North Carolina Department of Environmental Quality

2021 Agency Resilience Strategy

Annual Report as Required by the

2020 North Carolina Climate Risk Assessment and Resilience Plan

A Continuing and Updated Strategy for Reducing North Carolina's Vulnerability to Climate Change

March 2021

Contents

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I. Department of Environmental Quality

A. Executive Summary

The ***Department of Environmental Quality*** (DEQ) has continued its efforts in carrying out the expectations of Governor Cooper's Executive Order 80 (EO80) and the specific guidance and direction provided in the Climate Risk Assessment and Resilience Plan (RARP). Department Status Reports were provided in 2019 and 2020 showcasing the efforts made thus far.

DEQ is partnering with other Federal, State and Local agencies as-well-as non-governmental organizations, community groups, and our regulated entities to further develop and carryout the strategies laid out in the RARP and this updated strategies document. Each Division has highlighted in this report the many and varied priorities that not only help accomplish the base duties and expectations of their programs as outlined by statute, rule, policy and demand but a number of priorities that the Department sees as having a key role in moving North Carolina into a "State" of resilience and away from a state of reaction. Additional strategies will be identified and developed over the next few years and will augment and reinforce DEQ's overall strategy for meeting the objectives of EO80. Moreover, these efforts will contribute to our responsibilities to be defined in the Priority 2 Challenges Statewide Strategy due in October 2024.

The SARS-CoV-2 virus causing the coronavirus disease, COVID-19, has provided us with the obstacle of a pandemic to challenge us not only with our day-to-day activities but also in focusing and carrying-out our resilience plans and strategies. Although this did have some initial impact on all programs, primarily with the need to update technology (software and equipment), our continuity of operations plans (COOP), along with great leadership and employee initiative proved the resilience of the Department and its ability to quickly rebound to administer all of its programs, several of which saw no decrease in demand from our regulated public. All programs have operated successfully, many in teleworking status, during this period.

We are actively involved in Interagency Council meetings, are dedicated to coordinating with the Interagency Resilience Team to work on cross-sector resilience strategies and are actively leading and participating in the Environmental Preservation Response Support Function group of the State Disaster Recovery Framework. DEQ sees all of these efforts as important and necessary to effectively accomplish the resilience goals as identified in EO80.

B. **Overview**

In 2020, North Carolina Department of Environmental Quality (DEQ) along with other State agencies represented on the Climate Change Interagency Council have worked to continue efforts that we initiated as part of Executive Order 80 (EO80), to understand climate change impacts and build resilience in our operations, policies, and programs. This work proceeded in the face of a global pandemic that made working in person more difficult and impacted our approach to conducting field work, providing education, developing work products, and assisting the public, presenting additional challenges to both our staff and our partners. The success of this year is not only measured in our work products, but also in our ability to overcome challenges.

To guide DEQ's path forward, we will maintain and update the North Carolina Resilience Strategy and provide our State Agency Resilience Strategy update annually as required in the 2020 North Carolina Climate Risk Assessment and Resilience Plan (RARP). This strategy document is a compilation of information from multiple divisions within DEQ that 1) addresses changes or additions to the agency's latest understanding of its climate vulnerabilities and risks; 2) outlines the agency's current and planned actions to increase resilience; 3) includes a range of actions, such as proposed studies and planning activities; and 4) reports progress on implementing strategies previously identified by the agency.

Highlights of 2020 Efforts

Like all other State agencies, DEQ has been operating under its Continuity of Operations Plan (COOP) and continually improving that plan as we learn and use new technology and develop additional options for our staff and clients to carry out the business of the State under difficult situations. Addressing the challenges imposed by the Coronavirus pandemic (COVID-19) is in fact a test of our resilience not necessarily contemplated in our original EO80 planning efforts. However, those planning efforts have helped DEQ rebound from the pandemic impacts, accelerate measures needed for resilience to a range of threats, and perform effectively as can be seen in this report.

Much of 2020 was impacted by COVID-19. Many state workers had to pivot their workflows, using teleworking, staggering work schedules, practicing social distancing, and increasing disinfection. Many of our employees also faced challenges outside of work, including economic and health problems resulting from threat or infection by the COVID-19 virus, homeschooling children, and providing additional care within their families and communities. Despite these challenges, state agencies working on EO80 goals were able, for the most part, to continue both planning and implementing recommendations related to climate change. This, in and of itself, is one of our biggest accomplishments. COVID-19 required DEQ to adapt new methods and thought processes to keep people safe. One outcome is that the department accelerated the implementation of many practices that make DEQ's operations more resilient to extreme events, including online document storage and program implementation, transitioning to laptops and tablets to allow teleworking, and adoption of videoconferencing platforms. These practices have allowed the department to support our various programs with limited interruptions, even when facilities have been impacted by the extreme events associated with climate change.

Despite the challenges of this year, DEQ staff and state agencies accomplished a great deal:

- We worked with partners and stakeholders to implement several recommendations from the Clean Energy Plan, including carbon and clean energy policy designs, energy regulatory processes, and new energy efficiency programs for low- and moderate-income households.
- We rolled out electric vehicle and infrastructure programs including state agency purchases of electric/hybrid vehicles, funding the purchase of community electric/hybrid school and transit buses and funding installation of charging stations.
- We received a $4 million grant from the Coronavirus Aid, Relief, and Economic Security (CARES) Act, passed in March of 2020, to fund and implement low-income energy efficiency projects.

- We enhanced many existing programs in DEQ and other state agencies to increase our mitigation of greenhouse gases (GHGs) and build climate change resilience.
- We initiated studies to develop and provide data and information for future planning and design by federal and state agencies, local governments, and the private sector to improve North Carolina's overall resilience to flooding, drought, landslides, and ecological impacts.
- We are coordinating with federal and state agencies, and local governments on basin-wide studies and plans to develop strategies to reduce and avoid impacts from flooding due to climate change.
- We improved the timing and geographic resolution for communicating air quality information to the public through the expansion of daily air quality forecasting to all 100 counties.

In partnership with the Office of Recovery and Resiliency (NCORR), DEQ has co-hosted monthly meetings of the Recovery Support Function Group 7 on Environmental Preservation (RSF7). RSF7 includes state and federal agency members, local government representatives and non-government organizations (NGOs), actively working to identify and recommend ideas, projects, research, processes, frameworks, and initiatives on resiliency to NC Emergency Management (NCEM) and other agencies for consideration. Recommendations may also go to the NC General Assembly if statutory or budget authorizations are required.

This group has recently provided a report, "Recommendations of the Environmental Preservation Recovery Support Function (RSF7) for CDBG-DR and -MIT Planning Funds," to the Executive Director of NCEM and Chief Operating Officer of NCORR recommending resilience funding support for needs identified in the North Carolina Climate Risk Assessment and Resilience Plan. Those recommendations include funding for updating NOAA's Atlas 14, development of pilot projects to use climate scenarios to establish future rainfall statistics, updating the Probable Maximum Precipitation (PMP) Model for NC, development of a Middle Neuse Basin Flood Capacity Planning Project, and the Division of Coastal Management's Resilient Coastal Communities Program.

C. Key Resiliency Strategies for 2021

North Carolina Risk Assessment and Resilience Plan Implementation

Implementation of the 2020 Resilience Plan is being led by the North Carolina Office of Recovery and Resiliency (NCORR). Through collaborative efforts between state and local governments, NCORR will guide the development and delivery of agency work products over the next four years. Resilience work has already started at many of the agencies. Key efforts include the following:

- Convening a dedicated Interagency Resilience Team to work on cross-sector resilience strategies.
- Establishing the NC Resilient Communities program to provide training, expertise, and funding to local government and communities.

