOAA) Marsh Migration dataset was used to illustrate the potential distribution of marsh and wetlands inundated under the potential future sea level rise +1-foot scenario. As sea level rises, higher elevations will become more frequently inundated, allowing for marsh migration landward. At the same time, some lower-lying areas will be so often inundated that the marshes will no longer be able to thrive, becoming lost to open water.

Analysis Methodology

To better understand potential vulnerability and losses associated with hazards of concern, the Mid-East Region used standardized tools, combined with local, state, and federal data and expertise to conduct

the risk assessment. Three different levels of analysis were used depending upon the data available for each hazard, as described below. ***Table 1*** summarizes the type of analysis conducted by hazard of concern.

- Historic Occurrences and Qualitative Analysis – This analysis includes an examination of historic impacts to understand potential impacts of future events of similar size. In addition, potential impacts and losses are discussed qualitatively using best available data and professional judgement.
- Exposure Assessment – This analysis involves overlaying available spatial hazard layers, or hazards with defined extent and locations, with assets in geographic information systems (GIS) to determine which assets are located in the impact area of the hazard. The analysis highlights which assets are located in the hazard area and may incur future impacts.

Loss estimation — The FEMA Hazus modeling software was used to estimate potential losses for the hurricane wind hazard.

Table 1. Summary of Risk Assessment Analyses

Hazard	Population	General Building Stock	Critical Facilities And Lifelines
Coastal Erosion	Q	Q	Q
Flood	E	E	E
Hurricane	E, H	E, H	E, H
Sea Level Rise and 2050 1-Percent Annual Chance Flood	E	E	E
Storm Surge	E	E	E
Urban Heat Islands	Q	Q	Q

E – Exposure analysis; H – Hazus analysis; Q – Qualitative analysis

Hazards U.S. – Multi-Hazard (Hazus)

In 1997, FEMA developed a standardized model for estimating losses caused by earthquakes, known as Hazards U.S. or Hazus, in response to the need for more effective national-, state, and community-level planning and the need to identify areas that face the highest risk and potential for loss. FEMA expanded Hazus into a multi-hazard methodology, Hazus-MH, with new models for estimating potential losses from wind (hurricanes) and flood (riverine and coastal) hazards. Hazus is a GIS-based software tool that applies engineering and scientific risk calculations, which hazard, and information technology experts developed to provide defensible damage and loss estimates. These methodologies are accepted by FEMA and provide a consistent framework for assessing risk across various hazards. The GIS framework also supports the evaluation of hazards and assessment of inventory and loss estimates for these hazards.

Hazus uses GIS technology to produce detailed maps and analytical reports that estimate a community's direct physical damage to building stock, critical facilities, transportation systems, and utility systems. To generate this information, Hazus uses default Hazus-provided data for inventory, vulnerability, and hazards; this default data can be supplemented with local data to provide a more refined analysis. Damage reports can include induced damage (inundation, fire, threats posed by hazardous materials and debris) and direct economic and social losses (casualties, shelter requirements, and economic impact) depending on the hazard and available local data. Hazus' open data architecture can be used to

manage community GIS data in a central location. This software also promotes data output consistency now and, in the future, and standardization of data collection and storage. More information on Hazus is available at http://www.fema.gov/hazus.

In general, modeled losses were estimated in the program using user-defined flood depth grids for the flood analysis and probabilistic analyses were performed to develop expected/estimated distribution of losses (mean return period losses) for hurricane wind hazards. The probabilistic model generates estimated damages and losses for specified return periods (e.g., 100- and 500-year). ***Table 2*** displays the various levels of analyses that can be conducted using the Hazus software.

Table 2. Summary of Hazus Analysis Levels

Hazus Analysis Levels	
Level 1	Hazus-provided hazard and inventory data with minimal outside data collection or mapping.
Level 2	Analysis involves augmenting the Hazus-provided hazard and inventory data with more recent or detailed data for the study region, referred to as “local data”.
Level 3	Analysis involves adjusting the built-in loss estimation models used for the hazard loss analyses. This Level is typically done in conjunction with the use of local data.

Flood

The 1- and 0.2-percent chance flood events were examined to evaluate the Mid-East Region’s risk and vulnerability to the riverine and coastal flood hazard areas. These flood events are generally those considered by planners and evaluated under federal programs such as the NFIP.

The Mid-East Region is composed of multiple counties. As such, the text below outlines the counties within the region and their effective and letter of map revision (LOMR) Region FEMA Digital Flood Insurance Rate Map (DFIRM) dates:

Mid-East Region – Mid-East Commission

- Beaufort County: June 19, 2020
- Bertie County: December 21, 2018
- Hertford County: December 21, 2018
- Martin County: June 19, 2020. LOMR – May 14, 2020
- Pitt County: June 19, 2020. LOMR – October 5, 2018

The effective FEMA DFIRMs were used to evaluate the region’s assets' risk to flood exposure.

To estimate exposure to the 1-percent and 0.2-percent annual chance flood events, researchers overlaid DFIRM flood boundaries on the region’s assets (building stock, critical infrastructure, and population). Building footprints and critical infrastructure that intersected the flood boundaries were totaled to estimate the total number of buildings and infrastructure located in the flood inundation areas, respectively.

To estimate the total population and vulnerable population at risk of the flood hazard, the DFIRM flood boundaries were used to extract the area of each county in the region located in the 1-percent and 0.2-percent annual chance flood events. The population at risk of flood events was calculated by obtaining the percentage of total land area within the flood hazard for each county, multiplied against the county’s total population and vulnerable population types. Additionally, the analysis summarized the total number of persons living in moderate to high socially vulnerable tracts within the region located in the 1-percent

and 0.2-percent annual chance flood events. The percentage of total land area of Census tracts with CDC/ASTR SVI rankings of 0.5001 to 0.75 and more than 0.75001 located in the 1-percent and 0.2-percent annual chance flood events was multiplied against the total population and vulnerable population types within these moderate to high SVI tracts. These results were summarized for each county within the region.

Hurricane

A Hazus probabilistic analysis was performed for the Mid-East Region to estimate debris generated and displacement of persons caused by the 50-year hurricane wind mean return period event. The probabilistic Hazus hurricane model activates a database of thousands of potential storms that have tracks and intensities reflecting the full spectrum of Atlantic hurricanes observed since 1886 and identifies those with tracks associated with the region. Hazus contains data on historic hurricane events and wind speeds. It also includes surface roughness and vegetation (tree coverage) maps for the area. Surface roughness and vegetation data support the modeling of wind force across various types of land surfaces. Default demographic and building inventories in Hazus were used for the analysis. Although damages are estimated at the Census tract level, results were presented at the county and regionwide level.

Sea Level Rise and 2050 1-Percent Annual Chance Flood

Sea-level rise data (in 1-foot increments) available from the NOAA Office of Coastal Management (https://coast.noaa.gov/slrdata/) published in 2017 was considered and used for this analysis to understand the assets within the Mid-East Region that are at risk of impacts from the projected 2050 1-percent annual chance flood event (i.e., sea level rise +1 foot and 1-percent annual chance flood event). Sea level rise data does not include additional storm surge due to a hurricane. Furthermore, the current Flood Insurance Rate Maps (FIRMs) also do not include the effects of sea-level rise.

Asset data (population, building stock, and critical infrastructure) were used to support an evaluation of assets at risk of future impacts from the projected 2050 1-percent annual chance flood hazard area. To determine the assets at risk, the region's assets were overlaid with the hazard area. Building footprints and critical infrastructure that intersected the projected 2050 1-percent annual chance flood hazard area were totaled to estimate the total number of buildings and infrastructure located in the projected flood hazard area.

To estimate the total population and vulnerable population at risk of the projected 2050 1-percent annual chance flood hazard area, the projected flood hazard area was used to extract the area of each county in the region located in the 2050 flood hazard area. The population at risk of the 2050 1-percent annual chance flood was calculated by obtaining the percentage of total land area within the projected flood hazard area for each county, multiplied against the county's total population and vulnerable population types. Additionally, the analysis summarized the total number of persons living in moderate to high socially vulnerable tracts within the region located in the projected 2050 1-percent annual chance flood event. The percentage of total land area of Census tracts with CDC/ASTR SVI rankings of 0.5001 to 0.75 and more than 0.75001 located in the projected 2050 1-percent annual chance flood event was multiplied against the total population and vulnerable population types within these moderate to high SVI tracts. These results were summarized for each county within the region.

Storm Surge

An exposure analysis was conducted using the 2014 Sea-Lake Overland Surge from Hurricanes (SLOSH) Model, which represents potential flooding from worst-case combinations of hurricane direction,

forward speed, landfall point, and high astronomical tide were used to estimate exposure. Please note these inundation zones do not include riverine flooding caused by hurricane surge or inland freshwater flooding. The 2014 model, developed by the NOAA National Hurricane Center to forecast surges that occur from wind and pressure forces of hurricanes, considers only storm surge height and does not consider the effects of waves. The SLOSH spatial data includes boundaries for Category 1 through Category 4 storm surge events.

Asset data (population, building stock, and critical infrastructure) were used to support an evaluation of assets at risk of future impacts from storm surge. To determine the assets at risk, the region's assets were overlaid with each SLOSH Category 1 through 4 storm surge hazard area. Building footprints and critical infrastructure that intersected the SLOSH Category 1 through 4 storm surge hazard areas were totaled to estimate the total number of buildings and infrastructure located in each storm surge hazard area.

To estimate the total population and vulnerable population at risk of storm surge, the SLOSH Category 1 through 4 storm surge hazard areas were used to extract the area of each county in the region located in storm surge hazard areas. The population at risk of storm surge was calculated by obtaining the percentage of total land area within the SLOSH Category 1 through 4 storm surge hazard areas for each county, multiplied against the county's total population and vulnerable population types. Additionally, the analysis summarized the total number of persons living in moderate to high socially vulnerable tracts within the region located in the storm surge hazard areas. The percentage of total land area of Census tracts with CDC/ASTR SVI rankings of 0.5001 to 0.75 and more than 0.75001 located in the SLOSH Category 1 through 4 storm surge hazard areas was multiplied against the total population and vulnerable population types within these moderate to high SVI tracts. These results were summarized for each county within the region.

Urban Heat Islands

A qualitative assessment was conducted for the urban heat island (UHI) hazard. Information from the Trust for Public Land, Descarte Labs, and United States Geological Survey (USGS) was used to assess the potential impacts to the region's assets. The Urban Heat Island Severity for U.S. Cities – 2019 contains the relative heat severity for every city in the United States derived from imagery from the summers of 2018 and 2019. It shows where certain areas of cities are hotter than the average temperature for that same city. Knowing where areas of high heat are located can help plan for mitigation strategies.

Considerations for Mitigation and Next Steps

The following items are to be discussed for considerations for the next plan update to enhance the vulnerability assessment:

- Inventory Data
  - Update risk attributes of building footprints using current tax assessor data.
  - Update critical facilities with local input and locally available data sources.
- Coastal Erosion
  - Collect data on historic costs incurred to reconstruct buildings, cultural resources and/or infrastructure due to coastal erosion impacts.

- Flood
  - Conduct a Hazus loss analysis (e.g., 100-year flood event) using building footprint risk assessment attributes and updated flood data.
- Hurricanes
  - Estimate storm surge related losses using the Hazus flood model if the data is available.
  - Conduct Hazus loss analysis using user-defined facilities and critical facilities in the latest version of Hazus.
- Sea Level Rise and Projected 2050 1-Percent Annual Chance Flood Event
  - Incorporate modeled 2050 1-percent annual chance flood event data that shows modeled extent of future flood hazard area.
- Urban Heat Islands
  - Implement locally produced data for analysis if available.

Data Source Summary

Table 3 summarizes the data sources used for the risk assessment for this plan.

Table 3. Risk Assessment Data Documentation

Data	Source	Date	Format
Population Data	Census Bureau; American Community Survey 5-Year Estimates	2020; 2019	Digital (GIS) Format
Social Vulnerability Index	CDC/ATSDR SVI	2018	Digital (GIS) Format
Building Footprints	NCEM	2020	Digital (GIS) Format
Parcel Boundaries	NC One Map	2021/2022	Digital (GIS) Format
Critical Facilities	NC OneMap; HIFLD	2011/2016/2018/2019; 2020/2021/2022	Digital (GIS) Format
2019 Land Cover	USGS/NLCD	2021	Digital (GIS) Format
Marsh Migration	NOAA	2016	Digital (GIS) Format
Urban Heat Island	The Trust for Public Land	2019	Digital (GIS) Format
Digitized Effective FIRM Maps	NCFRIS; FEMA	2022; 2018/2020	Digital (GIS) Format
Sea Level Rise	NOAA	2017	Digital (GIS) Format
Sea-Lake Overland Surge from Hurricanes (SLOSH) Model	NOAA	2014	Digital (GIS) Format

Limitations

Loss estimates, exposure assessments, and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct such a study

- Incomplete or dated inventory, demographic, or economic parameter data
- The unique nature, geographic extent, and severity of each hazard
- Mitigation measures already employed by the participating municipalities
- The amount of advance notice residents has to prepare for a specific hazard event
- Uncertainty of climate change projections

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, the Mid-East Regionwill collect additional data to collect additional data, update, and refine existing inventories to assist in estimating potential losses.

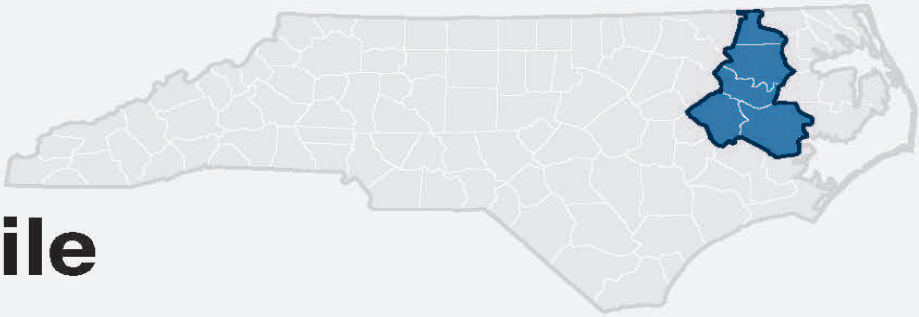
Potential economic loss is based on the present value of the general building stock utilizing best available data. The Mid-East Region acknowledges significant impacts may occur to critical facilities and infrastructure as a result of these hazard events causing great economic loss. However, monetized damage estimates to critical facilities and infrastructure and economic impacts were not quantified and require more detailed loss analyses. In addition, economic impacts to the industry, such as the tourism and real estate markets, were not analyzed.

B. Hazard Summary

The responses from the stakeholder survey served to establish the hazards profiled in the vulnerability assessment and informed the analysis of impacts on the identified sectors. The graphic below summarizes each hazard and its impacts on fundamental characteristics of the community.

This vulnerability assessment serves to profile the hazards identified by the Regional Stakeholder Partnership, provide an analysis of the hazards' impacts on the community, and provide key takeaways for building resilience across the region. Regional collaboration across all levels of government and nongovernmental organizations ensures that the community's concerns are addressed from a comprehensive standpoint, and the risk posed by current and future hazards are appropriately addressed throughout the region.

Mid-East Regional Profile



POPULATION

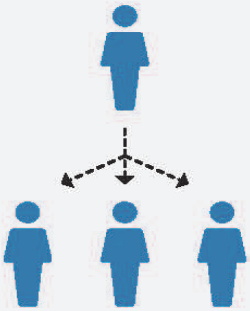
Total Population
276,412

47,866
Number of Persons Under 18

57,105
Number of Persons Over 65

Regional Median Income
$42,985

State Median Income
$56,642



Regional Population Changes

Regional population decreased approximately 3.5% from 2010 - 2020.

Regional population is anticipated to increase 9% in the next 30 years.

HOUSING, CRITICAL INFRASTRUCTURE, AND COMMUNITY SUPPORT SERVICES

83,086
Number of Pre-FIRM houses

21.29%
Percentage of residential structures that are mobile homes

680
Critical Facilities

319
Number of Utilities

5,621
Roadway Miles

231
Rail Miles

ECONOMY

Educational services, and health care and social assistance

- Self employment is the large share of industry at 42%
- Vidant Health is the primary employer in region
- Vidant Medical Center brings an estimated $4 billion impact to NC state product

III. REGIONAL PROFILE

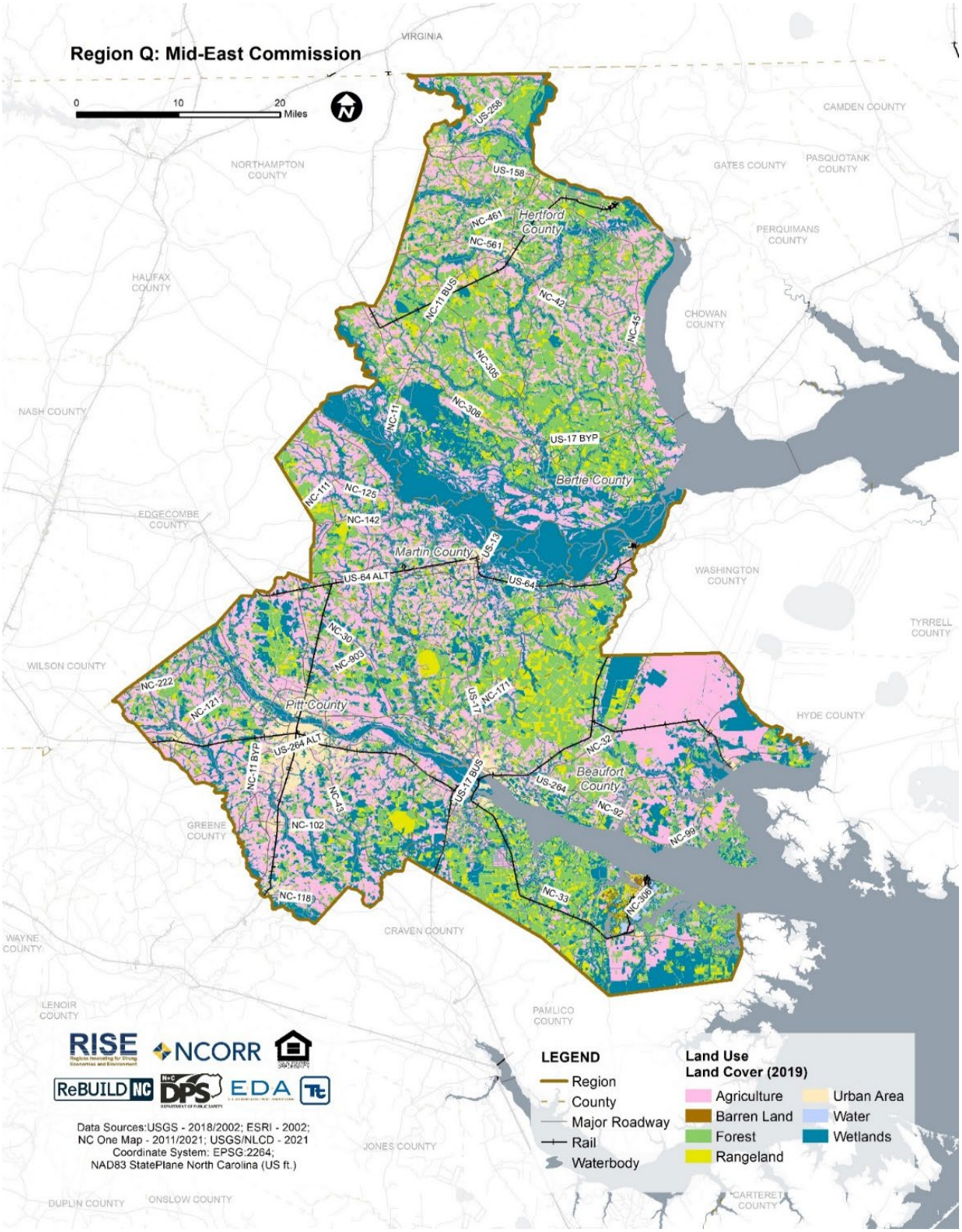
A. Physical Setting

The Mid-East Region is composed of Beaufort, Bertie, Hertford, Martin, and Pitt Counties and is located in the partially inland, northeastern corner of North Carolina. It is a wide, mostly flat, coastal plain lying within the inner coast along the Albemarle and Pamlico Sounds. With 276,412 people, the region is dominated by rural, undeveloped, agricultural land and woodland that is sparsely populated (US Census n.d.). With over 88,000 people, Greenville is the largest city in the Mid-East Region (US Census n.d.); smaller municipalities make up most of the other population centers in the Mid-East Region. The region is punctuated by flat, meandering rivers (Tar-Pamlico, Pungo, Chowan, and Cashie) and the more turbulent waters of the Roanoke (Mid-East Commission 2020). The vast acreage on both sides of these rivers and their many tributary creeks are devoted to floodplains that have been undevelopable due to seasonal high water tables and the year-round presence of excess water (Mid-East Commission 2020). The entire system of sounds, rivers, tributaries, and wetlands constitutes the second-largest estuary ecosystem on the entire East Coast (Mid-East Commission 2020).

The vegetation consists of that found in wet and floodplain areas, with Carolina pines tending to dominate the landscape. Farm crops, which dominate the soil and the natural resource-based economy, include peanuts, tobacco, cotton, grain corn, and soybeans. The region has a mild four-season climate with frequent humid conditions typical of the Southeastern United States. The land is dominated by wetland peat and predominantly sandy and loam-based prime agricultural soils. Pitt County is the only semi-developed county in the region and varies demonstratively from the other four counties (Mid-East Commission 2020). These soil types are highly water absorbent and promote higher water tables, presenting challenges to future development.

See Figure 4 for a breakdown of regional land-use types.

Figure 4. Land Use Land Cover in the Mid-East Region



Population growth has been overall negative for most of the Mid-East Region. Pitt County grew an estimated 31.9 percent between 2000 and 2017 (Neuse River Regional Hazard Mitigation Plan 2020), and Bertie County is the only unincorporated area in the Northeastern North Carolina (NC) Region that experienced a population increase during the same period (Northeastern NC Regional Hazard Mitigation Plan n.d.). By 2050, the region's population is expected to increase, with Pitt County expected to grow by 123.2 percent. Much of this growth will be in the County's municipalities and cities like Greenville and Winterville (Neuse River Regional Hazard Mitigation Plan 2020).

As a primarily rural community, the Mid-East Region has many challenges with ensuring populations are adequately supported in the event of a disaster scenario. Existing infrastructure, namely roads, highways, and water and wastewater services, need upgrades and extensions to ensure essential services can be provided (Mid-East Commission 2020). There are also several types of populations within the region that are more vulnerable to disaster than others. Vulnerable populations tend to have more issues evacuating in the event of a disaster and have a harder time recovering post-disaster. The population over 65 years of age in the Mid-East Region is 47,866 people, 45,642 people in the region have a disability, and 15,901 individuals are below 5 years of age (US Census n.d.). The Mid-East Region also has a high population living in poverty, with 61,433 people (22.2 percent of the population) living at the poverty level in the Mid-East Region. ***Figure 5*** displays the Census tracts in the Mid-East Region with the highest levels of social vulnerability.

Figure 5. Social Vulnerability in the Mid-East Region

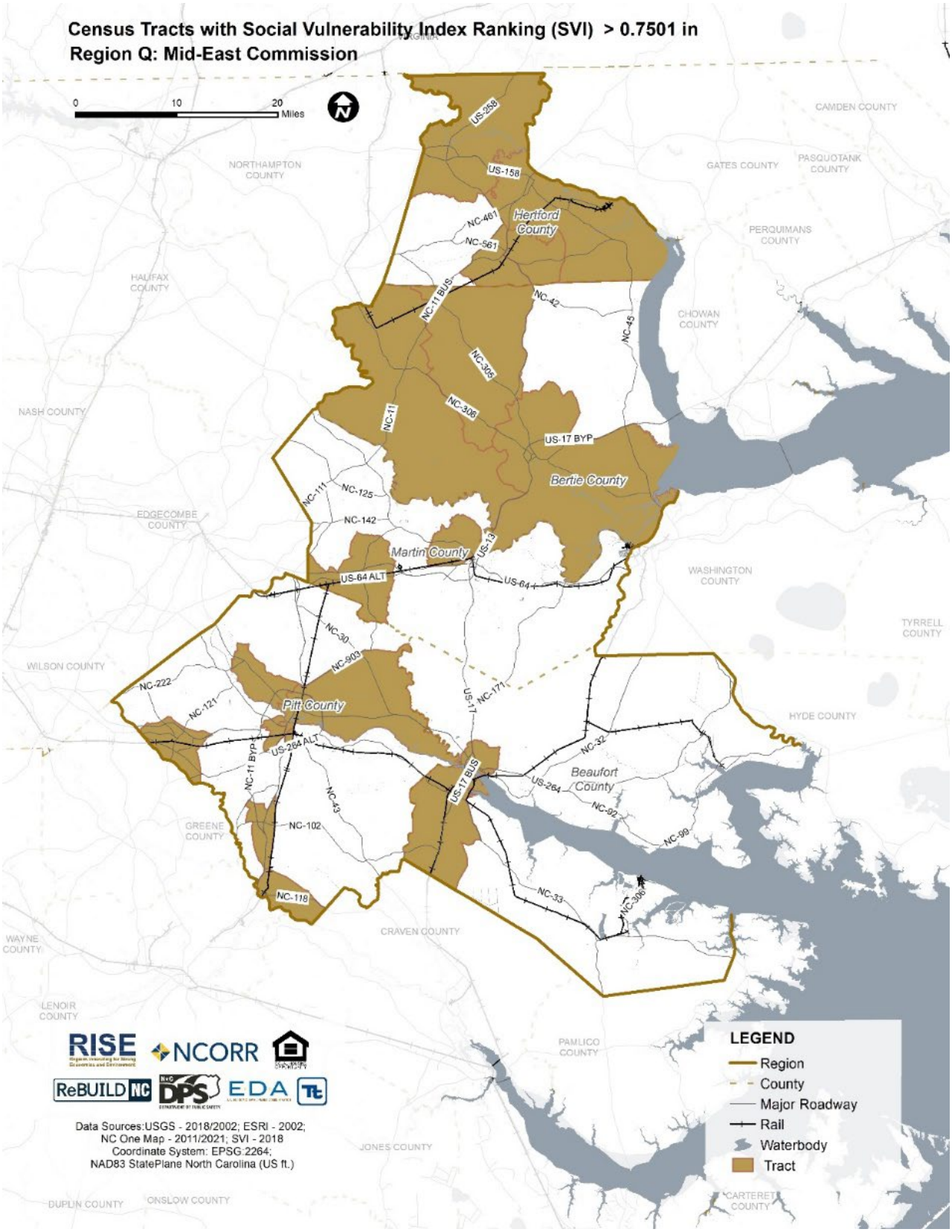
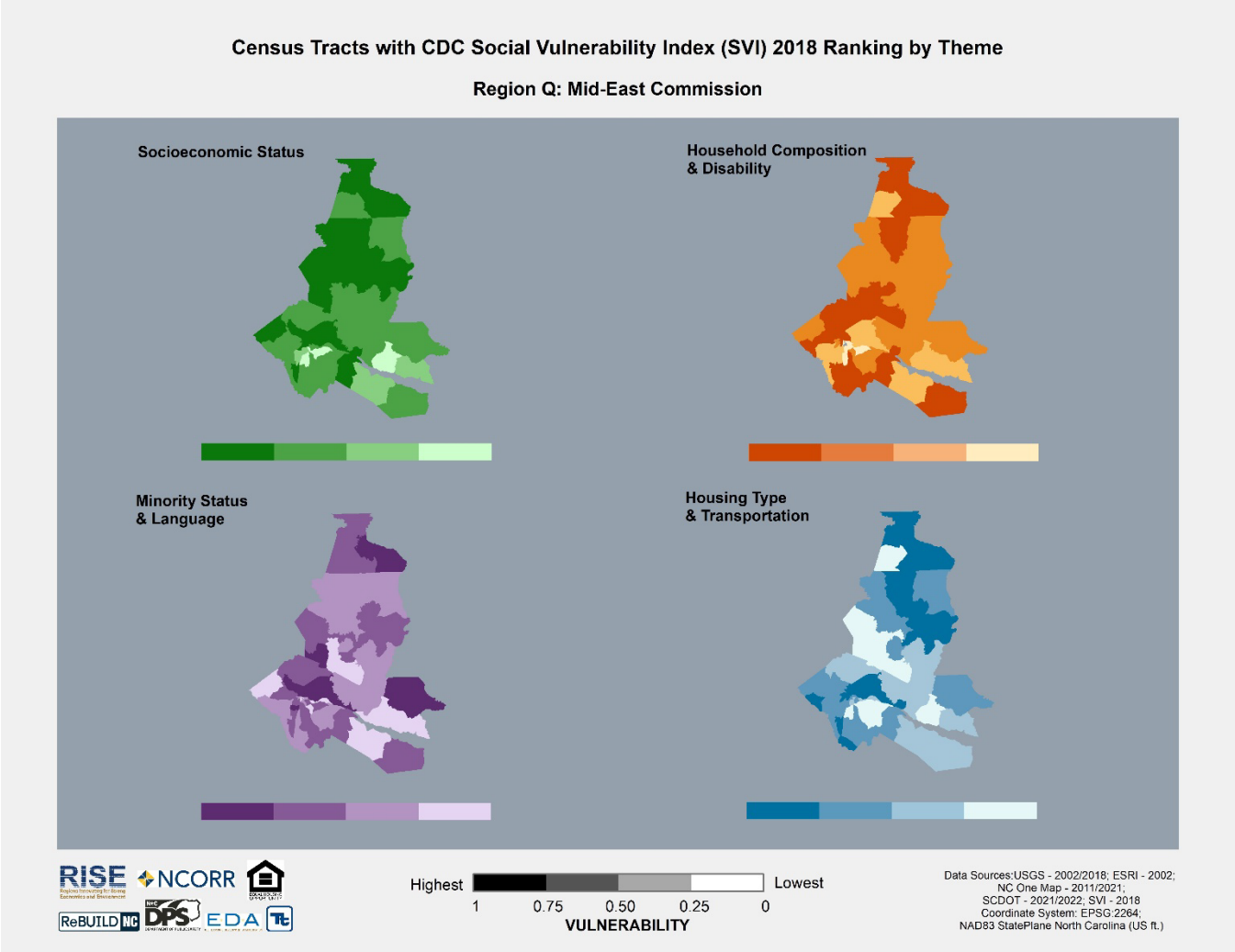


Figure 6. Social Vulnerability in the Mid-East Region illustrates several themes of social vulnerability across the region. Shown below are census tracts and their vulnerability related to socioeconomic status, household composition & disability, minority status & language, and housing type & transportation.

