RESILIENCE STRATEGY REPORT

Cultural Resources

Key Observations

- Cultural resources such as state and local historic sites and museums are irreplaceable, making them inherently sensitive to sea level rise and the increasing frequency and severity of heavy precipitation and flooding.
- The North Carolina Department of Natural and Cultural Resources (DNCR) is active across all 100 counties, and resources are limited. The threat of the hazard is growing.
- DNCR has regulatory authority over destruction of any public records managed on a local level.
- Much of the technical and constituent services for cultural assets are provided in a collaborative environment with federal, state, local, and private interests all having a stake in the solutions.

Cultural Resources Critical Impacts and Resiliency Strategies

- Water is one of the biggest threats statewide. There is no single solution to protect cultural assets from "water where it doesn't belong".
- The focus for now, and in the near-term, should be building resilience into assets owned and managed by the state, such as state museums, historic sites and parks.
- DNCR must provide greater services such as technical assistance to locally-owned cultural resources.
- DNCR should develop and enhance federal, state, local, and private partnerships to build cross-boundary resiliency capacity for cultural assets.

Cultural Resources Recommendations (cross sector and combining threats of hurricanes and flooding, heavy precipitation, sea level rise, and wildfire and drought). These recommendations fall into two major categories – (1) education and outreach with constituent aid and coordination and (2) resource interventions.

Education and Outreach / Constituent Aid and Coordination.

1. **Constituent education.** Broader constituent education for resiliency measures. State Archives programs, training, and consultations for essential records protection.
2. **Disaster response program.** The State Archives and CREST consultations with public and private custodians of cultural assets on the development of a robust disaster response plan, including comprehensive response contact information

and action steps.

3. **Certified Local Governments.** Federal program for local jurisdictions with active historic preservation program; funding available to prepare implementation of guidelines and adaptive strategies for resiliency.
4. **Regional planning coordination.** Modeled on other states' efforts to address these issues on a regional, rather than individual local jurisdictional basis.
5. **Survey and Inventory of threatened resources.** Survey, document, and inventory threatened cultural repositories as well as historical and archaeological sites to foster resiliency measures and better long-term planning for their preservation.

Resource Interventions for Resiliency.

6. **Building modifications/ resource adaptation**. Building adaptations include steps to protect against flooding (elevating buildings, wet or dry flood-proofing, site and landscape adaptations, protection of utilities, filling basements, elevating on a new foundation or through the interior structure, abandoning the first story, or moving the building to a less vulnerable location) as well as wind and fire damage, such as improved roofs (hurricane clips) and optimal building maintenance.
7. **Infrastructure approaches.** Engineering solutions for flood control, such as levee systems, dams, and other stormwater drainage means. Installation of generators for cultural institutions for continued climate control to help prevent mold growth.
8. **Strategic siting / relocations.** Relocation of archival or artifact collections from vulnerable locations or re-housed in more strategically selected sites. Potential for salvage excavation for vulnerable archaeological sites. Reducing vulnerability for directly managed state assets through strategic siting (farther inland or out of flood plains), and building adaptation, including potentially elevations.

Cultural Resources Accomplishments (March 2020 to March 2021)

Education and Outreach / Constituent Aid.

- **Essential Government Records training.** Presented training on the identification and protection of essential government records, a key mitigation strategy for government offices to ensure continuity of operations during an emergency. This training was based on FEMA-approved curriculum (Intergovernmental Protection for Essential Records), originally developed by the Council of State Archivists in 2011. (Government Records Section, Division of Archives and Records, DNCR).
- **Online training for disaster preparedness.** The Restoration Branch of the State Historic Preservation Office (HPO) provides technical advice for restorations, rehabilitations, and building maintenance to owners of historic buildings at no cost or obligation. The Branch has produced constituent videos available on YouTube, including review of federal disaster recovery assistance available

for property owners in historic districts; how to use GIS mapping and data to prepare for and respond to natural disasters; case studies of building elevations for better resiliency; and how to dry out a flooded historic building. (State Historic Preservation Office, Division of Historical Resources, DNCR).