The Risk and Resilience Plan includes sections on the NC Climate Science Report, environmental justice, vulnerability, risk, and resilience strategies, nature-based solutions, and a proposed path forward to meeting the challenge. The strategies section of the Plan includes examples of climate threats and potential efforts to adapt or increase resiliency to them. The 2020 Status Report describes the efforts that were pursued in 2020. This document identifies key strategies that each division within DEQ is initiating or continuing to develop in 2021. The status of these strategies and additional efforts will be described in subsequent annual strategy reports which will be released each March 1st.

1. Air Quality

The ***Division of Air Quality*** (DAQ) works to protect and improve outdoor air quality. It currently meets these objectives by operating a statewide air quality monitoring network to measure pollutant levels, implementing plans to meet future air quality initiatives, ensuring compliance with federal and state rules, and assisting and educating the public about air quality issues. There are several DAQ services and physical assets subject to increased impacts under changing climate conditions. These assets include planning services, ambient monitoring, and wildfire services.

In collaboration with the State Climate Office, DAQ is co-developing the Ambient Information Reporter (AIR) tool, which will display real-time meteorological and air quality data -- including the US Drought Monitor, ambient pollutant concentrations, real-time fire and smoke analysis -- on a web-based mapping system, allowing for a robust daily analysis of how meteorology and air quality interact across the state.

Primary Section Responsible	Threat	Strategy
Ambient Monitoring	Increased flooding and high wind impacts to air monitoring sites. Large precipitation events result in flooding and are often accompanied by high winds.	DAQ has been evaluating air monitoring sites located in low drainage areas. When possible, the division will seek to relocate these sites to higher elevations. If this is not an option, the division will implement a strategy for raising the shelters foundation such that high water will not inundate the shelter and damage expensive electronic scientific equipment. Also, new replacement shelters being purchased are capable of withstanding winds in excess of 140 mph.
Ambient Monitoring	Greenhouse gas emissions.	As infrastructure needs and funding dictates, DAQ has been purchasing new, modern, more energy efficient ambient monitoring shelters. These shelters will reduce energy consumption and consequently reduce the CO_2 (greenhouse gas) emitted by electricity-generating facilities.

Planning	Temperature and Precipitation Changes	DAQ's focus is to improve the timing and geographic resolution for communicating air quality information to the public. For example, in 2020, the DAQ began issuing daily ozone and PM2.5 forecasts for each of NC's 100 counties rather than for only urban areas in the state. DAQ is also working with third parties (e.g., the Weather Channel) that issue air quality forecast information on their websites and mobile device applications to support issuance of high-quality forecast data. This work also includes review of research and modeling efforts to understand how air emissions, weather, and meteorology may influence ozone and PM2.5 formation. The DAQ has also been coordinating with DHHS and other state agencies and public and private entities to produce and distribute educational materials to support understanding of air quality impacts and access to air quality data.
Planning	Wildfires	DAQ continues to maintain an adequate level of staffing and resources to monitor, forecast, and communicate air quality impacts associated with wildfires. For the past several years, DAQ has established relationships will state and federal agencies to coordinate an effective program for communicating wildfire hazards, including providing forecasting services, staffing command centers, and supporting deployment of portable PM2.5 monitoring equipment. In addition, DAQ recognizes the important role of prescribed burning for management of forest and wildlife ecosystems and to reduce wildfire fuels. DAQ is actively involved with several initiatives within NC and the southeast to share information with the prescribed burning profession to facilitate understanding of how to mitigate PM2.5 pollution associated with this activity.

2. Coastal Management

The ***Division of Coastal Management*** (DCM) carries out the state's Coastal Area Management Act (CAMA), Dredge and Fill Law, and the rules and policies of the Coastal Resources Commission (CRC), in the state's 20 coastal counties. The CRC is charged under CAMA with the protection, preservation, orderly development, and management of the coastal area of North Carolina, including public trust resources. DCM, which provides staff support to the CRC, is responsible for several programs, including permitting, land use planning oversight, coastal policy, and numerous grant programs. DCM's Coastal Reserve protects and manages more than 44,000 acres of coastal and estuarine land and water for research, education, and compatible traditional uses at ten reserve sites along N.C.'s coast. Four of these sites comprise the National Estuarine Research Reserve, a state-federal partnership between DCM and the National Oceanic and Atmospheric Administration (NOAA).

The Division of Coastal Management (DCM), in partnership with NCORR and others, designed and launched the Resilient Coastal Communities Program (RCCP) in September 2020. The RCCP is an incentive-based program that will fund local governments to implement a community-driven process for

setting coastal resilience goals, assessing existing and needed local capacity, and identifying and prioritizing projects to enhance community resilience to coastal hazards. Participating communities will also walk through a process leading to the development of "shovel-ready" projects. Local governments throughout the 20 coastal counties have applied for direct technical assistance to complete a community engagement process, risk and vulnerability assessment, and develop a resilience project portfolio.

The RCCP is funded through a disaster recovery appropriation from the N.C. State Legislature, and an Emergency Coastal Resilience Grant from the National Fish and Wildlife Foundation. It will provide funding to local governments to help overcome barriers in coastal resilience and adaptation planning, boost local government capacity, and support a proactive, sustainable, and equitable approach to coastal resilience planning and project implementation. The program has funding for one three-year cycle.

Primary Section Responsible	**Threat**	**Strategy**
Policy & Planning	Flooding from precipitation, storm surge, tides, and sea level rise.	DCM has built a website that hosts tools to help planners assess vulnerability and continues to coordinate the NC Sea Level Rise Assessment Reports. DCM has also partnered with Emergency Management to double the number of tide gauges that can be used to measure long-term sea level rise.
Policy & Planning	Inadequate local government planning and preparation for intensifying climate-driven hazards	DCM, in partnership with NCORR and others, created the Resilient Coastal Communities Program to incentivize and reward communities for meeting defined standards for long-term planning, preparedness, and community engagement, and help them to plan shovel-ready projects in order to capitalize on federal and state funding opportunities.
Policy & Planning	Increasing social inequalities	As a core component of the RCCP, communities are required to assess the vulnerability of their most disadvantaged populations and identify strategies to assist them.
Policy & Planning	Increased erosion and sedimentation	DCM is encouraging and incentivizing long-term beach planning and beneficial use of dredged material. DCM is also engaging with the Army Corps of Engineers, NOAA, the Bureau of Ocean Energy Management, and other agencies to identify sources of sand for beach nourishment, and strategies for managing the sand more maximum benefit.
Policy & Planning	Degradation and loss of natural infrastructure	DCM is partnering with other state agencies via the CHPP, local governments via the RCCP, NGOs, and others to identify priority restoration sites, and to seek funding for project design and construction. DCM is providing funding and technical assistance to incentivize communities to protect, enhance, and restore natural infrastructure that can provide flood protection, ecosystem, and economic benefits. DCM is also continuing to work with the CRC to simplify rules to make nature-based solutions easier to permit.
Coastal Reserve	Inundation and habitat loss at NC Coastal Reserve sites	DCM conducted applied research on techniques to enhance resiliency at Coastal Reserve sites and in coastal N.C. such as thin layer deposition and living shorelines, and continued monitoring environmental conditions, species, and habitats at Coastal Reserve sites to better understand change. The

		Reserve's NOAA Margaret A. Davidson Fellow is researching the impacts of sea level rise on wintering populations of vulnerable saltmarsh sparrows to inform future habitat and species management strategies.
Coastal Reserve	Public education and training	DCM's Coastal Training Program delivered resilience-related trainings to coastal decision-makers on nature-based solutions to reduce coastal hazards, barrier island development, and low impact development basics for water quality protection. DCM is developing curricular activities for K-12 teachers and non-formal educators to support resilience and climate change education.
Coastal Reserve	Rachel Carson Reserve Habitat Resilience	DCM is developing a habitat resilience plan for its Rachel Carson Reserve that identifies and prioritizes areas for resilience projects based on known vulnerabilities and hazards, and engineers two shovel-ready projects. The plan is funded by the National Fish & Wildlife Foundation with match from the NC General Assembly. Coastal Reserve staff hosted the Coastal Protected Land Manager Stakeholder Meeting on December 8 to: understand where coastal protected land managers are in planning for and implementing resilience-related projects; inspire participants with case studies of resilience work happening on coastal protected lands; discuss barriers to implementing resilience efforts on coastal protected lands; and discuss creating a land manager community of practice to continue to share lessons learned on improving resilience of coastal protected lands to climate change impacts.