Figure 6. Social Vulnerability in the Mid-East Region

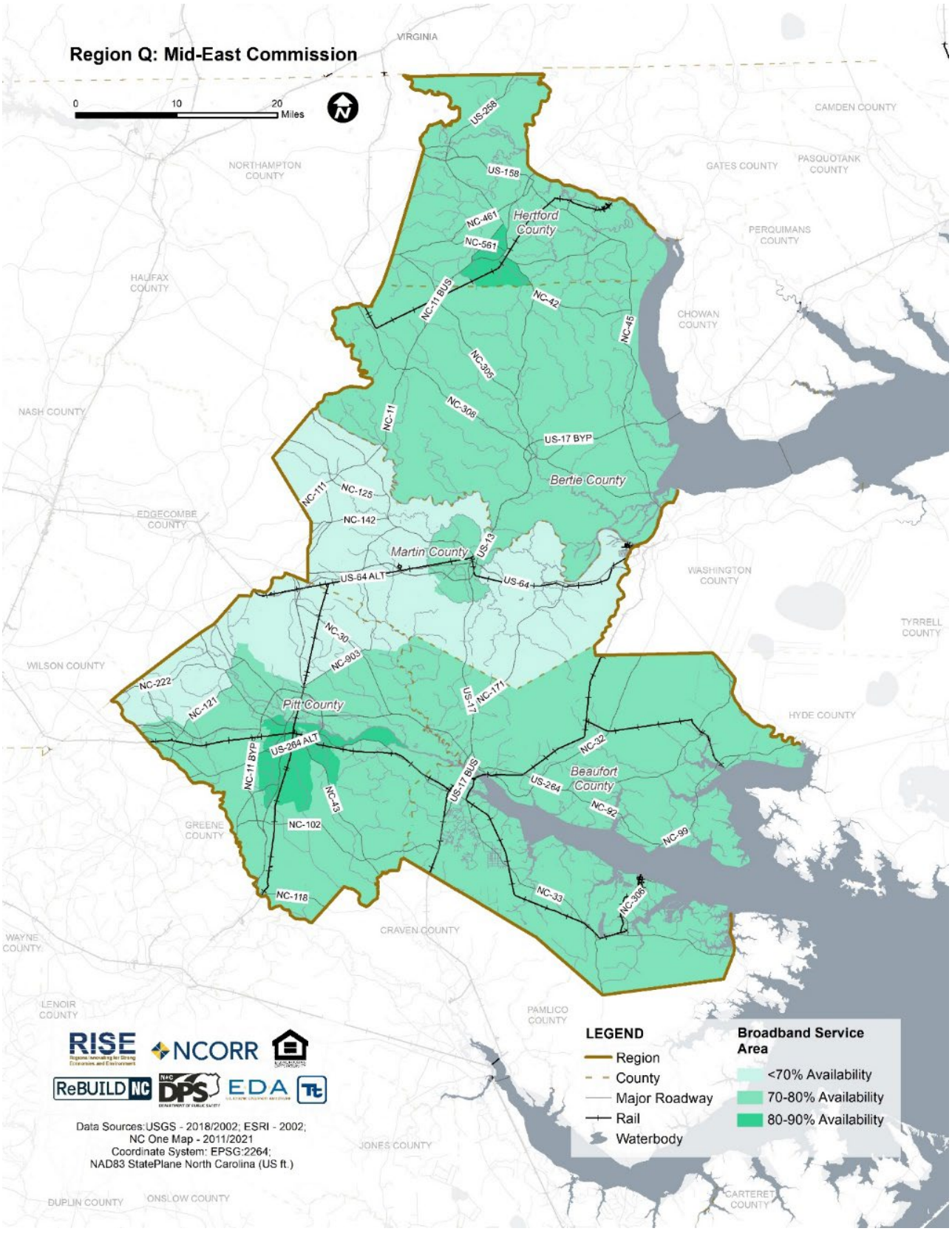


Critical facilities and infrastructure provide services and functions essential to a community, especially during and after a disaster. Critical facilities include essential facilities, transportation systems, utility systems, high-potential loss facilities (such as nuclear power plants, dams, and military installations), and hazardous material facilities. Transportation systems include roadways, bridges, airways, and waterways. Utility systems include potable water, wastewater, oil, natural gas, electric power facilities, and emergency communication systems. A community lifeline, a type of critical facility, enables the continuous operation of government functions and critical business and is essential to human health and safety or economic security. More information on the breakdown of the types of essential facilities in the region can be found in ***Appendix A: Additional Data***. To explore the location of critical facilities within the Mid-East Region, visit Mid East Region - Resilience Portfolio Web Map (arcgis.com).

Eastern Carolina University Health (ECU Health) is a primary employer in the region, with the Vidant Medical Center creating an estimated $4 billion in revenue within North Carolina's state's domestic product (ECU Health n.d.). Agriculture is also prominent within the region, with Perdue Products, Inc. as the largest employer in Bertie County (Mid-East Commission 2020). Agriculture takes up a sizable amount of land in each county, particularly in Beaufort County and Pitt County. The Mid-East Region has an estimated 558,456 acres of agricultural land and an estimated 13,232 buildings devoted to agricultural purposes. The land and structures all represent key pieces in the Mid-East economy.

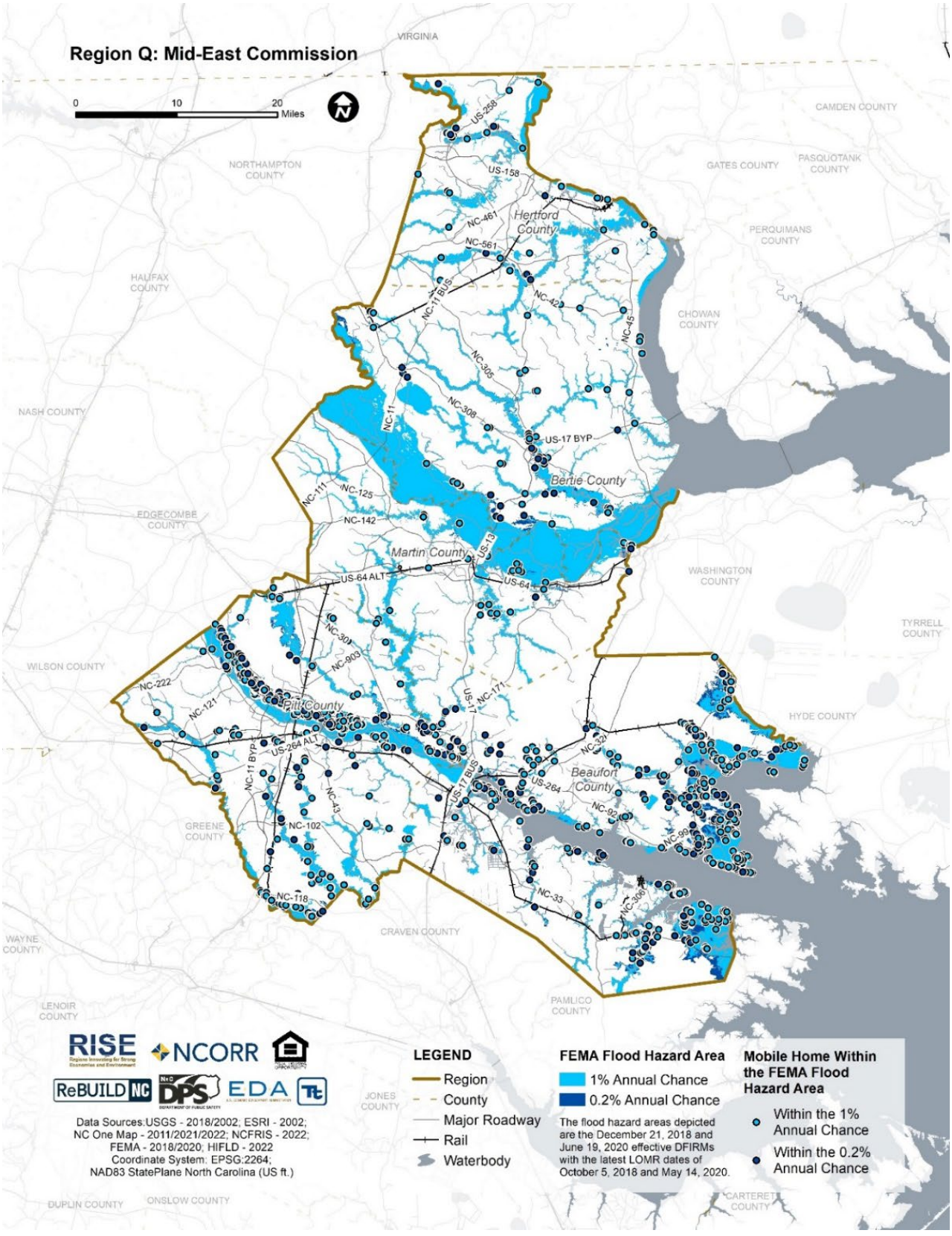
Consistent, reliable access to broadband capabilities is a challenge for many areas in the Mid-East Region. ***Figure 7*** shows the prevalence of broadband access within the region. Consistent broadband access allows for residents to expose themselves to educational and economic opportunities that are only available online, as well as obtain up-to-date information on important current events. Very little of the region has areas with more than 80 percent availability of broadband. Within Pitt County and Martin County specifically, there are several large areas where less than 70 percent of communities have access to consistent broadband service. This poses a challenge in keeping the people within these areas adequately informed about impending disasters and available emergency service.

Figure 7. Access to Broadband in the Mid-East Region



Given the heavily rural makeup of the region, mobile or manufactured homes are prominent within the Mid-East Region. Approximately 100 mobile home parks and over 31,000 mobile home buildings exist within the region (NC OneMap n.d.), providing lower cost living options to those within them. ***Figure 8*** displays the mobile homes within the current Federal Emergency Management Agency (FEMA) Flood Hazard Area. Over 2,800 mobile home buildings are located within the 1 percent annual chance flood hazard area, and over 4,600 mobile home buildings are in the 0.2 percent annual chance flood hazard area. Given their location and building materials, these structures and their residents are all vulnerable to dangerous high flood conditions.

Figure 8. Mobile Homes in the Mid-East Region Located in the FEMA Special Flood Hazard Area



IV. REGION'S STRENGTHS AND CHALLENGES RELATED TO RESILIENCE

The Mid-East Region is impacted by a wide variety of natural and human-caused hazards. For this assessment, the Stakeholder Partnership worked to identify the hazards of regional concern. Each hazard was profiled to determine the following:

- Impact on Social Vulnerability and Equity, Health, and Safety
- Impact on Housing, Critical Infrastructure, and Community Support Systems
- Impact on Economy
- Impact on Natural Environmental Systems
- Impact on Historical and Cultural Resources
- Cascading Impacts on Other Hazards

A. Regional Climate Hazard Overview

Based on a literature review and conversations with stakeholders and the public, the Mid-East Region selected the following hazards to assess. Each hazard impacts the region in specific ways, with changes in climate and development expected to exacerbate specific effects. Below are some key takeaways for each hazard effect.

- Extreme Temperature
  - The Mid-East Region experiences, on average, 13 extreme heat days per year.
  - Extreme heat events will likely increase in frequency and duration due to climate change.
  - Vulnerable populations are especially subject to negative health impacts from extreme temperatures.
- Flood
  - The Mid-East Region has experienced over 100 flood events since 2000 that have caused $11.19 million in property damage and $56.1 million in crop damage.
  - Climate change, precipitation changes, and sea level rise will expose the region to flood events of increased frequency and duration.
  - Vulnerable populations, particularly those who live in mobile homes, are subject to negative effects and damages from flood events.
- Hurricanes and Severe Storms
  - The Mid-East Region has been included in five (5) federal disaster declarations for hurricanes since 2016.
  - The Mid-East Region's coastal regions will likely experience more severe hurricanes and storms in the future.
  - Older buildings and infrastructure (pre-1953) are highly susceptible to damage from hurricane winds because of older materials and a (general) lack of mitigation actions taken to shore up the structures.
- Sea Level Rise

  - The Mid-East Region is experiencing high tide flooding, marsh migration, and lost coastline due to sea level rise. Increased saltwater exposure will corrode physical infrastructure, make agricultural land unfarmable, and destroy coastal structures.
  - As greater development occurs in coastal communities, more people and infrastructure will be vulnerable to the effects of sea level rise.

- Wildfire
  - The Mid-East Region is vulnerable to wildfire events.
  - Regions like the Albemarle-Pamlico Estuary are highly vulnerable to dying as a result of saltwater exposure. As more trees and plants die off due to saltwater exposure from flooding and sea level rise, the risk of wildfire is raised exponentially.

- Drought
  - All Mid-East Region counties have been dealing with drought conditions since 2021. Periods of drought and abnormally dry conditions are occurring more frequently in the Mid-East Region.
  - Loss of surface water and groundwater sources will be devastating for people and the economy, especially the agricultural industry. Local farmers are already altering their planting styles to adjust to drought conditions (Lundy 2022).

- Tornado
  - The Mid-East Region has experienced 76 tornadoes since 2000.
  - Those who work outdoors (i.e., recreation and agricultural employees) are the most vulnerable to the immediate effects of tornadoes due to a lack of shelter to escape the winds.
  - As storm frequency increases, tornadoes are more likely to increase.

B. Significant Non-Climate Stressors

As detailed above in the Regional Profile, the Mid-East Region faces significant challenges from development and population growth as well as the age of much of its regional infrastructure. As temperatures change, storms become more severe, and the shoreline moves further inland, it is imperative that communities address their zoning and development in ways which will work harmoniously with the natural landscape to avoid catastrophic losses from climate-related hazards.

C. Regional Strengths and Advantages in Relation to Climate Resilience

Many communities throughout the region are adept at preparing for and responding to the natural hazards which most regularly impact the region, notably flooding and tropical storms. Nongovernmental organizations have shown excellent emergency response and asset management skills. These skills will provide an advantage to residents, officials, and support agencies across the Mid-East as preparedness today serves as a foundation for individual and community resilience in the future.

D. Known Investment or Planning Efforts Underway

All five Mid-East counties have documented mitigation actions in the several Regional Hazard Mitigation Plans which address the region. Many of these mitigation actions indicate communities' desire to increase resilience to flooding, enhance public outreach and education strategies, and boost responders' capacity for disaster recovery. The Mid-East Commission also recently updated their Comprehensive Economic

Development Strategy, and the Rivers East Workforce Development Board released their strategy, which includes actions based around improving physical infrastructure (Rivers East Workforce Development Board 2020). These documented mitigation actions serve as an ideal way to start building community resilience across the region, which addresses all sectors.

Additionally, all five Mid-East counties are well-positioned to seek funding from federal grant sources such as FEMA's Building Resilient Infrastructure and Communities Program, NOAA's National Coastal Resilience Fund, and EPA's Clean Water State Revolving Fund to accelerate local resilience planning and implementation efforts.

E. Recovery Processes and Challenges

Stakeholders have consistently cited the age and overall quality of regional infrastructure as a challenge that hampers the disaster recovery process. Investments in electrical systems, transportation systems, and stormwater systems will provide improved communications and services access to those in remote areas, save the Mid-East Region money long-term on emergency-related expenses, and bolster the region's capacity to recover from disasters in the face of a changing climate and growing impacts of natural hazards.

F. Key Gaps in Data and Understanding

Additional development data and information regarding areas in the region targeted for growth would contribute to a comprehensive understanding of where the population and hazard exposure may increase throughout the region. This will provide an opportunity to utilize planning and regulatory capabilities to reduce risk, to the greatest extent possible, as the population increases, and more individuals are exposed to hazards. Higher building standards, improved flood damage prevention ordinances, membership in and/or improvement of a municipality's Community Rating System ranking are examples of such capabilities.

Additionally, an increased understanding of the competing priorities of local elected officials would help frame discussions of regional resilience. Investing in regional resilience projects and strategies allow communities to save lives, reduce damage to infrastructure, and reduce overall economic losses all at once. While investments in regional resilience may be seen as a less-pressing concern than investments in education, public safety, and local government services, findings from this report and from engagement with stakeholders and the public throughout this project indicate that prioritizing regional resilience will also provide benefit to the concerns of elected officials in each Mid-East community.

V. DROUGHT

A. Hazard Description

The Mid-East Region has been impacted by drought conditions. Long periods without precipitation can negatively impact communities, property, and the environment. Drought is a normal phase in the climactic cycle of most geographical regions. According to the National Drought Mitigation Center, drought "originates from a deficiency of precipitation over an extended period, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector" (National Drought Mitigation Center 2022). Drought is the result of a significant decrease in water supply relative to what is "normal" in each location.

Drought is a pervasive issue within the Mid-East Region. Due to below normal precipitation the previous winter, Beaufort, Martin, and Pitt counties experienced severe and extreme drought through the summer of 2011. As of July 8, New Bern and Cape Hatteras observed 54% and 76% of normal precipitation, respectively. This resulted in an open burn ban in Eastern North Carolina (NOAA NCEI 2011).

B. Location and Extent

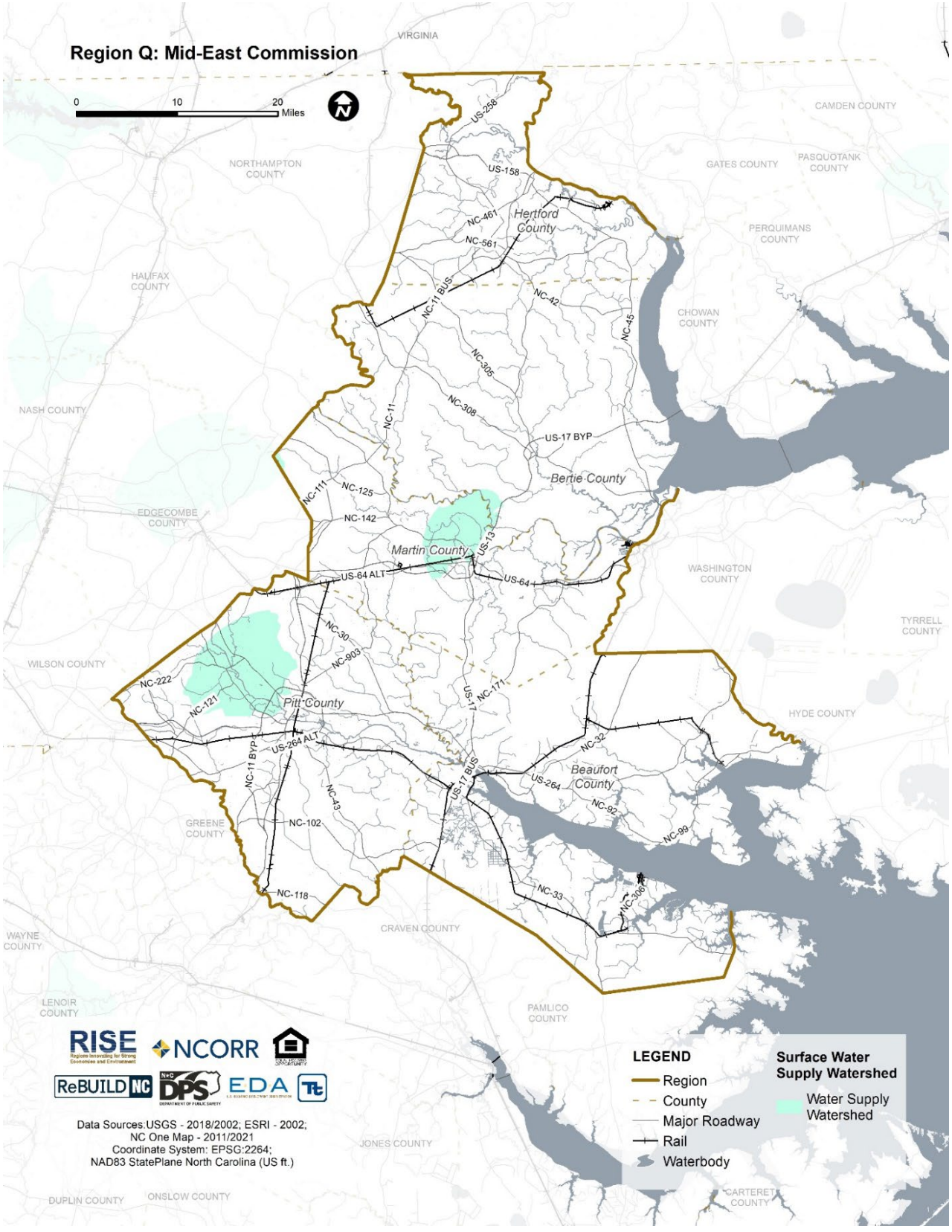
From 1895 to 2018, the Mid-East Region experienced, on average, 1.9 drought months per year (NCICS 2020). In December 2021, Beaufort, Bertie, and Hertford Counties were declared to be experiencing severe drought conditions (Coastal Review 2021). In June and July 2011, Beaufort, Martin, and Pitt Counties all experienced severe and extreme drought conditions (NOAA 2011). The year 2007 was recorded as the driest year in more than 100 years in North Carolina by the National Weather Service and set many records for number of days with temperatures above 90°F (Southeastern NC RHMP 2021).

Droughts can occur anywhere if there is a lack of precipitation resulting from an unusual weather pattern. If the weather pattern lasts a short time (a few weeks or a couple of months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered long-term. The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts (NOAA 2021).

C. Impact on Life, Health, and Safety (including Equity and Vulnerable Populations)

The entire population of the Mid-East Region is exposed to drought. Drought conditions can cause a shortage of potable water for human consumption, both in quantity and quality. A decrease in available water may also impact power generation and availability to residents. See ***Figure 9*** for the Mid-East Region's surface water supply watersheds. Decreases in these water supply watersheds can result in water restrictions down the line, negatively impacting residential and water-intensive industries like agriculture and outdoor recreation.

Figure 9. Surface Water Supply Watersheds in the Mid-East Region



Public health impacts of drought include an increase in heat-related illnesses, diminished air quality, waterborne illnesses, recreational risks, limited food availability, and reduced living conditions. Agricultural workers are most likely to be negatively impacted financially by drought, increasing social vulnerability. Over 6,700 individuals in the Mid-East Region work in agriculture (US Census n.d.), exposing them to dangerous heat and air quality conditions. Vulnerable populations could be particularly susceptible to the drought hazard and cascading impacts due to age, health conditions, and limited ability to mobilize to shelter, cooling, and medical resources.

D. Impact on Buildings and Critical Infrastructure

While associated drought events do not cause impacts on buildings or critical infrastructure, limited water supply can put stress on critical services such as drinking water, urgent health care access, fire suppression, and public safety.

E. Impact on Economy

Prolonged droughts impose serious economic consequences on a community. One impact of drought is its impact on water supply. Local farmers like Steve Sutton, owner of Homeplace Strawberries, have recently had to change their planting techniques to deal with drought. “The old saying is ‘playing in the dust and the bins will bust.’ It’s a little dry, but we’re all ‘no-till’ and we’re still finding moisture and the areas that we’re planting at,” Sutton commented. (Lundy 2022). In exceptional drought conditions, watering lawns and crops may not be an option. If crops are not able to receive water, soil will dry out, and crops will die. This can lead to crop shortages, which, in turn, increases the price of food (NCSU 2013). Increased demand for water and electricity can also result in shortages and higher costs for these resources. Industries that rely on water for business could be impacted the most (e.g., agriculture, landscaping businesses). Drought-induced algal blooms in drinking water sources can also dramatically increase treatment costs, impacting the cost and availability of potable water to multiple residences and industries.

Direct impacts of drought include reduced crop yield, increased fire hazard, reduced water levels, and damage to wildlife and fish habitat. When a drought occurs, the agricultural industry is most at risk in terms of economic impact and damage. For example, crops may not mature, leading to a lessened crop yield, wildlife and livestock may become undernourished, land values could decrease, and ultimately, there could be a financial loss for the farmer (IPCC n.d.). The Mid-East Region has an estimated 558,456 acres of agricultural land, which puts the region at great economic risk in the event of a drought.

F. Impact on the Environment

Beaufort County contains part of the Albemarle-Pamlico Estuary, one of the nation’s most vulnerable areas to climate change impacts. Droughts can impact the environment because these events can trigger wildfires, increase insect infestations, and exacerbate the spread of disease (IPCC n.d.). Droughts will also impact water resources that are relied upon by aquatic and terrestrial species. Ecologically sensitive areas, such as wetlands, can be particularly vulnerable to drought periods because they are dependent on steady water levels and soil moisture availability to sustain growth. As a result, these types of habitats can be negatively impacted after long periods of dryness.

Droughts could also lead to water pollution due to the lack of rainwater to dilute any chemicals in water sources. Contaminated water supplies may be harmful to plants and animals. If water is not getting into

the soils, the ground will dry up and become unstable. Unstable soils increase the risk of erosion and loss of topsoil (NCSU 2013).

G. Cascading Impacts on Other Hazards

Drought can exacerbate other hazards. Direct and indirect impacts include the following:

- Long-term damage to crop quality and crop losses
- Insect infestation leading to crop and tree losses
- Plant diseases leading to loss of agricultural crops and trees
- Reduction in outdoor activities, resulting in loss of tourism or recreation revenues
- Increased risk of brush fires and wildfires due to dried crops, grasses, and dying trees

H. Future Changes That May Impact Vulnerability

Climate Change Impacts

Climate change will likely increase the frequency and severity of droughts in the region. The NC Climate Science Report predicts future droughts in the Mid-East will be warmer than historical events (NCICS 2020). Warmer temperatures will lead to more rapid drying of soil, gravely impacting local agriculture and natural resources (NCICS 2020). Droughts cause deficits in surface and groundwater used for drinking water, agriculture, recreation, and other uses. As droughts persist, specific communities and/or industries may be forced to prioritize which areas receive increased water supplies compared to others. Additionally, if the region experiences an increased draw on freshwater aquifers due to drought conditions and limited supply of surface water, saltwater infusion may become exacerbated, further contaminating groundwater supplies. Warmer temperatures may lead to longer dry seasons and multi-year droughts (James M. Vose 2012).

I. Additional Data Needs

- Drought's impact on agriculture is assessed based on drought having impacts on all sectors of the agriculture industry in the region. Better understanding of the ability of current and future agricultural practices to withstand drought conditions is needed to determine vulnerability more accurately.
- Analysis of anticipated watershed levels would allow for better understanding of future water needs in the region and where drought impacts are likely to be felt strongest (agriculture, landscaping, etc.).

VI. EXTREME TEMPERATURE

A. Hazard Description

Recognizing the prevalence of extreme heat situations and the relative lack of extreme cold events in the Mid-East Region, this chapter addresses extreme temperatures but focuses predominately on the impacts of extreme heat. The Mid-East Region regularly experiences days of extreme heat. Extreme heat events can have a significant impact on human health, commercial/agricultural businesses, and primary and secondary effects on infrastructure (e.g., burst pipes and power failure). What constitutes extreme cold or extreme heat can vary across different areas of the country based upon what the population is accustomed to. The potential issues identified with extreme temperature events include:

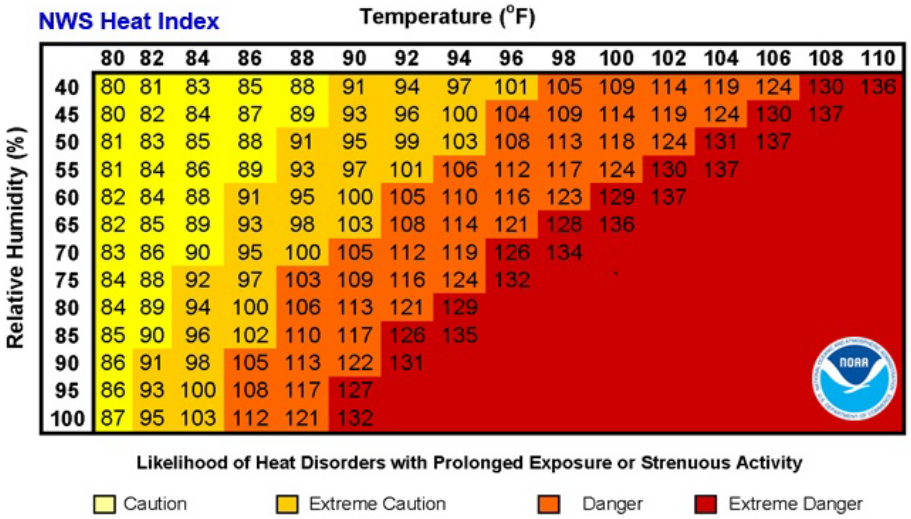
The Mid-East Region has a long history of extreme temperature events. There have been four extreme heat events in the region since 2000. The most recent in 2019 was a prolonged heat wave brought heat index values of 105 to 115 degree for much of Eastern North Carolina during the middle part of July. July 13 was particularly hot and humid with some area heat indices reaching 110 to 115 degrees (NOAA NCEI n.d.).

- Prolonged extreme heat events can lead to drought conditions and impact the drinking water supply for residents.
- The region's aging population may increase residents' vulnerability to extreme temperature events because the senior population is less able to withstand extreme temperatures due to age and health conditions.
- Extreme temperature events can damage aging infrastructure and buildings. Highways and roads are damaged by excessive heat as the asphalt softens. Roadways can be damaged by extreme cold temperatures causing frost heaving of road infrastructure.
- Homeless individuals experience an acute vulnerability to extreme temperatures owing to the lack of shelter and exposure to the elements.

Extreme Heat

The Mid-East Region averages about 13 very hot days per year (NCICS 2020). Since 1970, there has been an upward trend in the number of very warm nights (minimum temperature of 75°F or higher) (NCICS 2020). Extreme heat is defined as summertime temperatures that are much hotter and/or humid than average (CDC 2017). The extent of extreme heat temperatures is measured through the Heat Index, created by the National Weather Service (NWS) to accurately measure apparent temperature of the air as it increases with the relative humidity. Temperature and relative humidity are needed to determine the Heat Index (NCSU Climate Office 2022) as illustrated in Figure 10. Heat Index Chart below.

Figure 10. Heat Index Chart



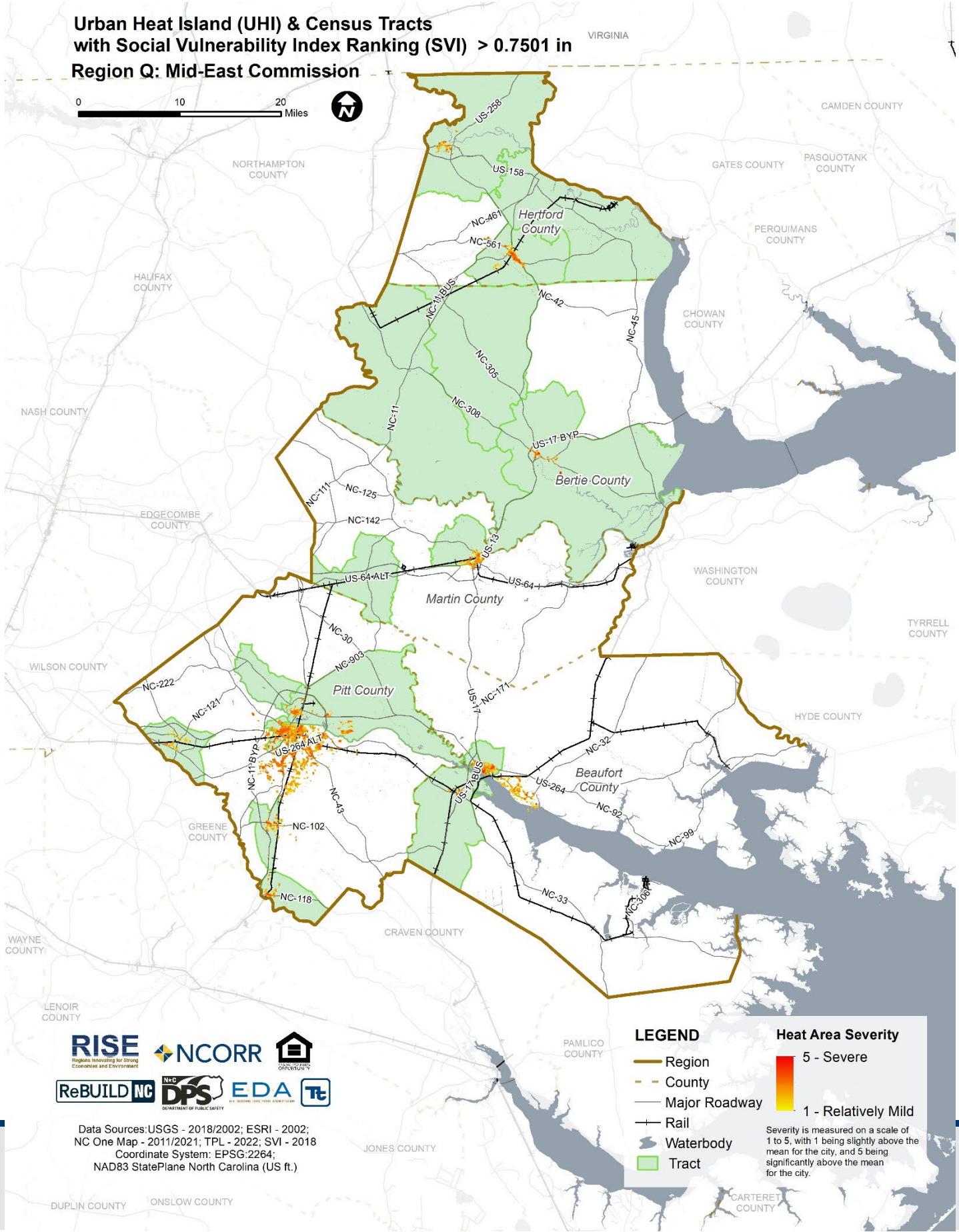
(NWS n.d.)