- **Statewide cooperation.**
  - **State Disaster Recovery Task Force and Framework.** State Historic Preservation Office participating in the Cultural Resources Recovery Support Function of the State Disaster Recovery Task Force, contributing map data and recommendations for the upcoming Disaster Recovery Framework update. (State Historic Preservation Office, Division of Historical Resources, DNCR).
  - **United States Army Corps of Engineers (USACE) South Atlantic Coastal Study At-Risk Cultural Resources Analysis.** Consulting with USACE to identify cultural resources (historic and archaeological sites, historic districts, and other historic resources) vulnerable to coastal storm damage and sea level rise. This analysis is part of a multi-state effort throughout the southeastern United States and Caribbean. GIS and archaeological and architectural survey data along with staff expertise are all proving crucial to informing this effort. Many of the places identified are federal and state historic assets open to the public.
  - **Statewide Historic Preservation Plan Update.** Preliminary planning for the 2023 10-year update cycle of the state plan is underway. The update will include specific measures to be taken toward strengthening disaster mitigation and resiliency for historic resources throughout the state. (State Historic Preservation Office, Division of Historical Resources, DNCR).
  - **Historic Resilience Planning Project for Local Governments.** In collaboration with the ncImpact Initiative at the UNC School of Government, working to better link local disaster planning to historic resource resiliency planning, and create and provide training for state agency personnel, local governments, and non-profit historic sites in best practices for disaster preparedness and response. Seeking federal funding approval for this initiative from congressional appropriation for historic preservation hurricane recovery grant. (State Historic Preservation Office, Division of Historical Resources, DNCR).
- **Survey and Inventory of Threatened Resources.**
  - **Historic architectural Surveys (post-Hurricanes Florence and Michael).** Identified six counties that received FEMA disaster declarations from hurricanes Florence and Michael currently lacking historic architectural survey information. Bids from an RFP to undertake these needed surveys in Hoke, McDowell, Montgomery, Person, Polk, and Vance counties under review. Funded with congressional appropriation for historic preservation recovery. (State Historic Preservation Office, Division of Historical Resources, DNCR).
  - **North Carolina Coastal Cemetery Survey (post-Hurricanes Florence and Michael).** Undertaking a North Carolina Coastal Cemetery Survey to identify,

document, and assess the condition of historical cemeteries on state lands in the nine coastal counties (Dare, Hyde, Beaufort, Pamlico, Carteret, Onslow, Pender, New Hanover, and Brunswick) likely to have been impacted by storm damage. Particular attention to recording cemeteries traditionally associated with African American communities, which are underrepresented in state records. Funded with congressional appropriation for historic preservation recovery. (Office of State Archaeology, Division of Historical Resources, DNCR).

    - **North Carolina Shorescape Archaeological Survey (post-Hurricanes Florence and Michael).** Undertaking a North Carolina Shorescape Survey to identify and document archeological resources associated with coastal communities that are most at risk of being damaged by storm events. Focus is on identifying and documenting sites within 200 ft (60 meters) of the shoreline.

- **Post-storm constituent consultations.** DNCR staff have worked on multiple fronts to address storm recovery and climate resilience in two historically marginalized communities with frequent flooding—Princeville and Pembroke.
    - Princeville: Consulted with town leaders to preserve buildings and artifacts associated with the historic Princeville School and the Matthewson House. Although, after careful consideration, the c.1870 Matthewson House was demolished in 2020, HPO and OAH staff continue to consult with town leaders to plan storage for the salvaged architectural elements and to assist with plans for a future Princeville Museum.
    - Pembroke: Consultations have led to recommendations for federal resiliency funding to address structural needs at The Indian Education Program Museum in the historic Pembroke High School. In addition, CREST has been able to direct federal funds earmarked for Hurricane Florence recovery to upgrade storage supplies for the museum's cultural heritage collection.
- **Coordination with National Park Service.** In early 2021, the National Park Service through the Cape Hatteras National Seashore began consultations with the State Historic Preservation Office on preservation of the Ocracoke Lighthouse complex after island-wide "sheet flooding" from Hurricane Dorian and to explore various resiliency intervention approaches. (State Historic Preservation Office, Division of Historical Resources, DNCR).
- **CLG funding for resiliency-oriented design guidelines.** The Towns of Edenton and Beaufort are currently working on federally CLG funded design standards updates that will incorporate resiliency measures into treatment of locally designated historic properties. (State Historic Preservation Office, Division of Historical Resources, DNCR).
- **Professional Development and Training.** The Restoration Branch of the State Historic Preservation Office has sought professional development opportunities regarding building adaptations for greater resiliency, including attendance at the national biennial Keeping History Above Water conferences and National Park Service training for historically sensitive building elevations where flooding is an issue. Several staff members have successfully completed floodplain

