2022

CLIMATE RESILIENCE PROJECTS FOR THE ALBEMARLE REGION

NCORR

RISE

Regions Innovating for Strong Economies and Environment

N★C DPS

DEPARTMENT OF PUBLIC SAFETY

EQUAL HOUSING OPPORTUNITY

Contents

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 Chesapeake, Chowanoke, Croatan, Hatteras, Lumbee, Mattamuskeet, Moratok, Pasquotank, Perquimans, Poteskeet, Roanoke, Secotan, and Yeopim people as the 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.

INTRODUCTION

North Carolina Office of Recovery and Resiliency (NCORR) Overview

In the wake of Hurricane Florence in 2018, the State of North Carolina established the Office of Recovery and Resiliency (NCORR) to lead the state's efforts in rebuilding smarter and stronger. At that time, eastern North Carolina communities were still recovering from Hurricane Matthew in 2016. NCORR manages nearly a 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 from 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.

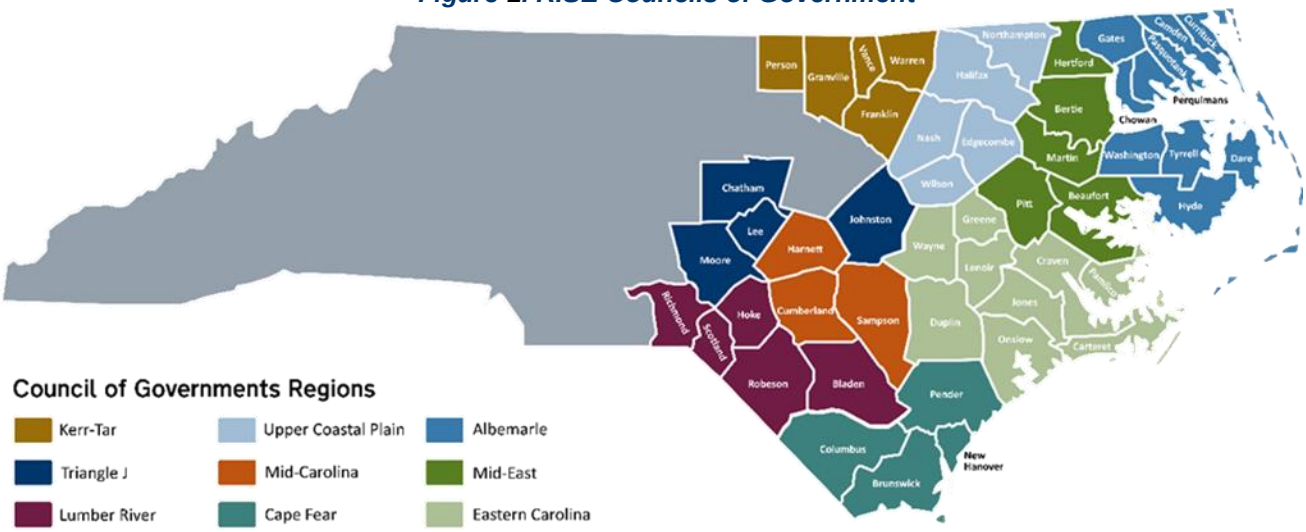
RISE Regional Resilience Portfolio Overview

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 North Carolina Rural Center leadership training workshop, which operates in the eastern half of the state, that emphasizes resilience as a tool for community economic development.

RISE is funded by the U.S. Economic Development Administration and the U.S. Department of Housing and Urban Development's Community Development Block Grant – Mitigation funds, with in-kind support from NCORR and North Carolina Rural Center. In addition, the Duke Energy Foundation committed $600,000 in grant funding to support the Regional Resilience Portfolio Program.

Figure 1. RISE Councils of Government

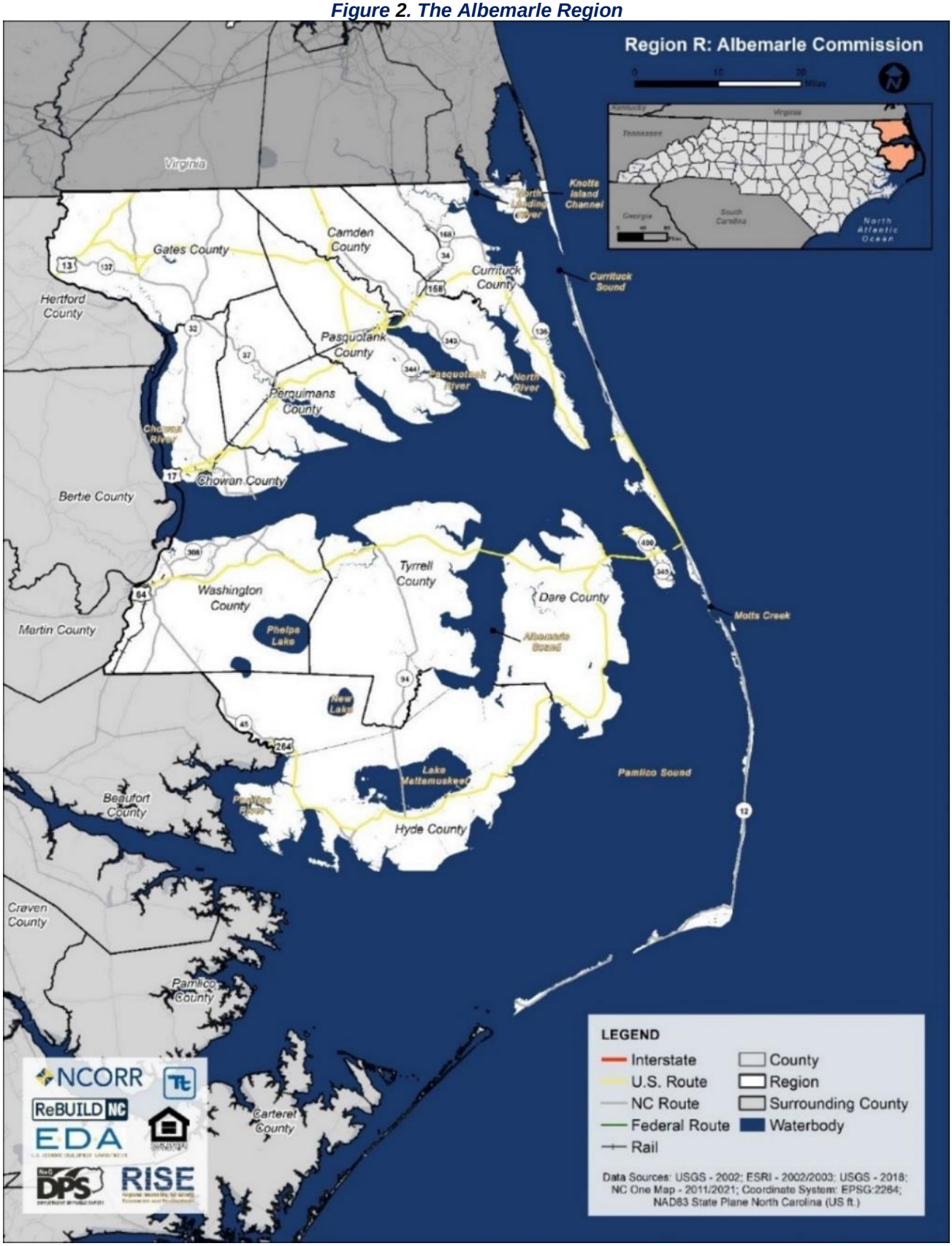


The Albemarle Regional Resilience Portfolio

The RISE Albemarle Regional Resilience Portfolio Program aims to advance the resilience of the region. RISE covers nine areas, which align with the North Carolina Council of Government regions. The Albemarle Region is located in the northeastern corner of North Carolina. The Region includes Camden, Chowan, Currituck, Dare, Gates, Hyde, Pasquotank, Perquimans, Tyrrell, and Washington Counties. The Region is predominantly rural, with expansive wetlands and agricultural land. With a total land area of 6,222 square miles, the Albemarle Region is the largest of the 16 planning regions in the state.

Initially organized in 1969 under the direction of the U.S. Economic Development Administration, the Albemarle Commission is sanctioned as the lead regional organization for Region R (Albemarle Region) by the federal government. The Commission has been addressing regional needs since its doors opened in 1970 and have been instrumental in the development and/or enhancement of regional infrastructure; industrial recruitment business development, labor force development, travel and tourism, community reinvestment /rehabilitation, and health and human services (Albemarle Commission 2020).

Figure 2. The Albemarle Region



Regional Team

The RISE Albemarle Regional Resilience Portfolio Program in the Albemarle Region was led by a Regional Team comprised of an NCORR representative, the Albemarle Commission, Tetra Tech, Inc, and a facilitator. The Albemarle Commission offered project guidance, and Tetra Tech, Inc. provided technical assistance. A local leader was retained by the North Carolina Rural Center to provide facilitation support at the many stakeholder and public meetings held during the planning process.

Stakeholder Partnership

The planning effort in the Albemarle Region was informed by a Stakeholder Partnership to ensure the vulnerabilities identified reflect local priorities. The Stakeholder Partnership:

- Steered the project by providing local input and perspective;
- Reviewed project materials to ensure materials reflect local priorities and address local concerns; and
- Attended monthly meetings.

The partnership was open to all those who were interested in participating and is composed of local leaders from across the region who either live or work within the Albemarle Region. Leaders have backgrounds from various sectors and disciplines, including community organizations, social services, business, and economic development, public health, planning and transportation, and local elected officials. Local leaders met monthly beginning in January 2022 to guide the implementation of the Regional Resilience Portfolio Program.

Letter of Support from the Regional Council of Governments

REGIONAL RESILIENCE PORTFOLIO DEVELOPMENT

The Regional Resilience Portfolio Program is a two-part effort consisting of the *Climate Change and Natural Hazards Vulnerability Assessment for the Albemarle Region* and the *Regional Resilience Project Portfolio* (refer to ***Figure 3***). The vulnerability assessment bridges science and local knowledge to analyze current and future hazards and their impacts on the region. The Vulnerability Assessment Summary overviews the findings of this analysis. To view the vulnerability assessment in its entirety please visit the Albemarle Regional Resilience Portfolio website.

The *Regional Resilience Project Portfolio* is a compilation of projects that will provide regional resilience benefits across the Albemarle Region. These projects respond to critical issues highlighted in the Vulnerability Assessment and reflect local priorities identified during the planning process. The number of projects in the full portfolio is limited to allow for greater depth in scoping the project and identifying pathways to implementation, including funding sources. Additional worthy projects considered during the planning process are listed in ***Appendix A***.

Figure 3. The Albemarle Region Regional Resilience Program Process

Planning Process

At the onset of the program, NCORR, the facilitator, and the Albemarle Council of Government (COG) recruited local leaders from the region, representing issues and communities inside and outside government, to serve as the Stakeholder Partnership for the project. The Stakeholder Partnership met over the course of the project to inform and guide its development. The Partnership was open to all those who were interested and either live or work within the region. Partnership membership spanned local government, community organizations, and companies, including:

- Representatives of county governments
- Albemarle Regional Health Services
- Albemarle Planning
- Albemarle-Pamlico National Estuary Partnership (APNEP)
- Wanchese Marine Industrial Park
- United States Coast Guard
- North Carolina Sea Grant
- Green Saves Green
- River City Community Development Corporation

- College of the Albemarle Health Science Program
- Partnership for the Sounds
- Intercounty Public Transport Authority
- Currituck Chamber of Commerce
- Department of Aviation/Emergency Management at Elizabeth City State University
- River City Community Development Corporation
- North Carolina Coastal Federation
- Northeast Academy
- Perquimans County Schools
- Albemarle Commission

Additionally, the project team solicited public input on vulnerabilities and potential solutions through a series of online surveys, virtual meetings, and in-person meetings. During the vulnerability assessment phase, the project team worked with the Regional Stakeholder Partnership to identify top climate hazards and their historic and potential future impacts in the region. Three virtual public workshops were offered in April 2022 allowing members of the public to contribute to the identification of climate and natural hazards vulnerabilities that the region faces. The vulnerability assessment was drafted and responded to comments from the project team, Stakeholder Assessment, and comments submitted during a public comment period in August 2022.

During the project identification phase, the project team again worked with the Stakeholder Partnership to develop a long list of potential projects to build resilience to vulnerabilities and challenges identified in the assessment. Proposed projects included public awareness and messaging, construction and nature-based solutions, program and policy development, and studies and analyses.

The project team and Regional Stakeholder Partnership prioritized 25 projects to present to community members to gain feedback and input. After refining projects based on feedback, the project team used criteria approved by the Regional Stakeholder Partnership to rank projects with a “resilience scorecard”. The project team determined projects to include in the Regional Resilience Project Portfolio by incorporating resilience scorecard results, the information of the Regional Stakeholder Partnership, and the project team’s subject matter expertise. The following criteria and questions were utilized to develop a ‘resilience scorecard rating for each of the 25 potential projects. The resilience scorecard ratings are available in ***Appendix B***.

Table 1: Ranking Criteria

Category	Considerations
Reduction in Risk	How many hazards are addressed? What is the probability the hazard(s) will occur?
	Does the project protect life or property or both?
	Does the project address current and future hazards?
	Does the project reduce the risk at a regional scale?
	Does the project reduce a non-climate stressor?
Scale	Is the project regional?
	Can the project be replicated?
Cost	What is the range of cost? Low (Under $50K)? Medium ($50k-$1m)? High (Over $1m)?
Benefits	Do benefits outweigh the costs?
Timeframe	How long will it take to implement the project? Short: Less than 5 years. Medium: 5-15 years. Long: More than 15 years

Category	Considerations
Feasibility	Is the project technically and legally possible?
	Will permitting be required?
	Are project sponsors identified, engaged, and have the capacity to implement the project?
	Is a funding source identified?
Socioeconomic	Does the project aid in building a strong economy?
	Does the project supports improving community infrastructure (e.g., road network)?
Climate Justice and Equity	Does the project benefit areas with a high Social Vulnerability Index?
	Does the project have a positive, qualitative impact on populations that identify as Black, Indigenous, or People of Color (BIPOC)?
	Does the project improve health resources?
Environmental Impacts	Does the project address drivers of climate change?
	Does the project use nature-based solutions?
	Does the project provide habitat restoration for threatened and endangered species?
Public and Stakeholder Support	Is there strong support for the project? Was it ranked as a high priority by the stakeholder partnership and community?

The Regional Stakeholder Partnership was surveyed to determine potential project sponsors and overall support for the projects. The survey results were averaged for each project for inclusion in the resilience scorecard. The results from the resilience scorecard and general support of the Regional Stakeholder Partnership were combined to identify the projects most likely to be successfully implemented. The resilience scorecard results are located in ***Appendix B***. These prioritized projects are included in this project portfolio. The remaining 18 projects that are not included in the portfolio are included in ***Appendix A*** for reference. The project team then conducted additional, targeted outreach to state and local stakeholders to further research and refine each project. At a public workshop conducted on November 10, 2022, RISE staff solicited feedback from community members and local officials on the proposed project list, in addition to educating attendees about the Albemarle Regional Resilience Portfolio Program and providing the findings of the Vulnerability Assessment. Following a presentation, participants were invited to explore and interact with the printed project boards and provide feedback on the prioritized projects. A final public comment period on the Project Portfolio was held in November and early December 2022.

Vulnerability Assessment Summary

The Climate Change and Natural Hazards Vulnerability Assessment for the Albemarle Region describe past problems and future risks associated with extreme weather events such as hurricanes, flooding, extreme temperatures, droughts, and wildfires as well as the impact of climate change on these existing hazards. The Vulnerability Assessment outlines the impacts of these climate hazards on housing, the environment, and the economy. Climate change and non-climate stressors create cascading impacts, which lead to new vulnerabilities in the region. Together, climate hazards, non-climate stressors, and regional challenges create specific vulnerabilities for socially vulnerable populations, housing, critical infrastructure, the economy, and natural resources.

The following hazards pose a significant threat to the Albemarle Region, based on scientific study, disaster history, and input from local leaders.

A summary of the full Vulnerability Assessment on the impact of natural hazards and climate change for the Albemarle Region is outlined below:

Social Vulnerability and Equity, Health, and Safety

- The Albemarle Region is home to many socially vulnerable populations that are at higher risk of the impacts of natural hazards and climate change due to many factors including lack of resources or ability to respond to and recover from events.
- Some hazards such as hurricanes present a direct and immediate risk to life and safety while other hazards, such as drought present indirect health risks and may be more impactful to the region in the long term.
- Equitable responses to risk are needed to address rising temperatures and increasing severity and frequency of natural hazard events.

Housing, Critical Infrastructure, and Community Support Systems

- The region's housing, critical infrastructure, and community support systems have been impacted by natural hazard events. These impacts are likely to increase in the future as hazard events increase in frequency and intensity due to climate change.
- Upgrades and retrofits of housing, critical infrastructure, and community support systems are necessary to adjust for today's conditions and prepare for continued changes due to climate change impacts.

Economy

- The large agricultural industry in the Albemarle Region is at risk of damage from severe weather events and saltwater intrusion.
- The region's tourism industry, especially in Date and Currituck Counties, is at risk from the impacts of coastal hazards such as hurricanes, floods, erosion, sea level rise, and the compounding effects of these hazards by climate change.
- The region is dominated by low-lying coastal areas which are more susceptible to sea level rise, elevated groundwater tables, saltwater intrusion, and increased flooding.

Natural Environmental Systems

- Climate change is already impacting natural systems in the region. Sea level rise is causing saltwater intrusion, resulting in the loss of coastal forests. Additionally, elevated groundwater tables are limiting the ability of soils to absorb stormwater causing increased occurrences of localized flooding and the ability of onsite wastewater treatment systems to properly treat wastewater.
- Climate change is causing rising temperatures and stronger weather events which stress natural environmental systems.
- Already stressed natural environmental systems are being impacted by invasive species, partially driven by shifting ranges of species due to rising temperatures.

Historical and Cultural Resource

- Historic structures in the Albemarle Region have a higher risk of severe weather and flooding as they were not built to modern standards and before the special flood hazard area (SFHA) maps were produced.
- Long-term exposure to hazards can result in the degradation of historical and cultural assets.
- Cultural events can be threatened by unsafe weather conditions.