B. Location and Extent

Extreme heat has impacted the Mid-East Region on multiple occasions and is likely to occur in the future. In July 2019, Beaufort County experienced a heat wave that had heat index values up to 107°F (NCDC n.d.). In July 2011, both Bertie and Hertford Counties experienced extended periods of excessive heat and humidity, with heat index values ranging from 110°F to 119°F (NCDC n.d.). Excessive heat incidents are widespread, even if there are localized cooler areas. Extreme heat temperatures occur throughout the region for most of the summer season, except for areas with high altitudes. High-pressure systems can move off the Atlantic coast and become stagnant for several days.

Areas of dense urban development are especially vulnerable to the urban heat island effect that can further raise temperatures. Urban heat islands occur when cities replace the natural land cover with impervious surfaces (buildings, pavement, etc.) that absorb and retain heat. This effect increases energy costs, air pollution levels, and heat-related mortality and illness (EPA 2022). Figure 11 below shows areas of the Mid-East Region particularly susceptible to the effects of urban heat islands.

Figure 11. Urban Heat Island and Socially Vulnerable Census Tracts



To explore the Mid-East Region's specific exposure to extreme temperature, visit Mid East Region - Resilience Portfolio Web Map (arcgis.com).

C. Impact on Social Vulnerability and Equity, Health, and Safety

The entire population of the Mid-East Region is exposed to extreme heat events. The population over 65 years of age in the Mid-East Region is 47,866 people, there are 45,642 individuals in the region who have a disability, and 15,901 who are below 5 years of age (US Census n.d.). The Mid-East Region also has a high population living in poverty. Over 61,000 people live at the poverty level in the Mid-East Region, and over 3,000 people commute to work either by using public transportation or walking (US Census 2020). Individuals who work outdoors or who regularly wait on transportation are also vulnerable.

According to the Centers for Disease Control and Prevention (CDC), populations most at risk during extreme heat events include:

- The elderly
- Infants and children up to 4 years of age
- Individuals with chronic medical conditions (e.g., heart disease, high blood pressure)
- Low-income persons who cannot afford proper heating and cooling
- The general public who may overexert during work or exercise during extreme heat events or experience hypothermia during extreme cold events (CDC 2017)

D. Impact on Housing, Critical Infrastructure, and Community Support Systems

There are 175,593 buildings in the Mid-East Region, and all are exposed to extreme heat hazards. Extreme heat generally does not impact buildings; however, elevated summer temperatures increase the energy demand for cooling. Losses can be associated with overheating heating, ventilation, and air conditioning (HVAC) systems. Extreme cold temperature events can cause damage through freezing/bursting pipes and freeze/thaw cycles as well as increased vulnerability to home fires. Additionally, manufactured homes (mobile homes) and antiquated or poorly constructed facilities can have inadequate capabilities to withstand extreme temperatures.

The 1,597 critical facilities in the Mid-East Region are all exposed to extreme temperature hazards. It is essential that these facilities remain operational during natural hazard events. Extreme heat events can sometimes cause short periods of utility failures, commonly referred to as brownouts, due to increased usage of air conditioners and other energy-intensive appliances. Similarly, heavy snowfall and ice storms, associated with extreme cold temperature events, can cause power interruption. Backup power is recommended for critical facilities and infrastructure.

Transportation infrastructure may experience damage from extreme temperature events, particularly with ground transportation systems at risk of cracking, buckling, or sagging due to high temperatures. This can cause disruptions to essential services that travel along these routes to provide services to the community. The Mid-East Region has a total of 86 transportation facilities, 5,621 miles of roadway, and 231 miles of rail that could potentially be exposed to this hazard. For more details on infrastructure vulnerability, see Tables 17 and 18 in ***Appendix A: Additional Data***.

E. Impact on the Economy

Extreme temperature events also impact the economy, including loss of business function and damage to and/or loss of business inventory. Business owners can be faced with increased financial burdens due to unexpected repairs caused to the building (e.g., pipes bursting), higher than normal utility bills, or business interruption due to power failure (i.e., loss of electricity or telecommunications). Disruptions in transportation infrastructure will also impact the economy for both commuters and customers alike.

Extreme heat can also damage crops, especially when combined with the impacts of drought. A changing climate is likely to change the growing season and could potentially change the types of appropriate crops as temperatures rise. From 1990 to 2006, North Carolina's plant hardiness zone shifted from a majority zone 7 statewide to a majority zone 8 statewide (North Carolina Department of Health and Human Services 2015).

F. Impact on Natural Environmental Systems

The Neuse River has experienced greater numbers of algal blooms and fish kills during the last few summers (Seagle 2022). Warming weather patterns create changes in natural processes. An excess amount of precipitation and earlier warming periods may affect natural processes such as flow within water resources (USGS 2019). Likewise, rain-on-snow events also exacerbate runoff rates with warming winter weather. Extreme heat events can have particularly negative impacts on aquatic systems, contributing to fish kills, aquatic plant die-offs, and increased likelihood of harmful algal blooms.

G. Cascading Impacts on Other Hazards

Extreme temperature events can exacerbate the drought hazard, increase the potential risk of wildfires, and escalate severe storm and severe winter weather events for the region. For example, extreme heat events may accelerate evaporation rates, drying out the air and soils. Extreme heat can also dry out terrestrial species, making them more susceptible to catching fire. Extreme variation in temperatures could create ideal atmospheric conditions for severe storms or worsen the outcome of severe winter weather during freezing and thawing periods.

Extreme heat, exacerbated by drought, can increase the withdrawal of fresh water and increase the likelihood of saltwater intrusion in coastal aquifers. Saltwater intrusion is a natural process, but it becomes an environmental problem when excessive pumping of freshwater from an aquifer changes the water pressure and intensifies the effect, drawing saltwater into new areas. When freshwater levels drop, the intrusion can proceed further inland until reaching a pumped well.

H. Future Changes That May Impact Regional Vulnerability to Extreme Temperature

Projected Development

Increasing development will create more impervious surfaces, exacerbating the heat island effect in Mid-East communities. Heat will be absorbed by roads and dark-surfaced infrastructure, trapping more heat closer to the ground, resulting in more people dealing with the impacts of higher temperatures. More development will also require greater power needs, straining systems in the event of extreme temperatures.

Projected Changes in Population

An increase in the population throughout the region will increase exposure to extreme temperature events. Increases in population may create greater strain on water resources in those communities throughout the Mid-East Region.

Climate Change Impacts

A gradual change in temperatures will alter the growing environment of many tree species throughout the Mid-East Region, reducing the growth of some trees and increasing the growth of others. Tree growth and regeneration may be affected more by extreme weather events and climatic conditions than by gradual changes in temperature or precipitation (James M. Vose 2012).

I. Additional Data Needs

Key gaps in data and understanding that were identified during review of available scientific information and public and stakeholder meetings included:

- Urban heat island impacts have been noted on smaller scales in more rural or suburban areas. Identification of localized urban heat island locations that are not located in urban areas would allow for better assessment of this phenomenon.
- Mapping of areas of anticipated future development would allow for better understanding of changes in exposure to extreme temperature.
- Understanding of the likely density of future development and the increase in hard surfaces and decrease in vegetation may help to identify potential sources of urban heat island effect.

VII. FLOOD

A. Hazard Description

Floods are one of the most common natural hazards in the Mid-East Region. The definitions for each type of flood risk for the Mid-East Region include:

- Riverine Flooding
  - Most common type of flood
  - Occurs along a channel and includes overbank and flash flooding
- Flash Flooding
  - Caused by heavy or excessive rainfall in a short period of time
  - Characterized by raging torrents after heavy rains that rip through riverbeds or urban streets
- Stormwater/Urban Flooding
  - Generally due to local drainage issues and high groundwater levels
  - Urban flooding is increasing due to the growing number of extreme precipitation events (University of Maryland 2018)
  - Urban flooding is not mapped by FEMA
- Coastal Flooding
  - Occurs along the coasts of oceans, bays, estuaries, coastal rivers, and large lakes
  - May cause beach erosion; loss or submergence of wetlands and other coastal ecosystems; saltwater intrusion; high water tables; loss of coastal recreation areas, beaches, protective sand dunes, parks, and open space; and loss of coastal structures (FEMA 2011)
- Storm Surge
  - Abnormal rise in seawater level during a storm, measured as the height of the water above the normal predicted astronomical tide (NOAA 2022)
  - Primarily caused by winds pushing water ashore

In addition, coastal erosion is considered a cascading hazard in coastal areas.

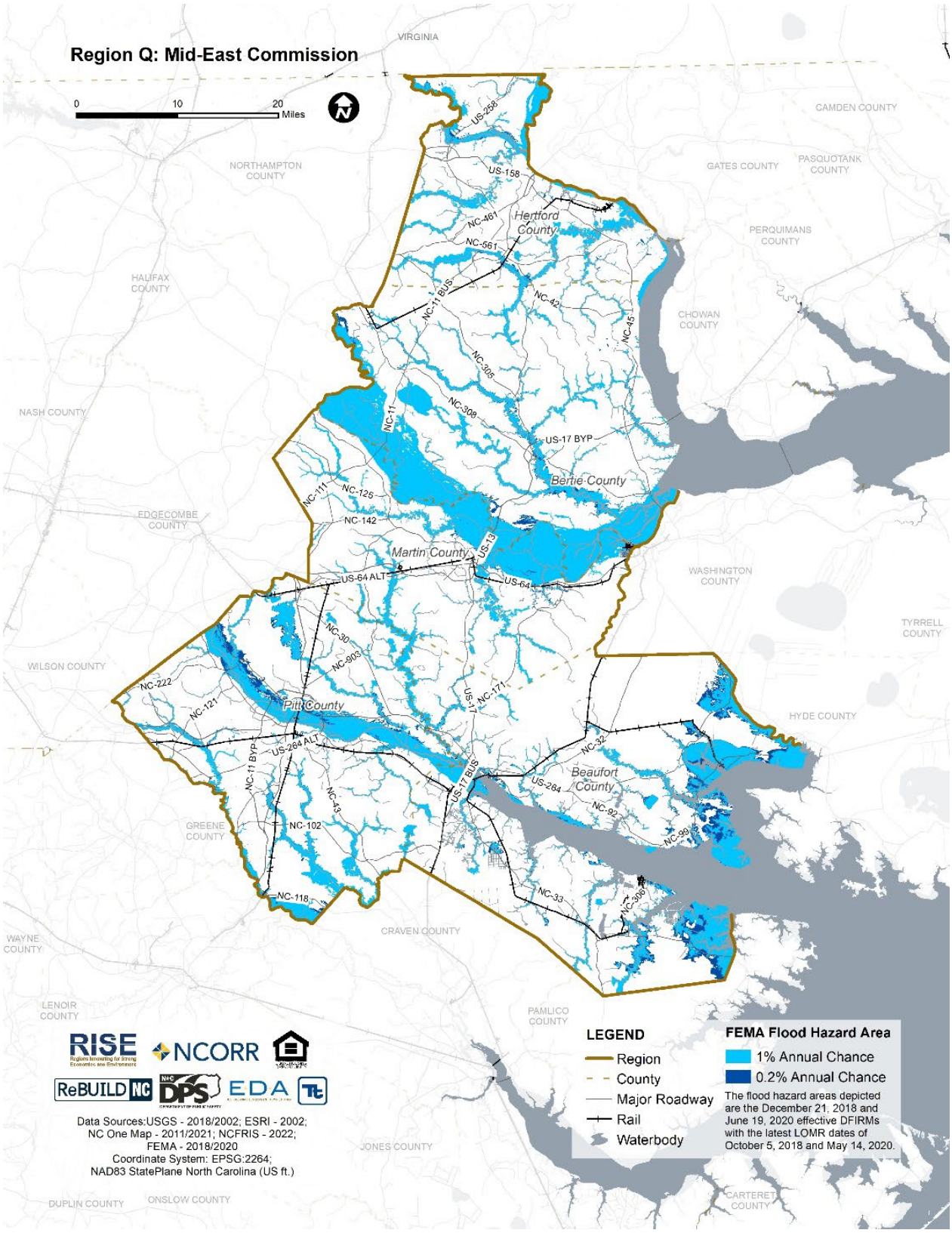
B. Location and Extent

Much of the terrain in Mid-East Region is within or near a floodplain. Over 70 percent of Beaufort County is undeveloped as a result, and nearly 80 percent of soils in Bertie County have limitations for septic tanks due to, among other things, “seasonably high-water tables, or permeability problems” (Mid-East Commission 2020). A floodplain is land which has been or may be covered by floodwater during a storm event. The State of North Carolina regulates the floodplain to protect people and property, ensure federal flood insurance and disaster assistance are available, save tax dollars, and reduce future flood losses to North Carolina communities (NCDPS 2017). The FEMA-designated floodplain includes both the floodway and flood fringe areas. The land does not need to be designated by FEMA to function as a floodplain.

Floodplain mapping is based on regional snapshots of riverine and coastal flooding conditions. Special Flood Hazard Areas (SFHAs) have special flood, mudflow, or flood-related erosion hazards and are shown on FEMA flood maps (FEMA n.d.). Future flooding conditions (from factors such as sea level rise, changes in rainfall) and urban/stormwater flooding conditions are not included in FEMA’s development of floodplain mapping. As such, floodplain maps are more likely to underestimate flooding risk in many areas in the region, potentially resulting in the public also underestimating risk, limitations in building requirements (as many are tied to floodplain zone), flood insurance requirements (as requirements are

tied to the SFHA), and available mitigation funding (as many federal flood mitigation funding sources are restricted to locations within the SFHA) (Carolina Public Press 2022). ***Figure 11*** shows the FEMA flood hazard areas within the Mid-East Region.

Figure 11. Floodplains in the Mid-East Region

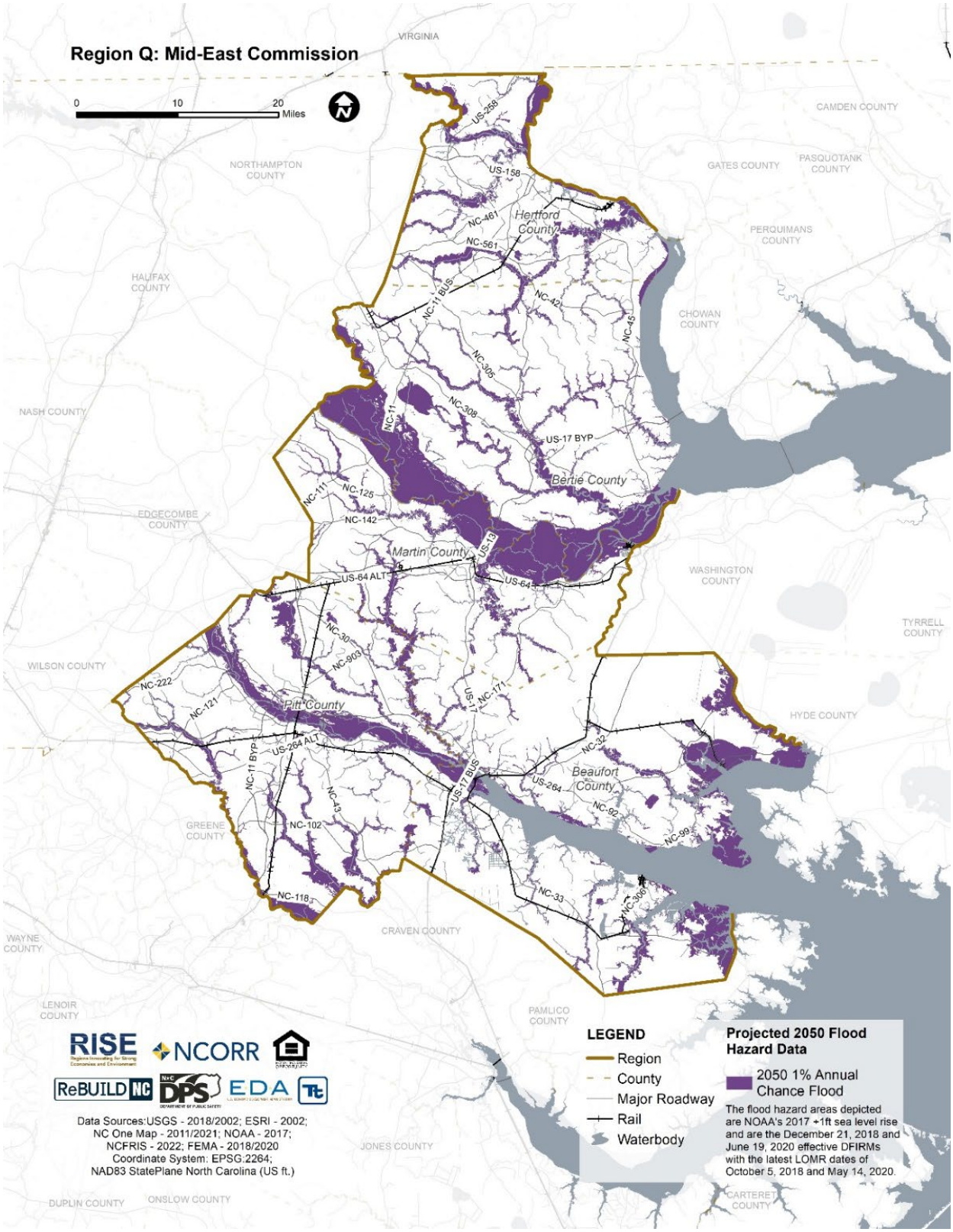


Sea Level Rise

The Mid-East Region is predicted to experience greater sea level rise and precipitation, leading to increased coastal flooding (NCICS 2020). This means that coastal floods are likely to reach a higher elevation and push farther inland. As a result, the mapped Special Flood Hazard Area (SFHA) will likely expand. ***Figure 12*** displays the potential expansion of the SFHA with one foot of sea level rise, a threshold likely to be reached by 2050. See Section VIII – Sea Level Rise for further information on sea level rise vulnerability.

To explore the Mid-East Region's specific exposure to flooding, visit Mid East Region - Resilience Portfolio Web Map (arcgis.com).

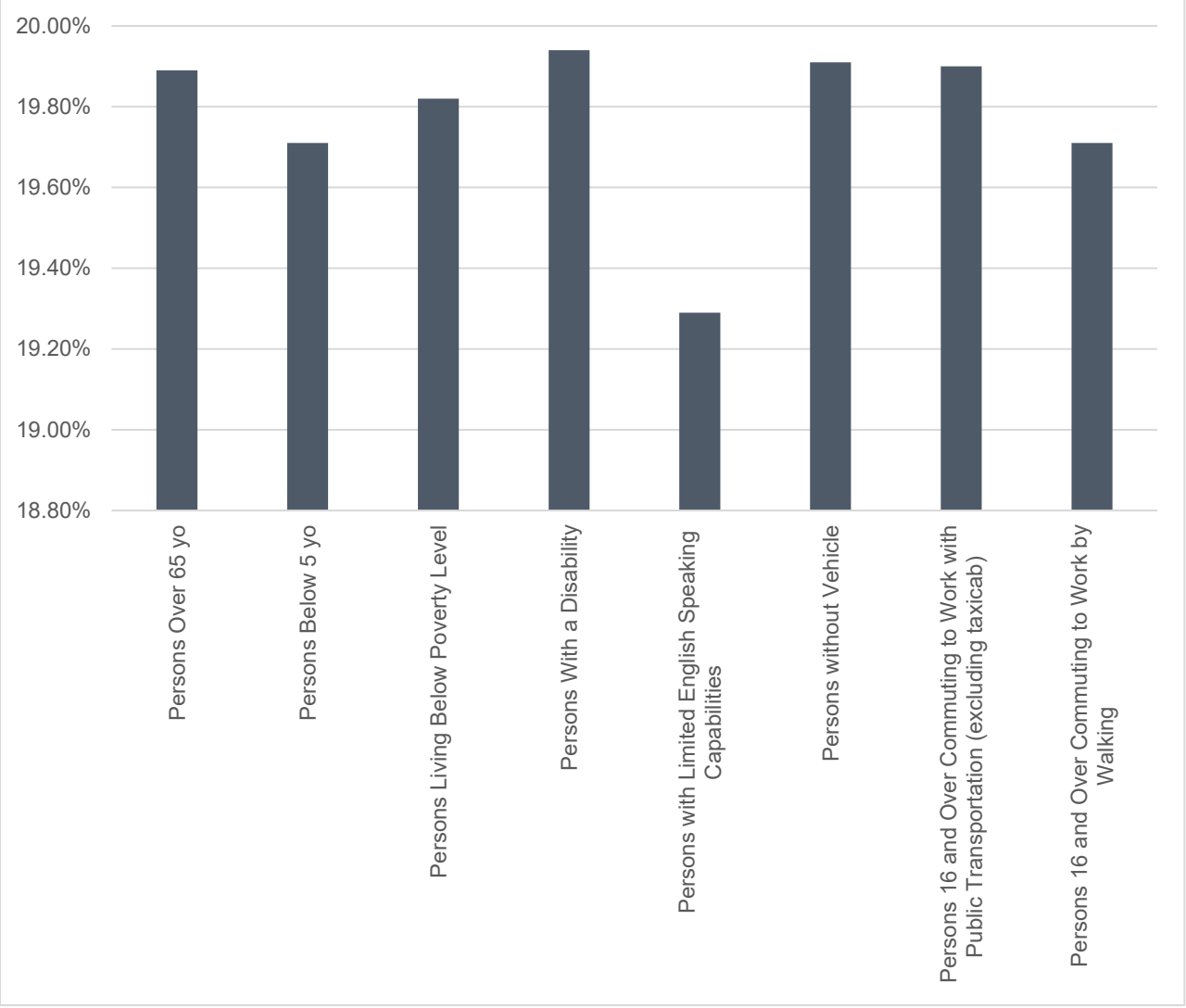
Figure 12. Projected Expanded SFHA in 2050 (1 foot of sea level rise) in the Mid-East Region



C. Impact on Social Vulnerability and Equity, Health, and Safety

The Mid-East Region has high percentages of vulnerable populations exposed to flood-prone areas. As shown in ***Figure 13***, nearly one-fifth of the population within these areas is elderly, disabled, or without a vehicle. Each of these groups faces real hurdles in trying to escape from or recover from exposure to flooding. Exposure represents the population living in or near floodplain areas that could be impacted should a flood event occur. Additionally, exposure should not be limited to only those who reside in a defined hazard zone but to everyone who may be affected by the effects of a hazard event (e.g., people are at risk while traveling in flooded areas or compromised access to emergency services during an event). The degree of that impact will vary and is not strictly measurable.

Figure 13. Percentage of Vulnerable Population Located in the 1-Percent Annual Chance Flood Hazard Area by Type



Riverine and Coastal Flooding

The Digital Flood Insurance Rate Map (DFIRM) flood boundaries were used to estimate population exposure to the 1 percent (or 100-year) and 0.2 percent (or 500-year) annual chance flood events. Based on the spatial analysis, there are an estimated 54,665 residents living in the 1 percent annual chance floodplain, or 19.8 percent of the total population of the Mid-East Region. There are an estimated 60,824 residents living in the 0.2 percent annual chance floodplain, or 22 percent of the region's total population. For a detailed assessment of the regional population, including vulnerable populations, living in the floodplain, please see Tables 23 - 28 in ***Appendix A: Additional Data.***

Research has shown that some populations may experience exacerbated impacts and prolonged recovery if/when impacted. This is due to many factors, including their physical and financial ability to react or respond during a hazard. Of the population exposed, the most vulnerable include economically disadvantaged individuals and individuals over the age of 65. Other socially vulnerable populations include persons below 5 years, persons with a disability, persons with limited ability to speak English, and persons without a vehicle. Special consideration should be given to these vulnerable groups when planning for disaster preparation, response, and recovery. For a detailed assessment of vulnerable populations living in the floodplain, please see Tables 23 - 28 in ***Appendix A: Additional Data***.

D. Impact on Housing, Critical Infrastructure, and Community Support Systems

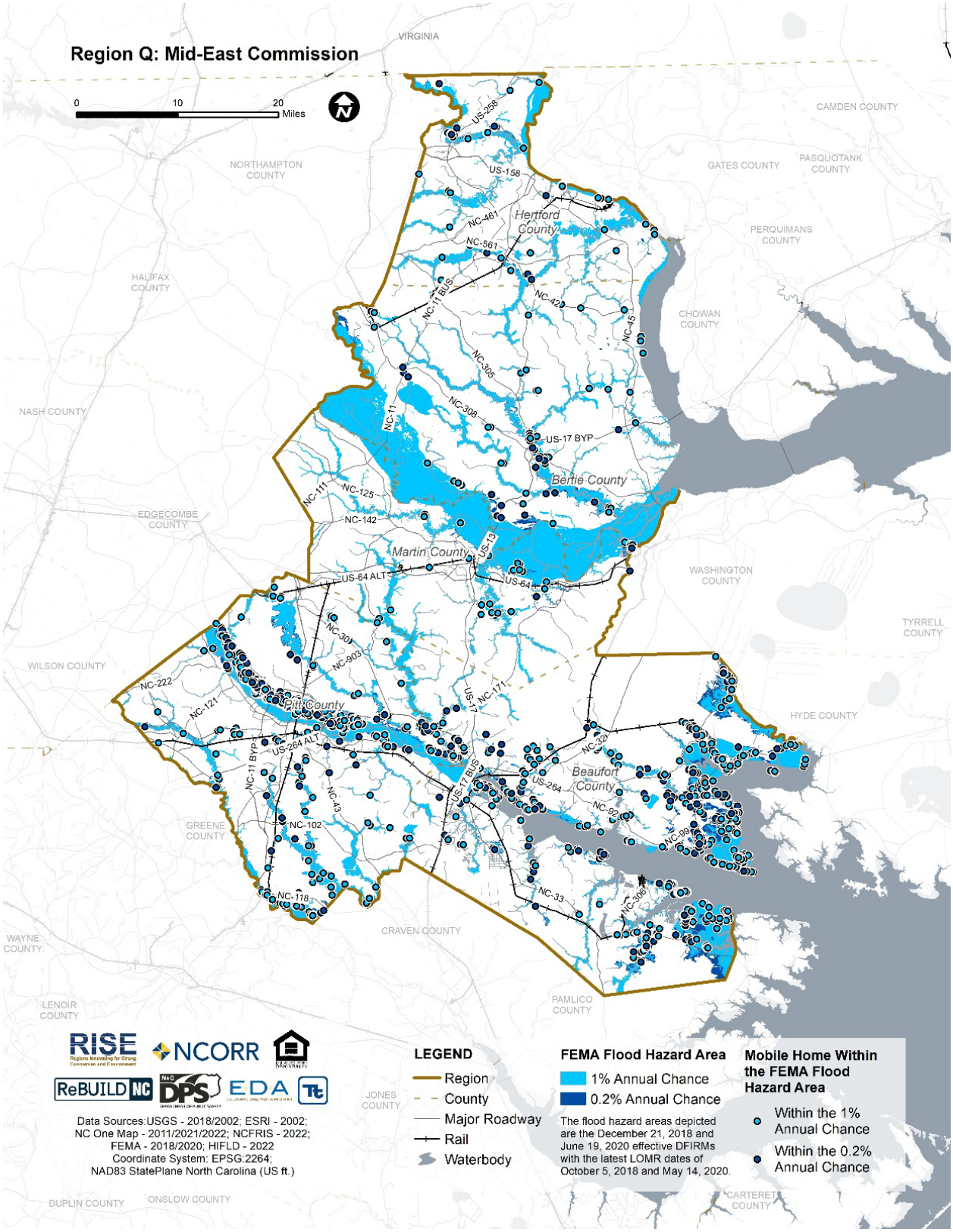
The built environment was evaluated after considering the population exposed and potentially vulnerable to the flood hazard. Exposure includes those buildings located in the flood zones. In the Mid-East Region, there are:

- 10,029 buildings located in the 1 percent annual chance flood boundary (5.7 percent of total buildings)
- 14,425 buildings located in the 0.2 percent annual chance flood boundary (8.2 percent of total buildings)

For a detailed assessment of buildings by general occupancy located in the floodplain, please see Tables 42 - 45 in ***Appendix A: Additional Data***.

While mobile homes are designed to be moved, lack of transportation or degradation of mobile components may prevent the evacuation of mobile homes before a flood event. Sudden flood events also eliminate the likelihood of mobile home evacuation. The general construction of mobile homes also makes them very vulnerable to damage or complete destruction in the event of a flood. ***Figure 14*** shows the location of mobile homes in the 1 percent and 0.2 percent annual chance flood areas.

Figure 14. Mobile Homes Located in the 1 Percent and 0.2 Percent Annual Chance Flood Hazard Areas in the Mid-East Region



For a detailed assessment of mobile homes and mobile home parks located in the floodplain, please see Tables 49 and 50 in ***Appendix A: Additional Data***.

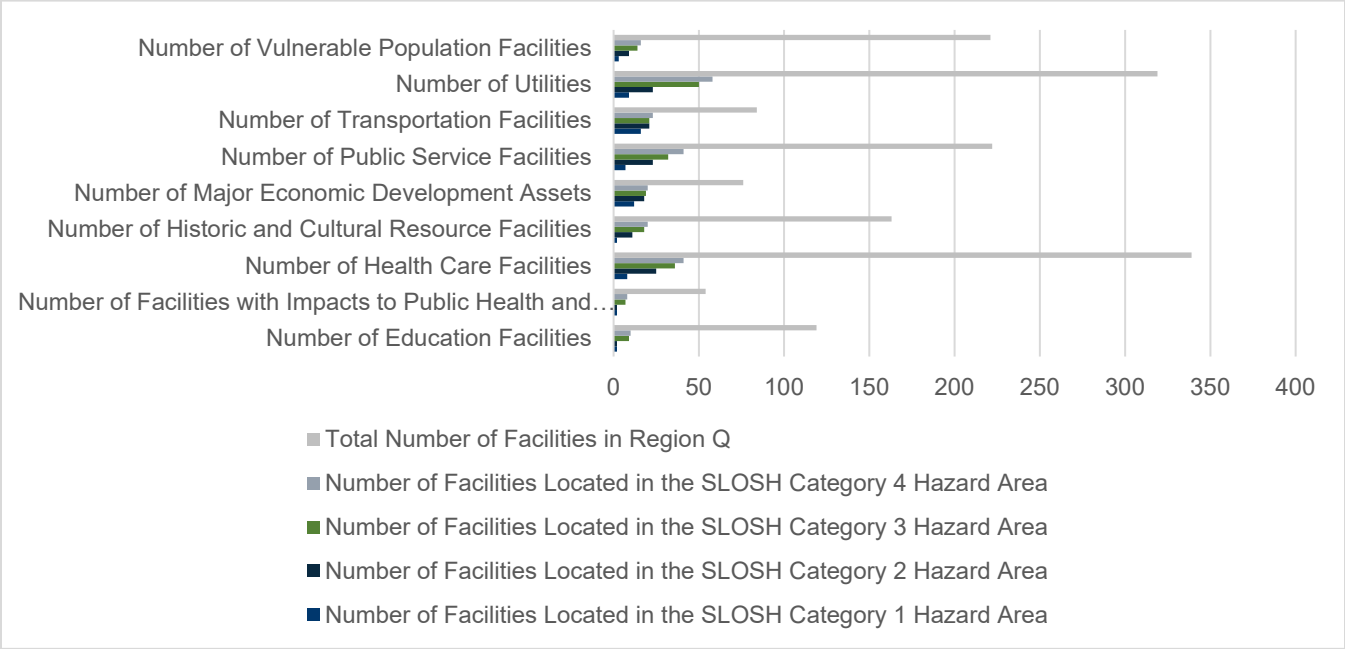
Infrastructure in coastal areas is vulnerable to both precipitation-based flooding and elevated tidal flooding. In a study by UNC Chapel Hill, data collected in Beaufort was used to model the impacts of tidal water levels on storm drain networks (UNC Institute for the Environment 2022). It was determined that stormwater network inundation likely increases risk of overland flooding in coastal urban areas (Gold, et al. 2022). It is important to determine the critical facilities and infrastructure that may be at risk of flooding and who may be impacted should damage occur. Critical services during and after a flood event may not be available if critical facilities are directly damaged or transportation routes to access these critical facilities are impacted. Blocked or damaged roads can isolate residents and prevent access throughout the planning area to many service providers needing to reach vulnerable populations or make repairs.