management training with North Carolina Emergency Management. (State Historic Preservation Office, Division of Historical Resources, DNCR).

- **Cultural Resources Emergency Support Team Regional Response Supplies.** The Cultural Resources Emergency Support Team (CREST) continues to help communities recover cultural heritage collections from damage inflicted by natural disaster. CREST received federal funds to establish a fifth regional cache of disaster recovery supplies at the Museum of the Albemarle to serve the vulnerable northeast region and the Outer Banks more readily. It also deployed annual caches regionally at the end of 2020. (Division of Archives and Records/ Cultural Resources Emergency Support Team (CREST), DNCR).

Resource interventions for resiliency.

- **Fleet modernization (Agency Fleet Zero Emission Vehicle / Electric Infrastructure).** Continued to modernize the State Historic Sites Craft Services vehicle fleet and equipment with more fuel efficient and less polluting utility vans and vehicles. (DNCR, Division of State Historic Sites).
- **Agency Building Utility Consumption Reduction.** Upgraded all lighting to LED systems. Installing more efficient HVAC systems. Utilizing geothermal HVAC systems when applicable during major renovations. Encouraging individual sites to adjust thermostat controls to cooler heating season temperatures and warmer cooling season temperatures where such changes will not affect artifact preservation. (DNCR, Division of State Historic Sites).
- **Other Conservation / Efficiency efforts.** Installed water fountains with the capacity to refill personal water bottles to help eliminate single use plastic bottles. Encouraging sites to utilize sustainably sourced materials for structural renovations and exhibit builds. (DNCR, Division of State Historic Sites).
- **Brunswick Town / Fort Anderson (BTFA) Wave Attenuator Project.** Continued installation of wave attenuators in the Cape Fear River to protect more of the sensitive, in situ Colonial-era archaeological resources and Civil War earthworks present along the shoreline from wave action and hurricane storm surge. Of the approximately 5,000 feet of shoreline in need of protection, two phases of wave attenuators have been installed for a total of 460 feet, with an additional two phases (1,775 more feet of protection) to be completed by December 2021. The excellent performance of previously installed sections during Hurricane Florence in protecting those segments of shoreline was in stark contrast to the loss of and damage to the largely non-protected stretches at Brunswick Town, which has been the subject of study through monitoring by the Coastal and Estuarine Studies Lab of the University of North Carolina-Wilmington. The agency believes this system is a demonstration project nationally for protection of vulnerable shorelines, particularly in the context of threatened cultural resources. (Division of State Historic Sites; State Historic Preservation Office and Office of State Archaeology, Division of Historical Resources; Capital Projects unit, all DNCR).