Cascading Impacts

- Several hazards are likely to occur during the same event in the region. Hurricanes bring high winds, heavy rainfall, coastal flooding, and erosion that can result in unintended releases of chemicals and contaminants that threaten water quality.
- The occurrence of some hazards increases the likelihood of other hazards. Extreme temperatures and drought result in an increased risk for wildfire events.

Summaries of the most significant impacts identified for each of the hazards of concern in the Albemarle Region are included below.

Drought

- Droughts could pose a significant risk to the region's agricultural industry.
- The area north of Elizabeth City on the Pasquotank River is reliant on surface water and is at higher risk of the impacts of severe drought.

Erosion

- Numerous areas along the Outer Banks experience erosional rates of more than two meters per year, placing oceanfront development at high risk.
- Estuarine shorelines are also at risk for erosion. Additionally in the future, sea level rise threatens estuarine shorelines that are unable to migrate leading to a significant loss of estuarine habitat.

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.
- Socially vulnerable populations that lack access to proper heating and cooling infrastructure are most at risk of extreme temperature health impacts.
- Droughts associated with extreme heat events could pose significant risks 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.
- Forty-four percent of the region's population and twenty percent of the region's buildings are in the 1 percent annual-chance floodplain.
- 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).
- Heavy rainfall is becoming more frequent in the Albemarle Region.
- Stormwater infrastructure is not designed to handle larger rainfall events. Additionally, elevated groundwater tables that occur periodically during the year associated with sea level rise, reduce the capability available for stormwater infiltration in the subsurface soil.

Invasive Species

- Invasive species pose significant risks to the region, with its extensive agricultural lands and natural ecosystems.
- Changing conditions due to climate change and other types of habitat disruption may increase the likelihood of invasive species moving into the Albemarle Region.

Hurricanes and Severe Storms

- The region experiences a variety of severe weather events including numerous secondary hazards like wind, tornados, lightning, and hail.
- Hurricanes and storms, like Hurricane Matthew in 2018, cause significant damages and impacts making recovery slow, often occurring over many years.
- The frequency and severity of these events are likely to increase in the future due to climate change.

Water Quality Issues

	• Hazards such as storms and floods can result in accidental spills and releases that can contaminate groundwater and surface water. • Runoff of nutrients can cause a growing environment for harmful algal blooms, which are environmentally damaging and pose health risks for humans. • Warming temperatures and increasing heavy precipitation increase the likelihood of harmful algal blooms. • Rising sea levels contribute to elevated groundwater tables that limit the ability of the soil to absorb stormwater and affect the ability of septic systems to treat wastewater. • Rising sea levels and groundwater withdrawal contribute to saltwater intrusion in the region's coastal areas and are likely to worsen over time. • Saltwater intrusion is leading to the abandonment of some agricultural land and may necessitate expensive treatment measures to maintain drinking water in impacted areas.
Wildfire	
	• Increasing frequency and severity of wildfires will lead to increased damages to natural systems and potential damages to structures. • Projected increases in wildfire risks and associated emissions can have harmful impacts on health.

PORTFOLIO OF PROJECTS

The Portfolio of Projects describes high-priority projects identified for the Albemarle Region by the Stakeholder Partnership after a review of past impacts, the vulnerability assessment, and strategies that have been used before in the Albemarle Region or elsewhere in the nation. These project ideas were further developed through community input and expert consultation. This portfolio outlines implementation steps, funding opportunities, and potential project partners to enable a clear path toward implementation for each project. A summary of the projects included in the portfolio is located on the following pages.

SUMMARY TABLE OF PROPOSED PROJECTS

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
Community Rating System User Group	**PROBLEM** The Albemarle Region has a high flood exposure. At the same time, flood insurance rates are becoming more expensive. Some residents are considering dropping their flood insurance as a result, leaving them financially vulnerable. Currently, only 10 municipalities in the Albemarle Region participate in the Community Rating System (CRS) program which rewards communities that go above and beyond National Flood Insurance Program requirements by lowering flood insurance costs. **SOLUTION** Establish regional coordination through the Albemarle Commission to encourage each county/municipality to enroll in the CRS program to reduce the cost of flood insurance. Provide leadership for the development of a CRS User Group that will meet throughout the year. This group consists of municipal, county, regional, and state networks that collaborate to meet local flood mitigation goals and support one another in qualifying for CRS credit.	Flood	Albemarle Commission, county and municipal floodplain managers, non-profit organizations, and other CRS professionals.	Low (under $10,000). Cost would mainly involve hosting meetings and storing meeting recordings and CRS support documentation on an online platform.	Regional effort with benefits at the municipal level for those that join/improve class in the CRS program.

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
Organization of Private Sector Emergency Response Partnership	**PROBLEM** Government disaster response following a large-scale event takes time, especially where outside resources need to be brought in. Storm damages to infrastructure, limitations in infrastructure, and the region's expansive sounds and waterways limit the speed of this response. **SOLUTION** Enhance relationships between faith-based organizations, non-profits, and businesses to allow for rapid deployment of goods to aid in recovery and supplement state or federal response and support agencies.	All Hazards	While a lead implementer has not yet been identified, a central faith-based organization, non-profit, or business will ultimately lead in identifying and inviting participants to join the group. The Albemarle Commission will assist in this identification effort.	Low for the start of the implementation process. Operating costs of a fully established partnership under a non-profit may involve annual operating costs of roughly $200,000.	Regional. Project is likely to begin on a smaller scale (town) and build to the full region.
Public Outreach	**PROBLEM** There is a need for more public education to capture the “mosaic” of the full impacts from hazard events. Hazards have long-lasting and repetitive impacts, and long recovery times, and cause a variety of lingering issues such as substandard housing. Without public awareness about these hidden impacts, the public is less likely to make personal choices to mitigate their property. **SOLUTION** Develop a multi-faceted public awareness program, partnering	All Hazards	The Albemarle Commission, in conjunction with the CRS User Group, will serve as the lead implementer. Numerous federal, state, academic, environmental, and non-profit organizations will be contacted to ask for assistance in developing outreach materials, hosting outreach	Under $50,000 to establish outreach materials and $10,000 a year to train educators, develop a repository, and update materials as necessary.	Regional

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	with non-profit organizations, academia, and businesses. Use museums, planetariums, and education centers in the Albemarle Region to conduct outreach on past hazard events and frame potential future impacts. Have businesses such as insurance agencies lead outreach as part of their advertising.		events, or leading trainings on hazard-related topics or outreach strategies.		
Stormwater Working Group	**PROBLEM** Throughout the Albemarle Region, stormwater infrastructure is undersized, failing, or in need of cleaning. All of these factors increase the risk of flooding, especially as heavy rainfall events increase in frequency and severity, and development increases the volume of stormwater runoff. **SOLUTION** Establish a Working Group to evaluate the region's stormwater capabilities, identify needs, and develop collaborative approaches to reducing stormwater flooding in the Albemarle Region.	Flood, Water Quality	The Albemarle Commission will serve as the lead implementer. Supporting agencies in this project will include all interested county and municipal agencies responsible for stormwater management and maintenance, non-profit organizations that can provide outreach support, academic organizations that can provide data, and state agencies that provide support for planning.	The cost for the implementation of this project is estimated to be low (under $5,000) and primarily focused around securing meeting spaces and staff time for participating officials.	Regional with local or multi-jurisdictional implementation of identified stormwater management strategies.

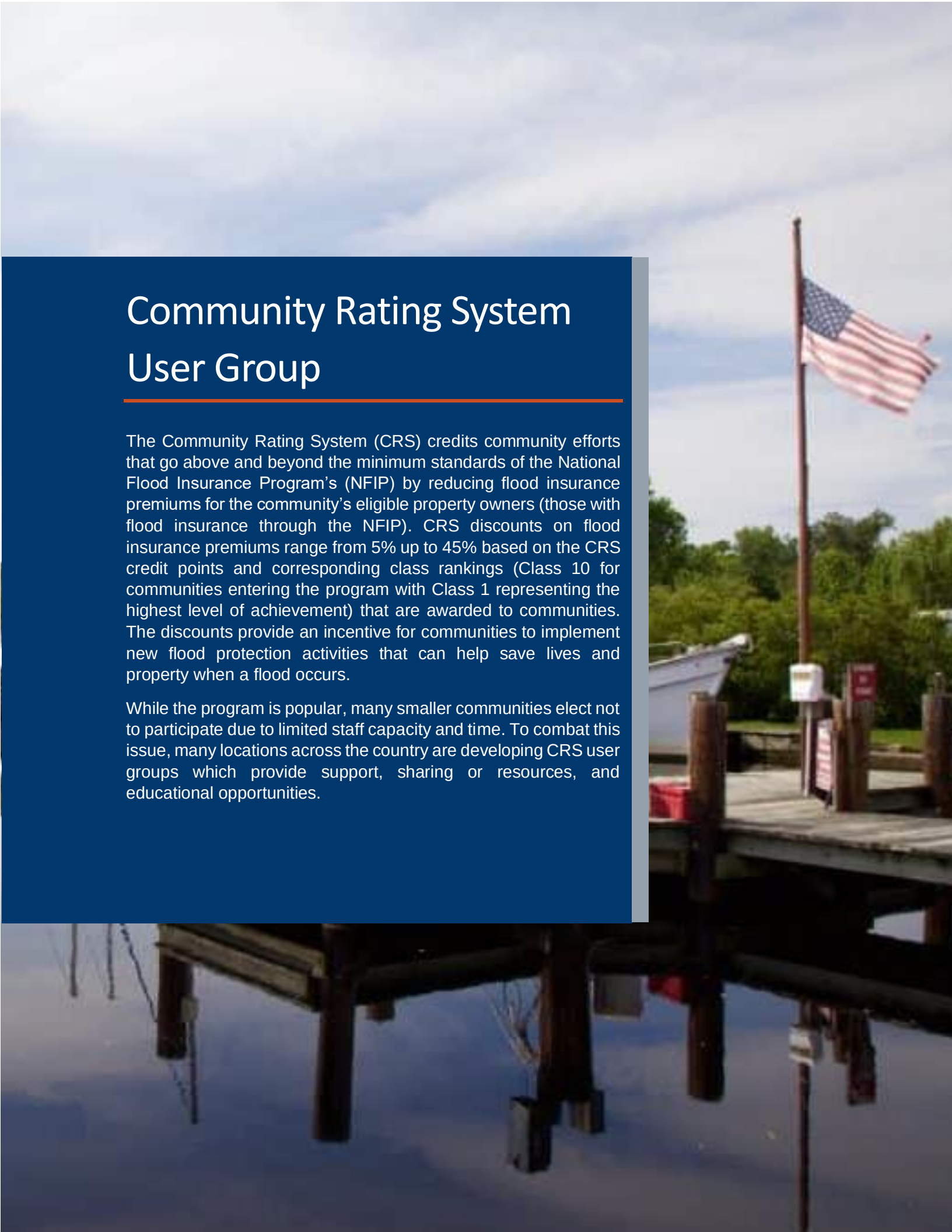
Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
Stormwater and Watershed Management Planning	**PROBLEM** To bring stormwater management in the Albemarle Region to a level that will address current and future needs and account for new development and a changing climate, robust planning needs to be completed to identify strategies and maintenance requirements at the local and watershed level scales. **SOLUTION** Provide training and collaboration opportunities that will result in development of stormwater management plans and watershed master plans throughout the Albemarle Region. Distribute outreach materials to address stormwater flooding issues.	Flood, Water Quality	The Albemarle Commission will serve as the lead implementer of the project and host workshops on the proper development of stormwater management plans for municipalities and counties. All county and local municipal governments in the Albemarle Region will be invited to participate. Input will be requested from the state, academic, and non-profit agencies/ organizations with planning expertise.	The cost for the implementation of this project is estimated to be low (under $5,000) and mainly involves the costs of meetings and storing stormwater/watershed plan guidance, references, and sample plans on an online platform for easy access.	Regional. Stormwater plans will be completed on a county-by-county basis. Watershed master plans to be completed across county boundaries.
Harmful Algal Bloom (HAB) Research, Prevention, and Identification	**PROBLEM** Harmful Algal Blooms (HABs) present unique ecosystem and health hazards. HABs have occurred in the past in the region but have become a more frequent problem in the last ten years. While there has been research and involvement by many	Water Quality	The Albemarle Commission will serve as the lead implementer at the beginning of the project and invite numerous federal, state, academic, environmental, and	The cost for the implementation of this project is estimated to be low (under $25,000 a year to establish and distribute outreach materials).	Regional

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	partners, an exact cause has not yet been determined. **SOLUTION** Conduct outreach to educate the public on the harms of HABs, identification, and reporting of blooms, and how to reduce exposure. Work with partners to develop a response protocol for notification of the blooms to stakeholders in the region.		non-profit organizations to assist in developing outreach materials and conducting outreach.		
Resilience Hub Network	**PROBLEM** In order to continue to have viable communities and economies in the Albemarle Region, Homeowners, farmers, and business owners need to be aware of the impacts of sea level rise, severe rainfall, and other hazard impacts and the potential mitigation measures they can take to protect lives and property. **SOLUTION** Create a network of resilience hubs (one for each county) that would offer information, guidance, and technical assistance to residents and business owners on hazards and mitigation options. Establish a peer-to-peer network to support resilience hubs.	All Hazards	Ongoing outreach and discussions are required to identify organizations that are currently involved with resilience hubs in the region.	The cost for the implementation of this project is estimated to vary from county to county based on the design and scale of their resilience hubs (under $75,000 to several million dollars).	Work will be completed on a county-by-county basis with the goal of all counties in the region participating

Community Rating System User Group

The Community Rating System (CRS) credits community efforts that go above and beyond the minimum standards of the National Flood Insurance Program's (NFIP) by reducing flood insurance premiums for the community's eligible property owners (those with flood insurance through the NFIP). CRS discounts on flood insurance premiums range from 5% up to 45% based on the CRS credit points and corresponding class rankings (Class 10 for communities entering the program with Class 1 representing the highest level of achievement) that are awarded to communities. The discounts provide an incentive for communities to implement new flood protection activities that can help save lives and property when a flood occurs.

While the program is popular, many smaller communities elect not to participate due to limited staff capacity and time. To combat this issue, many locations across the country are developing CRS user groups which provide support, sharing or resources, and educational opportunities.



COMMUNITY RATING SYSTEM USER GROUP

Problem

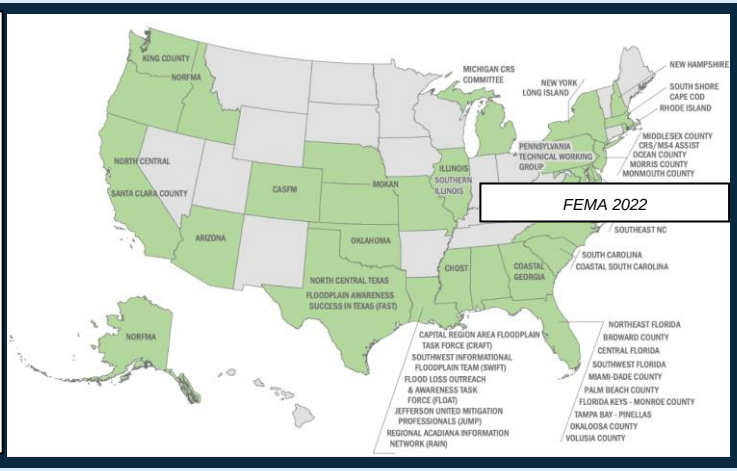
The Albemarle Region is exposed to a variety of flooding types including riverine, coastal, and stormwater-related flooding. Flooding often coincides with other hazards such as storms and erosion. Flood related hazards often have long-lasting impacts in the region.

While each county in the region contains extensive flood hazard zones, Dare County, Tyrrell County, and southeastern Hyde County are dominated by the 1 percent annual chance flood hazard zones or Special Flood Hazard Area (SFHA). Homeowners living in the SFHA that have a mortgage are federally required to carry flood insurance. ***Roughly 20 percent of the region's building stock and 44 percent of the region's population are located in the SFHA.***

Flooding is not limited to the SFHA. Stormwater related and flash flooding routinely occurs in areas outside the SFHA within the region. Other than Chowan County and Gates County, ***a severe storm surge from a Category 4 hurricane has the potential to impact nearly the entire region.***

Homeowners who do not have a mortgage or are located outside of the SFHA are not required to carry flood insurance. High flood insurance costs often result in these homeowners electing to not carry flood insurance, placing themselves at high risk for potential financial ruin in the event of a flood. Flooding also has economic impacts on revenue collection for municipalities since frequent flood issues such as repetitive losses or access issues caused by flood waters can decrease property tax values. The CRS program provides municipalities with the ability to reduce the cost of flood insurance for residents, encourages greater flood insurance coverage, and provides a roadmap for increasing the quality of floodplain management. While the benefits of the CRS program are looked upon favorably, municipalities often note a lack of staffing to administer the program forms a major barrier. Even well-staffed municipalities may be hesitant to join due to the time requirements to administer the program and a lack of guidance to assist in implementing and maintaining a local CRS program.

According to FEMA, there are roughly 45 CRS user groups spread across the country. These user groups provide participants with resources to be successful in joining the CRS program and maintaining and improving class rankings.



While a CRS User group exists in the Outer Banks, other communities in the region do not currently participate. Currituck County, Dare County, and municipalities in Dare County currently make up the OBX CRS User group. The focus is on coastal issues related to CRS. While all communities in the region would be invited to participate in the creation of this group, an additional CRS User group that can focus on the needs of inland communities in the region would be helpful. The CRS User Group could also assist in implementing the Public Outreach project also identified in the portfolio.

Hazards Addressed

Flood

Sectors Addressed

The following sectors will be supported by this project:

- Social Vulnerability and Equity, Health, and Safety
- Housing, Critical Infrastructure, and Community Support Systems
- Economy
- Natural Environmental Systems

Location/Service Area

Albemarle Region.

