DNCR North Carolina Department of Natural & Cultural Resources

2025-2030 Natural and Working Lands Action Plan

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Acknowledgements

We are grateful to all the steering committee members and participants in the Natural and Working Lands community who provided input on the 2025-2030 Natural and Working Lands Action Plan. They shared their expertise in one-on-one conversations and workgroups, edited drafts, and provided examples to make recommendations concrete, among other contributions.

Listed below are Steering Committee members whose organizations helped lead development of the 2025-2030 Natural and Working Lands Action Plan. A full list of contributors can be found in the Introduction.

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Terms Defined

Term	Definition
biodiversity	A measure of variation at the genetic, species, and ecosystem level.
carbon dioxide equivalent	A measure used to compare the emissions of the different greenhouse gases based upon their global warming potential.
carbon offset	A reduction, avoidance, or sequestration in emissions of carbon dioxide or other greenhouse gases made to compensate for emissions made elsewhere, especially when quantified as part of a market program. Offsets are generally measured in metric tons of carbon dioxide-equivalent (CO2e).
carbon offset market	A monetary structure that allows parties to buy, sell, and bank carbon offsets to comply with mandatory or voluntary greenhouse gas (GHG) reductions. The offsets are retired or surrendered when they are 'used' for compliance.
carbon sequestration	A process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils.
carbon storage	Long-term (20+ years) storage of carbon in terrestrial plants and soils, as well as coastal and ocean ecosystems.
climate mitigation	Processes that can reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing them from the atmosphere.
developed lands	Land covered by a mix of constructed materials, impervious surface, and vegetation.
easement	The right to cross over or use the property owned by another party or entity for a specified purpose.
ecosystem services	Benefits to humans of healthily functioning ecosystems; for example, removal of pollutants from air and water.
estuary	A partially enclosed coastal body of brackish water with one or more rivers or streams flowing

	into it, and with a free connection to the open sea.
fee simple acquisition	Transfer of full ownership of property, including the underlying title, to another party.
gray stormwater infrastructure	Stormwater pipes, ditches, inlets, and other infrastructure intended to convey stormwater runoff off from roofs, roads, and other impermeable surfaces and eventually into nearby waterbodies.
greenhouse gas (GHG)	A gas that traps heat in the atmosphere by absorbing infrared radiation and contributes to the greenhouse effect including carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). For more information see EPA's Overview of Greenhouse Gases..
greenway	A strip of undeveloped land near an urban area, set aside for recreational use or environmental protection.
green stormwater infrastructure	Plants, soil and topography engineered in developed areas to slow down and infiltrate stormwater runoff near where it falls rather than letting it run off onto impermeable surfaces. Street trees and rain gardens are two examples.
heat island effect	Higher temperatures experienced in developed and urban areas compared to rural and undeveloped areas due to heating of manmade surfaces.
hydrologic restoration	Restoration of natural water levels and flows to watershed ecosystems that have been hydrologically altered by humans, such as through damming, ditching, surface and groundwater withdrawals, and creation of impervious surfaces that increase stormwater runoff. Learn more at Prevention and Restoration of Hydrologically Altered Waters | US EPA.
impervious (or impermeable)	The quality of limiting liquids or gases from passing through.
natural and working lands	Forests, woodlands, grasslands, shrubland, wetlands, floodplains and riparian areas,

	rangeland, farmland, coastal areas, working and natural waterways, and greenspaces within built environments (including the urban forest, soil, and street trees in the public right-of-way). Natural and working lands may be managed to support food or timber production for human communities, such as public and private forests, cropland, and pastureland, or managed primarily for their ecosystem services, including wetlands, salt marsh, parks, and nontimbered forests in developed or undeveloped areas.
natural climate solutions	Nature-based strategies that reduce or sequester greenhouse gas emissions while also providing other ecosystem services
nature-based solutions	The Duke Nicholas Institute's Nature-Based Strategies Roadmap defines nature-based solutions as "Actions to conserve, restore or manage ecosystems in ways that help address social, environmental, and economic challenges." The 2024 NC Uniform Floodplain Management Policy defines "nature-based solutions" more narrowly as "sustainable planning, design, environmental management, and engineering practices that incorporate natural features or processes into the built environment to promote adaptation and resilience."
peatland	Terrestrial wetland ecosystems in which waterlogged conditions prevent plant material from fully decomposing.
pocosins	Saturated wetlands of Coastal Plain flats, swales, and Carolina bays, with organic matter accumulation, and with distinctive vegetation characterized by Pond Pine (*Pinus serotina*) and a suite of dense evergreen shrub species. Vegetation structure ranges from woodlands or nearly closed forests to dense shrublands with most of the species shared. These natural communities sequester and store a high volume of carbon per acre above and belowground.
resilience	The capacity of individuals, a community, a business, or the natural environment to prevent,