3. Energy, Mineral, and Land Resources

The ***Division of Energy, Mineral, and Land Resources*** (DEMLR) has responsibilities that include environmental permitting and compliance for activities and development that include mining and mine reclamation, dam safety, stormwater quality, sedimentation and erosion control, landslide mapping and response, and geologic mapping. The division's strategies to enhance resiliency are the recommendation and implementation of regulations designed to protect the land quality, surface water quality, natural and geologic resources, and the lives, health and property of the people of North Carolina.

DEMLR has identified a number of threats as a result of the changing climate impacts identified in the 2020 Climate Science Report and RARP. These threats and impacts require that DEMLR focus on issues related to heavy precipitation, stormwater runoff affecting water quality, flooding, erosion and sedimentation of our land and surface waters, dam overtopping/failure and response, and landslide mapping and response. Division programs and management efforts are being modified and updated to incorporate more extreme scenarios into our plans, preparations, resilience and COOP playbooks. This will improve response to these issues as well as to build statewide resilience to these threats.

Primary Section Responsible	**Threat**	**Strategy**
Land Quality Section - Dam Safety Program	Heavy Precipitation, Flooding, Dam	Continue the study of hydrologic and hydraulic (H&H) capacity of large and very large dams identified in the Neuse, Lumber and Cape Fear River Basins. The DEMLR Dam

	Overtopping, Dam Failure, Loss of Life and Property	Safety Program developed H&H models to determine the differing amounts of rain that would cause over 550 large and very large dams to overtop. Dam overtopping is a sign of inadequate spillway capacity but more importantly is a characteristic of dams in stress which could lead to failure of the dam and possibly cause public health, loss of life, flooding and property impacts. The information gained in this study will allow State and Local governments to prioritize emergency response to dam threats (overtopping or failure) given limited personnel resources as well as monitor the need for dam modifications in the future. Two published reports covering the Neuse and Lumber River basin dams consisting of approximately one-half of the study population from **SL 2016-124 4.1 (9)** have been provided to DEQ, Department of Public Safety/Emergency Management (DPS/EM) and to Local Emergency Management and Planning. DEMLR Dam Safety has just started this study in the Cape Fear River basin authorized under **SL 2019-224 2.1(3)** with plans to complete field work and modeling in December of 2021.
Land Quality Section – Dam Safety Program	Heavy precipitation, flooding, dam overtopping and failure, loss of life and property	Continue to perform and develop dam breach models of Intermediate and High Hazard dams to confirm hazard classifications and determine the impacts if failure were to occur. Breach model development is in partnership with NCDPS/NCEM's efforts in developing dam breach models throughout the state. Breach models are used by NCDEQ, NDPS, NCDOT, local Emergency Management staff, and dam owners to identify property, lives and infrastructure subject to impact. This information assists in the development of access and evacuation routes.
Geological Survey Section – Landslide Mapping and Modeling	Heavy precipitation, landslides, flooding, loss of life and property	The Landslide Mapping Program is funded by time-limited appropriations in **SL 2018-5 5.6(b)(2) a.** The program is implemented by NC Geological Survey's (GS) Landslide Mapping Unit in the Asheville Regional Office (ARO) with contracted partners Appalachian Landslide Consultants, PLLC, and UNC-Asheville's National Environmental Modeling and Analysis Center (NEMAC). The GS updates and maintains a landslide geodatabase, and this data is accessible in a public interactive web map viewer. The landslide program will continue to collect landslide data and conduct landslide modeling on a county-wide basis to identify areas vulnerable to landslides, especially those triggered by excessive rainfall events and seismic activity. Field mapping of landslides in Polk County is complete where 1,832 landslide features have been mapped. Field mapping of landslides in Rutherford County is underway, and 530 landslide features have been mapped to date through past and current work. Preliminary landslide susceptibility modelling is complete for 22 western NC counties. The GS continues to respond to requests for technical assistance on landslides from emergency mangers, NCDOT, local government agencies, the private sector, and the public. Since the program was fully staffed in June 2019,

		the GS has responded to over 80 landslides in 13 counties throughout western NC. Landslide data, maps and reports are generated as part of the response effort. The GS has implemented Unmanned Aerial Systems (UAS) technology for routine use in landslide mapping and analysis. Collaborative research with U.S. Geological Survey, UNC-Institute for the Environment, and the USDA-Forest Service is underway on landslides related to drought-induced wildfires. The GS has completed reports and maps on post-wildfire landslides in the Nantahala River Gorge (Swain County) and in Hickory Nut Gorge (Rutherford County). It also operates nine landside-rainfall monitoring sites in cooperation with the U.S. Geological Survey and the USDA-Forest Service. This information and response capability is and will remain important to the people of western North Carolina for planning, infrastructure, emergency response and life and property safety.
Land Quality Section – High Hazard Dam Rehabilitation Grant (HHPD)	Infrastructure deterioration, flooding, dam failure	FEMA has started a new grant program for the rehabilitation of High Hazard dams. This grant provided $169,000 to local government dam owners in its first year and an additional $395,000 in year two of the grant for local government dam owners to develop plans to determine dam risk and repair needs to address deficiencies to ensure improved infrastructure and reduce risk and increase resilience within their communities. The DEMLR Dam Safety Program is the administrator for this FEMA grant program. This grant strategy targets owners of publicly owned dams to rehabilitate, repair or modify their deficient dams thus removing the increased risk and threat to downstream properties due to safety deficiencies. It is DEMLR's duty to identify qualifying "at-risk" dams and to work with the owners through the repair approval process to improve safety and future resilience of these qualifying dams.
Land Quality Section – Risk-Informed Prioritization of North Carolina High Hazard Dams	Infrastructure Deterioration, Dam Failure, Loss of Life and Property	The DEMLR Dam Safety Program is developing a risk-informed Assessment Prioritization of the High Hazard Dams in North Carolina. This initial study assessment of 57 dams will develop a screening level risk assessment protocol for all High Hazard Dams in North Carolina. These assessments will allow our program, other state agencies including NCEM and NCDOT, local governments and dam owners to set priorities for these dams and the areas in breach inundation zones in setting repair/maintenance/ resilience plans and identifying resource needs for risk, resilience and emergency response. A larger overall study will also qualify North Carolina and its dam owners for future FEMA grants such as the HHPD grant previously described.
Land Quality Section – Erosion and Sedimentation	Infrastructure, Heavy Precipitation, Land Quality, Water Quality	The DEMLR Sedimentation Control Program will continue to produce workshops for design professionals, developers, contractors, local government programs, universities, and interested parties to address wide ranging erosion and sedimentation Control (E&SC) issues in North Carolina. This

Education Workshops		capability will improve resilience throughout the state on construction sites during and after construction. These workshops, three to ten held each year, educate and provide technical assistance to stakeholders on topics such as innovative design, ongoing research, regulatory updates, consistency between jurisdictions, benefit-cost analysis, use of natural systems, and native vegetation.
Land Quality Section – Probable Maximum Precipitation Study	Heavy precipitation, flooding, dam overtopping, dam failure, loss of life and property, infrastructure,	DEMLR is supporting NCDOT, NCORR and NCSU in their efforts to update NOAA's Atlas 14 and develop a pilot project to use climate scenarios to establish future projected rainfall statistics. DEMLR is also planning to update the Probable Maximum Precipitation (PMP) Model for NC. These projects are resilience tools identified in the 2020 RARP as being fundamental tools to be used by all government entities, planners, developers and emergency response agencies to design, develop and build a resilient infrastructure for all public and private efforts.
Land Quality Section – Stormwater Education Workshops	Infrastructure, heavy precipitation, land quality, water quality	The DEMLR Stormwater Program will continue to produce workshops for design professionals, developers, contractors, local governments, universities, and interested parties to address wide ranging stormwater quality and control issues. This capability will improve resilience and impacts to water quality throughout the state on development and re-development sites. These workshops, held monthly, educate and provide technical assistance to all stakeholders on topics such as updates in innovative design, ongoing research, regulatory updates, consistency between jurisdictions, benefit-cost analysis, and use of natural systems.