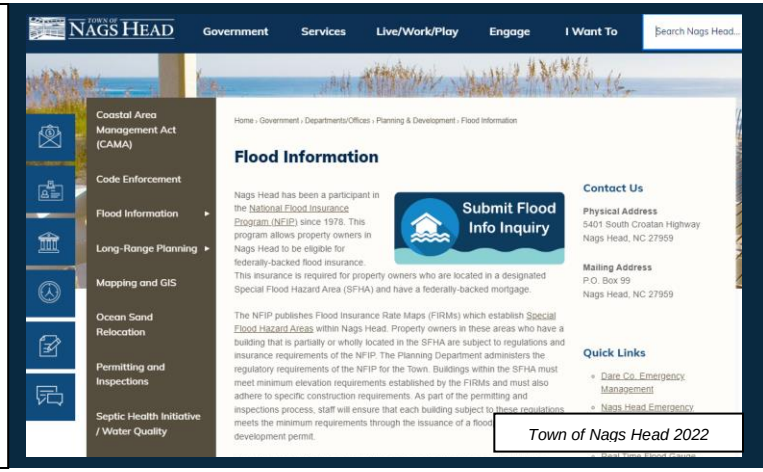
Potential Impact

Development of a CRS User Group in the Albemarle Region could support municipalities that currently participate in the CRS program, would like to join the CRS program, or are simply interested in improving their floodplain management program. This group may consist of municipal, county, regional, and state partners as well as non-profits that share similar missions. Working together, sharing resources, and learning from one another makes participation in the CRS program easier and less burdensome for staff in local governments. This will allow residents to gain a discounted rate on their flood insurance policies. Additionally, the CRS User Group could work together to assist in the implementation of the Public Outreach Project also identified in the portfolio.

Population(s) Served

This project will serve the entire population of the Albemarle Region, with financial benefits for NFIP flood insurance policyholders in communities that join and/or increase their class ranking in the CRS program.

Municipalities like the Town of Nags Head (Class 5, 25% discount) have used the CRS program to guide how flood related outreach is conducted. Using successful CRS participants in the region as a model able to be replicated can increase participation and success in the CRS program.



Town of Nags Head 2022

Roles of Lead and Supporting Agencies

This project will establish a CRS User Group involving county and municipal floodplain managers, non-profit organizations, and other CRS professionals.

Lead Implementer

The Albemarle Commission will serve as the organizer and lead implementer for the CRS User Group. The Albemarle Commission will be responsible for scheduling the meetings, inviting participants, and developing agendas with input from the group. The Commission could explore recording meetings and making them available online for those unable to attend meetings. Additionally, the Commission could host a repository of CRS materials, in electronic form, on the Commission's website.

Supporting Agencies

All municipalities in the Albemarle Region will be invited to participate in the CRS User Group. Representatives of each county, the state, FEMA, and the ISO/CRS specialists that service municipalities in the

region will also be invited to participate to encourage collaboration and the development of working relationships that will lead to success.

Current participants in the CRS program located in the Albemarle Region will be at the top of the recruitment list. These participants will be able to discuss how to avoid roadblocks and other best management practices that are specific to the region.

The following counties in the region participate in the CRS program and have the following class rankings and flood insurance premium discounts for eligible policyholders:

- Camden County – Class 7, 15% discount
- Currituck County – Class 6, 20% discount
- Dare County – Class 6, 20% discount
- Hyde County – Class 8, 10% discount
- Washington County – Class 7, 15% discount

The following municipalities in the region participate in the CRS program:

- Town of Creswell, Washington County – Class 7, 15% discount
- Town of Duck, Dare County – Class 6, 20% discount
- Town of Edenton, Chowan County – Class 7, 15% discount
- Town of Kill Devil Hills, Dare County – Class 5, 25% discount
- Town of Kitty Hawk, Dare County – Class 6, 20% discount
- Town of Manteo, Dare County – Class 5, 25% discount
- Town of Nags Head, Dare County – Class 5, 25% discount
- Town of Plymouth, Washington County – Class 8, 10% discount
- Town of Roper, Washington County – Class 8, 20% discount
- Town of Southern Shores, Dare County – Class 6, 20% discount

Other potential participants will include CRS professionals such as planners, emergency managers, public information officers, and non-profit or academic groups that may have an interest in partnering on projects that would benefit CRS programs such as outreach. Examples of such groups include the Nature Conservancy, Wetlands Watch, and the Albemarle-Pamlico National Estuary Partnership.

Cost Estimate

The cost for the implementation of this project is estimated to be low (under $10,000) and mainly involves the costs of hosting meetings and storing meeting recordings and CRS support documentation on an online platform.

Funding Sources

Funding for the establishment and maintenance of the CRS User Group is expected to be supported through normal municipal and organizational operating budgets. Larger CRS User Group efforts could be supported by potential applications to the Building Resilient Infrastructure and Communities (BRIC) grant program.

Benefits Provided

Physical Benefits

Certain mitigation measures such as acquisition and elevation projects may be implemented by municipalities to reduce flood risk and earn credit in the CRS program.

Socioeconomic Benefits

This project will encourage improved flooding resilience in the Albemarle Region through increased flood insurance coverage and improved floodplain management. Reduced flood insurance costs will provide economic relief to flood insurance policyholders in communities that elect to participate in the CRS program.

Environmental Benefits

Education on the importance of natural floodplain function and conservation of open space is likely to increase in the Albemarle Region as more communities participate in the CRS program.

Equitable Outcomes

The Albemarle Region is home to numerous socially vulnerable populations and many of these populations are located in areas with high flood risk. Nearly half of residents located in the SFHA may have one or a combination of factors that increase social vulnerability including persons over 65 or below 5 years of age, those below the poverty line, and those living with a disability.

This project would address floodplain management services for these populations and provide economic relief for flood insurance policyholders in communities that join the CRS.

Steps for Implementation

Phase 1: Coordination with State NFIP Director- In Phase 1, the Albemarle Commission should reach out to the State NFIP director to express interest in the formation of a CRS User Group and learn about the specific requirements for becoming an official State CRS User Group.

Phase 2: Community & Stakeholder Interest- In Phase 2, the Albemarle Commission will reach out to counties, municipalities, State Floodplain Management Officials, non-profit groups, and staff from ISO/CRS specialists that service municipalities in the Albemarle Region that may be interested in participating in a User Group to determine the level of interest and schedule a kickoff meeting. Representatives of each county, the state, FEMA, and the ISO/CRS specialists that service municipalities in the Albemarle Region will be invited to participate in the User Group.

Phase 3: Develop Vision, Goals, and Focus Areas- In Phase 3, the Commission will work with participants to develop a vision and goals for the group. The group will also identify potential focus areas and topics of discussion, guest speakers for future meetings, determine meeting frequency, and any other relevant decisions needed to meet the requirements of becoming an official CRS User Group. Recordings of the meetings could be made available online to allow those that were unable to join or would like to refer to items of discussion. Topic areas could include each of the CRS Coordinator's Manual's areas of focus:

- Public Information Activities,
- Mapping and Regulations,
- Flood Damage Reductions, and
- Warning and Response

The User Group should consider dedicating one meeting a year to focus on educating communities on how to create and sustain CRS programs to encourage greater enrollment.

Phase 4: Development of an Online Presence- In Phase 4, The Commission will organize an online catalog for CRS related materials and meeting recordings. Emphasis will be placed on maintaining a catalog of template materials that CRS communities can use to improve their floodplain management programs while gaining additional points. CRS approved outreach materials, plans, logs, etc. are already being used by some communities in the region to earn points in the program. These materials can be collected in an online catalog for quick reference and to prevent communities from needing to "reinvent the wheel," saving time and sharing resources.

Phase 5: Opportunities for Collaboration- In Phase 5, the User Group will explore opportunities for collaboration and potential multi-jurisdictional efforts such as floodplain management plans and programs for public information. There are opportunities for jurisdictions to share information and work together to develop materials that will save time for those involved.

Phase 6: Meetings, Information Sharing, and Networking- In Phase 6, the User Group will conduct regular meetings to address CRS topics and where networking opportunities will be established for CRS professionals. As an official CRS User Group, continuing education credits can be awarded for these events for Certified Floodplain Managers (CFM). Members of the User Group will be encouraged to

represent the User Group and report back on any outside conferences or workshops they attend related to floodplain management and CRS.

Implementation Timeframe

This project has a short implementation timeframe. The scheduling of the first CRS User Group meeting and recruitment for participation can begin once the Albemarle Commission establishes the capability to host the virtual meetings and begin populating the User Groups online catalog of CRS materials and meeting recordings.

Once established, the User Group will require regular meetings featuring programming and speakers. The online portal of CRS materials will need to be maintained and updated as necessary.

Integration with Existing Plans, Programs, and Policies

This project will build off the success of existing CRS communities in the Albemarle Region. The project will also work with or partner with the existing Southeast North Carolina and Outer Banks User Groups.

This project will complement the proposed public outreach project for this portfolio which will develop flood-related outreach to be eligible for scoring in the CRS program.

The project will increase collaboration between CRS communities and academic and non-profit organizations that undertake flood-related outreach and habitat restoration.

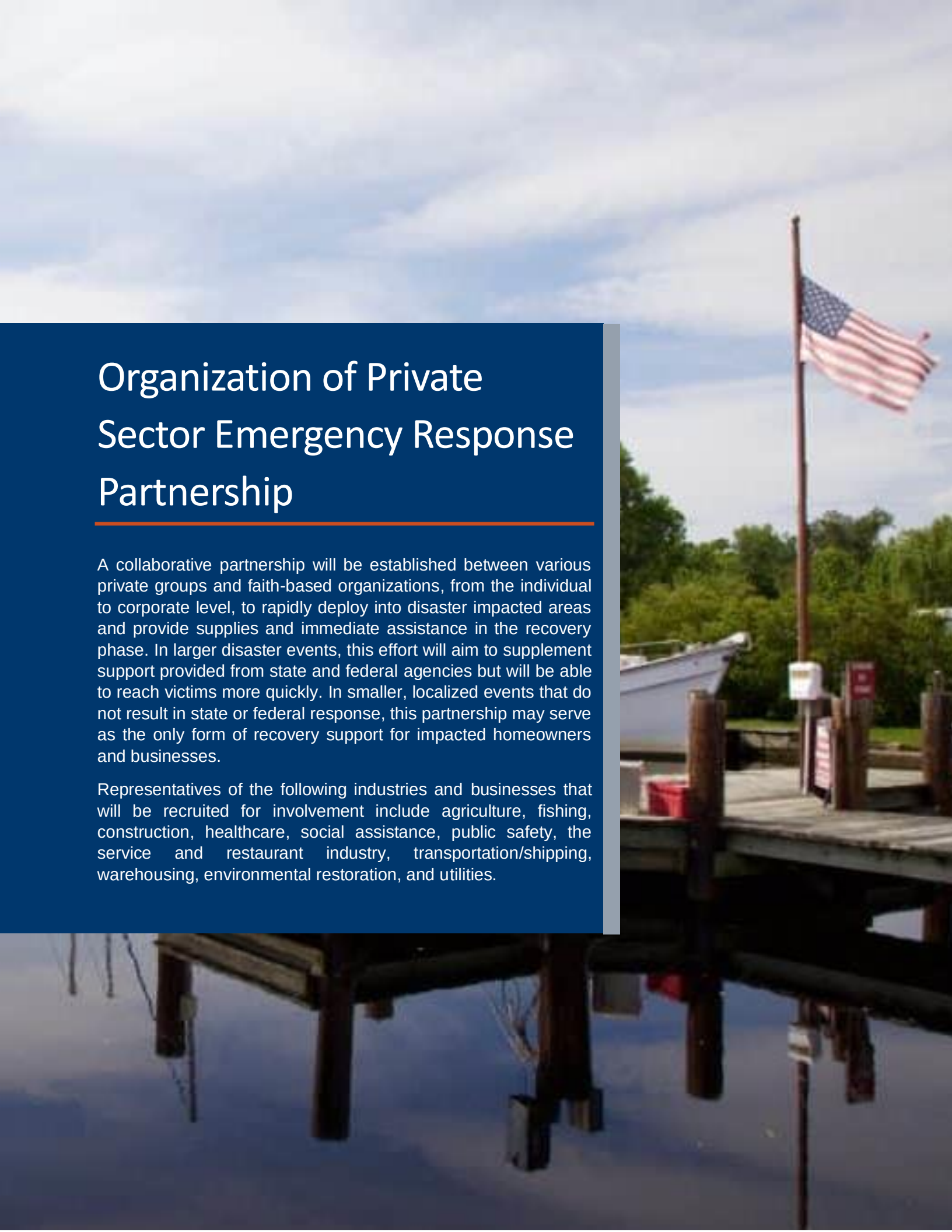
Challenges/Obstacles

The success of this project relies on the cooperation and enthusiasm of participants. Communities that are overwhelmed with other planning efforts may be unwilling to join. Communities that are already successful in the CRS program may be unwilling to participate if they feel they have already maximized their potential in the program.

Communication with these communities with hesitancies will include an explanation of how this project will ease the burden of participation in the program and open new opportunities for scoring potential.

Legislative Challenges, Permitting, Zoning Requirements

There are no foreseen legislative challenges, permitting, or zoning requirements for this project.



Organization of Private Sector Emergency Response Partnership

A collaborative partnership will be established between various private groups and faith-based organizations, from the individual to corporate level, to rapidly deploy into disaster impacted areas and provide supplies and immediate assistance in the recovery phase. In larger disaster events, this effort will aim to supplement support provided from state and federal agencies but will be able to reach victims more quickly. In smaller, localized events that do not result in state or federal response, this partnership may serve as the only form of recovery support for impacted homeowners and businesses.

Representatives of the following industries and businesses that will be recruited for involvement include agriculture, fishing, construction, healthcare, social assistance, public safety, the service and restaurant industry, transportation/shipping, warehousing, environmental restoration, and utilities.

ORGANZATION OF PRIVATE SECTOR EMERGENCY RESPONSE PARTNERSHIP

Problem

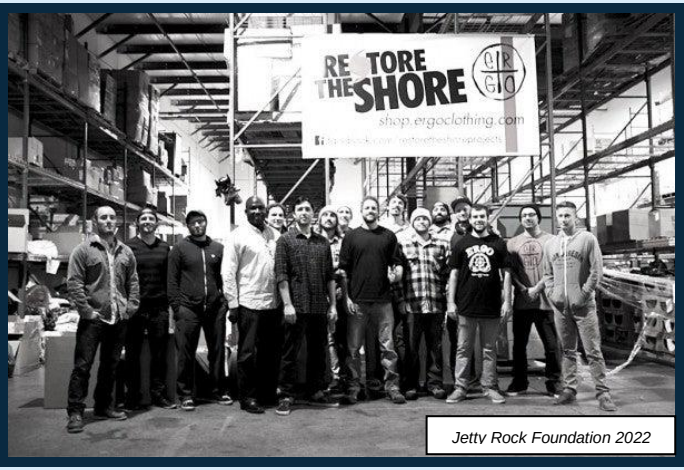
Government disaster response following a large-scale hazard event takes time, especially when outside resources and staff need to be brought in. Potential storm damages to infrastructure, limitations in the transportation system, and the Albemarle Region's expansive sounds and waterways also limit the speed of this response.

After a major disaster, immediate needs include basic needs such as food, water, medicine, and shelter. Other needs include materials and equipment necessary to shore up the property to prevent additional damages.

FEMA response is triggered once a presidential disaster or emergency declaration is issued. However, smaller, localized events may not trigger a response from federal or state agencies. When time is of the essence, rapid deployment of resources can save lives and property. Even when resources and supplies are available, a lack of manpower can result in a slowdown of distribution and necessary building and infrastructure repairs.

Typically, local governments address coordination and planning with the private sector through local Emergency Operations Plans (EOP). Following storm events, local residents, faith-based organizations, and others often rise to action to meet these local needs. This project is aimed at formalizing, organizing, and coordinating those who are already engaged and fulfilling this need in the region.

Local businesses rallied together in Ocean County, NJ to aid in response and recovery following Hurricane Sandy in 2012. This alliance is now celebrating 10 years of supporting their region in local support, disaster relief and environmental restoration through regular fundraising and the establishment of a non-profit agency.



Jetty Rock Foundation 2022

Hazards Addressed

All Hazards: Drought, Erosion, Extreme Temperature, Flood, Hurricane, and Severe Storms, Invasive Species, Water Quality Issues, Wildfire

Sectors Addressed

The following sectors will be supported by this project:

- Social Vulnerability and Equity, Health, and Safety
- Housing, Critical Infrastructure, and Community Support Systems
- Economy
- Natural Environmental Systems
- Historical and Cultural Resources

Location/Service Area

Albemarle Region

Potential Impact

In an effort to expedite the flow of necessary supplies and resources immediately following a disaster event, the formal establishment of a partnership would aid in recovery and expedite relief by engaging faith-based organizations, businesses, and those already assisting with recovery efforts. This effort would be in place to supplement relief expected to arrive from state or federal agencies as well as any local government efforts.

This project will be coordinated proactively ahead of an event, under blue sky conditions, through memorandums of understanding between the participating entities, with a central faith-based organization, business, or non-profit taking organizational lead. In the days leading up to a well-forecasted event, anticipated needs will be identified, and supplies, equipment, and transportation will be staged in coordination with local government efforts and in previously identified safe locations to prepare for deployment once conditions become safe for the relief effort to begin.

This effort will work to complement local government response and existing or planned Community Emergency Response Teams (CERT) in the region. The CERT program was established by FEMA to educate volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations.

Population(s) Served

This project will serve any populations impacted by disaster events in the Albemarle Region but prioritize assistance for those in greatest need including socially vulnerable populations.

Roles of Lead and Supporting Agencies

This project will establish a partnership between numerous groups and require strong organization and leadership to realize maximum potential and benefits on a regional scale.

Lead Implementer

While a lead implementer has not yet been identified, a central faith-based organization, non-profit, or business will ultimately lead in identifying and inviting participants to join the group. To help in identifying a lead implementer, the Albemarle Commission could convene a meeting with local Emergency Managers to learn what organizations are already working in this capacity. These entities could then be invited to a meeting to gauge interest in a more formalized partnership.

Supporting Agencies

Verbal support was expressed for this project from the Tyrrell Chamber of Commerce and the Edenton-Chowan Chamber of Commerce. Additional recruitment of participants could be sought from the following:

Groups that could aid in the transport of supplies include trucking and shipping groups; commercial and recreational fishing fleets; and businesses with vehicles used for deliveries.