- **Resiliency projects for State-Owned Historic Sites' properties.**
  - **Hurricane Florence and Michael funded projects.** Several state-owned historic properties are proposed to receive federal funding to address Hurricane Florence / Michael damage and provide greater resiliency:
    - Battleship USS North Carolina. Address resiliency for the mast superstructure using newly developed marine coatings that are more resistant to wind-driven rain and resultant scouring and corrosion of the steel.
    - Galen Stone Hall @ Charlotte Hawkins Brown Memorial. Design and construction of building and foundation drainage systems to prevent basement flooding that the building experienced during Florence.
    - Douglas Complex @ Tryon Palace. Address damaged flooring and brick sheathing, mold eradication, and water runoff control.
    - Harper House @ Bentonville Battlefield. Installation of an emergency generator to maintain power to the HVAC system during severe wind-driven rainstorm events will avoid future problems like the week-long period post-Florence where the building could not be adequately dried out and developed mold and plaster issues.
      (Division of State Historic Sites; State Historic Preservation Office and Office of State Archaeology, Division of Historical Resources; Battleship North Carolina Memorial Commission; Tryon Palace; Capital Projects unit, all DNCR).
  - **USS NORTH CAROLINA Living with Water project.** A $2.3M project funded by various grants (in hand) to build a constructed wetland in the middle of the Battleship North Carolina's park to deal with rising sea level and more frequent flooding. In design phase in 2020 and likely to be underway in 2021.
- **Hurricanes Florence and Michael Constituent Subgrant Program for Historic Preservation Recovery.** In December 2019, the National Park Service (NPS) awarded the North Carolina State Historic Preservation Office (HPO) approximately $17 million in federal grant funding to provide recovery assistance to historic resources damaged by Hurricanes Florence and/or Michael that are listed in or eligible for listing in the National Register of Historic Places. The award allowed the HPO to make available up to $9.25 million in grants for historic resources located in the 61 eligible counties in North Carolina designated by FEMA for disaster assistance. In September 2020 following a successful subgrant solicitation period, the HPO submitted 22 constituent subgrant proposals to the National Park Service (NPS) for funding approval totaling $9.25 million in cumulative assistance. These proposed projects include three planning projects (including a historic architectural resource survey of Cumberland County and Mount Pleasant), and nineteen brick and mortar projects; NPS has approved funding for these projects. (State Historic Preservation Office, Division of Historical Resources, DNCR

Ecosystems

The Natural Heritage Program maintains North Carolina's inventory of biodiversity information and administers the North Carolina Nature Preserves Act, protecting 441,638 acres of Dedicated Nature Preserves and 751,902 acres of Registered Heritage Areas.

The Division of Parks and Recreation conserves and protects representative examples of North Carolina's natural beauty, ecological features, recreational and cultural resources within the state parks system; provides and promotes safe, healthy and enjoyable outdoor recreational opportunities throughout the state; and provides educational opportunities that promote stewardship of the state's natural and cultural heritage. Manages 82 sites including state parks, state natural areas, and state trails, totaling 287,011 acres under the state Parks Act and the state Nature and Historic Preserve Dedication Act.

The North Carolina Land and Water Fund (NCLWF) awards grants to non-profit and governmental organizations to protect land for natural, historical and cultural benefit, limit encroachment on military installations, restore degraded streams, and develop and improve stormwater treatment. This is a primary source of grants allowing local governments, state agencies, and conservation nonprofits to address water pollution, protect clean water supplies, and conserve land. The NCLWF has protected nearly 750,000 acres of land to date.

The Parks and Recreation Trust Fund (PARTF) supports land acquisition and improvements within the state park system. PARTF is the main source of funding for local parkland acquisitions, facility improvements, and public beach and estuarine access.

Summary: Recommended Resilience Strategies for Ecosystems

- **Increase funding for land conservation.** Land conservation can help reduce vulnerability by protecting the natural resiliency of North Carolina ecosystems and by sequestering and storing carbon to reduce greenhouse gases in the atmosphere. Conservation lands also increase the quality of life for North Carolinians by providing natural areas for recreation, hunting, fishing, and education.
- **Protect riparian habitat.** Floodplains and wetlands enhance ecosystem resilience by providing wildlife habitat and migration space, flood water storage, erosion control, bank stabilization, regulation of stream temperature, and overall protection of water quality.
- **Restore floodplains, wetlands, and coastal habitat.** Restoration planning should combine first-hand knowledge of natural resources with historical data and future flood models to target areas that will provide the most resilience for human communities and natural systems.
- **Increase land-use planning.** Green infrastructure concepts can be used to 1) design the most cost-effective strategies for conserving forests, open space, farmland, rural landscapes, park lands, and cultural sites; 2) reduce fragmentation and habitat damage caused by development and human uses of land and water;

3) increase landscape resiliency to climate- related hazards and stressors.