4. Environmental Assistance and Customer Service

The ***Division of Environmental Assistance and Customer Service*** (DEACS) provides non-regulatory technical services to help customers navigate regulatory and permitting challenges, improve environmental performance through sustainable practices and recognition programs, and promote recycling and materials management programs. The division accomplishes its legislative pollution prevention and waste reduction directives through technical assistance, education, reporting, grant-making, and administrative support. DEACS contributes to the state's resiliency efforts through continuing and expanding support of resource efficiency, waste reduction, sustainable economic growth, and environmental leadership. Strategies which are ongoing or will be initiated are provided in the following table.

Primary Section Responsible	**Threat**	**Strategy**
Environmental Stewardship Initiative	Resource overconsumption and greenhouse gas emissions	Promote and support efforts by businesses and organizations to implement environmental management systems and incorporate sustainability and resiliency into strategic planning and core business functions. Assist businesses in developing goals to reduce energy, water, waste generation, and resource consumption. Continue to offer educational opportunities and

		events to disseminate free training and auditing services for ISO environmental management standards.
Recycling and Materials Management	Methane emissions from landfills	Coordinate between producers and consumers of organic waste including businesses, local governments, and higher education institutions to reduce food waste and organics entering landfills through encouraging source reduction, donation of edible food, and composting. Support the use of compost on farms and urban soils to sequester carbon and improve the state's soil health. Promote the expansion of anaerobic digestion, compost, and mulch operations through grant opportunities and technical assistance.
Recycling and Materials Management	Increased woody debris and mass animal mortalities from more frequent and intense storms	Provide technical support as needed following significant storm events regarding onsite composting at farms impacted by mass animal mortalities and sourcing of recycled woody bulking agents needed for the process.
Recycling and Materials Management	Greenhouse gas emissions from consumption of raw materials and landfilling	Promote and support public recycling programs and businesses that divert materials from the waste stream through grants and technical assistance. Emphasize the role of source reduction, recycling, and composting in reducing energy consumption and greenhouse gas production.
Waste Reduction Partners	Potable water supply scarcity: drought	Conducting demand-side management pilot projects with City of Durham and City of Asheville water departments to provide direct water efficiency technical assistance to their industrial, commercial and institutional water customers.
Waste Reduction Partners	Greenhouse gas emission reductions	Provide one-on-one, on-site energy efficiency assessments to businesses and institutions across North Carolina to voluntarily reduce energy consumption and improve economic competitiveness while reducing carbon footprints.
Environmental Assistance Section	Education and outreach to affected populations	Promote and improve the accessibility of hazard and climate change data to non-experts through web portals, infographics, and other communication channels. Provide personnel to set up statewide networking events in coordination with Division of Public Affairs.

5. Marine Fisheries

The ***Division of Marine Fisheries*** (DMF) is dedicated to ensuring sustainable marine and estuarine fisheries and habitats for the benefit and health of the people of North Carolina. This includes the management of North Carolina's marine and estuarine fisheries out to three miles offshore, and monitoring the State's fisheries habitat, encompassing all 2.9 million acres of coastal waters (marine and estuarine) and over 412,000 miles of coastline. The DMF carries out the rules and policies of the Marine Fisheries Commission, which is charged with managing, restoring, developing, cultivating, protecting, and regulating the State's marine and estuarine resources.

The RARP and annual status reports identify numerous strategies that DMF is continuing to develop and implement to address impacts from climate change, such as salinity changes and saltwater intrusion, increasing water temperatures, shifts in currents and tides, decreased water quality from increased storm runoff, and sea level rise all impact North Carolina's coastal habitats and marine organisms.

The Division of Marine Fisheries (DMF) staff, in conjunction with the Albemarle-Pamlico National Estuary Partnership (APNEP) and other DEQ divisions, is currently working on the 2021 Coastal Habitat Protection Plan (CHPP) Amendment including five issue papers with resulting recommended resilience strategies to better manage for the continuing impacts from climate change. DMF is also collaborating on two grant proposals. These proposals, if funded, will enhance coastal resilience research efforts by assessing the vulnerability of North Carolina's coast to sea level rise and evaluating a tiered approach to inform monitoring, assessment, and decision-making elements for seagrass management and conservation. The 2021 CHPP Amendment and the two grant proposals will offer tools to begin addressing several recommended strategies outlined in several chapters of the RARP.

Primary Section Responsible	**Threat**	**Strategy**
Shellfish Sanitation and Recreational Water Quality	Water quality impacts from wastewater treatment plant failures	Allow for improved assessment of the impacts of wastewater treatment plant failures on surrounding shellfish harvesting and recreational swimming areas through a Wastewater Assessment Training Program. Develop protocols for integrating DMF's drone fleet into pollution source assessments to provide improved data collection and more effective visual representation of impacts for public education purposes.
Shellfish Sanitation and Recreational Water Quality	Public health impacts from increased stormwater runoff	Enhance ability to address public health impacts of increased stormwater runoff through research and development of updated shellfish growing area management plans. Initiated collaborative projects with federal and academic partners to further management plans.
Shellfish Sanitation and Recreational Water Quality	Harmful Algal Blooms (HAB) due to increased nutrient loading and water temperature	Continue sentinel site monitoring for harmful algae species in shellfish growing waters throughout the coast. Focus on enhancing bloom response capabilities through staff training and the further development of collaborations between state, university, and federal partners. Develop protocol for rapid response to reported HAB issues utilizing DMF's drone fleet to help target on-the-ground staff investigations.
Shellfish Sanitation and Recreational Water Quality	Water quality issues impacting the suitability of shellfish for harvest	Continue to pursue acquisition of a facility to house the northern regional Shellfish Sanitation and Recreational Water Quality lab to help increase the division's ability to respond to water quality issues that impact the suitability of shellfish for harvest, particularly following storm impacts. A site has been identified but progress is stalled due to budgetary issues.
Habitat and Enhancement	Severe storm impacts on the shellfish aquaculture industry and resulting marine debris	DMF is partnering with NC Sea Grant and the NOAA Office of Response and Restoration's Disaster Preparedness Program to develop a Shellfish Aquaculture Storm Management Plan for shellfish growers throughout North Carolina. A virtual workshop is being held on April 8, 2021 to provide the aquaculture industry and shellfish farmers in North Carolina with resources and information about aquaculture debris issues including practical gear management techniques, proper gear anchoring methods, and severe-storm preparation strategies. The DMF is partnering with NC Sea Grant to develop a session at the 2021 NC Aquaculture Development Conference on March 20, 2021 which