Critical facility exposure to the flood hazard was examined. The Mid-East Region contains:

- 170 critical facilities located in the 1 percent annual chance flood event boundary
- 268 critical facilities located in the 0.2 percent annual chance flood event boundary

For a detailed assessment of critical facilities located in the floodplain, please see Tables 29 and 30 in ***Appendix A: Additional Data***. Additionally, Tables 31 - 41 ***in Appendix A: Additional Data*** list the number of facilities regionwide by critical facility type, including roadways, located in the 1 percent and 0.2 percent annual chance flood events. Figure 15. Number of Critical Facilities Located in the SLOSH Hazard Area illustrates the number of critical facilities in the Mid-East Region within the floodplain compared to the entire critical facility stock throughout the region.

Figure 15. Number of Critical Facilities Located in the SLOSH Hazard Area



E. Impact on the Economy

The Mid-East Region has experienced over 100 flood events since January 2000, with about $11.19 million in property damage and $56.1 million in crop damage reported as a result (NOAA NCEI n.d.). Economic damages include but are not limited to general building stock damages and associated tax loss, impacts to utilities and infrastructure, business interruption, impacts on tourism, and impacts on the tax base for municipalities in the Mid-East Region. In directly flooded areas, commercial and industrial building renovations may be necessary, disrupting associated services. Other economic components, such as loss of facility use, functional downtime, and socioeconomic factors, are less measurable with a high degree of certainty.

The Mid-East Region contains 42 major economic development assets located in the 1 percent annual chance flood hazard area and 66 assets in the 0.2 percent annual chance flood hazard area. For a detailed assessment of major economic assets located in the floodplain, please see Table 36 in ***Appendix A: Additional Data***.

F. Impact on Natural Environmental Systems

Due to low elevation and proximity to waterways, many areas of the Albemarle-Pamlico region are susceptible to flooding (Albemarle-Pamlico National Estuary Partnership n.d.). Flood extents for the 1 and 0.2 percent annual flood events will continue to evolve alongside natural occurrences, such as sea level rise, climate change, and/or severity of storms. Further, residents living in and around areas of wildfire may be at increased risk of flooding in the future due to changes in the natural landscape.

Flood events will inevitably impact the Mid-East Region's natural and local environment. Severe flooding not only influences the habitat of these natural land areas but can also be disruptive to species that reside in these natural habitats. For a detailed assessment of environmental and public health-related facilities, please see Table 33 located in **Appendix A: Additional Data**.

G. Impact on Historical and Cultural Resources

Flood events can significantly damage or destroy invaluable historical and cultural resources within the region. The Mid-East Region has four facilities of cultural significance in the 1 percent flood hazard area and seven facilities in the .2 percent flood hazard area (see Table 34 in ***Appendix A: Additional Data***). See Table 45 in ***Appendix A: Additional Data*** for more information on regional historic districts located in the floodplain. Note: As sea level rise drives shorelines further inland and flooding is exacerbated, impacts to cultural and historical resources will be further impacted.

H. Cascading Impacts on Other Hazards

Flood events can exacerbate the impacts of disease outbreaks and landslides. After a flooding event, runoff can pick up and transport pollutants from wildlife and soils. Such organisms can then appear in drinking water and transmit diseases to residents (CDC 2021). Flooding can also put additional strain on dams, which may lead to dam failure. According to NOAA, sea level rise can amplify factors that currently contribute to coastal flooding, such as high tides, storm surge, high waves, and high runoff from rivers and creeks. All these factors change during extreme weather and climate events (NOAA 2012).

I. Future Changes That May Impact Regional Vulnerability to Flood

Projected Development

An increase in development, particularly in low-lying and coastal areas, will worsen already-existing flooding issues. Paved surfaces, such as roads and parking lots, contribute significantly to urban and stormwater flooding. When urban flooding occurs in areas where the water table is high, water has nowhere to go but up, creating numerous incidents of localized flooding across the region. To address stormwater management related to new development while also mitigating the impacts of flooding and sea level rise, Mid-East communities can consider nature-based and environmentally sound solutions, such as rain gardens, bioswales, and permeable paving.

Projected Changes in Population

As the population increases, so may the number of people who could be impacted by flooding. To limit the number of residents impacted by flooding in the future, Mid-East communities can consider planning and zoning solutions, such as expanding regulatory floodplains, increasing freeboard requirements, buying out vulnerable residential areas, and establishing stormwater utilities.

Climate Change Impacts

The Mid-East Region will see an increase in average annual temperatures and precipitation due to a changing global climate. Annual precipitation amounts in the region will increase, primarily in the form of heavy rainfalls, which have the potential to increase the risk of flash flooding and riverine flooding, impacting flood-critical transportation corridors and infrastructure. Increases in precipitation may alter and expand the floodplain boundaries and runoff patterns, resulting in the exposure of populations, buildings, and critical facilities and infrastructure that were previously outside the floodplain. This increase in exposure will result in an increased risk to life and health, an increase in structural losses, a diversion of additional resources to response and recovery efforts, and an increase in business closures affected by future flooding events due to loss of service or access.

J. Additional Data Needs

Key gaps in data and understanding that were identified during review of available scientific information and public and stakeholder meetings included:

- Mapping of stormwater/urban flooding locations is needed to identify problem areas within the region. This type of flooding is not included in FIRMs and is constantly changing due to clogging, failure, and repair of stormwater systems.
- Modeling is needed to better understand the potential extent and severity of a combined riverine and coastal flooding.
- Mapping of areas of anticipated future development would allow for better understanding of changes in exposure to flooding, especially for location-specific flood risk like coastal and riverine flooding.

VIII. HURRICANES AND SEVERE STORMS

A. Hazard Description

Hurricanes and tropical storms are a regular occurrence for the Mid-East Region. June to November is the official eastern U.S. hurricane season; however, late July to early October is the most likely period for hurricanes and tropical storms to impact the Mid-East Region when coastal waters are warmest. A hurricane is a tropical storm that attains hurricane status when its wind speed reaches 74 miles per hour (mph) or higher. A tropical storm system is characterized by a low-pressure center and numerous thunderstorms that produce strong winds of 39 to 73 mph and heavy rain (NWS 2021).

Hurricanes are one of the most pervasive and impactful hazards facing the Mid-East Region. Climate change is making conditions in North Carolina more favorable for strong and damaging storms (Kunkel 2020).

From 2018 to 2020, the Mid-East Region experienced four separate federal disaster declarations for Hurricanes Florence, Dorian, Isaias, and Tropical Storm Eta (NOAA NCEI 2022). These four declarations brought more than $265,000,000 to the region for repair of homes, offices, roads, and other critical infrastructure.

B. Location and Extent

Since 2016, the Mid-East Region has been included in five federal disaster declarations for hurricanes and tropical storms (FEMA n.d.). According to the FEMA Winds Zones of the United States map (FEMA 2011), the Mid-East Region is in Wind Zone III. In this zone, wind speeds can reach up to 200 mph. Additionally, the region is located within a "Hurricane Susceptible Region", meaning the region is susceptible to hurricanes and other tropical cyclone events.

The extent of a hurricane or tropical storm is commonly categorized in accordance with the Saffir-Simpson Hurricane Wind Scale, which assigns a designation of a tropical storm for storms with sustained wind speeds below 74 mph and a hurricane category rating of 1–5 based on a hurricane's increasing sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered *major hurricanes* because of their potential for significant loss of life and damage. Tropical Storms and Category 1 and 2 storms are still dangerous and require preventative measures.

Figure 16 presents wind speeds for the 50-Year mean return period hurricane wind event. Every 50 years, the Mid-East Region will likely experience Category 1 hurricane winds of 74–95 mph. Coastal areas of the region, like in Beaufort County, are more likely exposed to stronger hurricane winds, which can result in greater property damage and loss of life during a hurricane event.

Figure 16. Wind Speeds for the 50-Year Mean Return Period Hurricane Wind Event

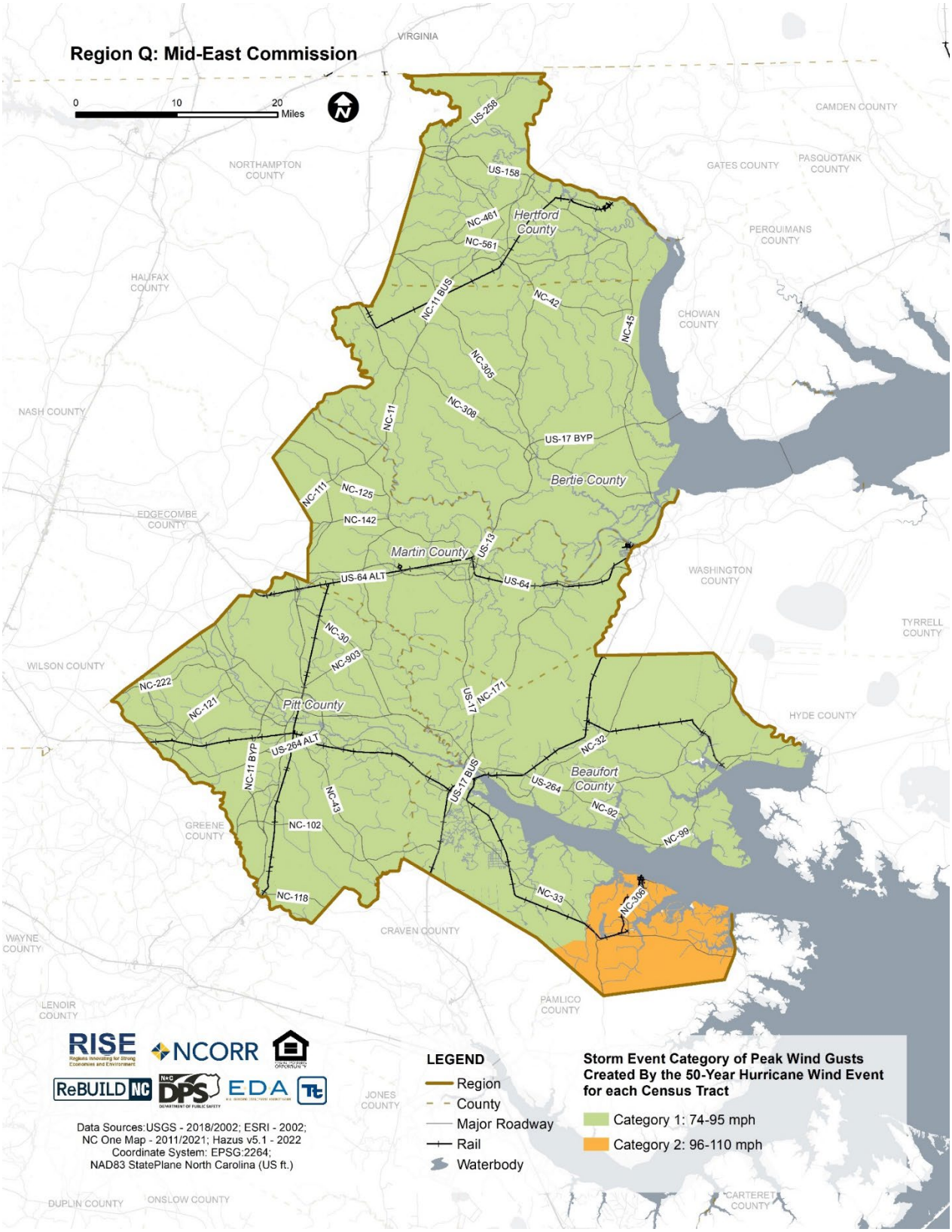
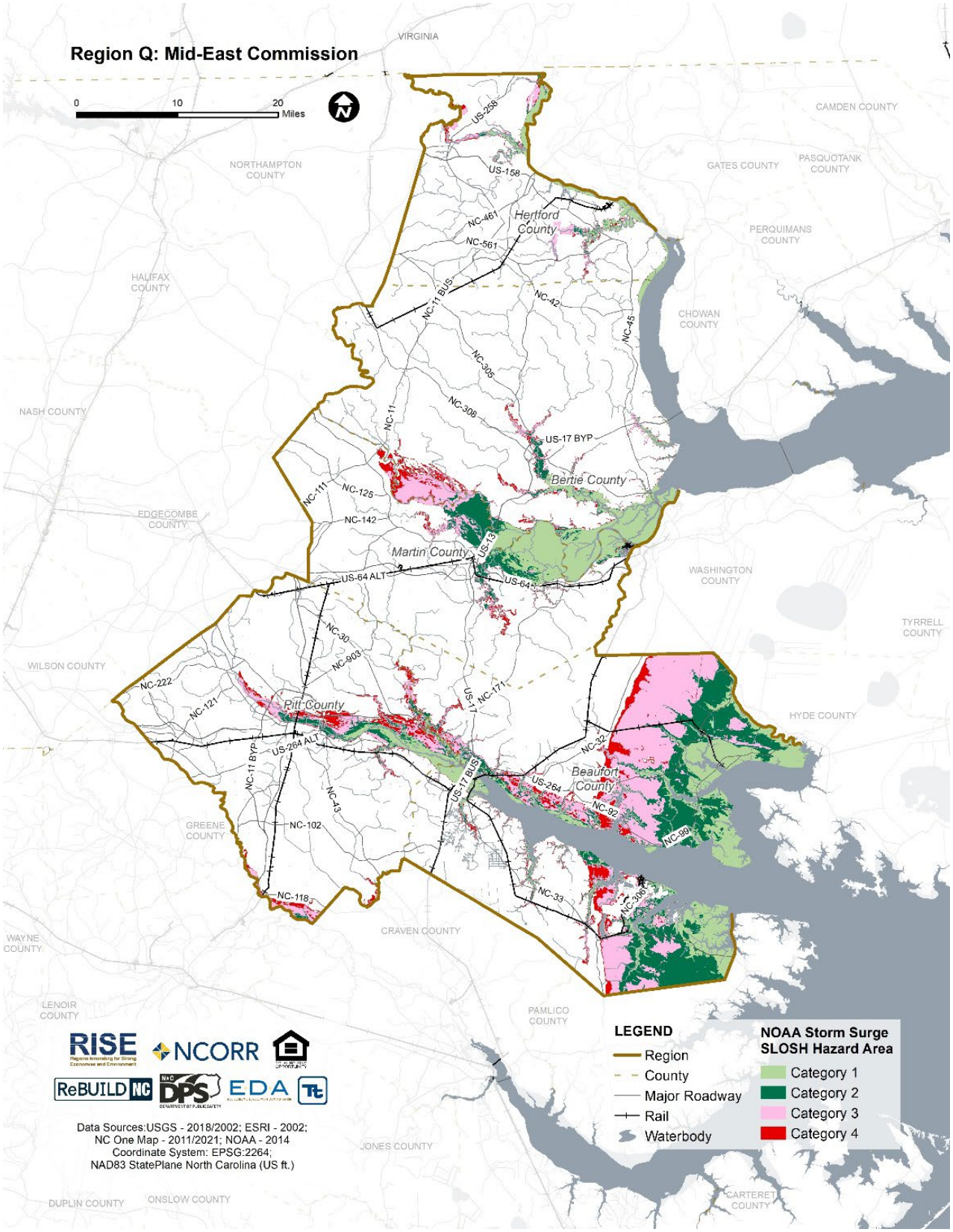


Figure 17 presents the areas of the region in the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) hazard zone. The SLOSH model estimates storm surge heights resulting from historical, hypothetical, or predicted hurricanes (NHC - NOAA n.d.). The greatest areas of SLOSH hazard on the map are concentrated in the coastal areas of Beaufort County and the riverine areas of Pitt and Martin Counties. In a severe storm surge, these areas are the most at risk of property and infrastructure damage.

To explore the Mid-East Region's specific exposure to hurricanes and severe storms, visit Mid East Region - Resilience Portfolio Web Map (arcgis.com).

Figure 17. NOAA Storm Surge SLOSH Hazard Areas in the Mid-East Region



C. Impact on Social Vulnerability and Equity, Health, and Safety

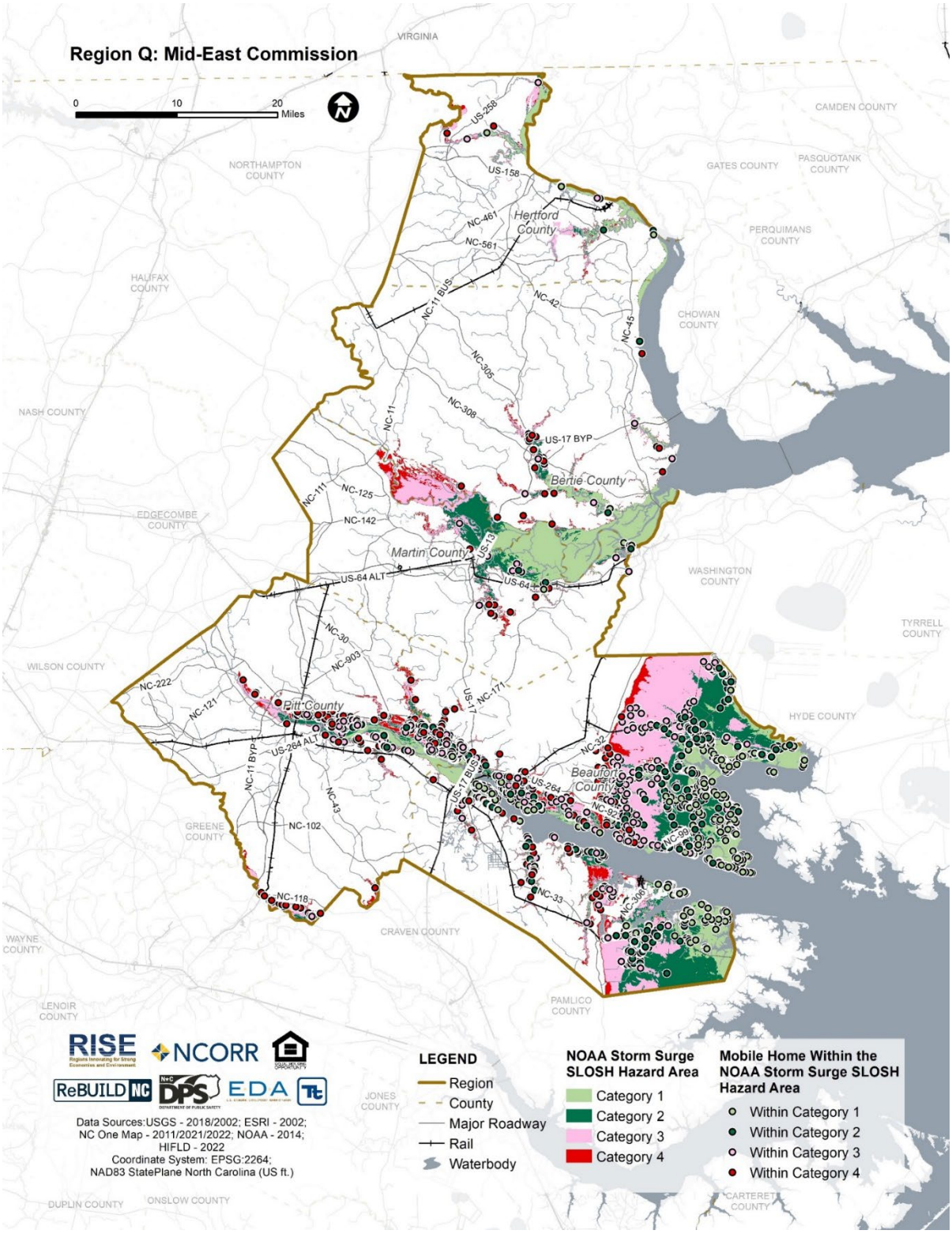
The entire population of the Mid-East Region is exposed to hurricanes and severe storm events. Residents may be displaced or require temporary to long-term shelter. In addition, downed trees, damaged buildings, and debris carried by high winds can lead to injury or loss of life. Socially vulnerable populations and people located outdoors (i.e., recreational activities and farming) are considered most susceptible to hurricane winds. This is because there is little to no warning, and shelter may not be available. Moving to a lower-risk location will decrease a person's vulnerability.

D. Impact on Housing, Critical Infrastructure, and Community Support Systems

Damage to buildings and critical infrastructure is dependent upon several factors, including wind speed, storm duration, and the path of the storm track. The following vulnerabilities may emerge in a hurricane or severe storm scenario:

- Mobile/manufactured homes, as well as wood and masonry buildings, may tend to experience more wind damage than concrete or steel buildings. See ***Figure 18*** for mobile homes located in SLOSH hazard areas. Most of these structures are clustered in the coastal areas of Beaufort and Pitt Counties, exposing them to the worst impacts of storm surge.

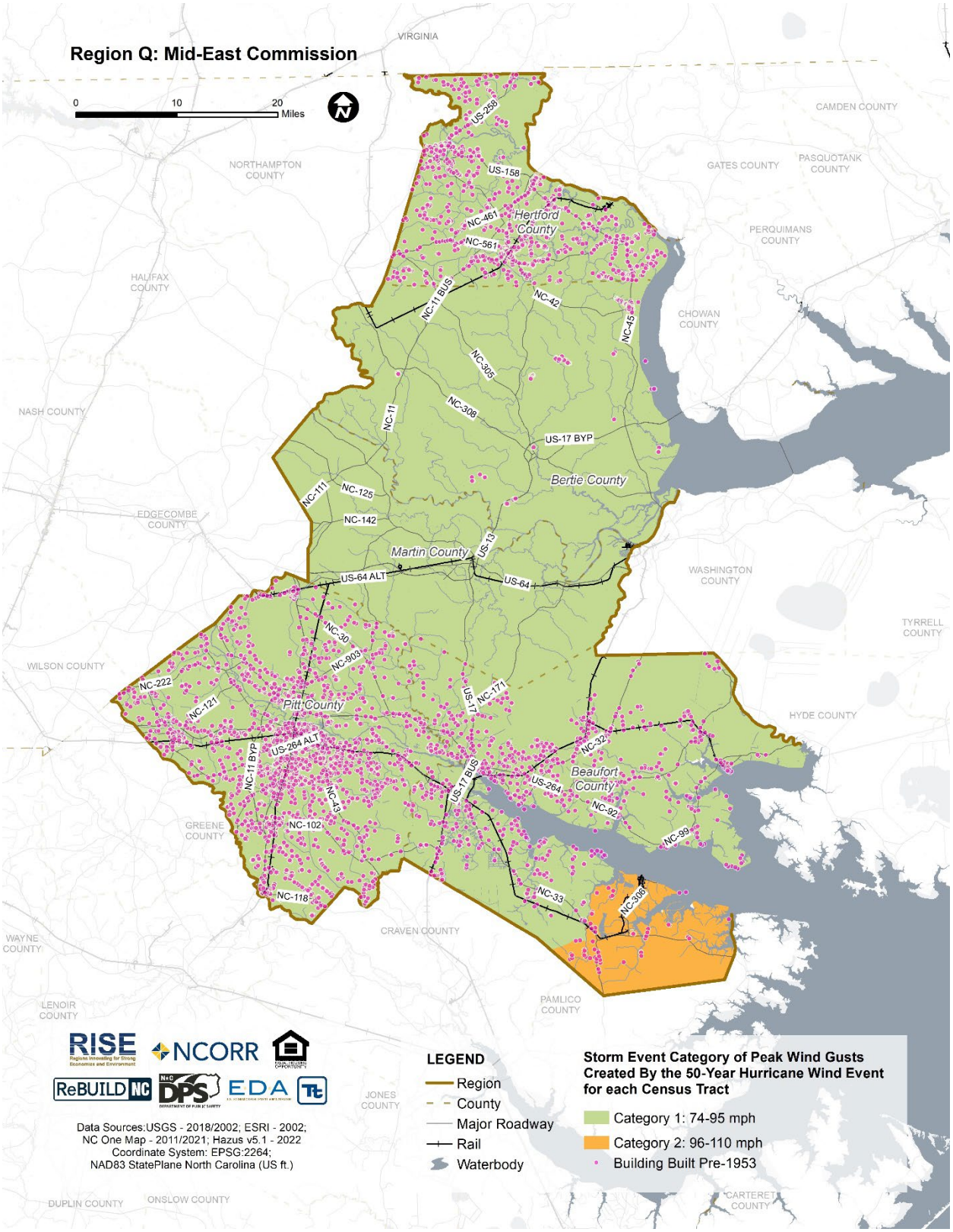
Figure 18. Mobile Homes Within the NOAA Storm Surge SLOSH Hazard Areas



- Critical infrastructure may experience direct structural damage from high winds or falling tree limbs/flying debris, which can also result in the loss of power. Power loss can greatly impact households, business operations, public utilities, and emergency personnel.
- The elderly population may be more vulnerable if power loss results in interruption of heating and cooling services, stagnated hospital operations, and potable water supplies.
- Emergency personnel such as police, fire, and emergency medical services (EMS) may not be able to effectively respond and maintain the safety of its residents.
- Buildings constructed prior to 1953 are less likely to have used construction techniques that adequately protect from wind damage. In the Mid-East Region, 12,534 buildings (7.1 percent) were constructed pre-1953 and have a higher likelihood to experience wind damage.

See Figure 19 for the locations of buildings built pre-1953.

Figure 19. Buildings Built Pre-1953 in the Mid-East Region



E. Impact on Economy

By July 2017, over 5,700 individual and public assistance claims were filed in the Mid-East Region to deal with impacts from Hurricane Matthew (Rebuild NC 2017). Pitt County alone filed 3,313 claims and received about $2.3 million in individual and household assistance. Hurricanes and severe storm events can have short- and long-lasting impacts on the economy. When a business is closed during storm recovery, there is lost economic activity in the form of day-to-day business and wages to employees. Overall, economic impacts include:

- Loss of business function (e.g., tourism, recreation)
- Damage to inventory (utility outages)
- Relocation costs, wage loss, and rental loss due to building damage
- Impacts to community's economy and tax base due to building damage
- Impacts to transportation that affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) needs
- Damage to utility infrastructure (power lines, gas lines, electrical systems) resulting in loss of power or heat, potentially impacting business operations and heating or cooling provision to the population
- Costly debris management operations for downed vegetation and removal of damaged construction materials

F. Impact on Natural Environmental Systems

Post-Hurricane Matthew, riverine flooding lasted for more than 2 weeks, setting rainfall records in the Tar, Cashie, and Neuse River watersheds (Rebuild NC 2017). Hurricanes and severe storms can be destructive to the natural and local environment. Any severe weather that creates longer periods of rainfall can erode natural banks along waterways and degrade soil stability for terrestrial species. Hurricane winds can tear apart habitats, causing fragmentation across ecosystems. Researchers believe more diseases will spread across ecosystems because of severe weather and climate change impacts on water supplies. Overall, as the physical environment becomes more altered, species will begin to contract or migrate in response, which may cause additional stressors to the ecosystems within the Mid-East Region.

G. Impact on Historical and Cultural Resources

Hurricanes and severe storms can be destructive to structures, including those of historical and cultural significance. The Mid-East Region has over 50 historical and cultural resource facilities located in the SLOSH Storm Surge Hazard Areas, with 20 of them located in Category 4 areas (Table 68 in ***Appendix A: Additional Data***). As climate change continues, hurricanes and severe storms are likely to become stronger and pose a greater threat to the integrity of historic structures. Sea level rise will also likely expose coastal structures to greater levels of saltwater corrosion and foundational erosion.

H. Cascading Impacts on Other Hazards

Hurricanes and severe storms often come with heavy precipitation that can cause flooding. Lightning can ignite wildfires. Strong winds can contribute to the rapid spread of a wildfire once ignited. Coastal storms can impact various natural land resources that can be easily uprooted by major wind events and storm surges, increasing the potential for erosion.

I. Future Changes That May Impact Regional Vulnerability to Hurricanes and Severe Storms

Climate Change Impacts

Providing long-term regional projections of future climate change is challenging. Shorter-term projections are more closely tied to existing trends taken from a larger area, making longer-term projections even more challenging. The further out a prediction reaches, the more subject to changing dynamics it becomes.

In the Mid-East Region, severe storms typically include coastal nor'easters, snowstorms, spring and summer thunderstorms, tornadoes, tropical storms, and hurricanes. As oceans warm, the length of hurricane season may expand. The 2010s had the most hurricanes, and there has been a steady increase since the 1990s. The National Hurricane Center is currently considering expanding the official hurricane season to begin in May, rather than June, as a result of the frequency of pre-season events (Cappucci, NOAA mulls moving start of Atlantic hurricane season up to May 15 2021). Temperatures are predicted to increase in the Mid-East Region, and ocean temperatures are forecast to continue to increase, which may lead to an increase in intensity and frequency of hurricanes. As temperatures increase, so will the energy in a storm system, increasing the potential for more intense storms, especially Category 4 and 5 storms (Melillo 2014).

J. Additional Data Needs

Key gaps in data and understanding that were identified during review of available scientific information and public and stakeholder meetings included:

- The residential status of mobile/manufactured homes in the Mid-East Region is needed. If these communities are continually occupied, resilience efforts can be enhanced to prioritize those in these vulnerable shelters.
- Better climate projections for the future occurrence of coastal storms and hurricanes in the Mid-East Region are needed. These projections are currently less certain than other climate-related projections due to the complexity of conditions necessary for coastal storms and hurricanes to form, intensify, and track over the Mid-East Region.
- Mapping of areas of anticipated future development would allow for better understanding of changes in exposure to wind damages from hurricanes and other severe storms.

IX. SEA LEVEL RISE

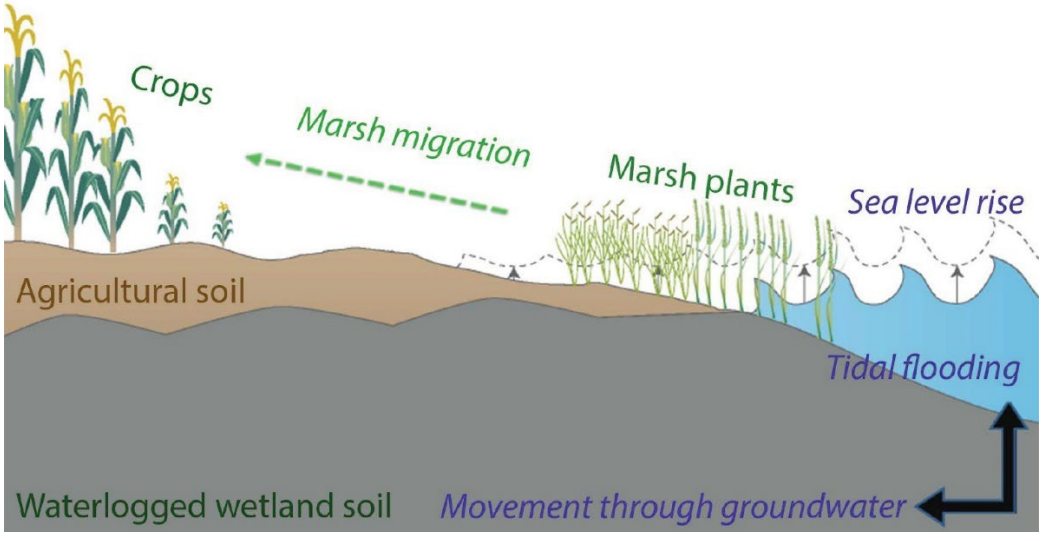
A. Hazard Description

The sea level off North Carolina's coast is up to 11 inches higher than it was in 1950. This increase is mostly due to ice melt. Solutions are not simple in the Mid-East Region because of the area's low elevation, extensive barrier islands, and vulnerability to coastal storms. In addition to the many people who live and work in the coastal region and vacationers who visit throughout the year, North Carolina has vast natural resources and habitats at risk, including the largest estuarine system on the U.S. Atlantic Coast. There are already nearly 60,000 properties at risk from frequent tidal flooding in North Carolina. The State is planning over $2 billion in sea level rise solutions, which include beach renourishment and improvements to reduce flooding on highways (sealevelrise.org n.d.).