Groups that could aid in the collection and distribution of food and medical supplies include grocery stores, farms, commercial fisheries, churches, food banks, pharmacies, health care providers, the American Red Cross, the United Way, and the Salvation Army.

Groups that could aid in rebuilding efforts include contractors, hardware stores, engineers, local utility companies, and lumber companies, such as Weyerhaeuser.

Groups that could aid in addressing environmental impacts from disaster events (such as cleanups and restorations) include local environmental non-profits such as the Coastal Federation, the

Albemarle-Pamlico National Estuary Partnership, Green Saves Green, Chowan Environmental Working Group, and the Albemarle RC&D.

Faith-based groups which support post-storm recovery in the region such as Baptist Men, Operation Blessing, Samaritan's Purse, and Salvation Army.

Coordination will take place with local emergency managers/departments, Local Emergency Planning Committees (LEPCs), and CERT Teams. The following CERT teams are currently in place in Chowan County, Currituck County, Dare County, Pasquotank County, Perquimans County, and Washington County:

- Currituck County CERT (Currituck County)
- Shalom International Church CERT (Chowan County)
- Hatteras Island CERT (Dare County)
- Elizabeth City State University CERT (Elizabeth City State University, Pasquotank County)
- Pasquotank-Camden CERT (Pasquotank and Camden County)
- Albemarle CERT (Perquimans County)
- Perquimans Deep Creek Shores CERT (Perquimans County)
- Shores at Lands End CERT (Perquimans County
- Washington County CERT (Washington County)

Cost Estimate

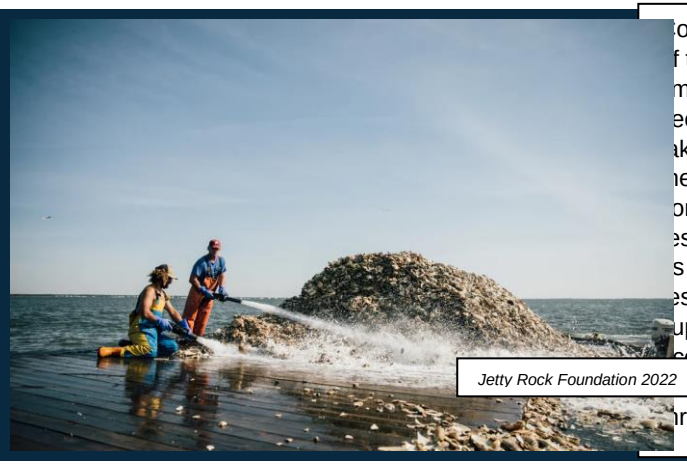
The cost for the implementation of this project will be dependent on scale and timeframe. Initial costs for the organizing interest meeting and potential establishment of the partnership are low, with most of the effort revolving around volunteered time.

However, the long-term cost of this project if it reached a formalized organization with staffing and an operating locating would be much higher. Based on efforts by the Jetty Rock Foundation, a similar organization in New Jersey, the estimated annual operating costs of a partnership reaching maximum potential across the entire Albemarle Region will be $200,000 a year, based on the operating budget.

Funding Sources

Primary funding for the partnership could come from fundraising and donations. Contributions could be sought from major businesses in the region. At maximum potential in the long-term future, the partnership should strive to meet the 80/20 rule: 80 percent of all incoming revenue will be translated into donations for victims of disaster events. The remaining 20 percent will be used toward operating expenses. Additional funding support for initiatives, such as habitat restoration, can be secured through small grant opportunities specific to the sub-projects the partnership chooses to pursue such as habitat restoration.

Benefits Provided


Jetty Rock Foundation 2022

Physical Benefits

This project will assist the region in recovering more quickly from damages following an event.

Socioeconomic Benefits

This project will create a stronger sense of community service and collaboration throughout the Albemarle Region. Where similar efforts have been established, such as the Jetty Rock Foundation in New Jersey, the local business community has thrived, and a strong social network has been established.

Environmental Benefits

This project will benefit ecosystems that are damaged during disaster events through targeted cleanups following storms, floods, and other events. As cooperation continues and more funding is secured, habitat restoration efforts to support the reestablishment of habitats such as wetlands, dunes, and forests may be possible. This habitat restoration could take place following disaster events such as wildfires to restore what was damaged or be a pre-emptive mitigation technique prior to a disaster event to maximize ecosystem services and protections from systems such as dune systems.

Equitable Outcomes

The Albemarle Region is home to numerous socially vulnerable populations that are at higher risk of the impacts of natural hazards and climate change due to a lack of resources or ability to respond to and recover from events. This project will provide vital support to these populations. The Albemarle Region's size is an advantage as this effort is likely to be able to draw resources from portions of the region that were not impacted by a disaster event and redistribute them to the areas of greatest need. Populations that have historically been missed or under-represented in post-disaster support allocations due to state and federal threshold requirements will benefit from a quicker, nimbler, and community-based approach to response and recovery.

Steps for Implementation

Phase 1: Project Initiation - In Phase 1, the Albemarle Commission could convene a meeting with local emergency managers to assess entities in the region already working in this capacity. These entities, including faith-based organizations, businesses, and non-profits, should be invited to participate in a meeting to document how they are currently operating, learn about the stakeholders they are serving, identify any gaps in services or needs of the organization, and gauge interest in a more formalized, regional partnership.

Phase 2. Identification of a Project Lead - In Phase 2, a project lead and partners will be identified and asked to join the partnership. The partnership should discuss who else should be included, development of a mission and goals for the organization, and how this group might function to support local government response.

Phase 3: Outreach and Analysis - In Phase 3, the partnership will meet and coordinate with municipal and county response groups including CERT teams, LEPCs, and emergency managers to learn about needs in the region and how the partnership may assist in filling in gaps in response and aid in response. During this phase, the partnership should also explore similar type partnerships in other areas of the nation to gather knowledge, lessons learned, and keys to success. The partnership may also explore reaching out to other organizations or potential partners who are engaged in disaster response to learning about their roles as well as the opportunity for partnership.

Phase 4: Development of Response Strategies and Plan - In Phase 4, the partnership should identify opportunities and strategies for the partnership to participate in responding to disasters or events in the region. This should be done in coordination with local emergency managers and CERT teams to develop a holistic response plan and avoid duplication of services. The partnership could also explore fundraising opportunities, grants, and outreach. Once strategies have been identified, these should be compiled in

a planning document. The document should identify specific actions to accomplish the strategy, who is responsible for implementation, the cost, the priority of the strategy, and where resources can be obtained from. This document can be shared with local governments and partners for integration in their planning efforts.

Phase 5. Deployment and Evaluation- In Phase 5, the partnership will be available for deployment during and after disaster events. Following events that require the deployment of resources, the partnership will meet to examine successes and obstacles, discuss additional needs, and continue to strengthen relationships with governmental agencies responsible for emergency response and recovery.

Phase 6. Maintain and Expand- In Phase 6, and as funding allows, the partnership will explore other community development and local support possibilities. The partnership will continue to recruit members, organize fundraising efforts, and identify additional projects such as habitat restoration that might mitigate hazards impacting the communities in the region.

Implementation Timeframe

This project has short and long implementation timeframes. The organization of the partnership can begin as soon as a leading individual, business, or non-profit is ready to start the partnership recruitment process. This process is estimated to take six months. However, the overall project will continue over a long timeframe and may take years to reach full capacity.

Integration with Existing Plans, Programs, and Policies

This project will complement existing disaster response programs that service the Albemarle Region including FEMA, local governments, and local CERT teams.

Challenges/Obstacles

The establishment of a private sector emergency response partnership relies on the cooperation and enthusiasm of participants. This enthusiasm may be difficult to build and nurture under “blue sky” conditions without a disaster event that displays the importance of this effort.

This can be overcome through strong leadership from the organizers who can communicate the need and benefits of this effort. A large disaster event often can serve as the inciting factor for the mobilization of this effort.

Legislative Challenges, Permitting, Zoning Requirements

There are no foreseen legislative challenges, permitting, or zoning requirements for this project.

Public Outreach

The Albemarle Region is exposed to a wide variety of natural hazards, ranging from ferocious and sudden severe storms to steady, long-term changes in sea level. Each hazard has a potential set of impacts tied to the location where they may occur within the Region. Not all impacts are as highly visible as downed trees or flooded buildings. Some hazard events may have long lasting impacts that may linger for many years, presenting health risks and weakening the economy. As the climate changes and the region undergoes changes in development and population, the level of risk and associated impacts for each hazard continues to evolve.

In order for the public to be prepared for both current and future hazard events, be informed to make responsible decisions to protect their lives and property, and protect the resilience of the local economy, a new approach to public outreach and education within the Albemarle Region is necessary. This new approach will use numerous avenues and stakeholder delivered messaging to focus on region-specific impacts, discuss less risks that are not commonly identified, be designed to evolve at the same pace has evolving conditions, and be tailored to specific audiences and socially vulnerable populations.

PUBLIC OUTREACH

The mission of the Elizabeth City State University Emergency Management (ECSU EM) program is to provide a diverse pool of professionals with the skills required to maintain the safety of individuals, organizations, and communities from emergencies and disasters. The ECSU EM program is one of the many pre-existing organizations and outreach mechanisms in the region that can be used to maximize hazard outreach potential.

ECSU EM 2022

Problem

Throughout the United States, there is a need for an evolved approach to public education to capture the "mosaic" of impacts from hazard events. In addition to obvious impacts like wind and water damage, hazards can have long lasting and repetitive impacts, long recovery times, and cause a variety of cascading and lingering issues such as substandard housing, food and water insecurity, and other public health threats. Without public knowledge of these risks, the public is less likely to make personal choices to mitigate their property, weakening the overall resilience of the Albemarle Region.

The Albemarle Region is exposed to a wide variety of hazards. Continued development, changing demographics, and ever-evolving climactic conditions have led to increased severity and frequency of disaster events and an evolving list of potential hazard impacts.

The Albemarle Region's vibrant tourism industry attracts visitors from around the country. These vacationers may not be familiar with the hazards that are present in the region and what to do before, during, and after a hazard event that occurs during their visit. Secondary homeowners who do not spend as much time in the region may also have similar knowledge limitations. The region has worked to make sure emergency management planning and notifications include non-residents, but hazard events that are localized, long-term, or have slow recovery times may not result in the same attention.

Socially vulnerable populations form a large portion of the Albemarle Region's permanent year-round population. These populations are especially at risk because of factors like socioeconomic status, household composition, minority status, or housing type and transportation. General outreach often misses connecting with these groups and lacks discussion of their unique risks to hazard events.

While outreach and education surrounding hazard events and their impacts are extensive, a region-specific approach to current and future hazard impacts that targets local audiences using a variety of methods needs to be organized and implemented.

Hazards Addressed

All Hazards: Drought, Erosion, Extreme Temperatures, Floods, Hurricanes, Severe Storms, Invasive Species, Water Quality Issues, Wildfires.

Sectors Addressed

The following sectors will be supported by this project:

- Social Vulnerability and Equity, Health, and Safety

- Housing, Critical Infrastructure, and Community Support Systems
- Economy
- Natural Environmental Systems
- Historical and Cultural Resources

Location/Service Area

Albemarle Region

Potential Impact

The Albemarle Region will develop a multi-faceted public outreach program, partnering with non-profit organizations, academia, and businesses, to organize and implement current and future hazard impact outreach.

Outreach will be developed to reach a variety of target audiences, including socially vulnerable populations. Target audiences are broken out from the populations that are considered "at risk" from the hazard or hazards of concern that the outreach is addressing. Target audiences will receive the same messaging as the general population but using different communication techniques that are specifically designed to reach and resonate with the target audience.

The program will work to expand beyond traditional hazard outreach pathways to move beyond focusing only on emergency management. The CRS User Group Project, identified in this portfolio, will convene local government staff to build education and outreach to communities. These projects share common goals and should be simultaneously considered as they each develop. Further, Elizabeth City State University's Emergency Management program may be available to assist with the development of educational materials and programming and assist with deployment. Museums in the region could be engaged and asked to partner in conducting outreach on past hazard events and potential future impacts.

Population(s) Served

This project will serve the entire population of the Albemarle Region including tourists and socially vulnerable populations.

Roles of Lead and Supporting Agencies

This project will establish a collaborative outreach effort between various academic groups, non-profit organizations, private businesses, and local governments.

Lead Implementer

The Albemarle Commission, in conjunction with the CRS User Group, will serve as the lead implementer. The Commission, along with participating local governments, can host a repository of outreach materials, in electronic form, on their respective websites. This repository will be organized according to the hazard type and the target audiences.

Supporting Agencies

Numerous federal, state, academic, environmental, and non-profit organizations will be contacted to ask for assistance in developing outreach materials, hosting outreach events, or leading trainings on hazard-related topics or outreach strategies.

Supporting agencies that showed interest during the planning process include:

- Elizabeth City State University's (ECSU) Department of Aviation and Emergency Management
- Tyrell County Community Development Corporation
- North Carolina Coastal Federation
- Albemarle Pamlico National Estuary Program
- Camden County Soil and Water District

- USDA NRCS Albemarle
- Camden County Soil and Water District

Additional partnerships may include:

- FEMA
- North Carolina Department of Public Safety and the NC Floodplain Management Program
- Soil and Water Conservation Districts
- American Red Cross
- County and local Offices of Emergency Management, Planning, and Building Inspections
- Museums
- Schools and youth organizations
- Environmental non-profits

Cost Estimate

The cost for the implementation of this project is estimated to be under $50,000 to establish outreach materials and $10,000 a year to train educators, develop a repository, and update materials as necessary.

Funding Sources

Funding to support the development of new outreach materials and the online repository may need to be supported through small grant opportunities.

Benefits Provided

Physical Benefits

No direct physical benefits will be provided by this project as it is focused on education. However, mitigation measures taken by property owners to protect homes and businesses are likely to occur throughout the Albemarle Region.

Since 2002, the Albemarle Pamlico National Estuary Program (APNEP) has supported over 40 outdoor education-conservation initiatives at schools and non-formal education centers throughout the region. This has included professional development opportunities for teachers. Training educators on how to communicate region-specific hazard impacts allows for greater reach and for information to reach the region's school children.


APNEP 2022

Socioeconomic Benefits

This project will provide educational awareness that will allow residents and businesses in the Albemarle Region to make informed decisions, allowing for the development of resilient communities and economies.

Environmental Benefits

No direct environmental benefits will be provided by this project as it is focused on education. However, environmental education will be a major component of this project and focus on the encouragement of protection and enhancement of environmental systems that reduce natural hazard risk. Topic areas will include dunes, estuarine shorelines, wetlands, and natural floodplain functions.

Equitable Outcomes

The Albemarle Region is home to many socially vulnerable populations that are at higher risk to the impacts of natural hazards and climate change. This project will provide targeted outreach to socially vulnerable populations through education that notes both

the natural hazards and local conditions that amplify risk for these populations.

Steps for Implementation

Phase 1: Project Kick-Off - In Phase 1, the Albemarle Commission will reach out to counties and municipalities in the Albemarle Region that may be interested in participating in this project to determine the level of interest and schedule a kickoff meeting.

Phase 2: Develop Outreach Goals and Audiences - In Phase 2, the group should outreach needs, specific audiences, and goals. It may be helpful to work with the CRS User Group who will also be conducting outreach to stakeholders in the region.

Phase 3: Identify How the Messaging to Specific Audiences May Occur - In Phase 3, the group should identify how messages should be conveyed to the audiences (through social media, workshops, videos, etc.).

Phase 4: Develop Messaging - In Phase 4, stakeholders will work together to develop messaging for the targeted audiences, topics, and delivery mechanism.

Phase 5: Develop Repository - In Phase 5, the Albemarle Commission will organize an outreach collaboration system and establish an online repository for outreach materials. Where possible, outreach materials in this repository will be in a template form that could be customized by the local government or organization.

Phase 6: Conduct Outreach Partnerships - In Phase 6, outreach will be performed by local governments, academia, non-profits, and community-based organizations. Implemented outreach actions will be recorded as part of the database to identify and help to address potential outreach gaps in terms of targeted audiences and outreach topics. The Commission will work with groups like the Albemarle Pamlico Estuary Program and Elizabeth City State University's (ECSU) Department of Aviation and Emergency Management to develop and host workshops for educators, and facilitators, and to introduce new hazard-related information and outreach techniques. Promotion of these outreach materials and strategies will be led by the Commission and supporting agencies.

Implementation Timeframe

This project has a short implementation timeframe. Once established, the project will require ongoing maintenance for continual improvement of outreach materials and the continued offering of workshops and trainings.

Integration with Existing Plans, Programs, and Policies

This project will complement existing outreach programs in the Albemarle Region, including existing CRS programs. Flood-related outreach will be designed with scoring in the Community Rating System (CRS) in mind to allow for communities in the CRS program to consider upgrading current outreach activities and provide additional incentives for non-participating communities to consider joining. Examples of flood-related CRS outreach can be gathered from CRS user groups and participating communities in coastal regions throughout the country.

The project will work with businesses that benefit from responsible decision-making by property and business owners including the insurance industry and realtor associations.

This project will work with programs that provide traditional sources of outreach such as emergency management groups and non-profits. The project will also seek to utilize non-traditional hazard outreach pathways such as the Homegrown Leaders program from the NC Rural Center, environmental education, and museum staff.

Challenges/Obstacles

The success of this project relies on the cooperation and enthusiasm of participants. This enthusiasm may be difficult to build and nurture under “blue sky” conditions without a disaster event that displays the importance of this effort. Outreach that is eligible for credit in the CRS program will provide an added incentive to shift to the outreach developed by this project.

Legislative Challenges, Permitting, Zoning Requirements

There are no foreseen legislative challenges, permitting, or zoning requirements for this project.

Stormwater Working Group

Throughout the Albemarle Region, stormwater flooding has been reported due to undersized, clogged, or damaged stormwater infrastructure. Problems associated with stormwater flooding can range from inconveniences due to closed roads from flooding or property damage and risk to life in significant flooding events. Heavier rainfall events and development in the region is expected to contribute to greater volumes of stormwater runoff, increasing the potential for flooding.

Stormwater management is the responsibility of various local governments and groups in the Albemarle Region. To address current and future issues with stormwater management, new approaches will be necessary to reduce stormwater flooding frequency and severity.