	withstand, respond to, and recover from a disruption.
restoration	Staff interpreting EO 305 directives regarding conservation, restoration, and tree planting objectives further defined restoration as "the return of an ecosystem to a close approximation of its condition and function prior to disturbance," and "interventions that have taken place after January 1, 2020, that improve habitat quality and ecosystem function of natural and working lands, encouraging natural ecological processes to re-establish and become self-sustaining in the long-term after a period of short-term active management and stewardship." Restoring full previous function of an ecosystem may not be possible, but an ecosystem should be on a path towards self-sustaining natural function.
riparian	The interface between land and a river or stream.
saltwater intrusion	Movement of saline water into near-coastal freshwater aquifers or wetland soil owing to the hydraulic connection between groundwater and seawater.
submerged aquatic vegetation (SAV)	Estuarine or marine habitat characterized by the presence of vascular plants that are rooted in the ground and remain under the surface of the water during all tidal stages, also referred to as seagrass or underwater grass.
tree canopy	The layer of tree leaves, branches, and stems that provide tree cover of the ground when viewed from above.
triple bottom line benefits	Benefits to people, planet, and profit, in contrast to the traditional business approach of solely focusing on the financial bottom line.
watershed	Geographic area that drains all the streams and rainfall to a common outlet such as the outflow of a reservoir, mouth of a bay, or any point along a stream channel.
water supply watershed	Geographic area that drains to a surface waterbody (lake, river, or stream) that provides drinking water supply for people.

wetland mitigation	Under the Clean Water Act, permitted entities that have attempted to avoid or minimize destruction of wetlands may "mitigate" unavoidable destruction of wetlands by restoring, enhancing, or protecting high-quality wetlands within a similar geographic region.

Abbreviations

Abbreviation	Definition
ACC	Atlantic Conservation Coalition
APNEP	Albemarle-Pamlico National Estuary Partnership (hosted by NCDEQ)
CDRZ	Community Disaster Resilience Zones
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DCM	Division of Coastal Management (within NCDEQ)
DLWS	Division of Land and Water Stewardship (within NCDNCR)
DMF	Division of Marine Fisheries (within NCDEQ)
DMS	Division of Mitigation Services (within NCDEQ)
DPR	Division of Parks and Recreation (within NCDNCR)
DWR	Division of Water Resources (within NCDEQ)
ECU	East Carolina University
ENCSL	Eastern North Carolina Sentinel Landscapes Partnership
EO 305	North Carolina Executive Order 305
FDP	Forest Development Program
FEMA	Federal Emergency Management Agency
GHG	greenhouse gas
GS	General Statute
NCCF	North Carolina Coastal Federation
NCDA&CS	North Carolina Department of Agriculture and Consumer Services
NCEM	North Carolina Emergency Management
NCDEQ	North Carolina Department of Environmental Quality
NCDNCR	North Carolina Department of Natural and Cultural Resources
NCDOA	North Carolina Department of Administration
NCFS	North Carolina Forest Service
NCLWF	North Carolina Land and Water Fund
NCWRC	North Carolina Wildlife Resources Commission
NFIP	National Flood Insurance Program
NFWF	National Fish and Wildlife Foundation
NGO	nongovernmental organization
NHP	North Carolina Natural Heritage Program (within NCDNCR)
NOAA	National Oceanic and Atmospheric Administration
NWL(s)	natural and working land(s)
RCCP	Resilient Coastal Communities Program
SLR	sea-level rise
TCF	The Conservation Fund
TNC	The Nature Conservancy
UNCW	UNC Wilmington

USACE	US Army Corps of Engineers
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
U&CF	Urban and Community Forestry (program of NCFS)
WRRI	Water Resources Research Institute (NC)

Executive Summary

Natural and working lands (NWL) constitute the ecosystems, working farms, forests and urban trees, waters, and soil that protect our air and water quality, support our economy and way of life, and buffer communities against hazards such as extreme heat, coastal storms, inland flooding, drought, and wildfires. These ecosystem services are available when natural and working lands are present and functioning. The 2025-2030 Natural and Working Lands Action Plan (also referred to as NWL Action Plan) outlines strategies to help protect and restore North Carolina's natural and working lands as the population continues to grow and natural hazards increase. It will be periodically augmented with updates and progress reports.