		will include a panel discussion titled "Shellfish Aquaculture Gear Management and Storm Preparedness"
Habitat and Enhancement	Water quality impacts on submerged aquatic vegetation (SAV) due to changes in salinity, water temperature, and water clarity	DMF staff, in conjunction with APNEP and other DEQ divisions, is currently working on the 2021 CHPP Amendment to include resilience strategies with priority issues including: Submerged Aquatic Vegetation Protection and Restoration, with Focus on Water Quality Improvements. Final approval of the recommendations, issue papers, and complete 2021 CHPP Amendment is expected late 2021. DMF staff is also collaborating on the grant proposal: *Evaluating a tiered approach to inform monitoring, assessment, and decision-making elements for seagrass management and conservation*, submitted to the National Estuarine Research Reserve System (NEERS) Science Collaborative.
Habitat and Enhancement	Wetland loss due to sea level rise/development impacts: wetland migration, fisheries, water quality, stormwater buffering capacity	DMF staff, in conjunction with APNEP and other DEQ divisions, is currently working on the 2021 CHPP Amendment to include resilience strategies with priority issues including: Wetland Protection and Enhancement, with a focus on Nature-Based Methods. Final approval of the recommendations, issue papers, and complete 2021 CHPP Amendment is expected late 2021. DMF staff is also collaborating on two grant proposals: 1) *Coastal Resilience Multiscale mapping, monitoring, and modeling to assess vulnerability of North Carolina's coast to sea level rise*, submitted to the NOAA's National Center for Coastal Ocean Science (NCCOS) The Effects of Sea Level Rise Program (ESLR), and 2) *Evaluating a tiered approach to inform monitoring, assessment, and decision-making elements for seagrass management and conservation*, submitted to the NERRS Science Collaborative. DMF continues maintaining and restoring oyster reefs that increase coastal resiliency by helping protect critical wetlands and other coastal habitats while providing other beneficial ecosystem services. As of 2020, DMF has constructed 15 oyster sanctuaries in the Pamlico Sound, totaling 396 permitted acres, and annually deploys several thousand bushels of cultch rock strategically throughout the estuaries.
Habitat and Enhancement	Water quality impacts from inflow and infiltration associated with wastewater infrastructure	DMF staff, in conjunction with APNEP and other DEQ divisions, is currently working on the 2021 CHPP Amendment to include resilience strategies with priority issues including: Reducing Inflow and Infiltration associated with Wastewater Infrastructure to Improve Coastal Water Quality. Final approval of the recommendations, issue papers, and complete 2021 CHPP Amendment is expected late 2021.
Habitat and Enhancement	Water quality degradation due to nonpoint source pollution from environmental rule compliance	DMF staff, in conjunction with APNEP and other DEQ divisions, is currently working on the 2021 CHPP Amendment to include resilience strategies with priority issues including: 1) Environmental Rule Compliance to Protect Habitat and 2) Habitat Monitoring to Assess Status and Regulatory Effectiveness. Final approval of the recommendations, issue

		papers, and complete 2021 CHPP Amendment is expected late 2021.
Fisheries Management	Climate change increases in variability of ecosystem factors impacting fish distribution, abundance, productivity and management	DMF continues to address climate change impacts as fishery management opportunities allow through the development fishery management strategies that are flexible and support easier entry and exit into new fisheries and out of those that are declining, to prevent overfishing. DMF continues to support interstate and federal cooperative management, stock assessments, and fishery management plan guidelines by incorporating climate change in vision statements and/or strategic plans and fishery management plans.

6. Information Technology

The ***Department of Information Technology*** (DIT) administers data centers and communication transmission infrastructure at and for state property and buildings which support emergency management communications capabilities, public safety services, medical facilities and services communications, sensors/monitoring tools, and non-government emergency services. Information technology (IT) can be vulnerable to climate impacts. In DEQ alone, IT supports functions such as emergency response and public safety for all central office and regional office staff. When climate or pandemic impacts affect the department, IT has to respond to address, at minimum, continuity of operations (COOP), primary work location compromise, and power interruptions.

Primary Section Responsible	**Threat**	**Strategy**
Information Technology.	Continuity of Operations during a threat	IT takes the lead for activation of the COOP and its current strategies to prepare more planning and development of "Playbooks" for use by the division programs. IT trains the division COOP representatives on how to update their COOP playbooks and then ensures the playbooks are updated.
Information Technology	Primary work location compromise	IT has positioned DEQ's computing environment that allows employees to work anywhere, at any time and with any device. IT developed a strategy to fully leverage DIT's Microsoft O365 environment that allows secure access to email, collaboration, storage, and a vast array of productivity applications. This environment can be securely accessed from anywhere and any device that has an Internet connection. These capabilities were able to create a much smoother transition for employees to work from home during the pandemic. IT is developing more capabilities for DEQ that will create even more robust tools.
Information Technology	Power interruptions	IT has identified networking and computing equipment that do not have a battery back-up, commonly referred to as Uninterruptable Power Sources (UPS). They are meant to provide key equipment with power during a short (less than 30 minute) power outage, to keep key equipment powered on for a seamless transition to a back-up power source with minimal

		loss to operations or data. IT has purchased and installed approximately 75% of the identified need.

7. Mitigation Services

The ***Division of Mitigation Services*** (DMS) is a state initiative that restores and protects wetlands and waterways for future generations while offsetting unavoidable environmental damage from economic development. DMS offers four In-Lieu Fee mitigation programs designed to assist private and public developers in meeting state and federal compensatory mitigation requirements for streams, wetlands, riparian buffers, and nutrients. DMS utilizes receipts from these programs to restore streams, wetlands, and forested buffers by working with state and local partners, including willing landowners to concentrate mitigation resources in areas where they will have the greatest watershed benefit.

Primary Section Responsible	**Threat**	**Strategy**
Division of Mitigation Services	Obtaining and maintaining functional uplift resulting from stream and wetland restoration given potential increases in nonpoint source pollution.	Develop a geodatabase paired with a SQL database to, in part, evaluate trends in water quality improvement. These evaluations allow DMS to detect changes in nonpoint source pollutant changes over time. Additionally, DMS instituted programmatic monitoring of nonpoint source pollutants in preconstruction and post construction streams. These data will support the efficacy of water quality improvements resulting from restoration activities and will aid in detection of declines given potential changes in runoff and/or drought.
Division of Mitigation Services	Increases in flood frequency, intensity and duration resulting from increases in rainfall.	DMS received legislative authority to develop a program which would create and address flood storage using nature-based solutions. The division is establishing an Advisory Board and applying for grants to develop pilot projects and test cases in the middle-Neuse river basin. These efforts aim to determine the goals, strategies, and funding sources for this new program.

8. Waste Management

The ***Division of Waste Management*** (DWM) is responsible for proper solid waste disposal, hazardous waste management, underground storage tank installation and operation, and Superfund cleanups throughout the state. DWM's Solid Waste Section ensures the proper management and disposal of all solid waste, including debris generated from hurricanes and floods, for the purposes of protection of public health and the environment. DWM's Underground Storage Tank (UST) Section is responsible for ensuring that petroleum releases (above and below ground) are properly cleaned up and/or restored as closely as possible to previous conditions. These agencies play key roles in lowering the direct costs of clean up and recovery and in protecting soil, groundwater and surface water within impacted communities by promoting pre-planning efforts, efficient and timely management of debris generated from hurricanes and floods and petroleum releases from USTs.

The Division of Waste Management (DWM) has been active in initiating resiliency efforts including:

- Codifying the temporary disaster debris site approval process providing for consistent statewide requirements for management of debris and to assist local, state, and federal public entities with public assistance eligibility requirements, while maintaining protection of public health and the environment. The rules became effective January 1, 2021.
- Effecting changes to Imminent Hazard legislation to allow certain solid waste permit conditions, such as hours and days of operation, tons of waste allowed to be disposed of per day or year, and service area of waste to be relaxed during/after an emergency event such as hurricane or mass animal mortality. Changes became effective July 1, 2020.
- Implementing multiple strategies, both pre- and post-Storm, to identify DWM sites located in flood-prone areas that may be impacted. Agencies make that information available to field response teams through tablets and a GIS-based Incident Management System that is compatible with the system already in use by EPA nationwide through two hurricane seasons. (Division of Waste Management in association with EPA and NC Emergency Management)
- Collaborating with County Emergency Management Coordinators (EMC) and Local Emergency Planning Committees (LEPC) through meetings and listening sessions to identify areas where DEQ/DWM and counties can create partnerships and assist in training.