A Working Group will be established to evaluate the region's stormwater capabilities, identify needs, and develop collaborative approaches to reducing stormwater flooding in the Albemarle Region.

STORMWATER WORKING GROUP

Problem

Flooding is one of the most visible hazards in the Albemarle Region. Localized stormwater related flooding happens with a high frequency. While the region garners a great deal of attention for coastal flooding, localized stormwater related flooding is occurring at an equal frequency. Problems from stormwater flooding can range from inconveniences due to closed roads from flooding or property damage and risk to life in significant flooding events.

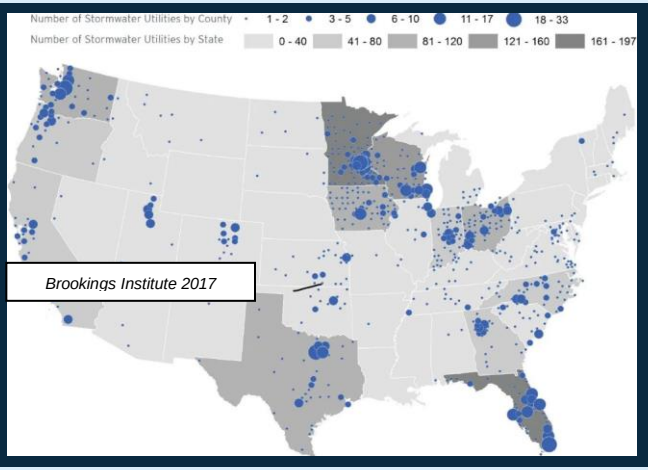
Construction of stormwater systems often takes place on a piece-by-piece basis over an extended period. Management of these systems is difficult and fragmented. As development has occurred and infrastructure aged, some stormwater systems become overwhelmed and lack the carrying capacity necessary to handle increased runoff.

Heavy rainfall events are becoming more common and intense resulting in frequent flooding of low-lying areas, even those not in special flood hazard areas (SFHA).

The Vulnerability Assessment for the region identified the following gaps in data and understanding:

- Better stormwater modeling tied to anticipated development is needed to determine future stormwater management needs.
- 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 combined riverine and coastal flooding.

A potential outcome of the working group may be stormwater utilities. Stormwater utilities are not uncommon in North Carolina. Expansion of the number and scale of stormwater utilities can provide more stable and consistent stormwater management, including maintenance and improvements to stormwater infrastructure, removing the burden on local governments.



- Better climate projections for the future occurrence of coastal storms and hurricanes in the Albemarle Region is needed to inform the future frequency and severity of storm surge.
- Mapping of areas of anticipated future development would allow for a better understanding of changes in exposure to flooding, especially for location-specific flood risk like coastal and riverine flooding.

Hazards Addressed

Flood, Water Quality

Sectors Addressed

The following sectors will be supported by this project:

- Social Vulnerability and Equity, Health, and Safety
- Housing, Critical Infrastructure, and Community Support System

Location/Service Area
Albemarle Region

Potential Impact

Creation of a stormwater working group would provide a support network for local governments working to address stormwater management and flooding in their communities. Working group members could work together to better understand stormwater management related needs in the region and develop best practices to address them. The working group would allow participants the opportunity to share information and funding sources to strengthen their programs. Communities may experience reduced occurrences of flooding and improved management of their stormwater systems by collectively working together as a region.

Population(s) Served
This project will support local governments in managing stormwater infrastructure. Through improved stormwater management, vulnerable populations in low-lying areas may be impacted less frequently.

Roles of Lead and Supporting Agencies

Lead Implementer
The Albemarle Commission will serve as the lead implementer.

Supporting Agencies
Supporting agencies in this project will include all interested county and municipal agencies responsible for stormwater management and maintenance (the partners), non-profit organizations that can provide outreach support, and academic organizations that can provide data. State agencies such as the North Carolina Department of Environmental Quality could provide support for planning.

The Working Group can connect with groups such as the North Carolina Coastal Federation to discuss low impact stormwater solutions to stormwater runoff. Projects involving wetlands restoration, natural infiltration techniques, and permeable pavement can reduce runoff and the necessary carrying capacity needs of stormwater infrastructure.


North Carolina Coastal Federation 2022

Cost Estimate
The cost for the implementation of this project is estimated to be low (under $5,000) and primarily focused on securing meeting spaces and staff time for participating officials.

Funding Sources
It is anticipated that the costs associated with hosting meetings of the working group and staff time for participants will be absorbed by operating budgets. Outcomes from the working group such as stormwater infrastructure improvements, identified equipment needs, or development of regional stormwater utilities are likely to be grant eligible through private, state, or federal sources, depending on the identified actions.

Benefits Provided

Physical Benefits
Identified improvements in stormwater management programs including infrastructure design, expansion of carrying capacity, and regular maintenance is likely to reduce the frequency and severity of stormwater flooding.

Socioeconomic Benefits

This project will increase the capacity of stormwater management programs which may reduce the damages caused by stormwater flooding. Damages avoided will include damages to stormwater infrastructure, roadways, buildings, and cars. The project will also result in a reduction in interruptions caused by stormwater flooding including roadway and business closures, emergency access issues, and lost wages.

Environmental Benefits

Improved management of stormwater systems may also result in improved water quality.

Equitable Outcomes

The Albemarle Region is home to numerous socially vulnerable populations. Many of these populations reside in low-lying areas susceptible to flooding and that historically have had limited investment in stormwater infrastructure. The Stormwater Working Group will support local governments in managing and implementing their stormwater programs more equitably.

Steps for Implementation

Phase 1: Stakeholder Interest and Assessment - In Phase 1, the Albemarle Commission will invite county and municipal departments, stakeholders, and other potential project partners to participate in an interest meeting on stormwater and flooding needs. During this meeting, the working group will assess and identify common needs across organizations. The working group will identify the current stormwater capabilities of participants including:

- Are existing stormwater programs in place?
- Do the programs include management plans and regulations?
- Have areas of frequent flooding been identified?
- Is stormwater infrastructure inventoried and mapped?

The Working Group will use this information to identify what is working well in the region, what improvements are needed, and areas to develop partnerships and work across jurisdictional lines when possible.

Phase 2: Develop Mission and Goals - In Phase 2, the Working Group will use information collected during Phase 1 to develop a mission statement and goals for the Working Group. Based on these goals, a schedule for the frequency of meetings will be established.

Phase 3: Access & Review Existing Plans, Policies, and Studies - In Phase 3, participating jurisdictions will inventory their plans, policies, and studies relating to stormwater management and submit copies if available to the Albemarle Commission. If possible, the Commission will create a website or shared drive where this information can be stored and accessed by all communities.

Phase 4: Review Gaps Identified in Vulnerability Analysis - In Phase 4, the Working Group will review the gaps in data and understanding identified in the vulnerability analysis:

- Better stormwater modeling tied to anticipated development is needed to determine future stormwater management needs.
- 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 combined riverine and coastal flooding.
- Better climate projections for the future occurrence of coastal storms and hurricanes in the Albemarle Region is needed to inform the future frequency and severity of storm surge.
- Mapping of areas of anticipated future development would allow for a better understanding of changes in exposure to flooding, especially for location-specific flood risk like coastal and riverine flooding.

The Albemarle Commission will facilitate a meeting with participants to discuss how these gaps might be addressed.

Phase 5: Explore Strategies and Potential Projects - In Phase 5, the Working Group will explore stormwater strategies that will help accomplish the goals identified in Phase 2. This could range from physical projects to research, to template documents that assist local governments with their stormwater management needs. Opportunities for partnership or to work at regional levels will be identified.

Phase 6: Peer-to-Peer Network - In Phase 6, the Commission and participants will continue to meet and utilize this peer-to-peer network to help improve the management of stormwater in their jurisdictions and the region.

Phase 7: Long-term projects - In Phase 7, the Commission and participants can explore long-term implementation projects.

Implementation Timeframe

This project has a short timeframe. The informational meeting can take place once the Albemarle Commission has coordinated with potential government and stakeholder representatives.

Integration with Existing Plans, Programs, and Policies

Information collected and projects identified through the Stormwater Working Group can be incorporated into capital improvement planning, hazard mitigation planning, stormwater management plans, watershed management, and ordinances.

This project will complement several of the proposed projects in this portfolio including:

- Albemarle Specific Natural Hazards Outreach
- Develop County-Wide Stormwater/Watershed Master Plans
- Harmful Algal Bloom (HAB) Prevention and Identification

The project will increase collaboration between stormwater managers and academic and non-profit organizations that have expertise in future conditions, stormwater management best practices, and those that can help identify problem areas, particularly in locations with historically underserved populations.

Challenges/Obstacles

The success of this project relies on the interest of municipal and county agencies responsible for stormwater management. It is acknowledged that not all of these agencies in the Albemarle Region will be interested in participating. Explanation of the benefits of this project will need to be highlighted at the onset. Inclusion of speakers from highly successful and efficient regional stormwater management programs in the country can be used to highlight successes, identify ways to avoid pitfalls, and demonstrate how regional cooperation for stormwater management represents a best management practice.

Legislative Challenges, Permitting, Zoning Requirements

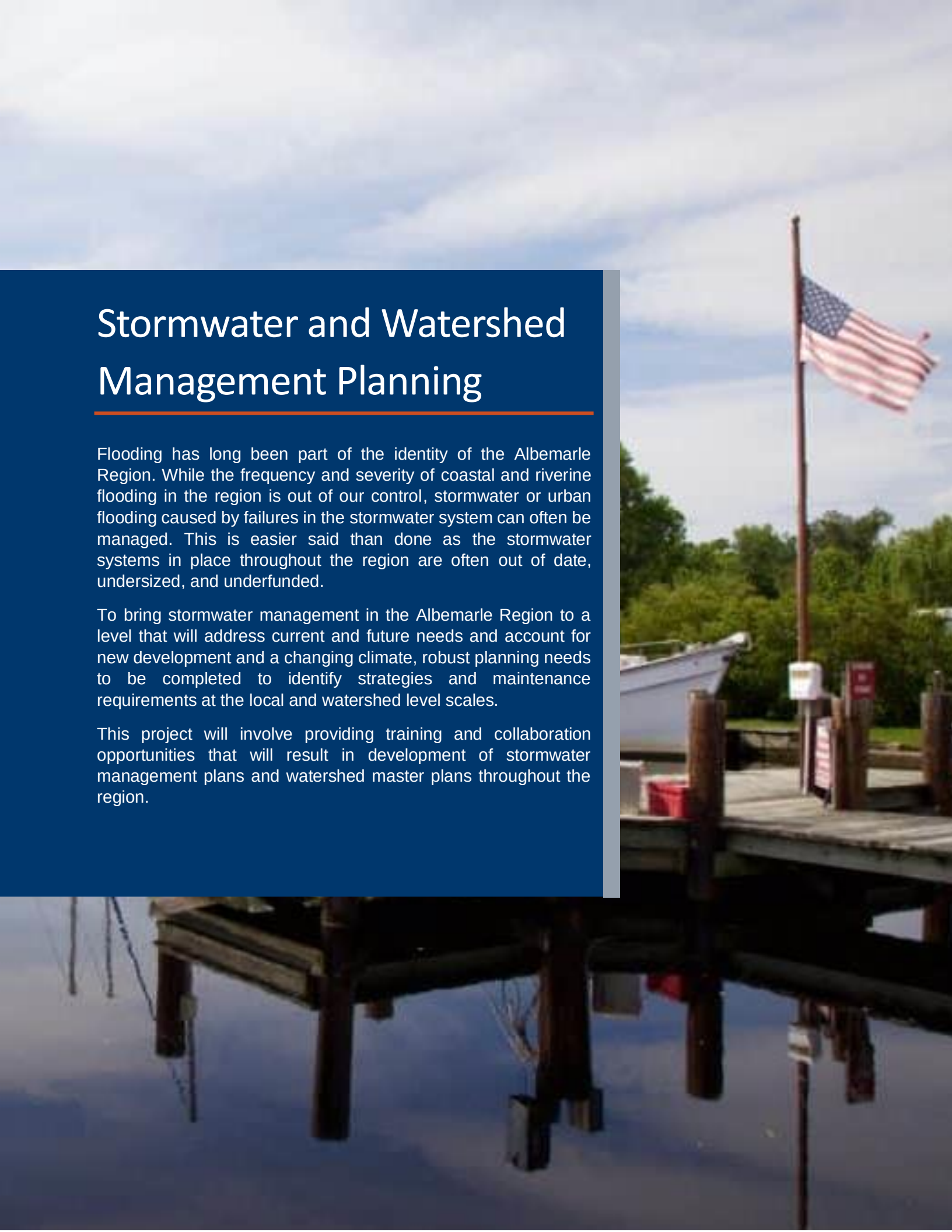
Certain stormwater management techniques may currently be prohibited under state law. Each identified stormwater management technique that exceeds state standards will require evaluation with current state and federal requirements. Currently, prohibited efforts that would result in benefits may be worth requesting review by state politicians

Stormwater and Watershed Management Planning

Flooding has long been part of the identity of the Albemarle Region. While the frequency and severity of coastal and riverine flooding in the region is out of our control, stormwater or urban flooding caused by failures in the stormwater system can often be managed. This is easier said than done as the stormwater systems in place throughout the region are often out of date, undersized, and underfunded.

To bring stormwater management in the Albemarle Region to a level that will address current and future needs and account for new development and a changing climate, robust planning needs to be completed to identify strategies and maintenance requirements at the local and watershed level scales.

This project will involve providing training and collaboration opportunities that will result in development of stormwater management plans and watershed master plans throughout the region.



STORMWATER AND WATERSHED MANAGEMENT PLANNING

PROBLEM

Stormwater management presents a major obstacle in the Albemarle Region. There are numerous factors, both natural and man-made, that contribute to the difficulty of effective stormwater planning and the proper maintenance of stormwater systems.

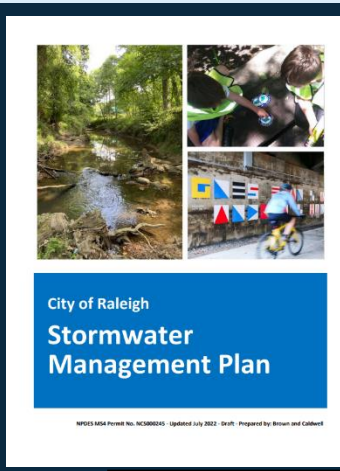
The region's high water table limits the ability to use certain stormwater detention and retention techniques to their maximum potential. Coastal storms can push storm surges inland, backing up natural conveyance systems and causing backflow in stormwater pipes. The slow and steady creep of sea level rise only exacerbates these issues.

The volume of stormwater that needs to be managed within the Albemarle Region continues to grow. Increasing development and expansion of impervious surfaces cause higher and higher rates of runoff. A changing climate has resulted in heavier and more intense rainfall events.

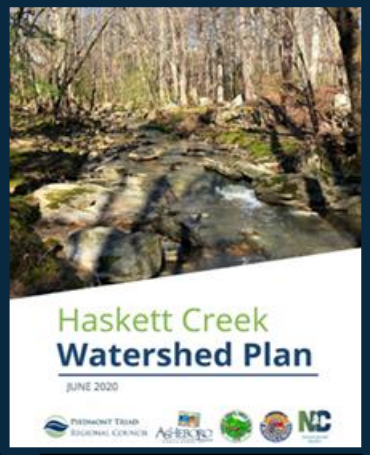
Stormwater infrastructure currently in place in many areas of the Albemarle Region is old, degraded, and often lacks proper maintenance. Stormwater systems designed 50 or more years ago lack the carrying capacity to handle the volume of stormwater created by increasingly developed land and the modern frequency in the severity of rainstorms. As time continues, stormwater capacity needs are only expected to increase.

In order to address today's stormwater flooding concerns and prepare for tomorrow's conditions, thorough and coordinated management of stormwater systems is needed throughout the region.

A stormwater management plan can be used to improve water quality and reduce stormwater flooding based on jurisdictional boundaries. A watershed management plan considers watershed boundaries. These plans can work together to address stormwater quality and flooding issues.



City of Raleigh 2022



Piedmont Triad Regional Council 2022

Stormwater management plans need to be developed or updated to account for current infrastructure needs and include design specifications that consider anticipated changes in precipitation patterns that are likely to occur within the useful life of stormwater components. Proper maintenance strategies, including funding allocations and identification of responsible parties, must be part of stormwater management planning.

Actions that impact stormwater upstream in a watershed, such as increased development, will in turn impact the stormwater volume and speed of flow of water moving into downstream communities. Stormwater planning needs to be addressed beyond municipal and county boundaries and involves coordination and planning for entire watersheds.

Hazards Addressed
Flood, Water Quality

Location/Service Area
Albemarle Region.

Potential Impact

All county and local municipal governments in the Albemarle Region will be invited to participate in workshops and be encouraged to develop and implement stormwater management and watershed master plans.

State agencies responsible for the review of plans and stormwater/watershed management will be encouraged to contribute to and participate in the workshops. Representatives of the Community Rating System (CRS program) will be invited to present methods of leveraging watershed master planning for points in the CRS program.

The North Carolina State Climate Office will be asked to present or contribute recommended guidance on future climate conditions that should be used to design stormwater system capacity requirements, including what present-day storm the systems should be designed to (10-year, 15-year, etc.) that will still account for future protections as well as sea level rise projections for coastal areas. It is expected that plans will be designed using data from the North Carolina Climate Risk Assessment and Resilience Plan.

Academia, environmental non-profit organizations, and soil and water conservation districts will be asked to partner with municipalities and counties to develop their plans, especially for watershed master plans that cross county borders.

Each municipality/county that develops and implements a stormwater management plan will also be strongly encouraged to develop a stormwater flooding reporting system. This system could be an online portal or a simple phone number that residents can use to report stormwater flooding and locations that need maintenance (debris clogs, broken or failing components, etc.). The reporting systems should connect directly to the responsible parties for the particular section of the stormwater system that is being reported on. Annual meetings of the responsible parties will be recommended to convene to discuss how maintenance of the system is proceeding if additional investment is needed and identify areas in need of an upgrade that should be included in the planning documents.