This Plan is intended to be used by 1) state, local, and federal government, regional and resilience planners, and NWL policymakers; 2) impact partners such as nonprofit organizations, land use consultants and investors, universities, and corporations; and 3) local communities and public and private landowners/managers.

The 2025-2030 Natural and Working Land Action Plan:

- Defines the need for protecting NWLs and outlines goals.
- Briefly summarizes recent accomplishments to protect NWLs.
- Presents a current snapshot of North Carolina's natural and working lands.
- Recommends actions to meet NWL goals, noting their benefits to people, the planet, and the economy.
- Identifies key actors and participants who will implement recommendations through 2030.
- Provides examples of projects that help accomplish these recommendations.

The 2025-2030 Natural and Working Lands Action Plan builds on the 2020 Natural and Working Lands Action Plan, which was developed by a broad coalition of stakeholders from inside and outside of state government as part of North Carolina's Risk Assessment and Resilience plan. Since the publication of the original NWL Plan in 2020, the NWL community has worked together to accomplish actions recommended in the plan and report on progress and secure grant funding to accomplish others. As these strategies are implemented, they will help to conserve and restore ecosystem services, build resilience, and improve public health and economic opportunities on natural and working lands in North Carolina.

The 2025-2030 NWL Plan also supports Executive Order 305 goals of permanently conserving 1 million new acres of forests and wetlands, restoring 1 million new acres of

forests and wetlands, and planting 1 million new trees in urban areas. In February 2024, EO 305 directed North Carolina Department of Natural and Cultural Resources (NCDNCR) to update the 2020 Natural and Working Lands Action Plan to assess progress toward achieving North Carolina's NWL goals, incorporate new data and recommendations, identify knowledge gaps, and report on resources that limit efforts to protect and restore NWLs. In October 2024, an NCDNCR report summarized progress toward accomplishment of 2020 plan goals. Between February and October 2025, NCDNCR embarked on a full update of the 2020 plan. Staff facilitated regular meetings of a steering committee including 17 state, local, and nonprofit stakeholders key to the original plan's development. Sixty-six additional subject matter experts were interviewed or contributed to drafts of the 2025-2030 Natural and Working Lands Action Plan. All this input resulted in the development of the 2025-2030 recommendations included in the table below. The next NWL report is scheduled to be completed by October 2027.

Table 2: 2025-2030 Natural and Working Lands Action Plan Recommendations

Section	NWL recommendations and actions
2.1	*Natural lands: Planning and technical assistance*
2.1.1	**Use targeted mapping and planning to inform conservation and restoration decisions**
2.1.1.1	Map and inventory wetlands to inform conservation and restoration efforts
2.1.2	**Modernize forest policy and tax incentives**
2.1.2.1	Extend the Conservation Tax Credit and expand public benefits it provides
2.2	*Natural lands: Implementation*
2.2.1	**Conserve natural lands to improve ecosystem and community resilience**
2.2.1.1	Conserve forests and wetlands in flood-prone areas
2.2.1.2	Conserve land for salt marsh and other coastal ecosystem migration inland
2.2.1.3	Increase recurring funding for statewide land conservation
2.2.2	**Restore natural lands to improve ecosystem and community resilience**
2.2.2.1	Expand restoration of public land
2.2.2.2	Expand restoration and reforestation of private land
2.2.2.3	Fund large-scale watershed restoration projects
2.2.2.4	Restore tribal access to natural lands and waters*
2.2.3	**Support partnership approaches to conserving and restoring at-risk ecosystems**
2.2.3.1	Prioritize peatland conservation and restoration
2.2.3.1.1	Conserve and restore peatlands on state-owned and/or large tracts of land