Rising sea level will cause saltwater to enter coastal aquifers, a phenomenon known as saltwater intrusion. Aquifers, which are like large underground lakes, are important sources of drinking water. With saltwater intrusion, the water in the aquifer becomes contaminated with salt and becomes undrinkable. Saltwater intrusion is a very serious problem because it threatens the availability of drinking water and can make soils too salty for native plants to grow, creating problems for coastal forests and agriculture. Saltwater intrusion is one of the first impacts that the coast is expected to face with an increase in sea level (NCDEQ n.d.).

As sea levels rise, saltwater moves inland through saltwater intrusion (Elliott White Jr. 2017). Freshwater wetlands, and marshes, will be the first to experience saltwater intrusion as indicated in ***Figure 20*** below. In general, three scenarios are possible: 1) marsh plants adapted to low salinities may not be able to survive and are replaced by saltmarsh plants, 2) salt stress causes low salinity marsh plants to be outcompeted by an invasive species like common reed (Phragmites australis), and 3) the rate of sea level rise and saltwater intrusion is such that the low salinity marsh dies off and the area becomes open water (Audobon NC 2021).

Figure 20. Saltwater Intrusion Process

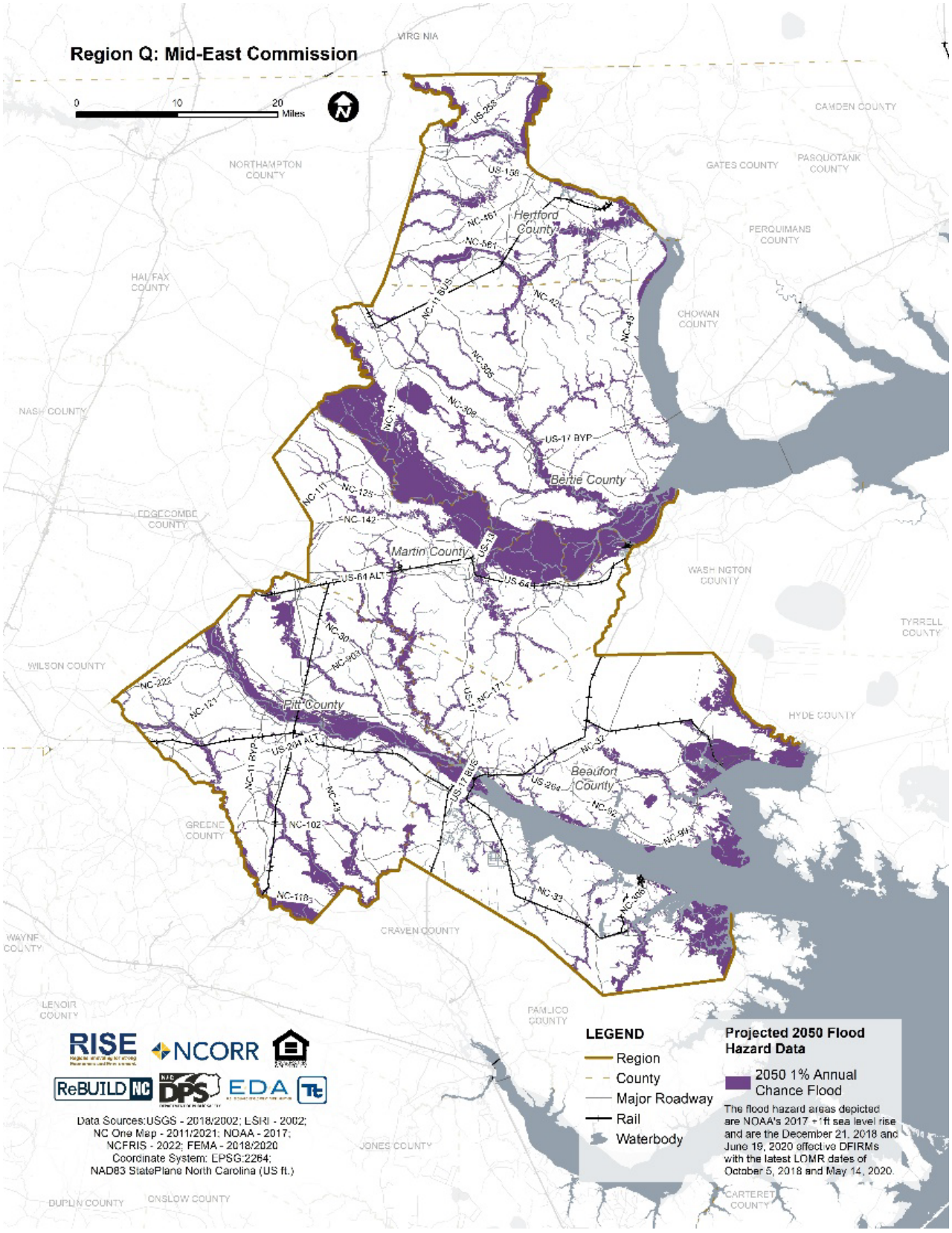


(USDA n.d.)

B. Location and Extent

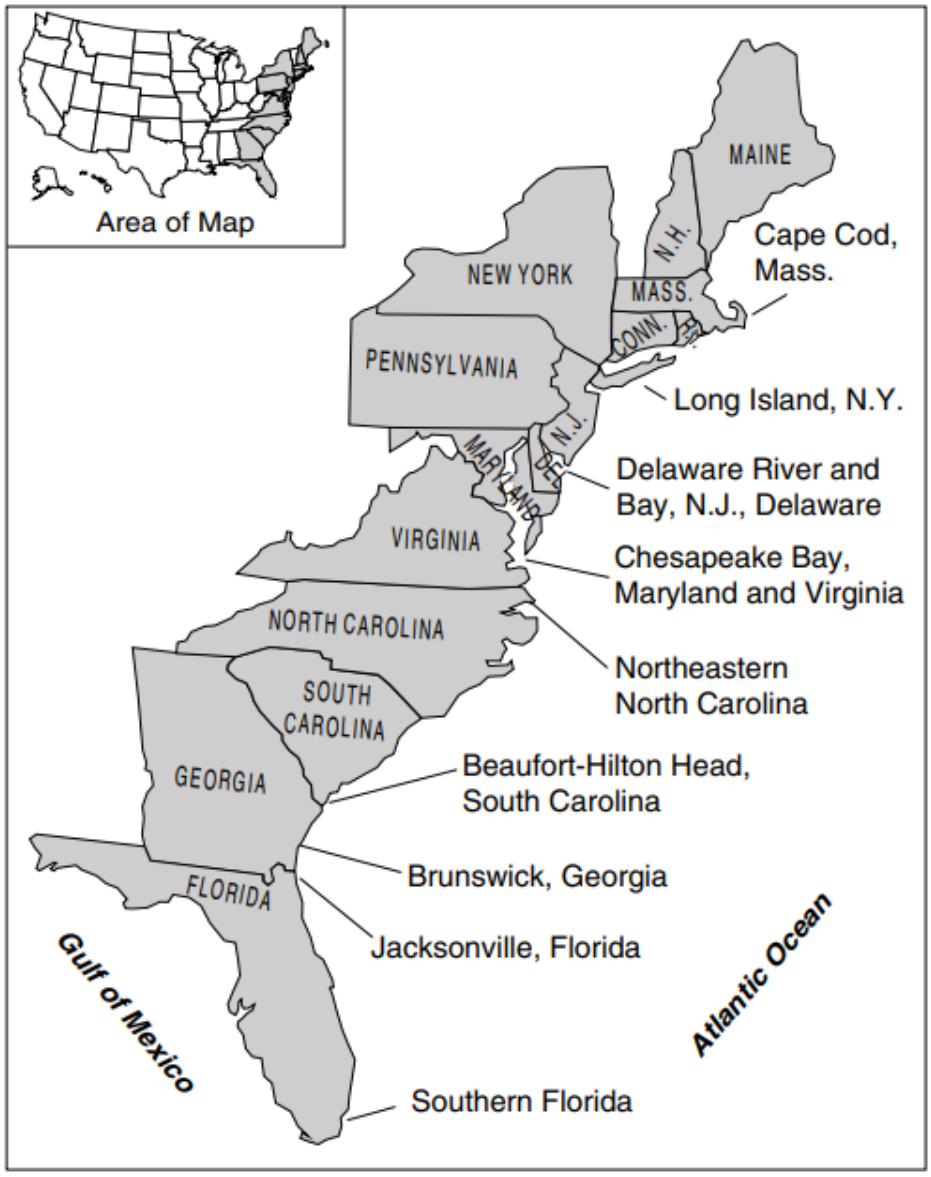
High tide flooding is already a regular occurrence in the Mid-East Region (UNC Institute for the Environment 2022). The NC Climate Science Report predicts that Beaufort and the central section of the North Carolina coast could experience high tide flooding as often as every other day from 2050 to 2060 and daily after 2080 (NCICS 2020). During the past 100 years, the rate of global mean sea level rise was approximately 1.7 millimeters per year (0.7 inches per decade), and observations show that the rate of global sea level rise is accelerating. As sea level rises, the starting elevation of coastal flooding events will also rise. This means that coastal floods are likely to reach a higher elevation and push farther inland. As a result, the mapped Special Flood Hazard Area (SFHA) will likely expand. ***Figure 21*** displays the potential expansion of the SFHA with 1 foot of sea level rise, a threshold likely to be reached by 2050.

Figure 21. Projected Expanded SFHA in 2050 (1 foot of sea level rise) in the Mid-East Region



The long-term severity of sea level rise is to be determined. ***Figure 22*** displays areas along the Atlantic coast where saltwater has intruded into freshwater aquifers. The Mid-East Region has been identified as one of these areas.

Figure 22. Selected Areas Along the Atlantic Coast Where Saltwater Has Intruded into Freshwater Aquifers.

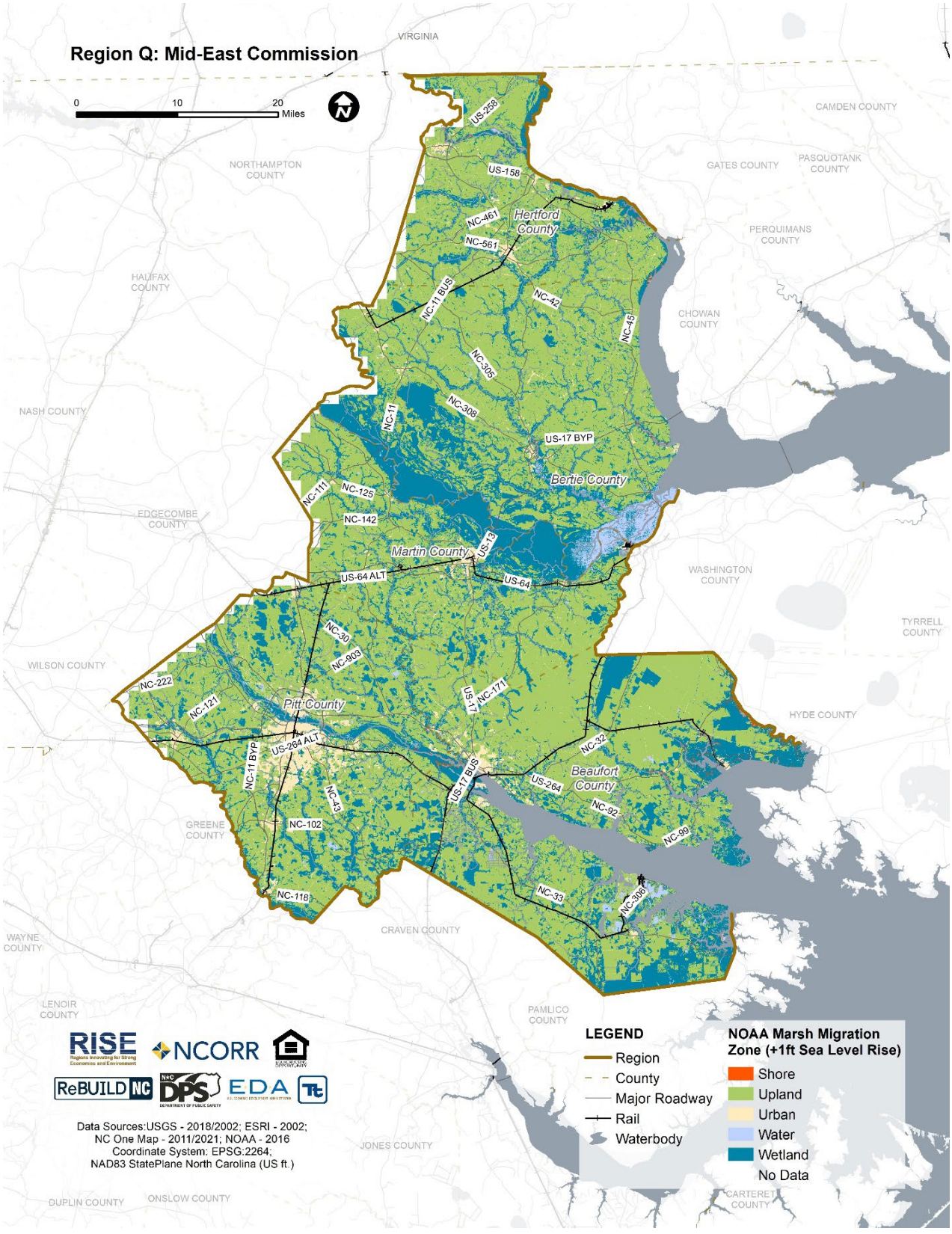


Source: Barlow and Wild 2002

Saltwater intrusion has also been identified as an issue in shallow coastal aquifers by stakeholders and members of the public during this planning process. Farms along the coast have experienced saltwater intrusion, which has resulted in the abandonment of sections of fields that have become too salty to support crops. ***Figure 23*** shows the rate of marsh migration in the Mid-East Region with 1 foot of sea level rise.

To explore the Mid-East Region's specific exposure to sea level rise, visit Mid East Region - Resilience Portfolio Web Map (arcgis.com).

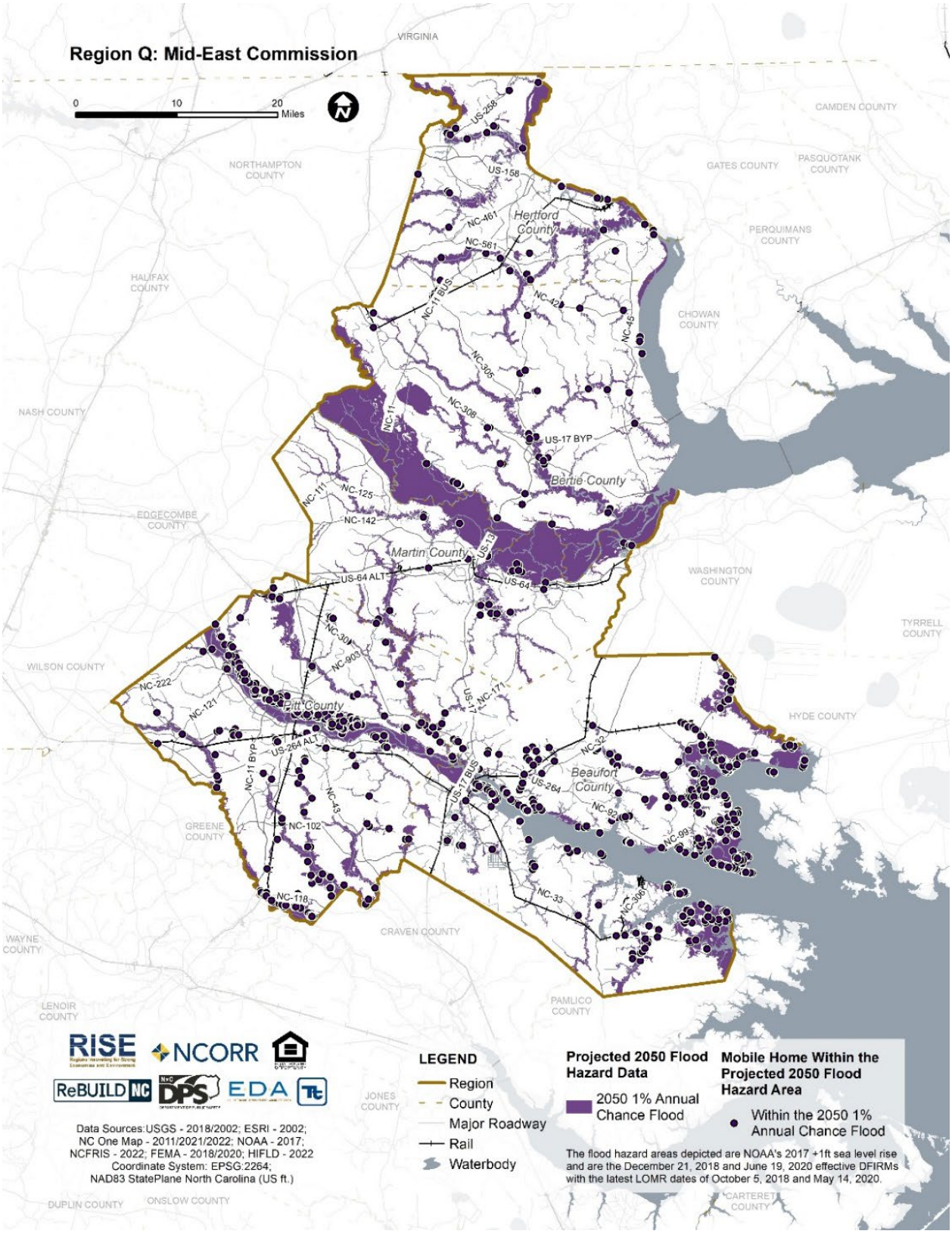
Figure 23. Marsh Migration in the Mid-East Region



C. Impact on Social Vulnerability and Equity, Health, and Safety

A spatial analysis was conducted using the projected expanded Special Flood Hazard Area (SFHA) in 2050 caused by 1 foot of sea level rise to estimate the population exposed and vulnerable to sea level rise hazards. By 2050, an estimated 54,673 people will live in the 1 percent SFHA. The elderly (9,521 people), those under 5 years of age (3,134), and the disabled (9,101) living in the region will be especially vulnerable to the hazard. Those who live in mobile home dwellings are also extremely vulnerable to sea level rise. Figure 24 below indicates mobile homes in the projected 2050 SFHA.

Figure 24. Mobile Homes Within the Projected 2050 SFHA

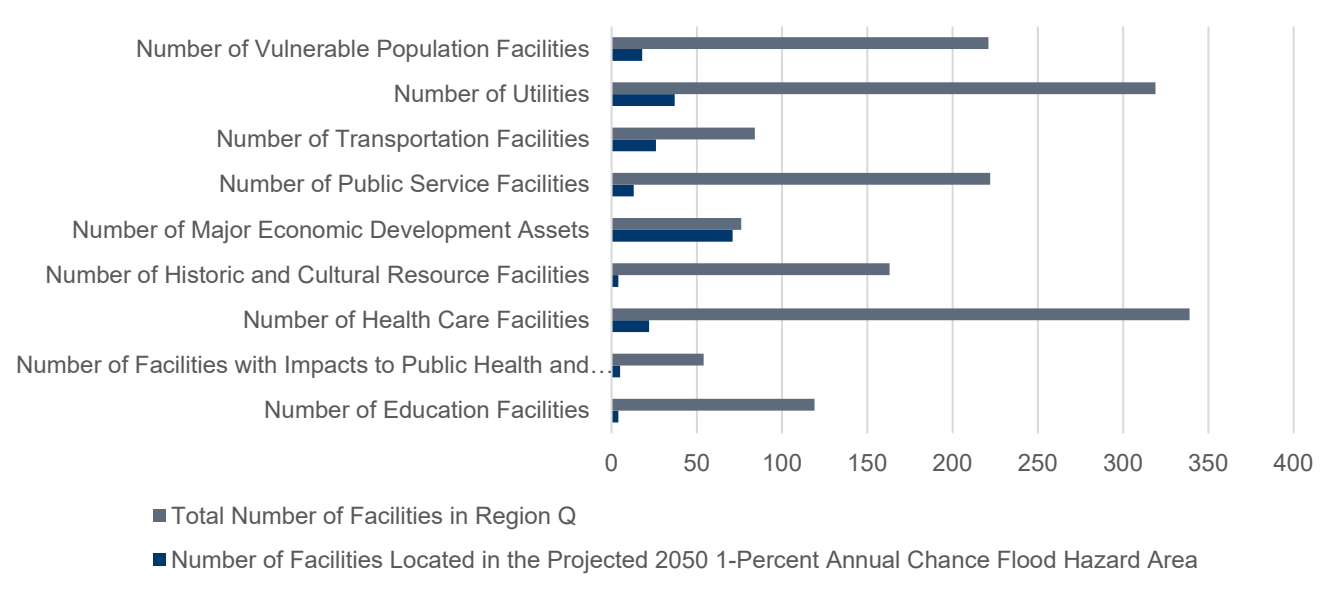


Sea-level rise can lead to increased saltwater intrusion. Saltwater intrusion may result in the elimination of safe drinking water if the aquifers accessed by potable wells are rendered too salty to drink. This is usually addressed by using a different aquifer, installing desalinization plants, or shipping water in from outside sources. However, these measures are often costly and can cause significant financial stress on socially vulnerable populations. See Tables 107 - 109 in ***Appendix A: Additional Data*** for more information on vulnerable populations in the projected 2050 Special Flood Hazard Area.

D. Impact on Housing, Critical Infrastructure, and Community Support Systems

Sea level rise in the long term will impact the region's buildings and critical infrastructure. Extended exposure to salt water can corrode pipes and metal infrastructure, resulting in structural failure or contamination. Many town water and wastewater systems in Mid-East are 30–40 years old and have not been effectively maintained (Mid-East Commission 2020). While no structures are anticipated to be directly affected by saltwater intrusion, saltwater intrusion can lead to the failure of services provided by potable water wells and aquifers or result in the need to build costly desalinization plants. Coastal erosion caused by sea level rise can also impact the structural integrity of coastal buildings and infrastructure. This may result in relocating or demolishing prominent structures in the Mid-East Region. See Tables A-110 – 113 in ***Appendix A: Additional Data*** for Critical Infrastructure in the Projected 2050 SFHA. Figure 25 below illustrates the number of critical facilities located in the 1-percent annual chance flood hazard area compared to the total number of critical facilities across the Mid-East Region.

Figure 25. Number of Critical Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area by Type



E. Impact on Economy

Sea level rise will likely have large-scale impacts on local economies and major economic development asset facilities. These may include:

- Cost of relocating or demolishing coastal structures
- Lost commercial and tourism opportunities

- The need to build costly desalinization plants
- Costs of constructing new wells or treatment facilities

See Table 116 in ***Appendix A: Additional Data*** for Major Economic Development Asset Facilities in the Projected 2050 SFHA.

F. Impact on Natural Environmental Systems

In a study funded by North Carolina Sea Grant, the spread of ghost forests across the North Carolina coast has severe implications for global warming (Oleniacz 2020). “The transition from forest to marsh along the coastline of the Albemarle-Pamlico Peninsula led to a significant loss in the amount of carbon stored in the plants and trees above ground” (Oleniacz 2020). Coastal forests that cannot tolerate saltwater may die off and become “ghost forests” if saltwater intrusion reaches their root system. Sea level rise can result in the loss of low-lying coastal ecosystems like wetlands and the conversion of uplands to wetlands. In addition, sea level rise can result in saltwater intrusion, which can damage or kill salt-intolerant plant life. Saltwater intrusion can result in the conversion of freshwater wetlands to saltwater wetlands where the impacted aquifer is shallow.

G. Impact on Historical and Cultural Resources

Sea level rise will put countless structures at risk in Mid-East, including those of historical and cultural significance. Historical structures are often more vulnerable to damage given that they were constructed with older materials and were not subject to modern building codes and standards. Mid-East has four historical and cultural resource facilities and 325 acres of historical districts located in the 2050 Projected 1-Percent Flood Hazard Area. For more information on these structures and historical districts in the projected flood hazard areas, see Tables 114 and 123 in ***Appendix A: Additional Data***.

H. Cascading Impacts on Other Hazards

According to NOAA, sea level rise can amplify factors that currently contribute to coastal flooding: high tides, storm surge, high waves, and high runoff from rivers and creeks. All of these factors change during extreme weather and climate events (NOAA 2012). Other secondary hazards that could occur along the coast in response to sea level rise include:

- Coastal erosion
- Flooding of wetland territories
- Saltwater intrusion in potable water sources
- Agricultural soil contamination from salt exposure
- Habitat loss

I. Additional Data Needs

Key gaps in data and understanding that were identified during review of available scientific information and public and stakeholder meetings included:

- The residential status of mobile/manufactured homes in the Mid-East Region. If these communities are continually occupied, resilience efforts can be enhanced to prioritize those in these vulnerable shelters.

- Better climate projections for the future occurrence of sea level rise in the Mid-East Region are needed. These projections are currently less certain than other climate-related projections due to the complexity of conditions necessary for coastal storms and hurricanes to form, intensify, and track over the Mid-East Region.
- Mapping of areas of anticipated future development would allow for better understanding of changes in exposure to wind damages from sea level rise.

X. TORNADO

A. Hazard Description

Tornadoes and high wind events are a common occurrence in the Mid-East Region. Each of these hazards has damaged property and infrastructure, downed trees, and power lines, and caused injuries and fatalities.

B. Location and Extent

Since 2000, the Mid-East Region has experienced 76 tornado events (NCDC n.d.). On April 25, 2014, multiple tornadoes were reported in parts of Pitt and Beaufort Counties (NCDC 2014). The total damage was estimated at $15 million, and an elderly woman living near Washington died from pneumonia resulting from injuries sustained during the tornado (NCDC 2014). According to the FEMA Winds Zones of the United States map (FEMA 2011), the Mid-East Region is in Wind Zone III. In this zone, wind speeds can reach up to 200 mph. Additionally, the region is located within a "Hurricane Susceptible Region," meaning the region is susceptible to hurricanes and other tropical cyclone events.

Thunderstorms are common occurrences during North Carolina's summer afternoons and evenings. During the warmer months of the year, weather is driven by more local-scale convective processes as the jet stream retreats north. The pop-up showers experienced during this time of year are generally small (1 mile to a few miles across) and produce very intense, very local rainfall. During the spring and summer, thunderstorms are often associated with the passage of warm and cold fronts as storms developing along the frontal line and can impact all parts of the state. Thunderstorms in North Carolina bring strong winds and intense rain that can lead to localized flash flooding. Sometimes these storms also produce hail and tornadoes or damaging straight-line winds (NCSU n.d.).

Tornadoes

The magnitude or severity of a tornado is categorized using the Enhanced Fujita Tornado Intensity Scale (EF Scale). This is the scale used exclusively for determining tornado ratings by comparing wind speed and actual damage.

Tornado watches and warnings are issued by the local NWS office. A tornado watch is released when tornadoes are possible in an area. A tornado warning means a tornado has been sighted or indicated by weather radar. The current average lead time for tornado warnings is 13 minutes. Occasionally, tornadoes develop so rapidly that little, if any, advance warning is possible (NOAA SPC n.d.).

High Winds

The NWS issues advisories and warnings for winds that are typically site-specific. The NWS issues high wind advisories, watches, and warnings when wind speeds can pose a hazard or are life-threatening. The criterion for each of these varies from state to state.

C. Impact on Social Vulnerability and Equity, Health, and Safety

The entire population of the Mid-East Region is exposed to tornado and high wind events. Examples of impacts may include:

- Residents may be displaced or require temporary to long-term sheltering due to severe weather events.
- Downed trees, damaged buildings, and debris carried by high winds can lead to injury or loss of life.
- Two people were killed on August 4, 2020, in the vicinity of Morning Road, after a tornado touched down near the intersection of Knowles Lane and Middle Track Road (NCDC 2020).
- People located outdoors (i.e., recreational activities and farming) are especially vulnerable to tornadoes and high wind events due to a lack of shelter.
- Power loss can greatly impact households, business operations, public utilities, and emergency personnel.
- The elderly population may be more vulnerable if power loss results in interruption of heating and cooling services, stagnated hospital operations, and potable water supplies.
- Emergency personnel, such as police, fire, and EMS, may not be able to effectively respond and maintain the safety of its residents.

D. Impact on Housing, Critical Infrastructure, and Community Support Systems

Tornadoes and high wind events can impact buildings and critical infrastructure. Likely damages include:

- Mobile homes, other residential structures, and wood/masonry buildings may be more susceptible to wind damage than commercial and industrial structures.
- On August 4, 2020, a tornado near Woodard flattened seven single-wide and double-wide mobile homes (NCDC 2020).
- Pre-1953 structures may experience more wind damage due to inadequate construction techniques. The Mid-East Region has 12,534 buildings built pre-1953.
- Critical facilities may experience direct structural damage from high winds or falling tree limbs/flying debris, which can also result in the loss of power.
- Transportation lifelines are vulnerable to cascading effects of tornadoes, such as flooding, falling debris, etc. Impacts on transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting) transportation needs.

E. Impact on Economy

Tornado and high wind events can have short- and long-lasting impacts on the economy. When a business is closed during storm recovery, there is lost economic activity in the form of day-to-day business and wages to employees. Overall, economic impacts include:

- Loss of business function (e.g., tourism, recreation)
- Damage to inventory (utility outages)
- Relocation costs, wage loss, and rental loss due to building damage
- Impacts to transportation that affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) needs
- Damage to utility infrastructure (power lines, gas lines, electrical systems) resulting in loss of power or heat, potentially impacting business operations and heating or cooling provision to the population
- Costly debris management operations for downed vegetation and removal of damaged construction materials

F. Impact on Natural Environmental Systems

Tornadoes and high wind events can be destructive to the natural and local environment. Tornadoes can tear apart habitats, causing fragmentation across ecosystems. Overall, as the physical environment becomes more altered, species will begin to contract or migrate in response, which may cause additional stressors to the ecosystems within the Mid-East Region.

G. Cascading Impacts on Other Hazards

Tornadoes can be accompanied by excessive precipitation, hail, and/or lightning. This precipitation often results in secondary hazards, such as flooding or structural damage. Lightning can start wildfires. Strong winds can contribute to the rapid spread of a wildfire once ignited. Tornadoes and cyclones can impact various natural land resources that can be easily uprooted by major wind events and storm surges, increasing the potential for erosion.

H. Future Changes That May Impact Regional Vulnerability to Tornado

Projected Development

New development and residents will be exposed to tornadoes and high wind hazards. However, due to increased standards and codes, new development might be less vulnerable to wind-related hazards compared to older buildings.