Primary Section Responsible	**Threat**	**Strategy**
Solid Waste Section	Management of disaster debris / extreme weather	Outreach/Guidance. DWM will continue to work with local, state, and federal partners to participate in and conduct training and to provide guidance via division webpages. DWM field staff have continued to work with local governments on an individual basis to establish new disaster debris sites. Rulemaking. DWM was successful in codifying the debris site approval process, providing consistent statewide requirements for management of debris and to assist local, state, and federal public entities with public assistance eligibility requirements while maintaining protection of public health and the environment. The rules were effective January 1, 2021. Changes to Imminent Hazard Legislation. DWM was successful in seeking legislative changes to allow certain permit conditions, such as hours and days of operation, tons of waste allowed to be disposed of per day or year, and service area of waste to be relaxed during/after an emergency event such as hurricane or mass animal mortality allowing removal of solid waste and debris to operational facilities outside of the impacted communities and/or political subdivisions. Local Government Debris Management Planning. While many local governments have debris management plans in place, they are primarily voluntary in nature. A recommendation would be for a statutory requirement that all city and county governments, either individually or jointly in resolution with one another, be required to develop and maintain a debris management plan as part of their Emergency Operations Plan in support of the NCEOP. This would also assist in their

		compliance with existing Statute 130A-309.09A for solid waste planning purposes, which includes debris management.
Underground Storage Tank Section	Spills from aboveground and underground storage tanks / extreme weather	Outreach/Guidance. DWM will continue to work with local, state, and federal partners to prevent spills from aboveground and underground storage tanks. We will participate in and conduct training and provide current guidance on our division webpages to prevent releases of petroleum to the environment. To improve and/or implement strategies to properly manage petroleum storage, we have been engaged in the following: • continue to attend training events and Area Contingency Plan meetings with US Coast Guard, • continue to collaborate with US EPA, NC Emergency Management, NC DEQ Division of Water Resources and NC DEQ Division of Air Quality to improve notification and response time to spills reported to the National Response Center and/or NC Emergency Management, and • identify unpermitted petroleum ASTs, focusing within flood zones, but including all of NC facilities, in an outreach program consisting of awareness and preparation prior to hurricane season. Enhanced Preparedness DWM/EPA staff in association with NC Emergency Management were successful in implementing multiple strategies, both pre- and post-Storm, to identify sites located in flood-prone areas that may be impacted. Agencies make that information available to field response teams through tablets and a GIS-based Incident Management System that is compatible with the system already in use by EPA nationwide through two hurricane seasons. This allows the Division to maximize efficiency and shorten response times by identifying and prioritizing those sites and permitted facilities that are more likely to require preparation, communication, or response, and by identifying sites that will not need to be visited by field-response teams after a flood event. State/Local Partnerships. DWM will continue to collaborate with County Emergency Management Coordinators (EMC) and Local Emergency Planning Committee (LEPC) through meetings and listening sessions to identify areas where DEQ/DWM and Counties can create partnerships and assist in training.
Solid Waste Section	Diminished landfill capacity/Extreme weather	Recycling/reuse. DWM should work with local, state, and federal entities, and waste and recycling facilities to improve and/or develop and implement strategies that promote the proper management of storm debris and its impacts to statewide communities by: • increasing waste segregation efforts that facilitates reuse, recycling, and proper disposal of the various waste streams, • expediting the removal of disaster-related waste from impacted communities, • maximizing reuse and recycling opportunities available to impacted communities,

		• growing waste reduction programs to maintain landfill capacity to withstand periodic influx of storm related debris, • promote local ordinances in building practices that eliminate exposure risks resulting in less waste being generated during storm events, and • working with public and private waste management facilities to ensure their acceptance of disaster-related wastes. Statute changes. Enhancing support of state and local recycling programs through legislation and funding initiatives based on waste reduction and materials management. Consideration of amending 130A-309.09A to set new statewide recycling goals (last established in 1991). Encourage or establish public and private partnerships to enhance or develop new local or regional materials processing facilities and develop incentives to new businesses that will serve as end users or consumers of NC materials.
Solid Waste Section	GHG emissions from landfills/ wastes/extreme weather	Organic wastes. Promote recycling/reuse of wood, vegetative, and food wastes that contribute to GHGs. White goods. Solid waste inspectors will continue to observe/inspect the collection of white goods and offer technical assistance to local governments to prevent releases of CFCs from air conditioners and refrigerators to the environment.
Solid Waste, UST	Spills, Extreme Weather	Response Coordination. DWM designated additional responsibilities for two current staff members (one for solid waste and one for UST). The staff can request and authorize Mission Statements and serve as contacts for hazardous substances and petroleum releases to soil resulting in enhanced spill response times.

9. Water Infrastructure

The ***Division of Water Infrastructure*** (DWI) administers state and federal funding associated with water and wastewater infrastructure across the state. Funding programs include the Clean Water State Revolving Fund (CWSRF), Drinking Water State Revolving Fund (DWSRF), state-appropriated funds, Community Development Block Grant-Infrastructure (CDBG-I) funds, and the newly formed Viable Utility Reserve (VUR) program. State-appropriated funding may be used for construction projects or for the Asset Inventory and Assessment (AIA) grant program or the Merger / Regionalization Feasibility study (MRF) grant program. The division also provides support to the politically appointed State Water Infrastructure Authority (Authority). Both the division and staff work hand in hand to work to provide funding to utilities to rehabilitate and replace water and sewer infrastructure.

Primary Section Responsible	Threat	Strategy
Division	Decaying infrastructure	Authority approved modifications to project priority points systems to prioritize projects that relate to resiliency.
Division	Utility non-viability	Authority continued to fully fund all complete and eligible MRF applications.
Division	Utility non-viability	Authority and division began developing and implementing the VUR program that was signed into law in July 2020 (S.L. 2020-79). As required by the statute, the Authority works in conjunction with the Local Government Commission.
Division	Reactive utility management	The Authority continued funding roughly 25 percent of all eligible and complete applications for the AIA program. This program remains a very competitive program.

10. Water Resources

The ***Division of Water Resources*** (DWR) is responsible for surface and groundwater quantity and quality throughout the state. DWR issues pollution control permits, monitors permit compliance, evaluates environmental water quantity and quality, and carries out enforcement actions for violations of environmental regulations. The Division's primary ability to enhance resiliency will be implementation and affecting compliance with regulations designed to protect water supply and water quality in the State's surface and groundwater.

DWR identified a number of impacts as a result of the potential changing in climate identified in the Climate Science Report. In many cases, these impacts are more extreme variations of issues that DWR is already focused on such as nonpoint source runoff and drought. Existing management efforts can be modified to incorporate more extreme scenarios. Strategies which are ongoing or will be initiated are provided in the following table.

DWR staff are coordinating with the Environmental Management Committee to identify where existing program rules or processes can be modified to protect water supply and water quality while supporting the goals of EO80. DWR is promoting the implementation of green energy through permitting of solar farms and has also added an element to the 319 Grant RFP application and the scoring criteria to address how proposed activities will address climate change adaptation as well as assisting underserved communities.