- **Manage stormwater.** Plan for stormwater management to reduce the rate of runoff during rainfall events, limit erosion, and decrease sediment and nutrient inputs to streams. Structures such as stormwater wetlands, bioretention cells (rain gardens), cisterns, permeable pavement, vegetated swales, and filter strips can be used as stormwater best management practices. Good housekeeping of materials stored or left in the open can also be an important stormwater management measure. Limiting the impervious surface of new structures and removing existing impervious surface area when possible is the surest way to reduce stormwater volume and allow for the natural treatment of runoff pollutants.
- **Monitor environmental variables and ecosystem response.** Monitoring will help detect change over time, provide the scientific basis for future projections, and help inform management, restoration, and conservation strategies. Monitoring is especially important for inland and coastal fisheries management, game and nongame wildlife species, and threatened, endangered, and vulnerable plants and animals.
- **Increase public awareness.** Education and outreach efforts are needed to help people understand climate hazards and how they will affect NC ecosystems, engage the population in contributing to solutions, and recruit assistance through citizen science and environmental stewardship.
- **Design bridges and culverts to allow for increased stream flow.** Bridge and culvert design should account for increases in precipitation, to allow stream movement and aquatic animal passage. Avoiding culvert failure prevents sediment input and keeps roads passable during storms. Poorly designed culverts prevent animal movement and fragment wild populations, making them more vulnerable to climate changes.
- **Increase funding for land management.** Government agencies and private landowners can enhance ecosystem resiliency through land stewardship activities that improve natural ecosystem functions and wildlife habitat. Managing with prescribed fire, removing invasive exotic species, avoiding excessive use of herbicides and pesticides, and restoring natural forests and riparian vegetation can all help support healthy resilient ecosystems.

<u>Ecosystems Resilience Accomplishments:</u>

- The NC Land and Water Fund has awarded grants for 56 projects totaling $20,041,287 since March 2020, which include:
  - 11,869 acres will be permanently protected, including:
    - Protecting over 2,246 acres that will be added to Wildlife Resources Commission Game Land enrollment in Ashe, Brunswick, Caldwell, Columbus, Davidson, Macon, and Scotland counties;
    - Adding 2,246 acres to NC State Parks in Johnston and McDowell Counties managed for public trail access for Mountains to Sea Trails and the newly created Wilderness Gateway State Trail, respectively;
    - Protecting over 1,530 acres added to increase recreational opportunities

on greenways and in local parks in Orange, Hyde, Gaston, Jackson, Macon, and Forsyth counties;

- 44,785 feet of stream will be enhanced or restored, impacting sport fisheries across the state including trout waters in Madison County, Muskellunge habitat in Henderson County, and saltwater fisheries in Carteret County;
- Construction of an innovative stormwater project that will protect the Jack Smith Creek Wetlands in the Duffyfields neighborhood of New Bern. In addition to protecting water quality, this project will address flooding issues and complement New Bern's Choice Neighborhood Planning Initiative revitalization effort; and
- Planning efforts to protect unique water resources including Cane Creek downstream of Mount Mitchell State Park, Rocky Branch as it flows through the redeveloped Dorothea Dix Park in Raleigh, and the shellfish waters of Stump Sound north of Surf City.