Projected Changes in Population

Increased population trends in the Mid-East Region will increase the region's overall risk of tornadoes and high wind events. Increased population trends along the coastline will change the region's overall risk of coastal cyclones.

Climate Change Impacts

Providing projections of future climate change for a specific region is challenging. Shorter-term projections are more closely tied to existing trends making longer-term projections even more challenging. The further out a prediction reaches, the more subject to changing dynamics it becomes.

A warmer atmosphere means storms have the potential to be more intense and occur more often (Kathie Dello 2020). In the Mid-East Region, severe storms typically include coastal nor'easters, snowstorms, spring and summer thunderstorms, tornadoes, tropical storms, and hurricanes. Most of these events occur in the warmer months between April and October, with nor'easters occurring between September and April.

I. Additional Data Needs

Key gaps in data and understanding that were identified during review of available scientific information and public and stakeholder meetings included:

- Federal-level tornado statistics were used as the best available data. Region-specific statistics would provide a more thorough assessment.
- Mapping of areas of anticipated future development would allow for better understanding of changes in exposure to the tornado hazard.

XI. WILDFIRE

A. Hazard Description

The Mid-East Region can be impacted by wildfires. A wildfire can be defined as any non-structural fire that occurs in the wildland. Three distinct types of wildfires have been defined and include:

- Naturally Occurring Wildfire
- Human-Caused Wildfire
- Prescribed (i.e., controlled) Wildfire

Wildfires can be highly destructive and difficult to control. They occur in forested, semi-forested, or less developed areas. Wildfires can result in the destruction of forests, brush, field crops, grasslands, real estate, and personal property and have secondary impacts on other hazards, such as flooding, by removing vegetation and destroying watersheds. Wildfire events can range in size and intensity. A wildfire's intensity depends significantly on both meteorological conditions and human activity.

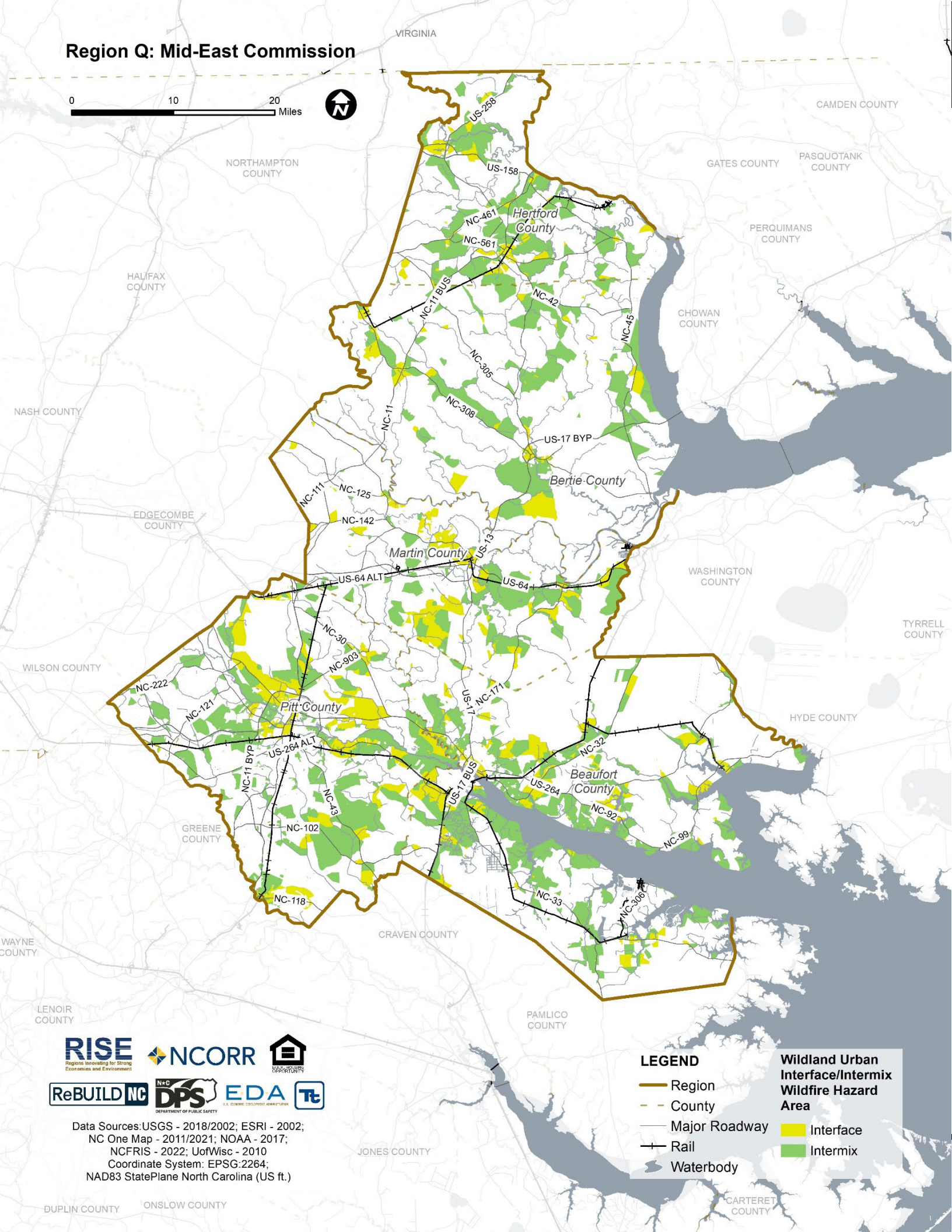
B. Location and Extent

The largest wildfire in recent years that impacted the Mid-East Region was the Evans Road fire in 2008. The fire burned for almost seven months and destroyed almost 42,000 acres of forest, mostly concentrated in the Pocosin Lakes National Wildlife Refuge (Davis 2015). Wildfire events can occur in natural areas, such as wetlands and forests, and in development adjacent to these areas throughout the Mid-East Region. Areas where vegetation and trees have died due to drought or saltwater intrusion (ghost forests) have an increased risk for wildfire (Velasquez-Manoff 2019).

Figure 25 displays wildfire hazard areas in the Mid-East Region. Both wildland-urban interface areas (transition zones between wilderness and land developed by human activity) and intermix areas (zones where houses and wildland vegetation directly intermingle) are shown. The map illustrates that wildfire risk is present in throughout the region and is often highest outside of metropolitan areas where develop transitions back to natural lands.

To explore the Mid-East Region's specific exposure to wildfire, visit Mid East Region - Resilience Portfolio Web Map (arcgis.com).

Figure 25. Wildland Urban Interface/Intermix Wildfire Hazard Area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DUPLIN COUNTY
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NC-121
US-17
NC-171
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DEPARTMENT OF PUBLIC SAFETY
EDA
Data Sources:USGS - 2018/2002; ESRI - 2002;
NC One Map - 2011/2021; NOAA - 2017;
NCFRIS - 2022; UofWisc - 2010
Coordinate System: EPSG:2264;
NAD83 StatePlane North Carolina (US ft.)
LEGEND
Region
County
Major Roadway
Rail
Waterbody
Wildland Urban Interface/Intermix Wildfire Hazard Area
Interface
Intermix

C. Impact on Social Vulnerability and Equity, Health, and Safety

Wildfires have the potential to impact human health and the lives of residents and responders, structures, infrastructure, and natural resources. While the Evans Fire was active, the smoke emitted from the blaze led to Code Purple (very unhealthy) conditions for those living in the northeastern Coastal Plain (Davis 2015). Air quality diminishes considerably in the event of a wildfire, which can exacerbate chronic respiratory illnesses in vulnerable populations who are exposed to smoke. The most immediately vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment. First responders and those living near the fire epicenter are exposed to the dangers from the initial incident and after-effects of smoke inhalation and heat stroke.

D. Impact on Housing, Critical Infrastructure, and Community Support Systems

Buildings and critical facilities located in or adjacent to wooded areas are exposed and considered vulnerable to wildfires. Buildings constructed of wood or vinyl siding are generally more likely to be impacted by the fire hazard than buildings constructed of brick or concrete.

E. Impact on Economy

Wildfire events can have major economic impacts on a community from the initial loss of structures and the subsequent loss of revenue from destroyed businesses. These events may cost thousands of taxpayer dollars to suppress and control and may involve hundreds of operating hours on fire apparatus and thousands of volunteer hours from volunteer firefighters. There are also many direct and indirect costs to local businesses that excuse volunteers from working to fight these fires.

F. Impact on Natural Environmental Systems

According to the USGS, post-fire runoff polluted with debris and contaminants can be extremely harmful to ecosystem and aquatic life. Studies show that urban fires are more harmful to the environment compared to forest fires (USGS 2018).

G. Cascading Impacts on Other Hazards

Wildfires can increase the probability of other natural disasters, specifically floods and mudflows. Wildfires, particularly large-scale fires, can dramatically alter the terrain and ground conditions, making land already devastated by fire susceptible to floods. Lands impacted by wildfire increase the risk of flooding and mudflow in those areas impacted by wildfire. Normally, vegetation absorbs rainfall, reducing runoff. However, wildfires leave the ground charred, barren, and unable to absorb water, thus creating conditions perfect for flash flooding and mudflows. Flood risk in these impacted areas remains significantly higher until vegetation is restored, which can take up to five years after a wildfire.

Wildfires can often make flooding more severe, as debris and ash left from the fire can form mudflows. During and after a rain event, as water moves across charred and denuded ground, it can also pick up soil and sediment and carry it in a stream of floodwaters. These mudflows have the potential to cause significant damage to impacted areas. Areas directly affected by fires and those located below or downstream of burn areas are most at risk for flooding (FEMA 2016).

H. Future Changes That May Impact Regional Vulnerability to Wildfire

Projected Development

Development in forested areas may expose more structures to the wildfire hazard in the Mid-East Region. Improved building codes and standards, as well as forest management strategies, may allow for decreased impacts on new structures.

Projected Changes in Population

The Mid-East Region's population is expected to grow at a slower rate, which will gradually expose more people to the wildfire hazard. Much of this growth will be in the more urban Pitt County, which falls within the Neuse River region. The Southern Wildfire Risk Assessment estimates that 98.8 percent of the Neuse River Region's population lives within the Wildland-Urban Interface (WUI), an area that marks the spatial extent of wildfire risk (Neuse River Regional Hazard Mitigation Plan 2020). Approximately 16,667 people in Pitt County currently live in the Wildland-Urban Interface. See Table 127 in ***Appendix A: Additional Data*** for more information on those living in the Wildland-Urban Interface.

Climate Change Impacts

The Mid-East Region can expect warmer and drier conditions which may increase the frequency and intensity of wildfires. Higher temperatures are expected to increase the amount of moisture that evaporates from land and water. These changes have the potential to lead to more frequent and severe droughts, which, in turn, increases the likelihood of wildfires (EPA n.d.). Longer dry seasons and multi-year droughts could create triggers for wildfires. Increased temperature and change in precipitation will also affect fuel moisture during wildfire season and the length of time during which wildfires can burn during a given year (James M. Vose 2012).

Sea level rise can also increase the frequency and intensity of wildfires through the creation of coastal "ghost forests." As saltwater migrates further inland, freshwater dependent vegetation will die from salt exposure, leaving behind dried vegetation that can be fuel for wildfires. Ghost forests have been reported in places like the Albemarle-Pamlico Estuary (Oleniacz 2020), increasing the likelihood that the Mid-East Region may be exposed to more wildfires in the future.

Climate change may also increase the frequency of lightning strikes. A warmer atmosphere holds more moisture which is one of the key items for triggering a lightning strike. Lightning strikes cause approximately half the wildfires in the United States. If the frequency of lightning strikes increases, the potential for wildfires from these strikes also increases. Wildfire incidents are predicted to increase throughout the United States due to climate change, causing at least a doubling of areas burned within the next century.

I. Additional Data Needs

Key gaps in data and understanding that were identified during review of available scientific information and public and stakeholder meetings included:

- State-level fire statistics were used as the best available data. Region-specific statistics would provide a more thorough assessment.
- Mapping of areas of anticipated future development would allow for better understanding of changes in exposure to the WUI.

XII. KEY TAKEAWAYS FOR REGIONAL CLIMATE HAZARD RESILIENCE

As a low-lying coastal community, the Mid-East Region's vulnerability to flooding and other coastal hazards is not surprising. Hazards such as storm surge, erosion, and severe winds are common occurrences, and residents and officials alike are generally prepared to manage the impacts of these hazards.

Coastal hazards are changing, however, as the global climate warms. This means that the hazards experienced across the Mid-East Region will be different in the future than what they have been in the past. While hurricanes and tropical storms may not be increasing significantly in frequency, they are increasing measurably in their intensity. Storm surge, flooding, winds, and the cascading impacts of tropical storms are all becoming more impactful as these weather events intensify.

A. Areas of Greatest Concern in the Region by Hazard

While climate hazards as a whole pose a regional concern, each hazard discussed in this assessment has unique impacts which affect specific locations. Below is a list of the climate-related hazards and impacts which pose the greatest threat to the Mid-East Region:

Drought

- The areas surrounding Williamston and west of Greenville are reliant on surface water and are at higher risk to the impacts of severe drought.
- Droughts could pose significant risk to the region's agricultural industry.

Extreme Temperature

- Due to climate change, extreme heat events are likely to become more frequent and severe in the region, while extreme cold events should become less frequent and less severe.
- Populations that lack proper heating and cooling are most at risk during extreme temperature events.
- Droughts associated with extreme heat events could pose significant risk to the region's agricultural industry.

Flood

- The region is exposed to various types of flooding, with coastal flooding and stormwater flooding being the largest concerns.
- Heavy rainfall is becoming more frequent in the Mid-East Region.
- Stormwater components are not designed to handle larger rainfall and can be damaged or contribute to stormwater flooding.

Hurricanes and Severe Storms

- The region experiences a variety of severe weather events, including numerous secondary hazards like wind, lightning, and hail.
- These events have led to significant damages and impacts, many taking years to recover.
- The frequency and severity of these events are likely to increase in the future due to climate change.

Sea Level Rise

- Sea level rise is likely to increase the frequency and severity of coastal flooding. Flood maps do not account for sea level rise and therefore under-represent future risk. The region's rate of sea level rise

(roughly 0.18 inches per year) is higher than the global average and roughly twice as fast as the southern portions of the state (NC Climate Science 2020).

Tornado

- All the Mid-East Region is exposed to tornadoes and high wind. The Mid-East Region is in FEMA Wind Zone III, where wind speeds can reach up to 200 mph (NIST 2011).
- Climate change is warming the atmosphere in the Mid-East Region, meaning storms have potential to be more intense and occur more often.

Wildfire

- Increasing frequency and severity of wildfire will lead to increased damage to natural systems and potential damage to structures.
- Projected increases in wildfire risks and associated emissions can have harmful impacts on health.

B. Future Considerations and Concerns

The time to invest in resilience actions is now. There exists a tremendous need to:

- Strengthen the community's capacity to prepare for and respond to disasters.
- Increase and enhance natural lands across the region to help manage water.
- Provide resilience education to residents, businesses, government staff, and elected officials.
- Seek out and secure funding for projects that will enhance the region's capacity to withstand and recover from disasters while simultaneously building a strong regional economy.

C. Considerations for Resilience Portfolio Development

By investing in regional resilience, the Mid-East Region can increase safety for residents and businesses, enhance its natural resources, continue building a strong regional economy, and upgrade infrastructure and utilities. Regional resilience is an opportunity for the Mid-East Region to build a strong, safe, and prosperous future.

Appendix A: Additional Data

Table 4. Total Population

Total Population in Mid-East Region	
Counties	**Total Population (2020 Decennial Census Population)**
Beaufort County	44,652
Bertie County	17,934
Hertford County	21,552
Martin County	22,031
Pitt County	170,243
Mid-East Region (Total)	**276,412**

Table 5. Total Vulnerable Population

	Total Vulnerable Population in Mid-East Region							
Counties	**Number of Persons Over 65**	**Number of Persons Below 5**	**Number of Persons Below Poverty Level**	**Number of Persons With a Disability**	**Number of Persons Limited English Speaking**	**Number of Persons Without Vehicle**	**Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)**	**Number of Persons 16 and Over Commuting to Work by Walking**
Beaufort County	11,013	2,338	8,689	8,468	263	1,379	20	325
Bertie County	4,244	825	4,181	4,054	18	789	64	117
Hertford County	4,653	1,109	4,786	4,726	62	816	27	313
Martin County	5,097	1,252	4,463	4,306	40	753	12	114
Pitt County	22,859	10,377	39,314	24,088	1,063	6,073	1,048	1,034
Mid-East Region (Total)	**47,866**	**15,901**	**61,433**	**45,642**	**1,446**	**9,810**	**1,171**	**1,903**

Table 6. Critical Facilities by Facility Type

Critical Facilities by Facility Type in Mid-East Region										
		Facility Type								
Counties	Total Critical Facilities Per County	Education Facilities	Facilities with Impacts to Public Health and Environmental Systems	Healthcare Facilities	Historic and Cultural Resource Facilities	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	21	10	58	19	37	50	25	78	49
Bertie County	185	12	6	39	22	22	31	8	27	18
Hertford County	207	14	3	36	39	11	27	14	45	18
Martin County	190	13	13	34	29	2	25	4	45	25
Pitt County	668	59	22	172	54	4	89	33	124	111
Mid-East Region (Total)	**1,597**	**119**	**54**	**339**	**163**	**76**	**222**	**84**	**319**	**221**

Table 7. Public Service Facilities

Public Service Facilities in Mid-East Region	
Public Service Facility	**Total Public Service Facilities**
EMS	71
EOC	5
Fire Stations	82
Library	18
Police	41
Public Health Department	5
Mid-East Region (Total)	222

Table 8. Education Facilities

Education Facilities in Mid-East Region	
Education Facility	**Total Education Facilities**
College and University	6
Private School	34
Public School	79
Mid-East Region (Total)	119

Table 9. Health Care Facilities

Health Care Facilities in Mid-East Region	
Health Care Facility	Total Health Care Facilities
Hospital	5
Medical Facility	247
Pharmacy	87
Mid-East Region (Total)	339

Table 10. Historic and Cultural Resource Facilities

Historic and Cultural Resource Facilities in Mid-East Region	
Historic and Cultural Resource Facility	**Total Historic and Cultural Resource Facilities**
Historical Site	163
Mid-East Region (Total)	163

Table 11. Facilities with Impacts to Public Health and Environmental Systems

Facilities with Impacts to Public Health and Environmental Systems in Mid-East Region	
Facility with Impacts to Public Health and Environmental Systems	**Total Facilities with Impacts to Public Health and Environmental Systems**
Septage Facility	21
Solid Landfill	21
Yard Waste Facility	12
Mid-East Region (Total)	54

Table 12. Major Economic Development Asset Facilities

Major Economic Development Asset Facilities in Mid-East Region	
Major Economic Development Asset Facility	Total Major Economic Development Asset Facilities
Port Facility	76
Mid-East Region (Total)	76

Table 13. Transportation Facilities

Transportation Facilities in Mid-East Region	
Transportation Facility	Total Transportation Facilities
Aircraft Landing Facility	51
Airport	1
Bus Station	5
Ferry Terminal	6
Highway Bridges	23
Mid-East Region (Total)	86

Table 14. Utilities

Utilities in Mid-East Region	
Utility	**Total Utilities**
AM Transmission Tower	9
Cellular Tower	78
FM Transmission Tower	18
Gas Plant	2
Power Plant	63
Sewer Treatment Plant	20
Substation	129
Mid-East Region (Total)	319

Table 15. Vulnerable Population Facilities

Vulnerable Population Facilities in Mid-East Region	
Vulnerable Population Facility	**Total Vulnerable Population Facilities**
Emergency Shelter	88
Mobile Homes	31,298
Nursing Homes	33
Mid-East Region (Total)	31,419

Table 16. Total Number of Emergency Shelters

Total Number of Emergency Shelters in Mid-East Region	
Beaufort County	17
Bertie County	12
Hertford County	8
Martin County	14
Pitt County	37
Mid-East Region (Total)	88

Table 17. Miles of Critical Infrastructure by General Category

Miles of Critical Infrastructure by General Category in Mid-East Region	
Transportation Routes	**Miles of Infrastructure**
NC Route	601
US Route	490
Interstate	-
Railroad	232
Mid-East Region (Total)	1,323
Evacuation Routes	
Roadway	466
Ferry	4
Mid-East Region (Total)	470

Table 18. Total Length of Critical Infrastructure (Miles)

Total Length of Critical Infrastructure in Mid-East Region (Miles)				
Counties	**Roadway**	**Rail**	**Evacuation (Road)**	**Evacuation (Ferry)**
Beaufort County	1,334	123	87	4
Bertie County	818	10	103	-
Hertford County	616	46	67	-
Martin County	918	51	85	-
Pitt County	1,935	1	124	-

Total Length of Critical Infrastructure in Mid-East Region (Miles)				
Counties	Roadway	Rail	Evacuation (Road)	Evacuation (Ferry)
Mid-East Region (Total)	5,621	231	466	4

Table 19. Total Area of Historic Districts (Acres)

Total Area of Historic Districts in Mid-East Region (Acres)	
Counties	Historic District Area
Beaufort County	325
Bertie County	-
Hertford County	42
Martin County	-
Pitt County	57
Mid-East Region (Total)	424

Table 20. Total Number of Buildings

Buildings in Mid-East Region	
Counties	Total Number of Buildings per County
Beaufort County	37,945
Bertie County	17,982
Hertford County	16,796
Martin County	20,456
Pitt County	82,414
Mid-East Region (Total)	175,593

Table 21. Number of Buildings by General Occupancy

Counties	Number of Buildings by General Occupancy in Mid-East Region							
	General Occupancy							
	Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	32,758	2,147	1,695	181	477	188	498	1
Bertie County	13,771	1,393	2,124	81	198	68	347	-
Hertford County	13,912	562	1,679	112	186	126	219	-
Martin County	14,416	1,251	3,708	212	266	70	533	-
Pitt County	71,699	4,532	4,026	306	511	343	997	-
Mid-East Region (Total)	**146,556**	**9,885**	**13,232**	**892**	**1,638**	**795**	**2,594**	**1**

Table 22. Number of Mobile Homes

Mobile Homes in Mid-East Region		
Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County
Beaufort County	25	9,495
Bertie County	2	3,197
Hertford County	6	2,867
Martin County	8	2,205
Pitt County	59	13,434
Mid-East Region (Total)	100	31,198

Table 23. Total Vulnerable Population Located in the 1-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the 1-Percent Annual Chance Flood Hazard Area									
		Total Population in Hazard Area	Vulnerable Population Category								
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	7,941	1,958	416	1,545	1,506	47	245	4	58
Bertie County	17,934	4,752	1,125	219	1,108	1,074	5	209	17	31
Hertford County	21,552	4,192	905	216	931	919	12	159	5	61
Martin County	22,031	4,722	1,092	268	957	923	9	161	3	24
Pitt County	170,243	33,058	4,439	2,015	7,634	4,677	206	1,179	204	201
Mid-East Region (Total)	276,412	54,665	9,519	3,134	12,175	9,099	279	1,953	233	375

Table 24. Total Vulnerable Population Located in the 0.2-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the 0.2-Percent Annual Chance Flood Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	9,662	2,383	506	1,880	1,832	57	298	4	70
Bertie County	17,934	4,945	1,170	227	1,153	1,118	5	218	18	32
Hertford County	21,552	4,321	933	222	960	948	12	164	5	63
Martin County	22,031	4,858	1,124	276	984	950	9	166	3	25
Pitt County	170,243	37,038	4,973	2,258	8,553	5,241	231	1,321	228	225
Mid-East Region (Total)	276,412	60,824	10,583	3,489	13,530	10,089	314	2,167	258	415

Table 25. Total Vulnerable Population with SVI Ranking 0.5001 – 0.75 Located in the 1-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Ranking 0.5001 - 0.75 Located in the 1-Percent Annual Chance Flood Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	8,488	749	115	549	687	30	70	1	19
Bertie County	17,934	1,614	135	23	72	114	-	11	-	1
Hertford County	21,552	3,536	140	33	108	124	-	14	-	-
Martin County	22,031	5,499	594	109	542	494	8	102	-	25
Pitt County	170,243	28,483	1,119	435	2,222	1,236	40	426	51	68
Mid-East Region (Total)	276,412	47,620	2,737	715	3,493	2,655	78	623	52	113

Table 26. Total Vulnerable Population with SVI Ranking 0.5001 – 0.75 Located in the 0.2-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Ranking 0.5001 - 0.75 Located in the 0.2-Percent Annual Chance Flood Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	10,278	907	139	664	831	36	85	1	23
Bertie County	17,934	1,673	140	24	75	119	-	12	-	1
Hertford County	21,552	3,538	140	33	108	124	-	14	-	-
Martin County	22,031	5,687	614	113	560	511	8	106	-	26
Pitt County	170,243	30,872	1,212	471	2,409	1,340	44	462	55	74
Mid-East Region (Total)	276,412	52,048	3,013	780	3,816	2,925	88	679	56	124

Table 27. Total Vulnerable Population with SVI Ranking > 0.7501 Located in the 1-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Ranking > 0.7501 Located in the 1-Percent Annual Chance Flood Hazard Area								
			Vulnerable Population Category							
		Total Population in Hazard Area	Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	8,365	536	189	714	459	17	159	-	34
Bertie County	17,934	5,687	869	182	1,072	882	6	211	20	34
Hertford County	21,552	4,369	770	183	836	805	13	148	5	63
Martin County	22,031	4,735	362	123	289	301	2	72	3	3
Pitt County	170,243	49,364	1,842	907	3,906	2,105	68	625	95	110
Mid-East Region (Total)	276,412	72,520	4,379	1,584	6,817	4,552	106	1,215	123	244

Table 28. Total Vulnerable Population with SVI Ranking > 0.7501 Located in the 0.2-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Ranking > 0.7501 Located in the 0.2-Percent Annual Chance Flood Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	8,844	567	199	755	486	18	168	-	36
Bertie County	17,934	5,921	905	189	1,116	918	6	219	21	36
Hertford County	21,552	4,533	799	190	868	836	13	153	6	66
Martin County	22,031	4,852	370	126	296	309	2	74	3	3
Pitt County	170,243	58,543	2,185	1,076	4,632	2,497	81	742	112	131
Mid-East Region (Total)	276,412	82,693	4,826	1,780	7,667	5,046	120	1,356	142	272

Table 29. Total Number of Critical Facilities within the Region Located in the 1-Percent Annual Chance Flood Hazard Area

Total Number of Critical Facilities within the Region Located in the 1-Percent Annual Chance Flood Hazard Area											
			Facility Type								
Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Education Facilities	Facilities with Impacts to Public Health and Environmental Systems	Healthcare Facilities	Historic and Cultural Resource Facilities	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	60	1	1	13	2	5	8	12	11	7
Bertie County	185	32	-	1	1	1	21	3	2	2	1
Hertford County	207	16	-	-	-	-	10	-	3	2	1
Martin County	190	8	-	1	-	-	2	-	1	4	-
Pitt County	668	54	3	2	8	1	4	2	7	18	9
Mid-East Region (Total)	1,597	170	4	5	22	4	42	13	25	37	18

Table 30. Total Number of Critical Facilities within the Region Located in the 0.2-Percent Annual Chance Flood Hazard Area

Total Number of Critical Facilities within the Region Located in the 0.2-Percent Annual Chance Flood Hazard Area											
Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Facility Type								
			Education Facilities	Facilities with Impacts to Public Health and Environmental Systems	Healthcare Facilities	Historic and Cultural Resource Facilities	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	100	2	2	14	2	28	11	16	13	12
Bertie County	185	46	-	1	4	3	22	8	2	5	1
Hertford County	207	22	-	2	1	-	10	-	4	3	2
Martin County	190	12	-	1	1	1	2	-	1	6	-
Pitt County	668	88	5	2	17	1	4	8	8	26	17
Mid-East Region (Total)	1,597	268	7	8	37	7	66	27	31	53	32

Table 31. Total Number of Public Service Facilities Located in the Flood Hazard Area

Total Number of Public Service Facilities Located in the Flood Hazard Area		
Essential Facilities	1-Percent Annual Chance	0.2-Percent Annual Chance
EOC	1	1
EMS	4	6
Fire Stations	4	8
Library	1	3
Police	3	7
Public Health Department	-	2
Mid-East Region (Total)	13	27

Table 32. Total Number of Education Facilities Located in the Flood Hazard Area

Total Number of Education Facilities Located in the Flood Hazard Area		
Education Facility	1-Percent Annual Chance	0.2-Percent Annual Chance
College and University	-	-
Private School	3	4
Public School	1	3
Mid-East Region (Total)	4	7

Table 33. Total Number of Health Care Facilities Located in the Flood Hazard Area

Total Number of Health Care Facilities Located in the Flood Hazard Area		
Health Care Facility	1-Percent Annual Chance	0.2-Percent Annual Chance
Hospital	1	1
Medical Facility	15	27
Pharmacy	6	9
Mid-East Region (Total)	22	37

Table 34. Total Number of Historic and Cultural Resource Facilities Located in the Flood Hazard Area

Total Number of Historic and Cultural Resource Facilities Located in the Flood Hazard Area		
Historic and Cultural Resource Facility	1-Percent Annual Chance	0.2-Percent Annual Chance
Historical Site	4	7
Mid-East Region (Total)	4	7

Table 35. Total Number of Facilities with Impacts to Public Health and Environmental Systems Located in the Flood Hazard Area

Total Number of Facilities with Impacts to Public Health and Environmental Systems Located in the Flood Hazard Area		
Facility with Impacts to Public Health and Environmental Systems	**1-Percent Annual Chance**	**0.2-Percent Annual Chance**
Septage Facility	2	2
Solid Landfill	1	1
Yard Waste Facility	2	5
Mid-East Region (Total)	5	8

Table 36. Total Number of Major Economic Development Asset Facilities Located in the Flood Hazard Area

Total Number of Major Economic Development Asset Facilities Located in the Flood Hazard Area		
Major Economic Development Asset Facility	1-Percent Annual Chance	0.2-Percent Annual Chance
Port Facility	42	66
Mid-East Region (Total)	42	66

Table 37. Total Number of Transportation Facilities Located in the Flood Hazard Area

Total Number of Transportation Facilities Located in the Flood Hazard Area		
Transportation Facility	1-Percent Annual Chance	0.2-Percent Annual Chance
Aircraft Landing Facility	9	12
Airport	1	1
Bus Station	-	-
Ferry Terminal	4	6
Highway Bridges	15	18
Mid-East Region (Total)	29	37

Table 38. Total Number of Utilities Located in the Flood Hazard Area

Total Number of Utilities Located in the Flood Hazard Area		
Utility	1-Percent Annual Chance	0.2-Percent Annual Chance
AM Transmission Tower	4	6
Cellular Tower	12	12
FM Transmission Tower	2	5
Gas Plant	2	2
Power Plant	1	3
Sewer Treatment Plant	6	9
Substation	10	16
Mid-East Region (Total)	37	53

Table 39. Total Number of Vulnerable Population Facilities Located in the Flood Hazard Area

Total Number of Vulnerable Population Facilities Located in the Flood Hazard Area		
Vulnerable Population Facility	1-Percent Annual Chance	0.2-Percent Annual Chance
Emergency Shelter	5	6
Mobile Homes	2,866	4,644
Nursing Homes	2	3
Mid-East Region (Total)	2,873	4,653

Table 40. Total Number of Emergency Shelters Located in the 1-Percent Annual Chance Flood Hazard Area

Total Number of Emergency Shelters Located in the 1-Percent Annual Chance Flood Hazard Area	
Beaufort County	4
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	1
Mid-East Region (Total)	5
Facility Name	**County**
B C Ed Tech Center	Beaufort
S W Snowden Elem	Beaufort
Northside Hs	Beaufort
P S Jones Middle	Beaufort
Aurora Middle	Beaufort
Greenville National Guard Armory	Pitt