While the primary goal of this project is to reduce the occurrence of stormwater and urban flooding, a secondary benefit will be an improvement in water quality. Proper stormwater and watershed management will include proper treatment of runoff to prevent pollutants and nutrients from reaching local waterways.

Population(s) Served
This project will serve the entire population of the Albemarle Region.

Sectors Addressed
The following sectors will be supported by this project:

- Housing, Critical Infrastructure, and Community Support Systems
- Natural Environmental Systems

Roles of Lead and Supporting Agencies

This project will encourage the implementation of stormwater management and watershed master plans in the Albemarle Region through guidance and input from a variety of agencies and organizations.

Lead Implementer

The Albemarle Commission will serve as the lead implementer of the project and host workshops on the proper development of stormwater management plans for municipalities and counties. The Commission will also provide additional workshops on the proper development of watershed master plans. The Commission will host guidance materials and example model documents on its website.

Supporting Agencies

All county and local municipal governments in the Albemarle Region will be invited to participate in workshops and be encouraged to develop and implement stormwater management and watershed master plans.

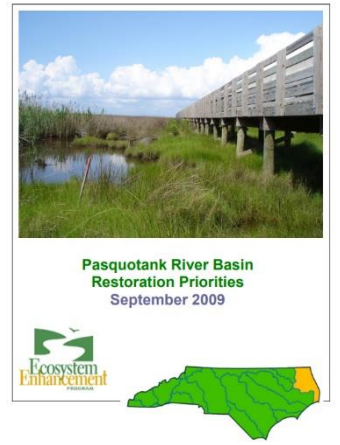
Agencies that will be asked to provide input and guidance on best practices for developing stormwater management and watershed master plans will include:

- State agencies responsible for review of plans and stormwater/watershed management
- Representatives of the CRS program
- North Carolina State Climate Office
- North Carolina Division of Mitigation Services
- North Carolina Department of Environmental Quality including the Division of Marine Fisheries
- Academia
- Environmental non-profit organizations
- Soil and Water Conservation Districts

Cost Estimate

The cost for the implementation of this project is estimated to be low (under $5,000) and mainly involves the costs of meetings and storing stormwater/watershed plan guidance, references, and sample plans on an online platform for easy access. Costs of stormwater infrastructure improvements identified by municipalities and counties are likely to be high.

The NC Division of Mitigation Services (DMS) is currently in the process of revising its River Basin Restoration Priority (RBRP) methodology and products. River Basin Restoration Priorities (RBRPs) are plans that DMS develops to identify priorities for the protection and enhancement of water quality, fisheries, wildlife habitat and recreational opportunities. The plans can be used to inform the development of watershed master plans that also consider reducing the impacts of flooding.



Ecosystems Enhancement Program 2009

Funding Sources

Funding for hosting workshops for the development of stormwater management and watershed master plans is anticipated to be provided by the Albemarle Commission and county governments. The writing of plans is anticipated to be funded by the county and municipal governments with some support possible from small grant opportunities such as the NC DEQ 205(j) Water Quality Management Planning Grant. Implementation of stormwater improvements identified in the plans is expected to be covered through a combined investment of local and county governments and larger grant opportunities from the state and federal level, including the Hazard Mitigation Grant Program (HMGP), the Building Resilient Infrastructure and Communities (BRIC) grant program, the Water Resources Development Grant Fund, and Section 319 grant funding opportunities. Private and foundational funding may also be available from sources such as the Golden LEAF Foundation.

Benefits Provided

Physical Benefits

No direct physical benefits will be provided by this project. However, as stormwater management and watershed master plans are used to implement capital improvements, stormwater infrastructure systems will be strengthened throughout the region, leading to reduced flooding.

Socioeconomic Benefits

This project will encourage improved flooding resilience in the Albemarle Region through proper stormwater management. This should result in reductions in road closures due to flooding and necessary repairs, maintaining access to businesses and neighborhoods and keeping emergency response times low.

Watershed plans have already been developed by numerous coastal communities and land management groups in North Carolina (including Hyde County and the Mattamuskeet Drainage Association within the Albemarle Region). These plans provide a competitive advantage in identifying cost-effective projects that reduce the volume and rate of runoff and help attract federal, state, local, and private funds for projects' design and construction.

Environmental Benefits

No direct environmental benefits will be provided by this project. However, as stormwater infrastructure improvements are made, proper treatment of stormwater should result in improvements in water quality through the reduction of non-point source pollution and nutrient loading.

Equitable Outcomes

The Albemarle Region is home to numerous socially vulnerable populations and many of these populations are located in areas that have received low funding support for stormwater infrastructure. With stormwater management and watershed master plans likely to result in long-term stormwater management and infrastructure improvements, areas with historically low investment in stormwater infrastructure will be prioritized.

Steps for Implementation

Phase 1: Workshops - In Phase 1, the Albemarle Commission will coordinate with state and federal agencies, academia, and environmental non-profits to gather input on best management practices, requesting participation as speakers at workshops. Once speakers are secured, the Commission will invite municipal and county governments to workshops. The workshop schedules, number of workshops, and topic areas will be determined by the level of interest.

Considerations for stormwater and watershed master plans encouraged through the workshops will include:

- Potential protective criteria recommendations for the Chowan River and Albemarle Sound from the Nutrient Criteria Development Plan (NCPD) Scientific Advisory Council (SAC) to reduce nutrient loading of waterways that contribute to eutrophication and HABs.
- Recommendations for on-site wastewater treatment systems (septic).
- Encouragement of green infrastructure techniques and habitat restoration to increase natural infiltration, utilizing guidance from documents like the Coastal Federation's Action Plan for Nature-Based Stormwater Strategies.
- Mapping of areas of anticipated future development to allow for a better understanding of potential downstream increases in runoff and associated water quality issues.
- Anticipated needs for increasing the capacity of stormwater systems due to increases in heavy rainfall events and higher runoff due to the development.
- Considerations for the impact of sea level rise on stormwater outfalls, wetlands retreat, and migration of saltwater interfaces.

Phase 2: Stormwater and Watershed Planning- In Phase 2, municipal and county governments will develop their stormwater and watershed master plans, aiming for collaboration and integration with other planning efforts.

Phase 3: Plan Review and Integration- In Phase 3, once stormwater and watershed master plans are developed, they will be shared with relevant state and federal agencies for review and input. The plans and recommended projects will be integrated with other relevant plans including hazard mitigation plans and capital improvement plans. Plans will be maintained and updated as necessary.

Implementation Timeframe

This project has a short implementation timeframe. The scheduling of workshops will be based on the availability of speakers and the interest of participants. Development of plans is likely to take several years.

Integration with Existing Plans, Programs, and Policies

This project will build on prior stormwater management planning efforts in the Albemarle Region. The project will complement the proposed public outreach project for this portfolio and encourage watershed master plans to be developed to score points in the CRS program.

The project will increase collaboration between counties, municipalities, and academic and non-profit organizations that undertake flood related outreach and habitat restoration.

Challenges/Obstacles

The success of this project relies on the cooperation and enthusiasm of participants. Counties and municipalities that are overwhelmed with other planning efforts or recently completed stormwater/watershed planning efforts may be unwilling to participate at this time.

Legislative Challenges, Permitting, Zoning Requirements

Certain higher standards may currently be prohibited under state law. Each identified initiative in stormwater and watershed management planning that exceeds state standards will require evaluation with current state and federal requirements. Currently, prohibited efforts that would result in benefits may be worth requesting review by state politicians.

Harmful Algal Blooms Research, Prevention, and Identification

The Albemarle Region is prone to harmful algal blooms (HABs), triggered by runoff of nutrients in stormwater. While HABs have occurred historically, they have become increasingly common in recent years. HABs are damaging to the aquatic ecosystem and present significant health risks to humans. HAB's also threaten the region's tourism economy and local fisheries.

As development in the region expands, temperatures warm, and heavy rainfall events increase in severity and frequency, HABs are likely to become more commonplace. While there has been research and involvement by many partners, an exact cause has not yet been determined.

The Albemarle Region will develop a collaborative outreach campaign to educate the public on how to identify and report HABs, and methods to reduce runoff that contributes to HABs. The region will work with partners to develop a response protocol for notification of the blooms to stakeholders in the region and encourage additional research to determine the cause of the HABs.

HARMFUL ALGAL BLOOMS RESEARCH, PREVENTION, AND IDENTIFICATION

Problem

The Albemarle Region is dominated by freshwater rivers and streams and brackish coastal waters. Contamination of these waterbodies can damage ecosystems, threaten fisheries, and negatively impact recreation and tourism.

According to the US Environmental Protection Agency (USEPA), rivers and streams of the Albemarle Region are nutrient-sensitive and require nutrient input controls. An excess of nutrients in a water body leads to a condition called “eutrophication” which can cause dense growth of plant life and death of animal life due to lack of oxygen. Algae blooms, also called cyanobacteria, can occur when eutrophication occurs, resulting in rapid growth and reproduction of algae in what is commonly referred to as a “bloom.” When waterbodies are inundated by water runoff with high levels of naturally occurring and manmade nutrients, the waterbodies become more vulnerable to algal blooms.

Many species of algae produce toxins. When these species bloom, it is referred to as a harmful algal bloom (HAB). These HABs are environmentally damaging and pose health risks for humans. Contact with water containing HABs can cause various health effects, including diarrhea, nausea, or vomiting; skin, eye, or throat irritation; and allergic reactions or breathing difficulties. HABs can also result in fish kills and render fish and shellfish that bioaccumulate toxins unsafe to eat.

When HABs occur, recreation and fishing are often prohibited to prevent potential health impacts. This represents a significant risk to the region’s economy. Harmful algal blooms are an increasingly common occurrence in the Albemarle Region. In 2021, HABs were reported in the Chowan River, Perquimans River, Little River, and Pasquotank River. As temperatures warm, and increased heavy rainfall events combine with increased development, the runoff of nutrients is likely to increase. This may cause HABs to become more commonplace and lead to greater disruptions, health risks, and environmental degradation.

Harmful algal blooms, or HABs, can take on a variety of forms including discolored water or surface scums that can appear bright green, blue, red, or brown in color; floating or submerged clumps, flecks, or mats; or milky blue/white surface scum. Suspected algal blooms should be reported to the North Carolina Division of Water Resources using the Fish Kill/Algal Bloom Reporting App.

NC DEQ 2022

As HABs are not as visible as other hazards, better public outreach is needed to educate the public on how to identify and report HABs.

Hazards Addressed

Water Quality Issues

Sectors Addressed

The following sectors will be supported by this project:

- Social Vulnerability and Equity, Health, and Safety
- Economy
- Natural Environmental Systems

Location/Service Area

Albemarle Region. Waterbodies that are calm and have issues with eutrophication (overloading of nutrients) are the most susceptible to HABs.

Potential Impact

The Albemarle Region will develop a two-pronged public outreach program to address HABs.

General outreach will be developed to educate the public on the risks posed by HABs, how to identify a HAB, and how to report a HAB to the North Carolina Department of Environmental Quality. Outreach will be designed through a collaboration of environmental non-profits, state agencies, and academia to provide up-to-date information and utilize pre-existing tools such as the NCDDWR Algal Bloom Map.

Once outreach is developed, the participating agencies will work with stakeholder groups and local governments to deliver the outreach to target audiences.

Population(s) Served

This project will serve the entire population of the Albemarle Region, including tourists, but focus on the Following target audiences:

- Populations living near waterbodies
- Tourists, ecotourism groups, and populations who use those waterbodies for recreation
- Commercial and recreational fishermen
- Populations that rely on surface water for their potable water supply.

Roles of Lead and Supporting Agencies

This project will establish a collaborative outreach effort between various environmental non-profits, state agencies, and academic institutions.

Lead Implementer

The Albemarle Commission will serve as the lead implementer at the beginning of the project and invite the supporting agencies to attend a workshop to discuss informational needs, data gaps, target audiences, and outreach strategies surrounding HABs in the Albemarle Region.

Supporting Agencies

Numerous federal, state, academic, environmental, and non-profit organizations will be contacted to ask for assistance in developing outreach materials and outreach strategies and conducting outreach.

Supporting agencies for this project include:

- Chowan Edenton Environmental Group
- Green Saves Green
- Albemarle-Pamlico National Estuary Partnership
- North Carolina Sea Grant
- Municipal and County governments
- Albemarle Resource Conservation and Development
- Tyrrell County Community Development Corporation
- North Carolina Coastal Federation
- Chowan Edenton Environmental Group

- Green Saves Green
- Albemarle-Pamlico National Estuary Partnership
- North Carolina Coastal Federation
- Tyrrell County 4-H Program

Additional cooperation will be requested, as a starting point, from the following groups:

- National Oceanic and Atmospheric Administration (NOAA) Sea Grant
- United States Fish and Wildlife Service
- U.S. Geological Survey (USGS)
- Natural Resources Conservation Service
- North Carolina Department of Agriculture and Consumer Services
- North Carolina Department of Environmental Quality including the Division of Marine Fisheries
- North Carolina Department of Health and Human Services
- North Carolina Environmental Management Commission
- North Carolina Water Resources Research Institute
- Waterkeepers Carolina
- Science and Technologies for Phosphorus Sustainability (STEPS) Center
- Soil and Water Conservation Districts
- Universities and colleges
- Schools and youth organizations
- Environmental non-profits

Cost Estimate

The cost for the implementation of this project is estimated to be low (under $25,000 a year to establish and distribute outreach materials).

Academic organizations such as the Science and Technologies for Phosphorus Sustainability (STEPS) Center who conducts research on phosphorus, one of the nutrients that can contribute to HABs, will be asked to contribute up to date information on eutrophication and HAB reduction techniques that can be used in the Albemarle Region.

STEPS 2022

Funding Sources

Funding for the identification of new outreach techniques will be supported through existing organizational means and small grant opportunities.

Benefits Provided

Physical Benefits

Minor physical benefits are expected from this project.

Socioeconomic Benefits

This project will promote proper stormwater management techniques that reduce the threat of HABs. Reduction in the frequency and severity of HAB events will benefit the Albemarle Region's tourism and fishing industries.

Environmental Benefits

This project will focus on the early detection of HABs and promote techniques that reduce stormwater runoff that contributes to poor water quality that can result in HABs.

Equitable outcomes

The Albemarle Region's fish and shellfish provide a stable food resource to many residents, including numerous socially vulnerable populations. HABs represent a threat to this food supply. Many socially vulnerable populations rely on the health of the region's coastal ecosystems for their livelihoods including those in the hospitality industry at tourist destinations and those involved in commercial fisheries. This project will benefit work to improve ecosystem health and allow for safe food, water, and stable sources of income.

Steps for Implementation

Phase 1: HAB Workshop- In Phase 1, the Albemarle Commission will invite supporting agencies to attend a workshop to discuss informational needs, data gaps, target audiences, and outreach strategies surrounding HABs in the Albemarle Region. The Commission will serve as a facilitator during this workshop, take notes, and write up the outreach strategy responsibilities identified and agreed to by the participants. The Commission will distribute this documentation to the participants.

Phase 2: HAB Outreach Development- In Phase 2, participating organizations and agencies will collaboratively develop outreach materials to serve the region. Localized outreach that speaks directly to specific issues will also be developed.

Phase 3: HAB Outreach Distribution and Update- In Phase 3, outreach materials will be distributed. Additional workshops will be held as necessary to update the outreach materials or develop new outreach strategies based on the success of the outreach campaign or changing conditions.

Potential water quality standards for the region that may be put in place by the North Carolina Environmental Management Commission would be included in outreach efforts.

Implementation Timeframe

This project has a short implementation timeframe. The HAB outreach development workshop can begin as soon as the Albemarle Commission and participants agree on a meeting date. Outreach implementation is anticipated to begin rollout over the course of a year and be sustained after that time. Once established, the outreach strategy will require maintenance and updates to the continual improvement of outreach materials.

Integration with Existing Plans, Programs, and Policies

This project will complement existing outreach programs in the Albemarle Region. Certain outreach materials that focus on protecting the natural floodplain function will be designed with scoring in the Community Rating System (CRS) in mind.

This project will encourage the identification and reporting of HABs through the North Carolina Division of Water Resources' Fish Kill/Algal Bloom Reporting App.

It is anticipated that once outreach materials and techniques are developed, they will be rolled into the broader proposed public outreach project of this portfolio.

Challenges/Obstacles

The success of this project relies on the cooperation and enthusiasm of participants. Organizations and government agencies that already conduct outreach on hazards may be unwilling to collaborate or change their current outreach strategies concerning HABs.

This can be overcome through the demonstration that the outreach developed is easy to deploy and is more effective at educating the public than current outreach measures. Outreach that is eligible for credit in the CRS program will provide an added incentive to shift to the outreach developed by this project.