Primary Section Responsible	Threat	Strategy
Classification and Standards	Multiple	Chair the Water Resources Management Committee for the national Association of Clean Water Administrators to stay involved in significant shifts in federal regulation and policy on climate adaptation and climate change that affects state/interstate/territorial water quality agencies. Continue to identify and understand various authorities involved with regard to climate consequences at the state and federal levels, where it could evolve, recommendations were developed and gaps in authority and information were identified to the Council on Environmental Quality (CEQ). There is indication under the current administration that authority will be revisited and created to adapt agencies to address climate change issues. NC having this experience and framework is highly relevant to successful implementation of federal regulation and policy.
Nonpoint Source, Ecosystems, Intensive Survey	Water Quality degradation due to nonpoint source pollution	Evaluate potential for statewide buffers to mitigate against the effects of extreme storm events. For example, buffers can filter and absorb excess runoff from heavy rain events and forested buffers provide a natural cooling effect when ambient air temperatures increase, protecting stream habitat and water quality. Identify plants which may be suitable as buffers under a warmer Plant Hardiness Zone category. Recommend legislative funding increases and programmatic priority elevation for riparian buffer restoration and conservation across various grant and cost share programs.
Permitting, Water Supply Planning, Ecosystems	Water scarcity during drought	Coordinate with USGS and other stakeholders to recalculate 7Q10 and other flow statistics statewide. Perform an assessment of changes to 7Q10 values to understand potential future dry weather flows. 7Q10 is used to calculate wasteload allocations from NPDES permitted facilities, determine water supply availability, and assess ecosystem habitat.
Permitting	Water quality degradation resulting from extreme events	Address permit condition requiring ground water monitoring for lagoons in the 100-year floodplain.
Nonpoint Source	Water quality degradation due to nonpoint source pollution	Added an element to the 319 Grant RFP application and the scoring criteria to address how their proposed activities will address climate change adaptation as well as assisting underserved communities
Nonpoint Source	Water quality degradation due to nonpoint source pollution	Jordan Lake One Water (JLOW) initiative is designing an implementation approach to propose to the state that would enable compliance flexibility from our perspective and incentivize multi-benefit, 'One Water' actions, including with greater environmental value. Green practices being a prime example.

Nonpoint Source	Water quality degradation due to nonpoint source pollution	Work with the Falls Lake stakeholders on an alternative approach to Existing Development rule compliance that would provide similar flexibility to do more multi-benefit practices including those with less clear nutrient benefit but co-benefits for water quality and other environmental value. January EMC approved the model program for that, and local governments will begin implementing in July concurrent with submitting local plans.
Stormwater	Water quality degradation	Encourage green infrastructure development in all urban areas to reduce stormwater runoff.
NPDES Permitting, DWI	Water quality degradation resulting from extreme events	Use inflow and infiltration from NPDES permit applications to identify systems with collection system issues. Work alongside DWI to begin providing funding for repair and bolstering of these collection systems.
Permitting	GHG Mitigation	Promote implementation of green energy through permitting of solar farms.
Basin Planning	Multiple	Incorporate climate resiliency as standard goal in all Watershed Action Plans including TMDL implementation. Strategies developed so far in the pilot plan include: - Increasing natural infrastructure, - Maximizing/optimizing plantings in restoration areas for carbon storage, - Preserve and enhance existing undeveloped and open space. DWR will be working with a multi-agency group to evaluate the strategies and develop measurable objectives for each strategy.
All Sections	Multiple	Train staff in the potential changes which may face NC from North Carolina and what mitigation and adaptation strategies can be used support the division's programs.
All Sections	Multiple	Improve efficiency of lighting and equipment at the Water Quality Lab.
All Sections	Multiple	Coordinate with the Environmental Management Committee to identify areas where existing rules need to be modified to support EO80.
All Sections	Multiple	Convert paper records to electronic files to reduce paper and simplify access and review by the public.

11. State Energy Office

North Carolina's energy infrastructure, with its diversified generating plants, robust transmission and distribution infrastructure, fuel pipeline systems, and renewable resources, is susceptible to both natural and man-made incidences that may result in local or statewide energy emergency events. While the ***State Energy Office*** (SEO) does not have direct responsibility for the state's energy infrastructure, pursuant to the Clean Energy Plan (CEP) and Risk Assessment and Resiliency Plan (RARP), SEO is dedicated to helping create a modern, resilient, and low-carbon electrical energy system in the state.

The CEP and RARP identify numerous strategies for SEO to reduce vulnerabilities and risks to achieve a reliable supply of energy. These include: hardening and modernizing the grid; targeted undergrounding and renewing existing assets with automations; installing intelligent devices and controllers; identifying alternative or lower volume water resources; and alternative fuel infrastructures and hardening existing fuel pipelines, terminals, and distribution infrastructure. In the year since the publication of the RARP, the

State Energy Office has focused attentions on developing strategies and actions related to two primary objectives, which incorporate many of the above-mentioned strategies:

- Enhance the energy-efficiency and resiliency of State-owned buildings and energy infrastructure; and
- Foster the development of modern and resilient electricity systems

To further these two objectives, the SEO is deploying multiple strategies, four of which are highlighted below. These strategies revolve around the risk of damage to energy infrastructure due to intense storms and severe weather events, such as inland and coastal flooding. They further identified strategies in the RARP and will result in energy resiliency frameworks, funding mechanisms for energy efficiency and energy infrastructure projects, and streamlined decision-making pathways. In addition, multiple strategies also involve shared strategies for interagency coordination, state/local government partnerships, and robust stakeholder/ community engagement processes. More information regarding SEO's resiliency efforts can be found at *deq.nc.gov/energy-and-climate*.

Primary Section Responsible	**Threat**	**Strategy**
DEQ State Energy Office, academia, and local governments	Intense Storms and Extreme Weather Events	**Leveraging federal resources to further resiliency goals.** The Building Resilient Infrastructure and Communities (BRIC) program is focused on nationwide hazard mitigation projects and funds projects that reduce the risk and damage from future natural hazards. It emphasizes that successful projects reduce risks to as many critical community services as possible, which includes energy services. Utilizing this opportunity, SEO has developed a project consistent with the RARP and partnered with New Hanover County and UNC Charlotte EPIC to propose BRIC funding to develop a strategic plan to deploy reliable on-site power to key community sites. The project will also examine system level vulnerabilities and improvements that would be in control of the utility and the NC Utilities Commission. The overall project will test an energy resilience framework that can be replicated in many parts of North Carolina that are dealing with hazards such as extreme flooding, landslides, winter storms, and high winds. Building on the state resilience strategy, this proposal specifically addresses community capability and capacity building and the selection of mitigation projects. Additional local governmental entities have approached the SEO to support future energy resiliency funding opportunities. The SEO is addressing this need through an assessment of state utility regulations and federal programs. State agencies may also be eligible to utilize BRIC funding to improve the resiliency and energy efficiency of State-owned infrastructure if key project elements are incorporated into NC's Hazard Mitigation Plan (HMP). The SEO is helping agencies coordinate with North

		Carolina Emergency Management (NCEM) to identify critical infrastructure or essential functions that may be included in the HMP update. These efforts will assist with future funding proposals for the BRIC program to enhance the energy-efficiency and resiliency of State-owned buildings.
DEQ State Energy Office, utilities, NC energy regulatory bodies, and other stakeholders	Intense storms and extreme weather events	**Determining resiliency metrics and targets appropriate for North Carolina's energy sector.** Resiliency efforts will benefit from improved metrics for measuring and increasing resiliency across the energy sector. "Planning an Affordable, Resilient, and Sustainable Grid (PARSG) in North Carolina" builds on the RARP to develop metrics that can evaluate the social and economic impact of weather-related energy emergencies. In collaboration with UNC Charlotte's Energy Production and Infrastructure Center (EPIC) and the NC Clean Technology Center at NC State University, PARSG is examining storm-related impacts and the costs and benefits of different investments in grid resiliency. Through a robust stakeholder engagement process, the team is considering a mix of alternatives that includes proposals from utility service providers as well as other potential solutions such as microgrids. As a result of this effort, an Affordable, Resilient & Sustainable Grid Roadmap will be developed to inform key energy planning processes specific to North Carolina.
DEQ State Energy Office, utilities, NC energy regulatory bodies, and other stakeholders	Intense Storms and Extreme Weather Events	**Establishing comprehensive utility system planning processes that connects generation, transmission, and distribution planning in a holistic, iterative, and transparent process that involves stakeholder input throughout.** Integrated Distribution System Planning provides the opportunity to build resilience through the modernization of the energy supply and delivery infrastructure. SEO, along with the NC Utilities Commission, is participating in the National Association of Regulatory Utility Commissioners (NARUC) and the National Association of State Energy Officials (NASEO) Comprehensive Electricity Planning Task Force. This Task Force allows North Carolina to evaluate integrated resources planning processes that achieve affordable, reliable, and safe services while supporting grid modernization initiatives and integrating increased demand for distributed energy resources and services. As a participant in this Task Force, North Carolina will develop a state-specific plan to apply insights gained to guide NC to grid modernization and resiliency. This will aid in developing a framework to accelerate decision-making related to energy infrastructure planning and operations.