Table 41. Total Number of Emergency Shelters Located in the 0.2-Percent Annual Chance Flood Hazard Area

Total Number of Emergency Shelters Located in the 0.2-Percent Annual Chance Flood Hazard Area	
Beaufort County	5
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	1
Mid-East Region (Total)	6
Facility Name	**County**
B C Ed Tech Center	Beaufort
S W Snowden Elem	Beaufort
Northside Hs	Beaufort
P S Jones Middle	Beaufort
Aurora Middle	Beaufort
Greenville National Guard Armory	Pitt

Table 42. Miles of Critical Infrastructure by General Category in the Flood Hazard Area

Miles of Critical Infrastructure by General Category in the Flood Hazard Area		
Transportation Routes	1-Percent Annual Chance	0.2-Percent Annual Chance
NC Route	36	53
US Route	46	61
Interstate	-	-
Railroad	28	39
Region Total	110	153
Evacuation Routes		
Roadway	41	55
Ferry	-	-
Mid-East Region (Total)	41	55

Table 43. Total Length of Critical Infrastructure within the Region Located in the 1-Percent Annual Chance Flood Hazard Area

Total Length of Critical Infrastructure within the Region Located in the 1-Percent Annual Chance Flood Hazard Area				
Counties	Roadway	Rail	Evacuation (Roadway)	Evacuation (Ferry')
Beaufort County	36	14	17	-
Bertie County	16	8	11	-
Hertford County	2	1	1	-
Martin County	4	6	1	-
Pitt County	23	-	11	-
Mid-East Region (Total)	81	29	41	-

Table 44. Total Length of Critical Infrastructure within the Region Located in the 0.2-Percent Annual Chance Flood Hazard Area

Total Length of Critical Infrastructure within the Region Located in the 0.2-Percent Annual Chance Flood Hazard Area				
Counties	Roadway	Rail	Evacuation (Road)	Evacuation (Ferry)
Beaufort County	47	17	20	-
Bertie County	20	10	13	-
Hertford County	3	1	2	-
Martin County	6	10	2	-
Pitt County	38	-	18	-
Mid-East Region (Total)	114	38	55	-

Table 45. Total Area of Historic Districts in the Flood Hazard Area (Acres)

Total Area of Historic Districts in the Flood Hazard Area (Acres)		
Counties	1-Percent Annual Chance	0.2-Percent Annual Chance
Beaufort County	325	325
Bertie County	-	-
Hertford County	-	-
Martin County	-	-
Pitt County	-	-
Mid-East Region (Total)	325	325

Table 46. Number of Residential Buildings Built Pre-FIRM Located in the 1-Percent Annual Chance Flood Hazard Area

Counties	Total Number of Buildings per County	Number of Residential Buildings Built Pre-FIRM Located in the 1-Percent Annual Chance Flood Hazard Area	Percentage of Residential Buildings Built Pre-FIRM Located in the 1-Percent Annual Chance Flood Hazard Area
Beaufort County	37,945	601	1.58%
Bertie County	17,982	116	.65%
Hertford County	16,796	188	1.12%
Martin County	20,456	251	1.23%
Pitt County	82,414	1,276	1.55%
Mid-East Region (Total)	175,593	2,432	1.39%

Table 47. Number of Buildings by General Occupancy Located in the 1-Percent Annual Chance Flood Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the 1-Percent Annual Chance Flood Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	4,601	456	210	6	80	24	62	-
Bertie County	17,982	476	135	59	3	7	6	25	-
Hertford County	16,796	218	17	50	-	-	1	3	-
Martin County	20,456	251	34	114	-	2	1	19	-
Pitt County	82,414	2,391	387	245	1	31	37	77	-
Mid-East Region (Total)	175,593	7,937	1,029	678	10	120	69	186	-

Table 48. Number of Buildings by General Occupancy Located in the 0.2-Percent Annual Chance Flood Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the 0.2-Percent Annual Chance Flood Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	5,990	557	391	10	105	31	91	-
Bertie County	17,982	767	200	83	12	14	17	40	-
Hertford County	16,796	376	23	54	-	3	1	10	-
Martin County	20,456	377	51	136	1	8	3	26	-
Pitt County	82,414	3,844	613	319	3	46	109	114	-
Mid-East Region (Total)	175,593	11,354	1,444	983	26	176	161	281	-

Table 49. Number of Mobile Home Parks and Mobile Home Buildings Located in the 1-Percent Annual Chance Flood Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the 1-Percent Annual Chance Flood Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	2	1,415
Bertie County	2	3,197	-	89
Hertford County	6	2,867	1	79
Martin County	8	2,205	-	40
Pitt County	59	13,434	8	1,232
Mid-East Region (Total)	100	31,198	11	2,855

Table 50. Number of Mobile Home Parks and Mobile Home Buildings Located in the 0.2-Percent Annual Chance Flood Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the 0.2-Percent Annual Chance Flood Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	5	1,825
Bertie County	2	3,197	-	143
Hertford County	6	2,867	2	107
Martin County	8	2,205	-	60
Pitt County	59	13,434	16	2,486
Mid-East Region (Total)	100	31,198	23	4,621

Table 51. Total Area of Agricultural Land Located in the 1-Percent Annual Chance Flood Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the 1-Percent Annual Chance Flood Hazard Area (Acres)
Beaufort	144,704	12,396
Bertie	103,292	5,484
Hertford	59,936	1,562
Martin	91,588	3,486
Pitt	158,935	13,494
Mid-East Region (Total)	558,456	36,422

Table 52. Total Area of Agricultural Land Located in the 0.2-Percent Annual Chance Flood Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the 0.2-Percent Annual Chance Flood Hazard Area (Acres)
Beaufort	144,704	19,822
Bertie	103,292	6,611
Hertford	59,936	1,929
Martin	91,588	3,715
Pitt	158,935	17,891
Mid-East Region (Total)	558,456	49,968

Table 53. Total Vulnerable Population Located in the SLOSH Category 1 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the SLOSH Category 1 Hazard Area								
			Vulnerable Population Category							
		Total Population in Hazard Area	Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	6,352	1,567	333	1,236	1,205	37	196	3	46
Bertie County	17,934	1,213	239	43	203	217	1	42	3	8
Hertford County	21,552	935	99	23	116	112	2	16	1	8
Martin County	22,031	1,456	220	48	185	178	3	39	-	7
Pitt County	170,243	2,847	76	35	154	78	4	14	7	2
Mid-East Region (Total)	276,412	12,803	2,201	482	1,894	1,789	46	307	13	71

Table 54. Total Vulnerable Population with SVI Tracts Ranking 0.5001 – 0.75 Located in the SLOSH Category 1 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Tracts Ranking 0.5001 - 0.75 Located in the SLOSH Category 1 Hazard Area								
			Vulnerable Population Category							
		Total Population in Hazard Area	Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	6,593	582	89	426	533	23	55	1	15
Bertie County	17,934	330	28	5	15	23	-	2	-	-
Hertford County	21,552	-	-	-	-	-	-	-	-	-
Martin County	22,031	2,260	244	45	223	203	3	42	-	10
Pitt County	170,243	-	-	-	-	-	-	-	-	-
Mid-East Region (Total)	276,412	9,183	854	139	664	759	26	99	1	25

Table 55. Total Vulnerable Population with SVI Tracts Ranking > 0.7501 Located in the SLOSH Category 1 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Tracts Ranking > 0.7501 Located in the SLOSH Category 1 Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	5,531	355	125	472	304	11	105	-	22
Bertie County	17,934	1,479	168	32	181	160	1	40	4	9
Hertford County	21,552	1,191	126	30	148	143	2	20	1	10
Martin County	22,031	16	1	-	-	1	-	-	-	-
Pitt County	170,243	6,271	31	26	87	40	1	3	2	-
Mid-East Region (Total)	276,412	14,488	681	213	888	648	15	168	7	41

Table 56. Total Vulnerability Population Located in the SLOSH Category Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the SLOSH Category 2 Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	12,982	3,202	680	2,526	2,462	76	401	6	94
Bertie County	17,934	1,452	286	51	243	260	1	50	4	9
Hertford County	21,552	1,111	117	28	138	133	2	19	1	10
Martin County	22,031	2,525	500	112	430	415	4	69	-	12
Pitt County	170,243	5,544	283	135	649	323	14	89	20	24
Mid-East Region (Total)	276,412	23,614	4,388	1,006	3,986	3,593	97	628	31	149

Table 57. Total Vulnerable Population with SVI Tracts Ranking 0.5001 – 0.75 Located in the SLOSH Category 2 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Tracts Ranking 0.5001 - 0.75 Located in the SLOSH Category 2 Hazard Area								
			Vulnerable Population Category							
		Total Population in Hazard Area	Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	14,426	1,274	195	932	1,167	51	120	1	33
Bertie County	17,934	364	31	5	16	26	-	3	-	-
Hertford County	21,552	-	-	-	-	-	-	-	-	-
Martin County	22,031	3,567	385	71	352	321	5	66	-	17
Pitt County	170,243	291	3	1	11	4	-	2	-	1
Mid-East Region (Total)	276,412	18,648	1,693	272	1,311	1,518	56	191	1	51

Table 58. Total Vulnerable Population with SVI Tracts Ranking > 0.7501 Located in the SLOSH Category 2 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Tracts Ranking > 0.7501 Located in the SLOSH Category 2 Hazard Area								
			Vulnerable Population Category							
		Total Population in Hazard Area	Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	7,316	469	165	625	402	15	139	-	29
Bertie County	17,934	1,780	202	38	218	192	2	49	4	11
Hertford County	21,552	1,415	149	36	176	169	2	24	1	12
Martin County	22,031	1,501	65	20	43	49	-	13	-	-
Pitt County	170,243	13,678	318	188	708	386	14	113	16	26
Mid-East Region (Total)	276,412	25,690	1,203	447	1,770	1,198	33	338	21	78

Table 59. Total Vulnerable Population Located in the SLOSH Category 3 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the SLOSH Category 3 Hazard Area								
			Vulnerable Population Category							
		Total Population in Hazard Area	Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	20,859	5,145	1,092	4,059	3,956	123	644	9	152
Bertie County	17,934	1,965	465	90	458	444	2	86	7	13
Hertford County	21,552	1,711	245	60	287	282	5	51	2	19
Martin County	22,031	3,039	602	134	518	499	5	83	-	14
Pitt County	170,243	10,755	725	334	1,488	805	33	199	41	51
Mid-East Region (Total)	276,412	38,329	7,182	1,710	6,810	5,986	168	1,063	59	249

Table 60. Total Vulnerable Population with SVI Tracts Ranking 0.5001 – 0.75 Located in the SLOSH Category 3 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Tracts Ranking 0.5001 - 0.75 Located in the SLOSH Category 3 Hazard Area									
		Total Population in Hazard Area	Vulnerable Population Category								
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	23,970	2,116	324	1,549	1,939	85	199	2	54
Bertie County	17,934	453	38	6	20	32	-	3	-	-
Hertford County	21,552	-	-	-	-	-	-	-	-	-
Martin County	22,031	4,098	442	81	404	368	6	76	-	19
Pitt County	170,243	1,422	22	6	64	27	1	10	1	3
Mid-East Region (Total)	276,412	29,943	2,618	417	2,037	2,366	92	288	3	76

Table 61. Total Vulnerable Population with SVI Tracts Ranking > 0.7501 Located in the SLOSH Category 3 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Tracts Ranking > 0.7501 Located in the SLOSH Category 3 Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	8,271	530	187	706	454	17	157	-	33
Bertie County	17,934	2,421	370	77	456	376	2	90	9	15
Hertford County	21,552	2,179	312	76	365	359	6	65	3	25
Martin County	22,031	2,431	105	33	70	79	1	20	-	-
Pitt County	170,243	28,599	666	393	1,481	808	30	236	34	55
Mid-East Region (Total)	276,412	43,901	1,983	766	3,078	2,076	56	568	46	128

Table 62. Total Vulnerable Population Located in the SLOSH Category 4 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the SLOSH Category 3 Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	22,730	5,606	1,190	4,423	4,311	134	702	10	165
Bertie County	17,934	2,276	539	105	531	514	2	100	8	15
Hertford County	21,552	1,913	274	67	320	315	5	57	2	22
Martin County	22,031	3,366	667	149	573	553	6	92	-	16
Pitt County	170,243	15,209	1,026	473	2,104	1,138	47	282	58	73
Mid-East Region (Total)	276,412	45,494	8,112	1,984	7,951	6,831	194	1,233	78	291

Table 63. Total Vulnerable Population with SVI Tracts Ranking 0.5001 – 0.75 Located in the SLOSH Category 4 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Tracts Ranking 0.5001 - 0.75 Located in the SLOSH Category 4 Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	25,411	2,243	344	1,642	2,056	90	211	2	57
Bertie County	17,934	490	41	7	22	35	-	3	-	-
Hertford County	21,552	-	-	-	-	-	-	-	-	-
Martin County	22,031	4,440	479	88	437	399	6	82	-	21
Pitt County	170,243	2,266	35	10	102	43	2	16	1	5
Mid-East Region (Total)	276,412	32,607	2,798	449	2,203	2,533	98	312	3	83

Table 64. Total Vulnerable Population with SVI Tracts Ranking > 0.7501 Located in the SLOSH Category 4 Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Tracts Ranking > 0.7501 Located in the SLOSH Category 4 Hazard Area									
		Total Population in Hazard Area	Vulnerable Population Category								
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	9,109	584	205	778	500	18	173	-	37
Bertie County	17,934	2,814	430	90	531	437	3	104	10	17
Hertford County	21,552	2,436	349	85	408	401	7	73	3	27
Martin County	22,031	2,542	109	34	73	82	1	21	-	-
Pitt County	170,243	42,006	978	577	2,175	1,186	44	347	50	81
Mid-East Region (Total)	276,412	58,907	2,450	991	3,965	2,606	73	718	63	162

Table 65. Total Number of Public Service Facilities Located in the SLOSH Storm Surge Hazard Areas

Total Number of Public Service Facilities Located in the SLOSH Storm Surge Hazard Areas				
Public Service Facilities	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
EMS	2	8	11	14
EOC	-	1	1	2
Fire Stations	3	7	9	10
Library	1	3	5	6
Police	1	4	6	9
Public Health Department	-	-	-	-
Mid-East Region (Total)	7	23	32	41

Table 66. Total Number of Education Facilities Located in the SLOSH Storm Surge Hazard Areas

Total Number of Education Facilities Located in the SLOSH Storm Surge Hazard Areas				
Education Facility	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
College and University	-	-	-	-
Private School	1	1	2	2
Public School	1	1	7	8
Mid-East Region (Total)	2	2	9	10

Table 67. Total Number of Health Care Facilities Located in the SLOSH Storm Surge Hazard Areas

Total Number of Health Care Facilities Located in the SLOSH Storm Surge Hazard Areas				
Health Care Facility	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
Hospital	-	1	1	1
Medical Facility	5	18	26	28
Pharmacy	3	6	9	12
Mid-East Region (Total)	8	25	36	41

Table 68. Total Number of Historic and Cultural Resource Facilities Located in the SLOSH Storm Surge Hazard Areas

Total Number of Historic and Cultural Resource Facilities Located in the SLOSH Storm Surge Hazard Areas				
Historic and Cultural Resource Facility	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
Historical Site	2	11	18	20
Mid-East Region (Total)	2	11	18	20

Table 69. Total Number of Facilities with Impacts to Public Health and Environmental Systems Located in the SLOSH Storm Surge Hazard Areas

Total Number of Facilities with Impacts to Public Health and Environmental Systems Located in the SLOSH Storm Surge Hazard Areas				
Facility with Impacts to Public Health and Environmental Systems	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
Septage Facility	1	1	1	1
Solid Landfill	-	-	3	4
Yard Waste Facility	1	1	3	3
Mid-East Region (Total)	2	2	7	8

Table 70. Total Number of Major Economic Development Asset Facilities Located in the SLOSH Storm Surge Hazard Areas

Total Number of Major Economic Development Asset Facilities Located in the SLOSH Storm Surge Hazard Areas				
Major Economic Development Asset Facility	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
Port Facility	12	18	19	20
Mid-East Region (Total)	12	18	19	20

Table 71. Total Number of Transportation Facilities Located in the SLOSH Storm Surge Hazard Areas

Total Number of Transportation Facilities Located in the SLOSH Storm Surge Hazard Areas				
Transportation Facility	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
Aircraft Landing Facility	9	12	12	12
Airport	-	-	-	-
Bus Station	-	1	1	1
Ferry Terminal	2	2	2	2
Highway Bridges	5	6	6	8
Mid-East Region (Total)	16	21	21	23

Table 72. Total Number of Utilities Located in the SLOSH Storm Surge Hazard Areas

Total Number of Utilities Located in the SLOSH Storm Surge Hazard Areas				
Utility	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
AM Transmission Tower	2	2	3	4
Cellular Tower	4	8	16	16
FM Transmission Tower	-	1	3	3
Gas Plant	-	1	1	1
Power Plant	-	-	4	6
Sewer Treatment Plant	1	4	6	7
Substation	2	7	17	21
Mid-East Region (Total)	9	23	50	58

Table 73. Total Number of Vulnerable Population Facilities Located in the SLOSH Storm Surge Hazard Areas

Total Number of Vulnerable Population Facilities Located in the SLOSH Storm Surge Hazard Areas				
Vulnerable Population Facility	SLOSH Category 1	SLOSH Category 2	SLOSH Category 3	SLOSH Category 4
Emergency Shelter	3	7	10	11
Mobile Homes	1,540	2,731	4,559	5,762
Nursing Homes	-	2	4	5
Mid-East Region (Total)	1,543	2,740	4,573	5,778

Table 74. Total Number of Critical Facilities within the Region Located in the SLOSH Category 1 Hazard Area

Total Number of Critical Facilities within the Region Located in the SLOSH Category 1 Hazard Area											
			Facility Type								
Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Education Facilities	Facilities with Impacts to Public Health and Environmental Systems	Healthcare Facilities	Historic and Cultural Resource Facilities	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	51	2	2	8	2	5	7	13	8	4
Bertie County	185	6	-	-	-	-	5	-	1	-	-
Hertford County	207	2	-	-	-	-	2	-	-	-	-
Martin County	190	1	-	-	-	-	-	-	-	1	-
Pitt County	668	-	-	-	-	-	-	-	-	-	-
Mid-East Region (Total)	1,597	60	2	2	8	2	12	7	14	9	4

Table 75. Total Number of Emergency Shelters Located in the SLOSH Category 1 Hazard Area

Total Number of Emergency Shelters Located in the SLOSH Category 1 Hazard Area		
Beaufort County		3
Bertie County		-
Hertford County		-
Martin County		-
Pitt County		-
Mid-East Region (Total)		3
Facility Name		County
B C Ed Tech Center		Beaufort
P S Jones Middle		Beaufort
Aurora Middle		Beaufort

Table 76. Miles of Critical Infrastructure in the SLOSH Category 1 Hazard Area

Miles of Critical Infrastructure in the SLOSH Category 1 Hazard Area	
Transportation Routes	Miles in Hazard
NC Route	17
US Route	20
Interstate	-
Railroad	13
Mid-East Region (Total)	50
Roadway	17
Ferry	-
Mid-East Region (Total)	17

Table 77. Total Miles of Critical Infrastructure per County within the Region in the SLOSH Category 1 Chance Flood Hazard Area

Total Miles of Critical Infrastructure Per County within the Region in the SLOSH Category 1 Chance Flood Hazard Area				
Counties	Roadway	Rail	Evacuation (Road)	Evacuation (Ferry)
Beaufort County	35	9	15	-
Bertie County	2	3	2	-
Hertford County	-	-	-	-
Martin County	-	-	-	-
Pitt County	-	-	-	-
Mid-East Region (Total)	37	13	17	-

Table 78. Total Area of Historic Districts in the SLOSH Category 1 Hazard Area

Total Area of Historic Districts in the SLOSH Category 1 Hazard Area	
Counties	Area (Acres)
Beaufort County	325
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	-
Mid-East Region (Total)	325

Table 79. Total Number of Critical Facilities within the Region Located in the SLOSH Category 2 Hazard Area

Total Number of Critical Facilities within the Region Located in the SLOSH Category 2 Hazard Area											
			Facility Type								
Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Education Facilities	Facilities with Impacts to Public Health and Environmental Systems	Healthcare Facilities	Historic and Cultural Resource Facilities	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	117	2	2	25	9	7	23	18	17	14
Bertie County	185	9	-	-	-	1	7	-	1	-	-
Hertford County	207	3	-	-	-	-	3	-	-	-	-
Martin County	190	4	-	-	-	-	1	-	-	3	-
Pitt County	668	4	-	-	-	1	-	-	-	3	-
Mid-East Region (Total)	1,597	137	2	2	25	11	18	23	19	23	14

Table 80. Total Number of Emergency Shelters Located in the SLOSH Category 2 Hazard Area

Total Number of Emergency Shelters Located in the SLOSH Category 2 Hazard Area		
Beaufort County		7
Bertie County		-
Hertford County		-
Martin County		-
Pitt County		-
Mid-East Region (Total)		7
Facility Name		**County**
B C Ed Tech Center		Beaufort
S W Snowden Elem		Beaufort
John C Tayloe Elem		Beaufort
P S Jones Middle		Beaufort
Aurora Middle		Beaufort
Northeast Elem		Beaufort
Northside Primary		Beaufort

Table 81. Miles of Critical Infrastructure in the SLOSH Category 2 Hazard Area

Miles of Critical Infrastructure in the SLOSH Category 2 Hazard Area	
Transportation Routes	Miles in Hazard
NC Route	41
US Route	37
Interstate	-
Railroad	29
Mid-East Region (Total)	107
Evacuation Routes	**Miles in Hazard**
Roadway	36
Ferry	-
Mid-East Region (Total)	36

Table 82. Total Miles of Critical Infrastructure per County within the Region in the SLOSH Category 2 Chance Flood Hazard Area

Total Miles of Critical Infrastructure Per County within the Region in the SLOSH Category 2 Chance Flood Hazard Area				
Counties	Roadway	Rail	Evacuation (Road)	Evacuation (Ferry)
Beaufort County	71	20	30	-
Bertie County	5	8	4	-

Total Miles of Critical Infrastructure Per County within the Region in the SLOSH Category 2 Chance Flood Hazard Area				
Counties	Roadway	Rail	Evacuation (Road)	Evacuation (Ferry)
Hertford County	-	-	-	-
Martin County	1	-	1	-
Pitt County	1	-	1	-
Mid-East Region (Total)	78	28	36	-

Table 83. Total Area of Historic Districts in the SLOSH Category 2 Hazard Area

Total Area of Historic Districts in the SLOSH Category 2 Hazard Area	
Counties	Area (Acres)
Beaufort County	325
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	-
Mid-East Region (Total)	325

Table 84. Total Number of Critical Facilities within the Region Located in the SLOSH Category 3 Hazard Area

Total Number of Critical Facilities within the Region Located in the SLOSH Category 3 Hazard Area											
			Facility Type								
Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Education Facilities	Facilities with Impacts to Public Health and Environmental Systems	Healthcare Facilities	Historic and Cultural Resource Facilities	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	174	9	5	32	15	8	30	20	32	23
Bertie County	185	16	-	-	3	1	7	2	-	2	1
Hertford County	207	5	-	-	-	-	3	-	-	1	1
Martin County	190	10	-	2	1	1	1	-	-	5	-
Pitt County	668	14	-	-	-	1	-	-	1	10	2
Mid-East Region (Total)	1,597	219	9	7	36	18	19	32	21	50	27

Table 85. Total Number of Emergency Shelters Located in the SLOSH Category 3 Hazard Area

Total Number of Emergency Shelters Located in the SLOSH Category 3 Hazard Area		
Beaufort County		10
Bertie County		-
Hertford County		-
Martin County		-
Pitt County		-
Mid-East Region (Total)		10
Facility Name		**County**
B C Ed Tech Center		Beaufort
S W Snowden Elem		Beaufort
Bath Elem		Beaufort
Eastern Elem		Beaufort
John C Tayloe Elem		Beaufort
P S Jones Middle		Beaufort
John Small Elem		Beaufort
Aurora Middle		Beaufort
Northeast Elem		Beaufort
Northside Primary		Beaufort

Table 86. Miles of Critical Infrastructure in the SLOSH Category 3 Hazard Area

Miles of Critical Infrastructure in the SLOSH Category 3 Hazard Area	
Transportation Routes	Miles in Hazard
NC Route	59
US Route	59
Interstate	-
Railroad	59
Mid-East Region (Total)	177
Evacuation Routes	**Miles in Hazard**
Roadway	58
Ferry	-
Mid-East Region (Total)	58

Table 87. Total Miles of Critical Infrastructure per County within the Region in the SLOSH Category 3 Chance Flood Hazard Area

Total Miles of Critical Infrastructure Per County within the Region in the SLOSH Category 3 Chance Flood Hazard Area				
Counties	Roadway	Rail	Evacuation (Road)	Evacuation (Ferry)
Beaufort County	97	48	40	-
Bertie County	12	10	11	-
Hertford County	1	-	1	-
Martin County	2	1	2	-
Pitt County	6	-	4	-
Mid-East Region (Total)	118	59	58	-

Table 88. Total Area of Historic Districts in the SLOSH Category 3 Hazard Area

Total Area of Historic Districts in the SLOSH Category 3 Hazard Area	
Counties	Area (Acres)
Beaufort County	325
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	-
Mid-East Region (Total)	325

Table 89. Total Number of Critical Facilities within the Region Located in the SLOSH Category 4 Hazard Area

Total Number of Critical Facilities within the Region Located in the SLOSH Category 4 Hazard Area											
			Facility Type								
Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Education Facilities	Facilities with Impacts to Public Health and Environmental Systems	Healthcare Facilities	Historic and Cultural Resource Facilities	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	187	9	6	33	15	8	32	20	35	29
Bertie County	185	27	-	-	4	3	8	7	1	3	1
Hertford County	207	5	-	-	-	-	3	-	-	1	1
Martin County	190	11	-	2	1	1	1	-	-	6	-
Pitt County	668	31	1	-	3	1	-	2	2	13	9
Mid-East Region (Total)	1,597	261	10	8	41	20	20	41	23	58	40

Table 90. Total Number of Emergency Shelters Located in the SLOSH Category 4 Hazard Area

Total Number of Emergency Shelters Located in the SLOSH Category 4 Hazard Area	
Beaufort County	10
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	1
Mid-East Region (Total)	11
Facility Name	**County**
B C Ed Tech Center	Beaufort
S W Snowden Elem	Beaufort
Bath Elem	Beaufort
Eastern Elem	Beaufort
John C Tayloe Elem	Beaufort
P S Jones Middle	Beaufort
John Small Elem	Beaufort
Aurora Middle	Beaufort
Northeast Elem	Beaufort
Northside Primary	Beaufort
Pactolus Elem	Pitt

Table 91. Miles of Critical Infrastructure in the SLOSH Category 4 Hazard Area

Miles of Critical Infrastructure in the SLOSH Category 4 Hazard Area	
Transportation Routes	Miles in Hazard
NC Route	68
US Route	80
Interstate	-
Railroad	76
Mid-East Region (Total)	224
Evacuation Routes	**Miles in Hazard**
Roadway	76
Ferry	-
Mid-East Region (Total)	76

Table 92. Total Miles of Critical Infrastructure per County within the Region in the SLOSH Category 4 Chance Flood Hazard Area

Total Miles of Critical Infrastructure Per County within the Region in the SLOSH Category 4 Chance Flood Hazard Area				
Counties	**Roadway**	**Rail**	**Evacuation (Road)**	**Evacuation (Ferry)**
Beaufort County	109	64	45	-
Bertie County	16	10	14	-
Hertford County	1	-	1	-
Martin County	4	2	3	-
Pitt County	18	-	13	-
Mid-East Region (Total)	147	76	76	-

Table 93. Total Area of Historic Districts in the SLOSH Category 4 Hazard Area

Total Area of Historic Districts in the SLOSH Category 4 Hazard Area	
Counties	Area (Acres)
Beaufort County	325
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	-
Mid-East Region (Total)	325

Table 94. Number of Buildings by General Occupancy Located in the SLOSH Category 1 Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the SLOSH Category 1 Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	4,683	368	170	6	64	19	63	-
Bertie County	17,982	43	14	1	-	-	-	1	-
Hertford County	16,796	70	-	-	-	-	-	1	-
Martin County	20,456	15	5	5	-	-	-	4	-
Pitt County	82,414	60	19	3	-	2	-	-	-
Mid-East Region (Total)	175,593	4,871	406	179	6	66	19	69	-

Table 95. Number of Buildings by General Occupancy Located in the SLOSH Category 2 Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the SLOSH Category 2 Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	9,550	884	695	26	165	68	167	-
Bertie County	17,982	96	27	7	2	-	2	4	-
Hertford County	16,796	93	-	1	-	-	-	1	-
Martin County	20,456	106	32	37	-	-	-	18	-
Pitt County	82,414	258	68	24	-	2	-	-	-
Mid-East Region (Total)	175,593	10,103	1,011	764	28	167	70	190	-

Table 96. Number of Buildings by General Occupancy Located in the SLOSH Category 3 Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the SLOSH Category 3 Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	13,049	1,392	1,018	83	256	125	276	-
Bertie County	17,982	289	97	18	5	7	12	32	-
Hertford County	16,796	120	-	8	-	-	-	3	-
Martin County	20,456	256	46	73	-	7	1	27	-
Pitt County	82,414	895	139	95	-	8	3	5	-
Mid-East Region (Total)	175,593	14,609	1,674	1,212	88	278	141	343	-

Table 97. Number of Buildings by General Occupancy Located in the SLOSH Category 4 Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the SLOSH Category 4 Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	14,064	1,504	1,065	89	282	128	302	-
Bertie County	17,982	504	146	42	9	11	16	41	-
Hertford County	16,796	137	1	23	-	-	-	3	-
Martin County	20,456	319	50	90	1	7	3	34	-
Pitt County	82,414	1,872	278	160	4	19	28	32	-
Mid-East Region (Total)	175,593	16,896	1,979	1,380	103	319	175	412	-

Table 98. Number of Mobile Home Parks and Mobile Home Buildings Located in the SLOSH Category 1 Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the SLOSH Category 1 Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	1	1,473
Bertie County	2	3,197	-	6
Hertford County	6	2,867	-	19
Martin County	8	2,205	-	8
Pitt County	59	13,434	-	33
Mid-East Region (Total)	100	31,198	1	1,539

Table 99. Number of Mobile Home Parks and Mobile Home Buildings Located in the SLOSH Category 2 Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the SLOSH Category 2 Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	5	2,514
Bertie County	2	3,197	-	10
Hertford County	6	2,867	-	25
Martin County	8	2,205	-	20
Pitt County	59	13,434	-	157
Mid-East Region (Total)	100	31,198	5	2,726

Table 100. Number of Mobile Home Parks and Mobile Home Buildings Located in the SLOSH Category 3 Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the SLOSH Category 3 Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	10	3,837
Bertie County	2	3,197	-	40
Hertford County	6	2,867	1	30
Martin County	8	2,205	-	39
Pitt County	59	13,434	2	600
Mid-East Region (Total)	100	31,198	13	4,546

Table 101. Number of Mobile Home Parks and Mobile Home Buildings Located in the SLOSH Category 4 Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the SLOSH Category 4 Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	15	4,369
Bertie County	2	3,197	-	80
Hertford County	6	2,867	1	35
Martin County	8	2,205	-	51
Pitt County	59	13,434	8	1,203
Mid-East Region (Total)	100	31,198	24	5,738

Table 102. Total Area of Agricultural Land Located in the SLOSH Category 1 Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the SLOSH Category 1 Hazard Area (Acres)
Beaufort	144,704	10,106
Bertie	103,292	33
Hertford	59,936	32
Martin	91,588	126
Pitt	158,935	162
Mid-East Region (Total)	558,456	10,460