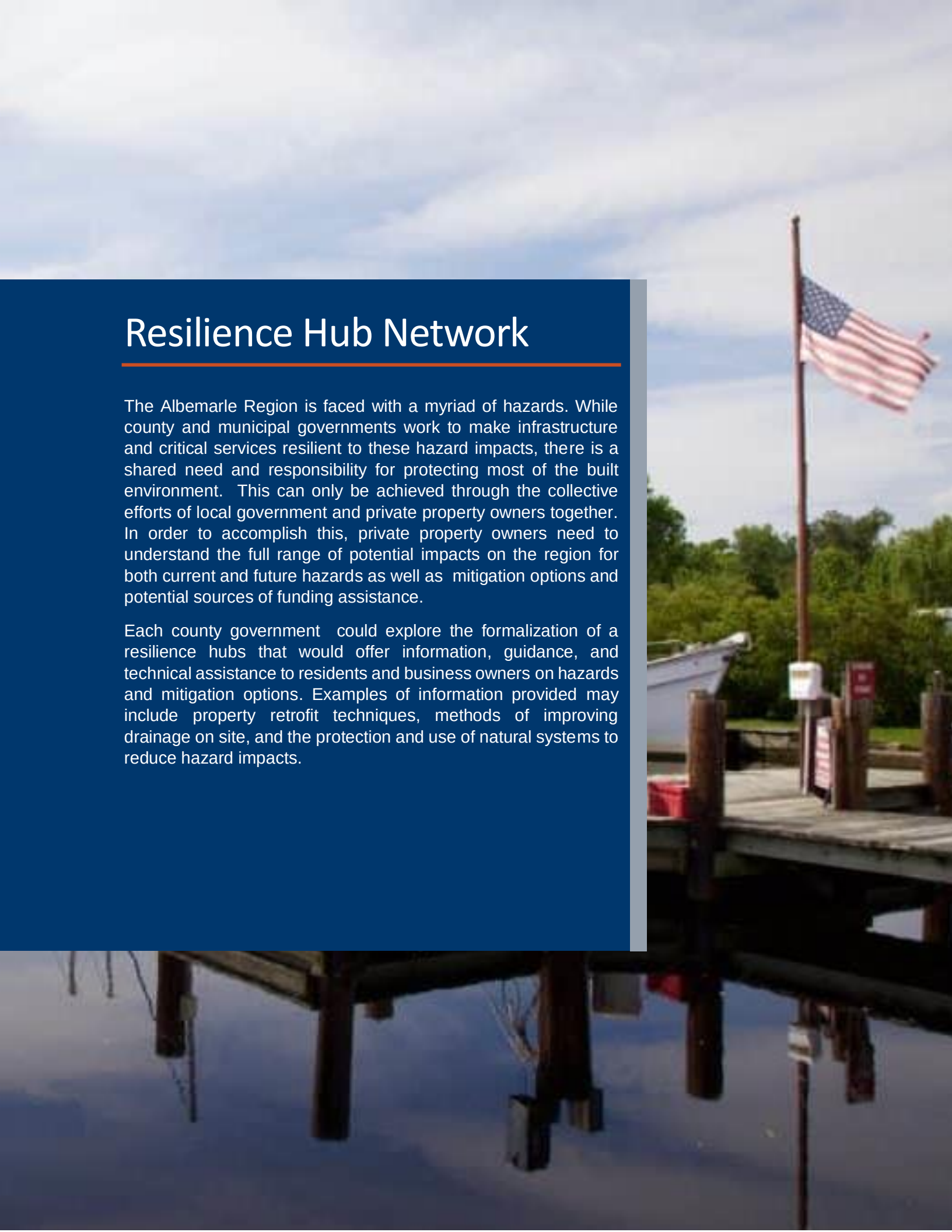
Legislative Challenges, Permitting, Zoning Requirements

There are no foreseen legislative challenges, permitting, or zoning requirements for this project.

Resilience Hub Network

The Albemarle Region is faced with a myriad of hazards. While county and municipal governments work to make infrastructure and critical services resilient to these hazard impacts, there is a shared need and responsibility for protecting most of the built environment. This can only be achieved through the collective efforts of local government and private property owners together. In order to accomplish this, private property owners need to understand the full range of potential impacts on the region for both current and future hazards as well as mitigation options and potential sources of funding assistance.

Each county government could explore the formalization of a resilience hubs that would offer information, guidance, and technical assistance to residents and business owners on hazards and mitigation options. Examples of information provided may include property retrofit techniques, methods of improving drainage on site, and the protection and use of natural systems to reduce hazard impacts.



RESILIENCE HUB NETWORK

Problem

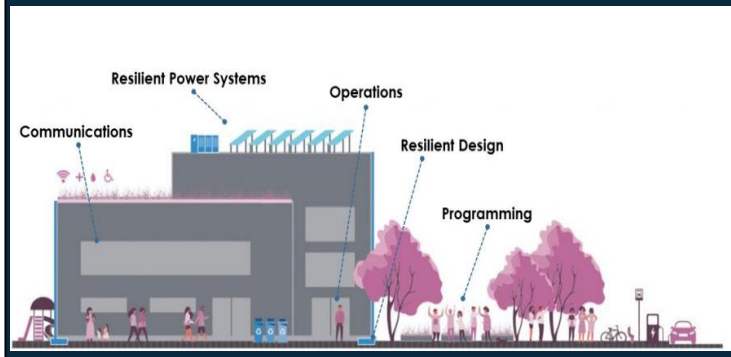
Disaster events continue to impact the Albemarle Region and are exacerbated by climate change. To combat the impacts, state, county, and local governments have developed emergency and hazard mitigation planning efforts to protect public infrastructure and critical services. Additional efforts have been made in education and gone towards developing a wide range of mitigation options for home and business owners to consider that can provide property protection. Information on these options occurs from many sources, but often at a federal level scale that is not specific to the needs of the Albemarle Region. Property owners need more specific information to understand how hazards will affect their communities and specialized guidance on region specific resilience options that are best suited for their individual circumstances.

Once a resilience option has been selected, funding becomes the next challenge. Many mitigation measures are costly and burdensome, especially those from socially vulnerable populations. There are many sources of funding but identifying the proper funding source and navigating the application process can also be an impediment to implementation.

Local governments in the region provide a great deal of information and guidance already. However, more specific hazard impacts and region-specific mitigation measures are needed to support property owners. Resilience hub networks may assist residents in gaining valuable information resources they need and local governments in carrying out services.

A resilience hub network can take many forms from physical sites or improvements to informational websites. Resilience hubs are designed to strengthen relationships between governments and the people they serve, shift power to local residents to identify and drive solutions, and, in the longer term, address the existing health inequities that disasters highlight and exacerbate. While some hubs can offer information, others may provide food and water during an emergency. Resilience Hubs are intended to complement emergency response and operations, not replace them.

A resilience hub is a community facility that connects residents to resources and services to help a community be prepared for disruptions, including chronic stressors and acute emergencies. Resilience hubs are being established throughout the nation by local and county governments.



Washington DC Department of Energy and Environment. 2019

Hazards Addressed

All hazards

Sectors Addressed

The following sectors will be supported by this project:

- Social Vulnerability and Equity, Health, and Safety

- Housing, Critical Infrastructure, and Community Support Systems
- Economy
- Natural Environmental Systems

Location/Service Area

Each county embodies unique community values and has different needs. Ideally, each county in the region could consider formalizing a resilience hub.

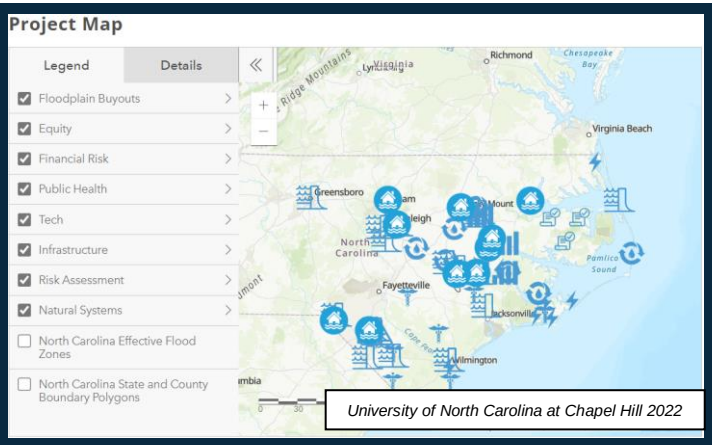
Potential Impact

Resilience hubs will offer year-round access to information and technical support for property owners that are interested in improving the resilience of their property and their safety. Through the resilience hub network, information on regional best practices, examples of pilot projects, and success stories can be shared. Grant and funding opportunities applicable to the region can be identified and kept up to date. Options for low-cost resilience actions that could be self-funded will also be provided based on the property owners' hazardous exposure, level of risk, and vulnerabilities to their homes or business.

Each resilience hub's primary task will be the distribution of this information ahead of a hazard event. However, when hazard events occur, the resilience hub networks will also be equipped to support the public and local governments during, recovery, and rebuilding. In the aftermath of hazard events, each resilience hub could conduct outreach campaigns to provide property owners with information on available financial support and methods of rebuilding to higher standards to reduce future hazard damages.

In the future, resilience hubs may choose to expand their scope to include concepts such as sustainability or similar needs within each county. Resilience hubs, as physical space, can store disaster response equipment and serve as or support emergency shelters in their counties. While this is not the initial goal in the region, this option could be explored in the future.

Resilience hubs can centralize available information and build upon previous efforts like the North Carolina Flood Resiliency Hub, a clearinghouse which features research focusing on flooding issues, including flood mapping, mitigation actions, resiliency planning efforts, natural infrastructure, and community impacts.



University of North Carolina at Chapel Hill 2022

Population(s) Served

This project will serve the entire population of the Albemarle Region through county-level implementation, with services focused on socially vulnerable populations.

Roles of Lead and Supporting Agencies

This project will explore the creation of county-level resilience hubs in the Albemarle Region.

Lead Implementer

Ongoing outreach and discussions are required to identify organizations that are currently involved with resilience hubs in the region.

Supporting Agencies

The Resilience Hub Network will be supported by a variety of agencies and organizations.

These groups may include:

- Community-based organizations (CBOs), especially those active in disaster and disaster recovery
- Groups that convene CBOs with roles in disaster and resilience, such as the North Carolina Inclusive Disaster Recovery Network and The Conservation Fund's Resourceful Communities
- Local emergency management agencies, building inspectors, planners, and local health and social services departments
- NC Division of Emergency Management
- NC Department of Health and Human Services
- NC Department of Public Safety and the NC Floodplain Mapping Program
- National Flood Insurance Program (NFIP)
- Federal agencies such as the Federal Emergency Management Agency (FEMA), the U.S. Department of Housing & Urban Development (HUD), and the U.S. Department of Energy (DOE)
- Academia
- Environmental non-profits
- Soil and Water Conservation Districts
- Albemarle Resource Conservation and Development
- American Red Cross
- Salvation Army

Cost Estimate

The cost for the implementation of this project is estimated to vary from county to county based on the design and scale of their resilience hubs. Resilience hubs that are developed by modifying existing programs and facilities will have a lower cost based on increasing staffing capacity, installing generators, etc. These costs could be kept under $75,000. Hubs that require the construction of new facilities or the hiring of staff are likely to have higher costs which could be several million dollars based on the size, structural design, and equipment installed.

Funding Sources

Funding for the establishment of County Resilience Hubs may be achieved through a variety of potential funding avenues including:

- County budgets
- Building Resilient Infrastructure and Communities (BRIC) grant program
- NOAA Environmental Literacy Program grants
- National Science Foundation (NSF) grant opportunities
- Investment by colleges and universities

Benefits Provided

Physical Benefits

County Resilience Hubs that provide physical space could be utilized as emergency shelters or areas where supplies could be stored that help support response and recovery operations.

Indirect physical benefits from this project will occur as mitigation measures recommended by the Resilience Hubs such as acquisition and elevation projects and drainage improvements are implemented by property owners.

Socioeconomic Benefits

This project will encourage resilient decision making that results in reduced hazard damages, quicker recovery time, and reduction in economic disruptions, leading to stronger, more resilient communities.

This project will help property owners identify funding sources for their mitigation improvements, supporting property owners that may not have the means to self-fund improvements to their properties.

Increases in the resiliency of privately owned properties decreases the need for emergency response in hazard events, improving overall emergency response and critical service capacity throughout the region.

Environmental Benefits

Natural systems will benefit as property owners learn more about natural floodplain functions or implement resilience measures that utilize natural systems. Additionally, as these options are implemented, the region could benefit from localized reduction in stormwater runoff and improved water quality.

Equitable Outcomes

The Albemarle Region's socially vulnerable populations are those most in need of financial support to implement resiliency improvements to their properties. This project will supply technical support for these populations. During hazard events and periods of recovery, this project will also prioritize assisting these populations.

Steps for Implementation

Phase 1: Identify Lead - In Phase 1, a lead implementer needs to be identified; an agency or organization with an interest in community resilience and experience liaising with the government would be a good fit.

Phase 2: Define Resilience Hubs - In Phase 2, the definition of the term "resilience hub" varies. In Phase 2, resilience hub leaders and experts on resilience hubs will be included in initial conversations with participants to develop a shared definition for the purpose of this project.

Phase 3: Needs Assessments - In Phase 3, participants will conduct a needs assessment with existing resilience hubs and other community-based organizations that provide some relevant offerings. A separate needs assessment with local emergency management and social services departments will also be conducted to better understand what gaps might be filled by resilience hubs.

Phase 4: Implementation Strategies - In Phase 4, participants will explore strategies to strengthen existing hubs or help existing nonprofits transition to resilience hubs and build consensus around top priorities.

Phase 5: Funding Identification - In Phase 5, participants will pursue funding and other next steps to implement the resilience hub networks.

Phase 6: Peer-to-Peer Network - In Phase 6, if needed and wanted, a peer-to-peer network can be developed to support resilience hubs, such as through regular calls and a listserv system. This exchange would help participants share updates and opportunities, successes, and challenges.

Implementation Timeframe

This project depends on finding a motivated lead implementer, which may or may not materialize. Once a lead implementer has been identified, the engagement needs assessments, and strategy development could be completed in under a year. Pursuing the priority strategies will depend on their scope, but a timeframe of multiple years should be anticipated.

Integration with Existing Plans, Programs, and Policies

The project will build from the work of local governments, academic groups, community and faith-based organizations, and non-profit organizations who undertake resilience related outreach and implementation efforts.

This project will complement the proposed CRS User Group project and the Public Outreach project identified in this portfolio. County Resilience Hubs would serve as another avenue for outreach and education to occur.

Challenges/Obstacles

Implementation of this project depends on finding a willing lead implementer and building the political leadership for it if the lead is outside the local government.

Legislative Challenges, Permitting, Zoning Requirements

There are no foreseen legislative challenges, permitting, or zoning requirements for this project.

APPENDIX A: OTHER RESILIENCE PROJECTS CONSIDERED BY THE RISE ALBEMARLE REGION

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
Regional Home Elevation Program	**PROBLEM** Most home elevation grant programs (FEMA FMA, HMGP, etc.) require the homeowner to self-fund their elevation projects before being reimbursed once work is complete. Many homeowners, particularly socially vulnerable populations, do not have the budget to cover these upfront costs, essentially eliminating these programs as an avenue to protect their properties. **SOLUTION** Establish a regional program to provide the upfront costs for participation in elevation reimbursement programs. The program would provide funding for construction costs for home elevation for low-income property owners. Upon property owner reimbursement from FEMA, the funds would be restored to the program to support the next homeowner.	Flood	To Be Determined	High	Regional, primarily focused on areas with high social vulnerability in the floodplain.
Wetlands Mitigation Banks	**PROBLEM** Wetlands are at risk for loss throughout the Albemarle Region due to sea level rise, wetlands retreat, erosion, saltwater intrusion, and habitat degradation. Wetlands provide critical habitat, improve water quality,	Coastal Erosion, Flood, Water Quality	North Carolina Department of Environmental Quality (DEQ) Division of Mitigation Services (DMS), the Coastal	High	Regional, focused on wetland areas and areas of projected wetlands

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	and provide flood protection and wave attenuation for adjacent areas.		Federation, local governments, and landowners		retreat due to sea level rise
	SOLUTION Utilize and expand existing wetland mitigation banks. Wetland mitigation banks are established through the restoration, creation, or enhancement of wetlands. When a mitigation bank is established, the landowner retains ownership and use of the property, while a conservation easement protects the wetlands from incompatible degrading activities.				
V Zone Requirements for the Coastal A Zone	**PROBLEM** Coastal flooding events and erosion are likely to increase in frequency and severity in the future as sea levels rise. This raises risks for development in coastal areas. Homes in the V zone of the Special Flood Hazard Area may experience waves of 3 feet or greater in a 1% storm and must meet higher building requirements to account for this extra risk of wave damage. Homes located in the adjacent Coastal A zone may experience waves of 1.5 to 3 feet in the same storm and may experience similar building damages but are not currently required to meet additional wave damage-related building requirements.	Flood	Local municipalities	Low	Municipal but can be replicated regionwide
	SOLUTION Require new or substantially improved homes in the Coastal A zone to also				

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	meet V zone requirements to account for expected wave damage risks.				
Coastal Evacuation Route Upgrades	**PROBLEM** Evacuation routes in coastal areas are degraded in many areas. Some roadways used as evacuation routes are undersized (not enough lanes) or low-lying. This presents risk of potential damage/failure of roadways during hazardous events, roadways being exposed to flooding, and the speed of evacuation being reduced by the maximum capacity of the roadway.	Floods, Severe Storms, Erosion	State-level coordination and approval are needed from NC DOT; Hyde County will take a lead role as a pilot county.	High	County replicated and coordinated throughout the Albemarle Region
	SOLUTION Conduct a transportation study to identify inadequacies. Undertake roadway widening, bridge replacement, and ferry upgrades to aid in the evacuation.				
Water Quality Sampling Program	**PROBLEM** The state does not conduct ambient water quality sampling in Currituck Sound, North Landing River, or the Northwest River watersheds.	Water Quality	Albemarle-Pamlico National Estuary Partnership	Medium	Regional, in local waterbodies
	SOLUTION Establish a standard water quality sampling program to test for potential contaminants and harmful algal blooms. This would include using a numeric nutrient criterion to test for potential eutrophication issues.				
Stormwater Modeling	**PROBLEM** Many stormwater systems in the Albemarle Region are undersized.	Flood	Would require the collaboration of NC State DOT,	High	Regional

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	Current standards for stormwater system construction are based on precipitation norms of the past and do not incorporate today or tomorrow's projected rainfall conditions. Undersized stormwater components lead to stormwater flooding and potential damage to roadways, adjacent properties, and the stormwater system.		NCDEQ, and academia; Pasquotank County is willing to take a supporting role as a pilot.		
	SOLUTION Develop a stormwater model that projects capacity needs based on anticipated changes in precipitation for the lifespan of the stormwater infrastructure. Utilize this model to establish regional stormwater system requirements for construction and guide the replacement/upkeep of current systems.				
Address I&I in Sewerage Lines	**PROBLEM** Inflow and infiltration (I&I) occur when rainwater or groundwater enters the wrong system – the sanitary wastewater system – and over burdens it. Groundwater (infiltration) seeps into sewer pipes through holes, cracks, joint failures, and faulty connections. Stormwater (inflow) rapidly flows into sewers via roof drain downspouts, foundation drains, storm drain cross-connections, and through holes in manhole covers. Groundwater tables are rising in the region. Stronger rainfall events and stormwater deficiencies can cause	Water Quality	Regional Sewer Utilities, Counties, Municipalities	High	Local, replicated throughout the Albemarle Region as necessary