DEQ State Energy Office and NCORR in partnership with State Facility Managers and energy system stakeholders	Intense Storms and Extreme Weather Events	**Incorporating energy resiliency into government buildings and power grid infrastructure through Recovery Support Functions.** Recovery Support Functions (RSFs) serve to address long-term planning, resiliency, and recovery goals in North Carolina. Each of the established 12 RSFs consists of stakeholders from governmental and non-governmental organizations to provide technical subject matter support, suggest policies, or request legislation to achieve the framework's goals. Integrating the energy-efficiency and resiliency of State-owned buildings and energy infrastructure into RSF-5 (Transportation & Infrastructure) will align with key goals of the RARP and allow for the planning of extreme weather events that create energy emergencies. State buildings and energy infrastructure are an area that would greatly benefit from future funding opportunities or methodologies that may emerge from the RSFs to assist with reducing annual energy intensity and costs. The SEO has initiated a dialogue with NCORR to begin RSF-5 coordination process for state buildings and the power system providers.

12. Environmental Justice

The Environmental Justice Program (EJ) at DEQ works to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.

The challenge ahead of the department is integrating this perspective into the core mission of the department, along with the legal and scientific lens guiding how DEQ employees pursue their work now. DEQ's mission, "Provide science-based environmental stewardship for the health and prosperity of all North Carolinians," can only be accomplished if fighting for Environmental Justice is part of every DEQ activity.

Primary Section Responsible	Threat	Strategy
EJ	Climate Impacts to Vulnerable Communities	**Provide updated mapping when detailed climate projections come out, including overlap with socially vulnerable communities using 2020 Census and other up-to-date data:** The EJ Program has advised and will continue to work with colleagues within DEQ to map climate risks as data-driven projections are made available. The EJ Program Team is patiently awaiting the release of data from the U.S. Census Bureau on the 2020 decennial census in order to determine which Census Block Groups in North Carolina meet the criteria for "underserved populations," generally defined as disproportionately nonwhite and disproportionately

		experiencing poverty (page 4-5 of the Plan). This information will help inform DEQ to target underserved communities for improving engagement (see next item), providing additional resources, and prioritizing collaborative efforts with sister agencies.
EJ	Communication with underserved communities	**Continue enhanced engagement strategies for potentially underserved communities and translation and interpretation services for non-English speakers (as laid out in the DEQ's Public Participation and LEP Language Access Plans):** Robust communication strategies are key to successful EJ programming. The EJ Program Team has updated the Public Participation Plan to reflect the strategies employed by the Department to provide enhanced engagement and participation opportunities to underserved communities. Likewise, the EJ Program Team, in collaboration with the Internal Translation Team in Public Affairs, provides translation and interpretation services for Spanish-speakers. This year, the Department integrated Google Translate on its website for the 14 most frequently spoken languages in North Carolina. In the coming year, the EJ Program Team, with Public Affairs, will continue to share relevant information in ways that are accessible to and easily understood by all North Carolinians.

II. Conclusion

After a strong start to addressing the requirements of EO80 in 2019, DEQ faced the challenge of adapting to COVID-19 in 2020. The need to respond to the immediate risk of the virus, changes to the work environment, and near complete cessation of face-to-face meetings took the focus away from resiliency planning for a period of time. In fact, the threat of the virus was a test of the Department's vulnerabilities and resiliency capabilities. We are glad to say that DEQ not only withstood the impacts but continued to effectively carry out the business for the people of the state.

Despite these challenges, state agencies working on EO80 goals did see progress in planning and implementing recommendations related to climate change. This strategy document identifies a few of the highlights accomplished in 2020 as well as strategies that will be continued or undertaken in 2021. As can be seen, the Department has been very busy with inter-governmental coordination (federal, state and local), environmental design studies and research, developing key foundations for a resilient framework (flooding, power, and water resources), leveraging federal grants (eg. BRIC, HHPD, 319, NFWF) NGO and private stakeholder involvement, staff training, public workshops, emergency response, implementation of nature-based solutions, and technology improvements.

Key Departmental efforts for 2021include the following:

- Continuing involvement in Interagency Council meetings
- Convening a dedicated Interagency Resilience Team to work on cross-sector resilience strategies.
- Coordinating with NCORR on the NC Resilient Communities program to provide training, expertise, and funding to local government and communities.
- Identification of additional approaches for a department-wide comprehensive strategy is scheduled for release in 2024.

DEQ Divisions will continue to implement the strategies in this report and identify additional strategies that are required and necessary to meet its responsibilities and assignments under the 2020 Climate Risk Assessment and Resilience Plan (RARP). Statewide implementation of the RARP is being led by NCORR who will guide the development and delivery of agency work products over the next four years.

The early successes DEQ has had, thus far, are due to the dedication and initiative of its employees. Many of these early successes have also been budget neutral as Divisions have planned and implemented the resilient strategies and goals outlined in this report through reprioritization and improved efficiency in programmatic implementation. Other successes have been resourced through State and Federal Disaster Recovery funds and grants. For example, Landslide Mapping and Dam Overtopping studies are the result of disaster recovery funding through the General Assembly; Coastal Management is developing a habitat resilience plan that identifies and prioritizes areas for resilience projects based on known vulnerabilities and hazards with two shovel-ready projects funded by a grant from the National Fish & Wildlife Foundation; and several Department agencies are awaiting final approval from NCORR and HUD on recommended projects by the Response Support Function Group 7 (Environmental Preservation) to promote and enhance resilience in North Carolina.

As evidenced here, the base budget of the Department has given us a relatively good start but will only get us so far in our work efforts towards resilience. We will continue to leverage our available resources but additional funding will be needed. The availability of Federal grants is becoming more competitive nationwide and without relative increases in availability, they will become harder to come by as other states join the competitive pool. The State Disaster Recovery Funding is a good resource for the work that has already begun but it too has its limitations with specified conditions in the legislation that created it and it is a response to failures that occurred as a result of natural disasters. True resilience in North Carolina will be a continued labor by all stakeholders and will require a budget investment up-front if it is

to be effective and efficient. Per the US Department of Commerce's National Institute of Standards and Technology (NIST) Technical Note 1959: *Defining the Resilience Dividend: Accounting for Co-benefits of Resilience Planning*, (https://nvlpubs.nist.gov/nistpubs/TechnicalNotes/NIST.TN.1959.pdf), *…"resilience is not trivial and communities do not face a binary choice between being resilient and not. The range of options varies by community... The concept of the resilience dividend helps communities compare investment options using a metric that encompasses multiple objectives and recognizes strengthening the community in the day-to-day…"* We need to be able to address this same concept for DEQ and its programs that support all of North Carolina's communities. With continued leadership and financial support from the Administration, General Assembly, and citizenry of North Carolina, we can accomplish these goals.