- Natural Heritage Program staff conducted biological inventories, gathering baseline data that can be used to detect change over time, especially for threatened, endangered, and at-risk plants and animals, and vulnerable natural communities.
  - Natural Heritage Program staff mapped and assessed species at 96 sites during the performance period. Examples include high elevation sites, such as Mt. Mitchell State Park in Yancey County and Elk Knob State Natural Area in Ashe County, and low-lying coastal plain sites that experienced record levels of flooding in recent years such as Big Swamp in Robeson County and Atlantic Natural Area in Carteret County.
  - Many of these natural area inventories helped North Carolina agencies prioritize acquisition of conservation lands. Natural Heritage Program staff inventoried 39 sites under consideration by Land and Water Fund for acquisition grants, and documented locations of rare species and sensitive resources that would benefit from conservation and restoration.
  - NHP monitored montane natural areas and endangered plant species in the National Forests of North Carolina (supported with funding from the U.S. Forest Service). Target species included Roan Mountain Bluet, Heller's Blazing Star, Swamp Pink, and Virginia Spiraea.
- With funding from the NC Wildlife Resources Commission, the Natural Heritage Program gathered and entered occurrence records of animal Species of Greatest Conservation Need into the Biotics data management system; making this information available to all NC agencies helps ensure the long-term resilience of these populations and their habitat.
- At the request of emergency responders from the Federal Emergency Management Agency (FEMA) and the N.C. Department of Environmental Quality (DEQ), the Natural Heritage Program provided training on accessing maps of protected areas and endangered species online, to help minimize and avoid impacts to sensitive areas during emergency response and storm cleanup.

FEMA staff consulted with the Natural Heritage Data Explorer maps 11 times for hurricane and storm recovery projects, and DEQ personnel reviewed NHP data for 26 Temporary Disaster Debris Staging Sites during this time.

- The Natural Heritage Program maintains a dataset of lands managed, at least partially, for conservation and restoration. Knowledge of the extent and location of these lands is crucial for planning a long-term ecosystem resilience strategy for North Carolina. The Natural Heritage Program is in the process of comprehensively updating the Managed Area Database and has added 3,139 managed area records since March 1, 2020.
- Natural Heritage Program publications with resilience implications:
    - Hakkenberg, C.R., R.K. Peet, T.R. Wentworth, K. Zhu, and M.P. Schafale 2020. Tree canopy cover constrains the fertility-diversity relationship in plant communities of the southwestern United States. Ecology 101 (10):e03119. 10.1002/ecy.3119.
    - Knapp, W.M., Frances, A., Noss, R. et al. 2020. Regional records improve data quality in determining plant extinction rates. Nature Ecology & Evolution 4:512–514.
    - Knapp, W.M., Frances, A., Noss, R. et al. 2020. Vascular plant extinction in the continental United States and Canada. Conservation Biology 0 (0): 1–9 © 2020 Society for Conservation Biology DOI: 10.1111/cobi.13621.
    - Siripoonsup, D. 2020. Inventories of Threatened and Endangered Plants on the Pisgah and Nantahala National Forests. Submitted to the U.S.D.A. Forest Service Under Participating Agreement No. 20-PA-11081100-082. Division of Land and Water Stewardship. Department of Natural and Cultural Resources, Raleigh.
- Natural Heritage Program staff worked with DEQ to lead the development of the North Carolina Natural and Working Lands Action Plan, convening a statewide stakeholder group including other state agencies and external stakeholders across North Carolina.
- The Division of Parks and Recreation employs the best methods of building resilient ecosystems through active management designed to mimic natural processes to the greatest extent possible. This includes removing dense plantations and replacing them with native species, eliminating dangerous invasive species, and reestablishing natural fire and hydrologic regimes.
    - The Division has worked to control invasive species on 24 of our park properties controlling 34 aquatic and terrestrial species.
    - Prescribed fire was performed on 41 individual properties for a total of 2,928 acres.
    - Removed a 215-acre plantation and restored the natural communities by planting them back to native species.
    - Followed up on ecosystem restoration projects with fire, invasive species control and plantings at four additional state properties.
    - Restored native ground cover on an additional 150 acres of park lands.

    - Continued extensive rare and endangered species monitoring throughout the park system.
- To reduce the impacts of climate change the Division of Parks and Recreation acquires sensitive lands that provide areas where natural processes can absorb the impacts of change. 1,368 acres were added to 6 different parks and state trails.