Table 103. Total Area of Agricultural Land Located in the SLOSH Category 2 Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the SLOSH Category 2 Hazard Area (Acres)
Beaufort	144,704	40,561
Bertie	103,292	316
Hertford	59,936	136
Martin	91,588	1,115
Pitt	158,935	1,620
Mid-East Region (Total)	558,456	43,748

Table 104. Total Area of Agricultural Land Located in the SLOSH Category 3 Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the SLOSH Category 3 Hazard Area (Acres)
Beaufort	144,704	94,194
Bertie	103,292	756
Hertford	59,936	460
Martin	91,588	2,143
Pitt	158,935	4,865
Mid-East Region (Total)	558,456	102,418

Table 105. Total Area of Agricultural Land Located in the SLOSH Category 4 Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the SLOSH Category 4 Hazard Area (Acres)
Beaufort	144,704	98,633
Bertie	103,292	1,510
Hertford	59,936	704
Martin	91,588	2,564
Pitt	158,935	8,716
Mid-East Region (Total)	558,456	112,128

Table 106. Number of Buildings Built Pre-1953

Number of Buildings Built Pre-1953		
Counties	Total Number of Buildings per County	Number of Buildings
Beaufort County	37,945	1,642
Bertie County	17,982	224
Hertford County	16,796	4,207
Martin County	20,456	-
Pitt County	82,414	6,461
Mid-East Region (Total)	175,593	12,534

Table 107. Total Vulnerable Population Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	7,948	1,960	416	1,547	1,507	47	245	4	58
Bertie County	17,934	4,752	1,125	219	1,108	1,074	5	209	17	31
Hertford County	21,552	4,192	905	216	931	919	12	159	5	61
Martin County	22,031	4,721	1,092	268	956	923	9	161	3	24
Pitt County	170,243	33,060	4,439	2,015	7,634	4,678	206	1,179	204	201
Mid-East Region (Total)	276,412	54,673	9,521	3,134	12,176	9,101	279	1,953	233	375

Table 108. Total Vulnerable Population of Tracts with SVI Ranking 0.5001 – 0.75 Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population of Tracts with Overall SVI Ranking 0.5001 - 0.75 Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area								
			Vulnerable Population Category							
		Total Population in Hazard Area	Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	8,504	751	115	550	688	30	70	1	19
Bertie County	17,934	1,615	135	23	72	115	-	11	-	1
Hertford County	21,552	3,536	140	33	108	124	-	14	-	-
Martin County	22,031	5,499	594	109	542	494	8	102	-	25
Pitt County	170,243	28,483	1,119	435	2,222	1,236	40	426	51	68
Mid-East Region (Total)	276,412	47,637	2,739	715	3,494	2,657	78	623	52	113

Table 109. Total Vulnerable Population of Tracts with SVI Ranking > 0.7501 Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population of Tracts with Overall SVI Ranking > 0.7501 Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area								
			Vulnerable Population Category							
		Total Population in Hazard Area	Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	8,367	536	189	715	459	17	159	-	34
Bertie County	17,934	5,687	869	182	1,072	882	6	211	20	34
Hertford County	21,552	4,369	770	183	836	805	13	148	5	63
Martin County	22,031	4,735	362	123	289	301	2	72	3	3
Pitt County	170,243	49,365	1,842	907	3,906	2,105	68	625	95	110
Mid-East Region (Total)	276,412	72,523	4,379	1,584	6,818	4,552	106	1,215	123	244

Table 110. Total Number of Critical Facilities within the Region Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Critical Facilities within the Region Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area											
			Facility Type								
Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Education Facilities	Facilities with Impacts to Public Health and Environmental Systems	Healthcare Facilities	Historic and Cultural Resource Facilities	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	89	1	1	13	2	33	8	13	11	7
Bertie County	185	33	-	1	1	1	22	3	2	2	1
Hertford County	207	16	-	-	-	-	10	-	3	2	1
Martin County	190	8	-	1	-	-	2	-	1	4	-
Pitt County	668	54	3	2	8	1	4	2	7	18	9
Mid-East Region (Total)	1,597	200	4	5	22	4	71	13	26	37	18

Table 111. Total Number of Public Service Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Public Service Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area		
Public Service Facilities		Total
Police		3
Fire Stations		4
EOC		1
EMS		4
Library		1
Public Health Department		-
Mid-East Region (Total)		13

Table 112. Total Number of Education Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Education Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Education Facility	Total
College and University	-
Private School	3
Public School	1
Mid-East Region (Total)	4

Table 113. Total Number of Health Care Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Health Care Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Health Care Facility	Total
Hospital	1
Medical Facility	15
Pharmacy	6
Mid-East Region (Total)	22

Table 114. Total Number of Historic and Cultural Resource Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Historic and Cultural Resource Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Historic and Cultural Resource Facility	Total
Historical Site	4
Mid-East Region (Total)	4

Table 115. Total Number of Facilities with Impacts to Public Health and Environmental Systems Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Facilities with Impacts to Public Health and Environmental Systems Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Facility with Impacts to Public Health and Environmental Systems	Total
Septage Facility	2
Solid Landfill	1
Yard Waste Facility	2
Mid-East Region (Total)	5

Table 116. Total Number of Major Economic Development Asset Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Major Economic Development Asset Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Major Economic Development Asset Facility	Total
Port Facility	71
Mid-East Region (Total)	71

Table 117. Total Number of Transportation Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Ara

Total Number of Transportation Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Transportation Facility	Total
Aircraft Landing Facility	9
Airport	1
Bus Station	-
Ferry Terminal	6
Highway Bridges	16
Mid-East Region (Total)	32

Table 118. Total Number of Utilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Utilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Utility	Total
AM Transmission Tower	4
Cellular Tower	12
FM Transmission Tower	2
Gas Plant	2
Power Plant	1
Sewer Treatment Plant	6

Total Number of Utilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Utility	Total
Substation	10
Mid-East Region (Total)	37

Table 119. Total Number of Vulnerable Population Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Vulnerable Population Facilities Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Vulnerable Population Facility	Total
Emergency Shelter	5
Mobile Homes	2,866
Nursing Homes	2
Mid-East Region (Total)	2,873

Table 120. Total Number of Emergency Shelters Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Number of Emergency Shelters Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Beaufort County	4
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	1
Mid-East Region (Total)	5
Facility Name	**County**
B C Ed Tech Center	Beaufort
Northside Hs	Beaufort
P S Jones Middle	Beaufort
Aurora Middle	Beaufort
Greenville National Guard Armory	Pitt

Table 121. Miles of Critical Infrastructure in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Miles of Critical Infrastructure in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Transportation Routes	Miles in Hazard
NC Route	37
US Route	50
Interstate	-
Railroad	29
Mid-East Region (Total)	116
Evacuation Routes	**Miles in Hazard**
Roadway	45
Ferry	4
Mid-East Region (Total)	49

Table 122. Total Miles of Critical Infrastructure within the Region in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Miles of Critical Infrastructure within the Region in the Projected 2050 1-Percent Annual Chance Flood Hazard Area				
Counties	Roadway	Rail	Evacuation (Road)	Evacuation (Road)
Beaufort County	38	15	17	4
Bertie County	19	8	14	-
Hertford County	2	1	2	-
Martin County	4	6	1	-
Pitt County	23	-	11	-
Mid-East Region (Total)	86	30	45	4

Table 123. Total Area of Historic Districts in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Total Area of Historic Districts in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
Counties	Area (Acres)
Beaufort County	325
Bertie County	-
Hertford County	-
Martin County	-
Pitt County	-
Mid-East Region (Total)	325

Table 124. Number of Buildings by General Occupancy Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	4,641	460	211	6	80	24	62	-
Bertie County	17,982	484	135	59	3	7	6	25	-
Hertford County	16,796	218	17	50	-	-	1	3	-
Martin County	20,456	251	34	114	-	2	1	19	-
Pitt County	82,414	2,391	387	245	1	31	37	77	-
Mid-East Region (Total)	175,593	7,985	1,033	679	10	120	69	186	-

Table 125. Number of Mobile Home Parks and Mobile Home Buildings Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	2	1,415
Bertie County	2	3,197	-	89
Hertford County	6	2,867	1	79
Martin County	8	2,205	-	40
Pitt County	59	13,434	8	1,232
Mid-East Region (Total)	100	31,198	11	2,855

Table 126. Total Area of Agricultural Land Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the Projected 2050 1-Percent Annual Chance Flood Hazard Area (Acres)
Beaufort	144,704	12,443
Bertie	103,292	5,484
Hertford	59,936	1,562
Martin	91,588	3,486
Pitt	158,935	13,494
Mid-East Region (Total)	558,456	36,469

Table 127. Total Vulnerable Population Located in the Wildland-Urban Interface Wildfire Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the Wildland-Urban Interface Wildfire Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	2,789	688	146	543	529	16	86	1	20
Bertie County	17,934	604	143	28	141	137	1	27	2	4
Hertford County	21,552	1,112	159	39	186	183	3	33	1	13
Martin County	22,031	1,753	347	78	299	288	3	48	-	8
Pitt County	170,243	16,667	1,124	518	2,306	1,247	51	309	63	79
Mid-East Region (Total)	**276,412**	**22,925**	**2,461**	**809**	**3,475**	**2,384**	**74**	**503**	**67**	**124**

Table 128. Total Vulnerable Population Located in the Wildland-Urban Intermix Wildfire Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population Located in the Wildland-Urban Intermix Wildfire Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	8,730	2,153	457	1,699	1,656	51	270	4	64
Bertie County	17,934	2,753	652	127	642	622	3	121	10	18
Hertford County	21,552	5,438	778	189	911	895	15	163	6	61
Martin County	22,031	2,934	581	130	500	482	5	80	-	14
Pitt County	170,243	37,309	2,516	1,160	5,162	2,792	115	691	142	178
Mid-East Region (Total)	**276,412**	**57,164**	**6,680**	**2,063**	**8,914**	**6,447**	**189**	**1,325**	**162**	**335**

Sources: UofWisc 2010; ACS 2019; Census 2020

Table 129. Total Vulnerable Population with Overall SVI Ranking 0.5001 - 0.75 Located in the Wildland-Urban Interface Wildfire Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Ranking 0.5001 - 0.75 Located in the Wildland-Urban Interface Wildfire Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	2,280	201	31	147	184	8	19	-	5
Bertie County	17,934	437	37	6	20	31	-	3	-	-
Hertford County	21,552	1,019	-	-	-	-	-	-	-	-
Martin County	22,031	1,306	141	26	129	117	2	24	-	6
Pitt County	170,243	8,859	136	38	399	168	6	62	5	18
Mid-East Region (Total)	**276,412**	**13,901**	**515**	**101**	**695**	**500**	**16**	**108**	**5**	**29**

Table 130. Total Vulnerable Population with Overall SVI Ranking 0.5001 - 0.75 Located in the Wildland-Urban Intermix Wildfire Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Ranking 0.5001 - 0.75 Located in the Wildland-Urban Intermix Wildfire Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	5,261	464	71	340	426	19	44	-	12
Bertie County	17,934	5,178	434	73	231	367	-	36	-	3
Hertford County	21,552	5,203	-	-	-	-	-	-	-	-
Martin County	22,031	2,739	296	54	270	246	4	51	-	13
Pitt County	170,243	35,377	541	151	1,592	670	25	249	19	71
Mid-East Region (Total)	**276,412**	**53,758**	**1,735**	**349**	**2,433**	**1,709**	**48**	**380**	**19**	**99**

Table 131. Total Vulnerable Population with Overall SVI Ranking > 0.7501 Located in the Wildland-Urban Interface Wildfire Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Ranking > 0.7501 Located in the Wildland-Urban Interface Wildfire Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	7,934	509	179	678	436	16	151	-	32
Bertie County	17,934	654	100	21	123	102	1	24	2	4
Hertford County	21,552	1,138	163	40	191	187	3	34	1	13
Martin County	22,031	2,114	91	28	61	68	1	18	-	-
Pitt County	170,243	36,339	846	499	1,881	1,026	38	300	43	70
Mid-East Region (Total)	**276,412**	**48,179**	**1,709**	**767**	**2,934**	**1,819**	**59**	**527**	**46**	**119**

Table 132. Total Vulnerable Population with Overall SVI Ranking > 0.7501 Located in the Wildland-Urban Intermix Wildfire Hazard Area

Counties	Total Population (2020 Decennial Census Population)	Total Vulnerable Population with Overall SVI Ranking > 0.7501 Located in the Wildland-Urban Intermix Wildfire Hazard Area								
		Total Population in Hazard Area	Vulnerable Population Category							
			Number of Persons Over 65	Number of Persons Below 5	Number of Persons Below Poverty Level	Number of Persons With a Disability	Number of Persons Limited English Speaking	Number of Persons without Vehicle	Number of Persons 16 and Over Commuting to Work with Public Transportation (excluding taxicab)	Number of Persons 16 and Over Commuting to Work by Walking
Beaufort County	44,652	12,967	831	292	1,108	712	26	247	-	52
Bertie County	17,934	2,020	309	65	381	313	2	75	7	12
Hertford County	21,552	5,504	787	192	922	906	15	165	6	62
Martin County	22,031	1,320	57	18	38	43	0	11	0	0
Pitt County	170,243	31,010	722	426	1,605	876	33	256	37	60
Mid-East Region (Total)	**276,412**	**52,821**	**2,706**	**993**	**4,054**	**2,850**	**76**	**754**	**50**	**186**

Table 133. Total Number of Critical Facilities within the Region Located in the Wildland-Urban Interface Wildfire Hazard Area

Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Facility Type								
			Education Facilities	Healthcare Facilities	Historic and Cultural Resource Facilities	Facilities with Impacts to Public Health and Environmental Systems	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	89	3	22	13	1	-	19	6	12	13
Bertie County	185	51	1	16	6	-	-	19	3	2	4
Hertford County	207	79	7	23	23	-	1	14	1	4	6
Martin County	190	59	7	14	10	6	-	12	-	1	9
Pitt County	668	133	8	36	10	7	-	13	6	19	34
Mid-East Region (Total)	**1,597**	**411**	**26**	**111**	**62**	**14**	**1**	**77**	**16**	**38**	**66**

Table 134. Total Number of Critical Facilities within the Region Located in the Wildland-Urban Intermix Wildfire Hazard Area

Counties	Total Number of Critical Facilities Per County	Total Number of Critical Facilities Per County in Hazard Area	Facility Type								
			Education Facilities	Healthcare Facilities	Historic and Cultural Resource Facilities	Facilities with Impacts to Public Health and Environmental Systems	Major Economic Development Asset Facilities	Public Service Facilities	Transportation Facilities	Utilities	Vulnerable Population Facilities
Beaufort County	347	74	3	7	1	4	3	11	6	23	16
Bertie County	185	43	6	10	2	1	1	5	-	8	10
Hertford County	207	34	1	3	-	-	-	4	7	15	4
Martin County	190	24	-	5	1	1	-	3	-	10	4
Pitt County	668	71	3	15	2	2	1	9	8	16	15
Mid-East Region (Total)	**1,597**	**246**	**13**	**40**	**6**	**8**	**5**	**32**	**21**	**72**	**49**

Table 135. Total Number of Facilities Located in Wildfire Hazard Areas

Total Number of Public Service Facilities Located in the Wildfire Hazard Area		
Essential Facilities	Wildland-Urban Interface Wildfire Hazard Area	Wildland-Urban Intermix Wildfire Hazard Area
EOC	22	13
EMS	3	1
Fire Stations	26	18
Library	9	0
Police	15	0
Public Health Department	2	0
Mid-East Region (Total)	**77**	**32**
Total Number of Education Facilities Located in the Wildfire Hazard Area		
Education Facility	Wildland-Urban Interface Wildfire Hazard Area	Wildland-Urban Intermix Wildfire Hazard Area
College and University	1	-
Private School	9	3
Public School	16	10
Mid-East Region (Total)	**26**	**13**
Total Number of Health Care Facilities Located in the Wildfire Hazard Area		
Health Care Facility	Wildland-Urban Interface Wildfire Hazard Area	Wildland-Urban Intermix Wildfire Hazard Area
Hospital	2	-
Medical Facility	86	38
Pharmacy	23	2
Mid-East Region (Total)	**111**	**40**
Total Number of Historic and Cultural Resource Facilities Located in the Wildfire Hazard Area		
Historic and Cultural Resource Facility	Wildland-Urban Interface Wildfire Hazard Area	Wildland-Urban Intermix Wildfire Hazard Area
Historical Site	62	6
Mid-East Region (Total)	**62**	**6**
Total Number of Facilities with Impacts to Public Health and Environmental Systems Located in the Wildfire Hazard Area		
Facility with Impacts to Public Health and Environmental Systems	Wildland-Urban Interface Wildfire Hazard Area	Wildland-Urban Intermix Wildfire Hazard Area
Septage Facility	9	2
Solid Landfill	4	4
Yard Waste Facility	1	2
Mid-East Region (Total)	**14**	**8**
Total Number of Major Economic Development Asset Facilities Located in the Wildfire Hazard Area		
Major Economic Development Asset Facility	Wildland-Urban Interface Wildfire Hazard Area	Wildland-Urban Intermix Wildfire Hazard Area
Port Facility	1	5
Mid-East Region (Total)	**1**	**5**

Total Number of Public Service Facilities Located in the Wildfire Hazard Area		
Total Number of Transportation Facilities Located in the Wildfire Hazard Area		
Transportation Facility	**Wildland-Urban Interface Wildfire Hazard Area**	**Wildland-Urban Intermix Wildfire Hazard Area**
Aircraft Landing Facility	12	15
Airport	-	-
Bus Station	2	-
Ferry Terminal	-	-
Highway Bridges	2	6
Mid-East Region (Total)	**16**	**21**
Total Number of Utilities Located in the Wildfire Hazard Area		
Utility	**Wildland-Urban Interface Wildfire Hazard Area**	**Wildland-Urban Intermix Wildfire Hazard Area**
AM Transmission Tower	1	2
Cellular Tower	6	22
FM Transmission Tower	1	6
Gas Plant	2	-
Power Plant	7	14
Sewer Treatment Plant	2	6
Substation	19	22
Mid-East Region (Total)	**38**	**72**
Total Number of Vulnerable Population Facilities Located in the Wildfire Hazard Area		
Vulnerable Population Facility	**Wildland-Urban Interface Wildfire Hazard Area**	**Wildland-Urban Intermix Wildfire Hazard Area**
Emergency Shelter	18	15
Mobile Homes	7,374	11,289
Nursing Homes	15	5
Mid-East Region (Total)	**7,407**	**11,309**

Table 136. Total Number of Emergency Shelters Located in the Wildland-Urban Interface Wildfire Hazard Area

Total Number of Emergency Shelters Located in the Wildland-Urban Interface Wildfire Hazard Area	
Beaufort County	4
Bertie County	-
Hertford County	2
Martin County	7
Pitt County	5
Mid-East Region (Total)	**18**
Facility Name	**County**
B C Ed Tech Center	Beaufort
Chocowinity Middle	Beaufort
John Small Elem	Beaufort
P S Jones Middle	Beaufort
Ahoskie Elem	Hertford
CS Brown Student Dev	Hertford
Bear Grass HS	Martin
EJ Hayes Elem	Martin
Jamesville HS	Martin
Jamesville School	Martin
Rodgers Elem	Martin
Williamston Middle	Martin
Williamston Primary	Martin
Belvoir Elem	Pitt
CHSCOD Elem	Pitt
Grifton Elem	Pitt
Northwest Elem	Pitt
Sadie Saulter Elem	Pitt

Table 137. Total Number of Emergency Shelters Located in the Wildland-Urban Intermix Wildfire Hazard Area

Total Number of Emergency Shelters Located in the Wildland-Urban Intermix Wildfire Hazard Area	
Beaufort County	3
Bertie County	8
Hertford County	1
Martin County	1
Pitt County	2
Mid-East Region (Total)	**15**
Facility Name	**County**
Aurora Middle	Beaufort
Chocowinity Primary	Beaufort
Washington HS	Beaufort
Aulander Elem	Bertie
CG White Middle	Bertie
Colerain Elem	Bertie
John P Law Elem	Bertie
Serendipity school	Bertie
West Bertie Elem	Bertie
Windsor National Guard Armory	Bertie
Roanoke-Chowan CC	Hertford
Martin CC	Martin
G R Whitfield Elem	Pitt
Stokes Elem	Pitt

Table 138. Total Transportation Routes in Wildland Urban Interface Wildfire Hazard Areas

Transportation Routes	Wildland-Urban Interface Wildfire Hazard Area
NC Route	77
US Route	79
Interstate	-
Railroad	26
Mid-East Region (Total)	**182**
Evacuation Routes	
Roadway	69
Ferry	-
Mid-East Region (Total)	**69**

Table 139. Total Length of Critical Infrastructure within the Region Located in the Wildland-Urban Interface Wildfire Hazard Area

Total Length of Critical Infrastructure within the Region Located in the Wildland-Urban Interface Wildfire Hazard Area				
Counties	**Roadway**	**Rail**	**Evacuation (Roadway)**	**Evacuation (Ferry')**
Beaufort County	39	16	19	-
Bertie County	21	-	8	-
Hertford County	23	5	11	-
Martin County	23	5	10	-
Pitt County	50	-	20	-
Mid-East Region (Total)	**156**	**26**	**69**	**-**

Table 140. Total Length of Critical Infrastructure within the Region Located in the Wildland-Urban Intermix Wildfire Hazard Area

Total Length of Critical Infrastructure within the Region Located in the Wildland-Urban Intermix Wildfire Hazard Area				
Counties	**Roadway**	**Rail**	**Evacuation (Road)**	**Evacuation (Ferry)**
Beaufort County	46	22	13	-
Bertie County	39	-	20	-
Hertford County	47	10	23	-
Martin County	23	12	14	-
Pitt County	68	-	24	-
Mid-East Region (Total)	**224**	**44**	**94**	**-**

Table 141. Total Area of Historic Districts in the Wildfire Hazard Area (Acres)

Total Area of Historic Districts in the Wildfire Hazard Area (Acres)		
Counties	**Wildland-Urban Interface Wildfire Hazard Area**	**Wildland-Urban Intermix Wildfire Hazard Area**
Beaufort County	301	-
Bertie County	-	-
Hertford County	36	-
Martin County	-	-
Pitt County	-	-
Mid-East Region (Total)	**337**	**-**

Table 142. Number of Buildings by General Occupancy Located in the Wildland-Urban Interface Wildfire Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the Wildland-Urban Interface Wildfire Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	7,168	655	229	29	165	102	132	1
Bertie County	17,982	2,593	351	150	10	47	28	101	-
Hertford County	16,796	4,238	295	117	51	71	43	47	-
Martin County	20,456	3,813	487	635	73	107	43	94	-
Pitt County	82,414	8,879	609	474	32	92	57	110	-
Mid-East Region (Total)	**175,593**	**26,691**	**2,397**	**1,605**	**195**	**482**	**273**	**484**	**1**

Table 143. Number of Buildings by General Occupancy Located in the Wildland-Urban Intermix Wildfire Hazard Area

Counties	Total Number of Buildings per County	Number of Buildings by General Occupancy Located in the Wildland-Urban Intermix Wildfire Hazard Area							
		General Occupancy							
		Residential	Commercial	Agricultural	Education	Religion	Government	Industrial	Vacant
Beaufort County	37,945	9,256	451	353	37	114	21	144	-
Bertie County	17,982	3,825	345	543	30	50	20	67	-
Hertford County	16,796	4,281	71	474	11	51	45	55	-
Martin County	20,456	2,599	159	649	22	44	10	163	-
Pitt County	82,414	8,688	543	775	53	63	43	121	-
Mid-East Region (Total)	**175,593**	**28,649**	**1,569**	**2,794**	**153**	**322**	**139**	**550**	**-**

Table 144. Number of Mobile Home Parks and Mobile Home Buildings Located in the Wildland-Urban Interface Wildfire Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the Wildland-Urban Interface Wildfire Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	7	2,399
Bertie County	2	3,197	1	697
Hertford County	6	2,867	2	632
Martin County	8	2,205	-	560
Pitt County	59	13,434	23	3,053
Mid-East Region (Total)	**100**	**31,198**	**33**	**7,341**

Table 145. Number of Mobile Home Parks and Mobile Home Buildings Located in the Wildland-Urban Intermix Wildfire Hazard Area

Counties	Total Number of Mobile Home Parks per County	Total Number of Mobile Home Buildings per County	Number of Mobile Home Parks and Mobile Home Buildings Located in the Wildland-Urban Intermix Wildfire Hazard Area	
			Number of Mobile Home Parks	Number of Mobile Home Buildings
Beaufort County	25	9,495	13	4,574
Bertie County	2	3,197	1	1,273
Hertford County	6	2,867	2	1,343
Martin County	8	2,205	3	538
Pitt County	59	13,434	10	3,532
Mid-East Region (Total)	**100**	**31,198**	**29**	**11,260**

Table 146. Area of Agricultural Land Located in the Wildland-Urban Interface Wildfire Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the Wildland-Urban Interface Wildfire Hazard Area (Acres)
Beaufort	144,704	15,458
Bertie	103,292	7,421
Hertford	59,936	5,054
Martin	91,588	11,555
Pitt	158,935	22,354
Mid-East Region (Total)	**558,456**	**61,842**

Table 147. Area of Agricultural Land Located in the Wildland-Urban Intermix Wildfire Hazard Area (Acres)

Counties	Total Agricultural Land per County (Acres)	Area of Agricultural Land Located in the Wildland-Urban Intermix Wildfire Hazard Area (Acres)
Beaufort	144,704	18,338
Bertie	103,292	18,885
Hertford	59,936	14,330
Martin	91,588	10,886
Pitt	158,935	25,719
Mid-East Region (Total)	**558,456**	**88,158**

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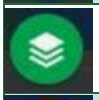
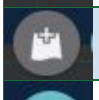
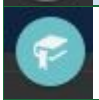
Appendix C: Mapping Solution

The RISE Regional Resilience Portfolio program aims to support resilience efforts throughout the region by engaging local leaders and the community. The web map in combination with the vulnerability assessment bridges science and local knowledge to identify current and future hazards impacting the region. The vulnerability assessment profiles natural hazards and climate risks, provides an analysis of the hazards' impacts on the region, and provides key takeaways for building resilience across the region. The web map is a companion tool to allow users to further explore hazard data and the exposure of critical assets throughout the region. The web map can be accessed at: [Mid East Region - Resilience Portfolio Web Map (arcgis.com)]

The table below provides an overview of the symbols available in the application:

Table 148: Map Symbology

Icon	Explanation
	Click on this tool to view the legend of layers shown in the web map.
	Click on this tool to turn layers on and off, open the attribute table, or view the layer's information to download the data.
	Click on this tool to change the basemap.
	Click on this tool to print out a static copy of the web map.
	Click on this tool to add data to the web map.
	Click on this tool to bookmark a location on the web map.
	Click on this tool to measure a length on the web map.
	Click on this tool to draw on the web map.
	Click on this tool to swipe one or more layers on the web map.
	Click on this tool for more information about the tools available in this web map.
	Click on this tool to share this web map.
	Click on this tool to add a note or delete a note you have added to the web map. You are encouraged to add comments about the data shown in the web map, which will be shared with other viewers of the web map.

Icon	Explanation
	Click on this tool to select data shown on the web map. You may use this tool to extract and export data.

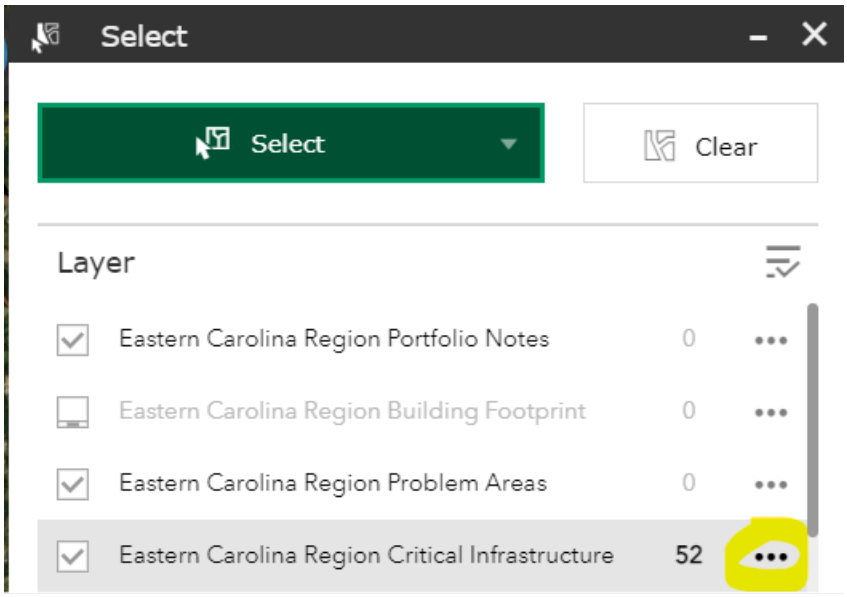
The following layers are available on the maps to visualize the identified hazards:

Table 149: Map Layers and Hazards

Layer	Hazard
Urban Heat Island	Extreme Temperature
• Wildland Urban Interface Wildfire Hazard Area • Wildland Urban Intermix Wildfire Hazard Area	Wildfire
• Storm Surge SLOSH Category 1 • Storm Surge SLOSH Category 2 • Storm Surge SLOSH Category 3 • Storm Surge SLOSH Category 4 • Projected 2050 1-Percent Annual Chance Flood Event • 1-Percent Annual Chance Flood Event • 0.2-Percent Annual Chance Flood Event	Flood
• Storm Surge SLOSH Category 1 • Storm Surge SLOSH Category 2 • Storm Surge SLOSH Category 3 • Storm Surge SLOSH Category 4	Hurricanes and Severe Storms
Short-Term (~30 Year) Historical Shoreline Change Rates Short-Term (~30 Year) Historical End Point Shoreline Change Rates Marsh Migration Zone with 1-Foot Sea Level Rise Marsh Migration Zone with 0-Foot Sea Level Rise	Erosion
Marsh Migration Zone with 1-Foot Sea Level Rise Marsh Migration Zone with 0-Foot Sea Level Rise	Sea Level Rise

Once you have selected the features using the Select Tool, click on the ellipses next to the layer you would like to extract. You can only extract layers that have a value greater than 0 next to the ellipses.

Figure 26: Layer Extraction



The following data sources were used to build the webmap application:

Table 150: Data Sources for Webmap

Data	Source	Date
Social Vulnerability Index	CDC/ATSDR SVI	2018
Building Footprints	NCEM	2020
Parcel Boundaries	NC One Map	2021/2022
Critical facilities	NC OneMap; HIFLD	2011/2016/2018/2019; 2020/2021/2022
2019 Land Cover	USGS/NLCD	2021
Marsh Migration	NOAA	2016
Erosion Rate	USGS; NC Division of Coastal Management	2017;2020
Urban Heat Island	The Trust for Public Land	2019
Digitized Effective FIRM maps	NCFRIS; FEMA	2022; 2018/2019/2020/2021
Sea Level Rise	NOAA	2017
Sea-Lake Overland Surge from Hurricanes (SLOSH) Model	NOAA	

Appendix D: Acronyms

Acronym/Abbreviation	Definition
CDC	Centers for Disease Control and Prevention
DFIRM	Digital Flood Insurance Rate Map
EMS	Emergency Medical Services
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
IPCC	Intergovernmental Panel on Climate Change
MRCC	Midwest Regional Climate Center
NCDEQ	North Carolina Department of Environmental Quality
NCDPS	North Carolina Department of Public Safety
NCORR	North Carolina Office of Recovery and Resiliency
NCSU	North Carolina State University
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NSSL	NOAA National Severe Storm Laboratory
NWS	National Weather Service
RHMP	Regional Hazard Mitigation Plan
RISE	Regions Innovating for Strong Economies and Environment Program
SFHA	Special Flood Hazard Area
SLOSH	Sea, Lake, and Overland Surges from Hurricanes
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WCT	Wind Chill Temperature