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	urban flooding to be more intense and last longer. Most I/I is caused by aging infrastructure that needs maintenance or replacement. In the Albemarle Region, wastewater treatment plants assume that I&I is a large problem as volume rates rise dramatically during and following a rainfall event. As I&I worsens, costs of wastewater treatment rise, and the potential for the release of untreated wastewater due to volume exceedance increases. **SOLUTION** Develop a regional program to identify sources of I&I and establish a program to fund necessary repairs. Improvements and repairs could include locking lids, flood vents, and watertight systems.				
Elevate Lift Stations	**PROBLEM** Numerous lift stations in the Albemarle Region are not elevated and could be impacted by flooding, resulting in potential damage and release of untreated water. **SOLUTION** Survey the region's lift stations to determine current flood protection levels. Elevate flood-prone lift stations and waterproof components that are not able to be lifted.	Flood, Water Quality	Regional Sewer Utilities, Counties, Municipalities	High	Local, replicated throughout the Albemarle Region as necessary
Hazard Disclosure	**PROBLEM** The North Carolina State Real Estate Commission requires sellers to tell buyers if the seller has "actual knowledge" of the property is subject	All Hazards primarily focused on Flood	North Carolina, State Real Estate Commission	Low	Regional

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	to flood risk or being located in a federally designated flood area. This language is not specific enough to require a comprehensive assessment of past flooding or other hazard events. There also is no need to tell buyers whether they are required to have flood insurance.				
	SOLUTION Establish a regional hazard disclosure policy and expand hazard disclosure to include discussion of a flood, erosion, and other hazards. A flood-focused hazard disclosure requirement has recently been proposed by the Biden administration on a national scale. It would require the disclosure of any previous flood damage, flood insurance claim, or requirement to have flood insurance. FEMA would enforce disclosure by requiring counties and municipalities that participate in the federal flood insurance program to have disclosure policies in effect, either through local or state laws.				
Address Flooding in Pasquotank County	**PROBLEM** Pasquotank County has a high flood risk and a history of flooding damages. Specific flood issues have been identified at the Meadstown/Weeksville portion of the County and the Newland area, a flood study is needed. Given the low elevation of the County, sea level rise	Flood	Pasquotank County	Low	County focused on Pasquotank County but can be replicated in other counties in the Albemarle Region

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	will result in increasing coastal flooding risk in the future. **SOLUTION** Complete a flood study of Pasquotank County, develop a stormwater/flooding/ watershed master plan for Pasquotank County, and implement identified actions. Replicate the planning and implementation effort in other counties in the Albemarle Region.				
Creation of Regional Resiliency Funding Source	**PROBLEM** It is difficult to compete for national grants for resilience project funding. **SOLUTION** Develop a regional funding program to fund smaller projects in the Albemarle Region that would struggle to be competitive on a national scale.	All Hazards	Existing regional leaders such as the Albemarle Commission	High	Regional
Expand Air Quality Testing	**PROBLEM** The Albemarle Region is impacted by poor air quality due to high temperatures and other air quality issues. Residents of the Albemarle Region have a high rate of asthma and are more prone to the impacts of poor air quality. **SOLUTION** Expand on the air quality sensor network being established by the Chowan Environmental Group to develop full coverage of the Albemarle Region.	Extreme Temperature	Chowan Edenton Environmental Group	Medium	Regional
Dredging of Inlets and Waterways	**PROBLEM** Navigable channels need to be maintained to allow for commercial	Coastal Erosion, Flood	USACE, Soil and Water Conservation Districts; Hyde	High	Regional, focused on inlets,

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	and recreational boating, including ferry systems. Erosion of shorelines results in sediment being transferred into waterways and channels. Inland channels that are filled with sediment and debris contribute to flooding. **SOLUTION** Conduct regular dredging of inlets and navigable waterways. Complete de-snagging and siltation removal of inland waterways that are flood concerns.		County would be interested in participating in work in connection with: Dredging inlets and Waterways - particularly Hatteras Inlet and Silver Lake Channel in Ocracoke and would take a leading role.		navigable channels, and inland waterways
VIPER Radio Expansion	**PROBLEM** Interoperable communications were identified in the General Assembly's Criminal Justice Information Network report of 1995 as a critical need for public safety agencies when responding to emergencies. The State is using the VIPER system of 800 MHz radios. To have coordinated communication, local agencies need to incorporate 800 MHz radios into their dispatch center consoles so they can communicate with State personnel and neighboring counties on the VIPER system. Not all county and local agencies have this capability yet due to costs. This results in limited emergency response coordination capabilities. **SOLUTION** Implement upgrades of communications systems to the VIPER system in local and county	All Hazards	North Carolina Department of Public Safety, county, and municipal emergency management departments. Hyde County has verbally committed to take a supporting role.	Medium	Municipal and county as needed

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	emergency response agencies that currently lack it to achieve interoperability.				
Convert Flood Prone Farmland to Wetlands	**PROBLEM** Low-lying coastal farmlands are losing productivity due to regular flooding and saltwater intrusion. Wetlands are being lost due to erosion and sea level rise near the water's edge in many locations.	Coastal Erosion, Flood, Water Quality	NC DEQ, NCSU, USDA	High	Regional, focused on wetland areas and areas of projected wetlands retreat due to sea level rise
	SOLUTION Conduct a survey of coastal farmers in the Albemarle Region to determine acreage of farmland that is regularly flooded/abandoned due to sea level rise. Establish conservation easements on impacted farmland in exchange for payments to landowners. Convert land located in easements to wetlands.				
Ambient Water Quality Standard for Cyanobacteria and Cyanotoxins	**PROBLEM** The state of North Carolina does not have stringent testing requirements in place for harmful algal blooms and lacks ambient water quality standards for cyanobacteria or related cyanotoxins.	Coastal Erosion, Flood, Water Quality	NC DEQ, NC DHHS, North Carolina Environmental Management Commission	Low	Regional, located in local waterways
	SOLUTION Increase water quality testing for harmful algal blooms. Develop state water quality criteria for common cyanotoxins and adopt the 2019 EPA-recommended cyanotoxin ambient water-quality criteria for recreational use.				

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
Establish Drone Monitoring Program	**PROBLEM** Monitoring of natural systems is needed to identify long-term changes from hazards such as erosion, wetlands retreat, saltwater intrusion, sea level rise, and invasive species. Hazard events that result in damages also need to be surveyed. Lack of this information results in a less thorough understanding of hazard impacts/problem areas and weakens potential grant applications.	Erosion, Flood, Invasive Species, Water Quality, Wildfire	Elizabeth City State University	Medium	Regionwide
	SOLUTION Establish an AUV monitoring program through the Elizabeth City State University Aviation Science Degree program. Use long-term aerial monitoring to establish baselines for the region's: beaches to monitor for erosion; wetlands to monitor for wetlands retreat; coastal forests and coastal agriculture to monitor for saltwater intrusion/ghost forests, and forests and other at-risk ecosystems to monitor for invasive species. Complete post-event surveys for storms, floods, severe erosion events, harmful algal blooms, and wildfires.				
Scuppernong River Flood Study	**PROBLEM** Water management improvements are needed for Lake Phelps at Pettigrew State Park and canals leading out of the lake that is connected to the Scuppernong River. Flood issues are compounded by agricultural ditches and water management / hydrologic	Flood	Soil and Water Conservation Districts	Medium	Washington, Tyrrell, and Hyde Counties

Project Name	Project Description	Hazards	Lead Agency	Estimated Cost	Scale
	restoration at Pocosin Lakes National Wildlife Refuge. Flooding may be caused by a variety of factors including rainfall/climatic issues, storm-driven flooding, sea level rise, and poor drainage systems. Floodwaters block roadways and surround the St. Mary's Church outside of Crestville in eastern Washington County.				
	SOLUTION Complete a flood study to identify the causes of and methods of addressing flooding in Washington, Tyrrell, and Hyde Counties. Implement identified actions.				

APPENDIX B: RESILIENCE SCORECARD

Category	Considerations	-1	0	1
Reduction in Risk	How many hazards are addressed? What is the probability the hazard(s) will occur?	One	More than 1	All Hazards
	Does the project protect life or property or both?	Neither	Life or Property	Both
	Does the project address current and future hazards?	Neither	Current or Future	Both
	Does the project reduce the risk at a regional scale?	No	Maybe	Yes
	Does the project reduce a non-climate stressor?	No	Maybe	Yes
Scale	Is the project regional?	No	Maybe	Yes
	Can the project be replicated?	No	Maybe	Yes
Cost	What is the range of cost? Low (Under $50K)? Medium ($50k-$1m)? High (Over $1m)?	High	Medium	Low
Benefits	Do benefits outweigh the costs?	No	Maybe	Yes
Timeframe	How long will it take to implement the project? Short: Less than 5 years. Medium: 5-15 years. Long: More than 15 years	Long	Medium	Short
Feasibility	Is the project technically and legally possible?	No	Maybe	Yes
	Will permitting be required?	Yes	Maybe	No
	Are project sponsors identified, engaged, and have the capacity to implement the project?	No	Identified but not committed	Identified and committed
	Is a funding source identified?	No	Yes, have to apply	Yes, in place
Socioeconomic	Does the project aid in building a strong economy?	No	Maybe	Yes

Category	Considerations	-1	0	1
	Does the project supports improving community infrastructure (e.g., road network)?	No	Maybe	Yes
Climate Justice and Equity	Does the project benefit areas with a high Social Vulnerability Index?	No	Maybe	Yes
	Does the project have a positive, qualitative impact on populations that identify as Black, Indigenous, or People of Color (BIPOC)?	No	Maybe	Yes
	Does the project improve health resources?	No	Maybe	Yes
Environmental Impacts	Does the project address drivers of climate change?	No	Maybe	Yes
	Does the project use nature-based solutions?	No	Maybe	Yes
	Does the project provide habitat restoration for threaten and endangered species?	No	Maybe	Yes
Public and Stakeholder Support	Is there strong support for the project? Was it ranked as a high priority by the stakeholder partnership?	Low	Medium	High

Category	Considerations	Regional Home Elevation Program	Private Sector Emergency Response Partnership	Wetlands Mitigation Banks	V Zone Requirements for the Coastal A Zone	Coastal Evacuation Route Upgrades	Water Quality Sampling Program	Stormwater Modeling	Address I&I in Sewerage Lines	Elevate Lift Stations	Public Outreach	Hazard Disclosure	Creation of Stormwater Utilities	Address flooding in Pasquotank County	Develop County-Wide Stormwater/Watershed Plans	HAB Education and Outreach	Creation of Regional Resiliency Funding Source	Agriculture Stormwater Control	Expand Air Quality Testing	Dredging of inlets and waterways	VIPER Radio Expansion	Convert flood-prone farmland to wetlands	Establish Ambient Water Quality Standard for	Regional Community Rating System Coordination/CRS	Establish Drone Monitoring Program	Scuppernong River Flood Study	Resilience Hub Network
Reduction in Risk	How many hazards are addressed? What is the probability the hazard(s) will occur?	0	1	0	0	0	-1	-1	0	-1	1	1	-1	-1	-1	-1	1	-1	-1	0	1	0	-1	-1	0	-1	1
	Does the project protect life or property or both?	0	1	1	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	1	0	-1	0	1	1	1	1
	Does the project address current and future hazards?	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
	Does the project reduce the risk at a	1	-1	-1	1	1	1	1	1	-1	1	0	1	-1	1	1	1	1	1	-1	-1	-1	1	1	0	0	1

Category	Considerations	Regional Home Elevation Program	Private Sector Emergency Response Partnership	Wetlands Mitigation Banks	V Zone Requirements for the Coastal A Zone	Coastal Evacuation Route Upgrades	Water Quality Sampling Program	Stormwater Modeling	Address I&I in Sewerage Lines	Elevate Lift Stations	Public Outreach	Hazard Disclosure	Creation of Stormwater Utilities	Address flooding in Pasquotank County	Develop County-Wide Stormwater/Watershed Plans	HAB Education and Outreach	Creation of Regional Resiliency Funding Source	Agriculture Stormwater Control	Expand Air Quality Testing	Dredging of inlets and waterways	VIPER Radio Expansion	Convert flood-prone farmland to wetlands	Establish Ambient Water Quality Standard for	Regional Community Rating System Coordination/CRS	Establish Drone Monitoring Program	Scuppernong River Flood Study	Resilience Hub Network
	regional scale?																										
	Does the project reduce a non-climate stressor?	-1	1	-1	-1	1	-1	1	1	-1	-1	-1	1	-1	-1	-1	1	-1	0	1	1	-1	-1	1	-1	-1	-1
Scale	Is the project regional?	1	1	1	0	1	1	1	1	-1	1	0	1	-1	-1	1	1	1	1	-1	1	1	1	1	1	0	1
	Can the project be replicated?	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cost	What is the range of cost? Low (Under $50K)? Medium ($50k-$1m)? High	-1	1	-1	1	-1	0	-1	-1	-1	0	1	-1	0	1	1	-1	1	0	-1	0	-1	1	1	0	0	-1

Category	Considerations	Regional Home Elevation Program	Private Sector Emergency Response Partnership	Wetlands Mitigation Banks	V Zone Requirements for the Coastal A Zone	Coastal Evacuation Route Upgrades	Water Quality Sampling Program	Stormwater Modeling	Address I&I in Sewerage Lines	Elevate Lift Stations	Public Outreach	Hazard Disclosure	Creation of Stormwater Utilities	Address flooding in Pasquotank County	Develop County-Wide Stormwater/Watershed Plans	HAB Education and Outreach	Creation of Regional Resiliency Funding Source	Agriculture Stormwater Control	Expand Air Quality Testing	Dredging of inlets and waterways	VIPER Radio Expansion	Convert flood-prone farmland to wetlands	Establish Ambient Water Quality Standard for	Regional Community Rating System Coordination/CRS	Establish Drone Monitoring Program	Scuppernong River Flood Study	Resilience Hub Network
	(Over $1m)?																										
Benefits	Do benefits outweigh the costs?	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	-1	1	0	1	-1	1	1	1	1
Timeframe	How long will it take to implement the project? Short: Less than 5 years. Medium: 5-15 years. Long: More than 15 years	1	1	0	1	-1	1	0	-1	0	1	1	0	0	1	1	1	1	1	0	0	-1	1	1	1	1	1
Feasibility	Is the project technically	1	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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	and legally possible?																										
	Will permitting be required?	1	1	-1	1	-1	1	1	-1	1	1	1	1	1	1	1	1	1	1	-1	1	-1	1	1	0	1	1
	Are project sponsors identified, engaged, and have the capacity to implement the project?	-1	0	0	0	1	1	0	0	0	1	0	1	1	1	1	-1	1	1	1	1	1	0	1	1	0	1
	Is a funding source identified?	-1	-1	0	1	0	0	0	0	0	1	1	-1	0	0	1	-1	1	0	0	0	0	1	1	1	0	1
Socioeconomic	Does the project aid in building	-1	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	1	-1	-1	1	-1	1	-1	1	-1	-1	-1	1	-1	-1	-1

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	a strong economy?																										
	Does the project supports improving community infrastructure (e.g., road network)?	-1	-1	0	-1	1	-1	1	1	1	-1	-1	1	1	1	-1	1	-1	-1	0	0	-1	-1	-1	-1	1	-1
Climate Justice and Equity	Does the project benefit areas with a high Social Vulnerability Index?	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Does the project have a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Category	Considerations	Regional Home Elevation Program	Private Sector Emergency Response Partnership	Wetlands Mitigation Banks	V Zone Requirements for the Coastal A Zone	Coastal Evacuation Route Upgrades	Water Quality Sampling Program	Stormwater Modeling	Address I&I in Sewerage Lines	Elevate Lift Stations	Public Outreach	Hazard Disclosure	Creation of Stormwater Utilities	Address flooding in Pasquotank County	Develop County-Wide Stormwater/Watershed Plans	HAB Education and Outreach	Creation of Regional Resiliency Funding Source	Agriculture Stormwater Control	Expand Air Quality Testing	Dredging of inlets and waterways	VIPER Radio Expansion	Convert flood-prone farmland to wetlands	Establish Ambient Water Quality Standard for	Regional Community Rating System Coordination/CRS	Establish Drone Monitoring Program	Scuppernong River Flood Study	Resilience Hub Network
	positive, qualitative impact on populations that identify as Black, Indigenous, or People of Color (BIPOC)?																										
	Does the project improve health resources?	-1	1	-1	-1	-1	1	-1	-1	-1	1	-1	-1	-1	-1	1	-1	1	1	-1	-1	-1	1	-1	-1	-1	1
Environmental Impacts	Does the project address drivers of climate change?	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1

Category	Considerations	Regional Home Elevation Program	Private Sector Emergency Response Partnership	Wetlands Mitigation Banks	V Zone Requirements for the Coastal A Zone	Coastal Evacuation Route Upgrades	Water Quality Sampling Program	Stormwater Modeling	Address I&I in Sewerage Lines	Elevate Lift Stations	Public Outreach	Hazard Disclosure	Creation of Stormwater Utilities	Address flooding in Pasquotank County	Develop County-Wide Stormwater/Watershed Plans	HAB Education and Outreach	Creation of Regional Resiliency Funding Source	Agriculture Stormwater Control	Expand Air Quality Testing	Dredging of inlets and waterways	VIPER Radio Expansion	Convert flood-prone farmland to wetlands	Establish Ambient Water Quality Standard for	Regional Community Rating System Coordination/CRS	Establish Drone Monitoring Program	Scuppernong River Flood Study	Resilience Hub Network
	Does the project use nature-based solutions?	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	0	0	0	-1	0	-1	1	-1	0	-1	0	-1
	Does the project provide habitat restoration for threaten and endangered species?	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0	0	0	0	0	-1	-1	-1	1	-1	-1	-1	-1	-1	-1
Public and Stakeholder Support	Is there strong support for the project? Was it ranked as a high	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-1	0	0	0	0	0	0	0	0	0

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	priority by the stakeholder partnership?																										
SCORE		0	7	3	2	5	3	5	2	-2	9	5	7	4	9	11	7	11	3	2	4	0	4	11	4	4	8

Priority	Scoring
Low Priority	<1
Medium Priority	1-3
Medium-High Priority	4-6
High Priority	>6

APPENDIX C: REFERENCES

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