2.2.3.1.2	Engage private landowners in peatland conservation and restoration
2.2.3.2	Continue to dedicate funding to wetland conservation and restoration
2.2.3.3	Partner across sectors to conserve and restore coastal habitats
2.2.3.4	Conserve and restore submerged aquatic vegetation
2.3	*Working lands: Planning and technical assistance*
2.3.1	**Increase agricultural and forest landowner access to technical and financial assistance**
2.3.1.1	Support diverse forest product markets that sustain working forestlands
2.3.1.2	Increase state funding for the Forest Development Cost Share Program
2.3.1.3	Share resources about voluntary forest carbon offset options
2.3.1.4	Expand access to information about agricultural conservation practices
2.3.1.5	Expand access to cost-share funding for controlled drainage infrastructure and other peatland BMPs
2.4	*Working lands: Implementation*
2.4.1	**Support programs that promote working lands' resilience and ecosystem services**
2.4.1.1	Support sustainable management of working forestland
2.4.1.2	Expand implementation of agricultural conservation practices
2.4.1.2.1	Increase funding for Soil and Water Conservation District cost-share programs
2.4.1.3	Preserve working farmland and enhance ecosystem services*
2.4.1.4	Restore natural floodplain conditions that benefit working lands, reduce risk, and improve water quality
2.5	*Developed lands: Planning and technical assistance*
2.5.1	**Promote urban forest assessment, management, and reforestation**
2.5.1.1	Support planning efforts to retain urban forest ecosystem services
2.5.1.1.1	Develop statewide best practices for tree protection, management, and care
2.5.1.1.2	Maintain urban tree lists to recommend trees that will thrive in urban areas
2.5.1.1.3	Use tree canopy cover data to identify opportunities to restore urban forests
2.5.1.2	Standardize tree canopy assessment data
2.5.1.2.1	Compile urban tree canopy assessment GIS data in a state-managed database
2.5.1.3	Increase technical assistance, training, and funding for urban forestry
2.5.1.3.1	Secure sustainable funding for adequate urban and community forestry program staff
2.5.2	**Provide technical assistance and training on nature-based resilience solutions for developed areas**

2.5.2.1	Build local government capacity to address stormwater and flooding impacts*
2.5.2.2	Incentivize local implementation of green stormwater infrastructure
2.5.2.3	Maintain and expand NC Resilience Exchange resources and local training capacity
2.6	*Developed lands: Implementation*
2.6.1	**Promote land management strategies that improve ecosystem and community resilience**
2.6.1.1	Support and expand urban tree planting
2.6.1.2	Encourage best practices for site preparation and soil during development
2.6.1.3	Inform, assist, and fund voluntary property buyouts in high-hazard areas
2.6.1.4	Preserve natural and working lands during infrastructure development*
2.7	*Multiple land uses: Planning and technical assistance*
2.7.1	**Integrate NWL and resilience strategies into planning efforts**
2.7.1.1	Incorporate NWL programs, resources, and recommendations into planning efforts
2.7.1.2	Help local governments integrate hazard resilience into planning documents
2.7.1.3	Support local governments' progression from vulnerability assessments to resilience project implementation
2.7.2	**Provide technical assistance and training on the benefits of NWL strategies**
2.7.2.1	Convey the importance of NWL strategies through public education, training, and communications
2.7.2.2	Provide funding and technical assistance to local governments for conservation planning
2.8	*Multiple land uses: Implementation*
2.8.1	**Use proactive nature-based solutions to increase ecosystem and community resilience**
2.8.1.1	Protect forested land to protect downstream drinking water sources
2.8.1.2	Use prescribed burning to manage forest habitat and reduce wildfire risk*
2.8.1.3	Use nature-based solutions to reduce stormwater and flooding impacts
2.8.1.4	Implement coastal nature-based resilience projects
2.8.1.4.1	Use living shorelines where appropriate to protect coastal ecosystems

*new recommendations in 2025-2030 plan

1 Introduction

1.1 The importance of natural and working lands to North Carolina

North Carolina's natural and working lands include agricultural lands and waters, coastal areas, forests, wetlands, and urban trees and soil. They are an important part of our heritage, our economy, and what makes North Carolina a great place to live and work. They provide food, timber, shade, and give us places to hike, watch birds, hunt, and fish. Moreover, natural and working lands hold parts of our cultural memory – they connect us to people who came before us and the lands they inhabited, and they provide us with a sense of home.

Figure 1: Backwater on the Waccamaw River, photo credit Michael Schafale

Taken together, the agriculture, coastal tourism and recreation, forestry, and fisheries sectors produce more than 20% of North Carolina's gross state product (Walden 2018; Parajuli 2017; NC Sea Grant and Duke Nicholas Institute 2017). Natural and working lands (NWLs), however, provide more than financial value. Natural ecosystems and agricultural and forestry lands provide homes for native plants and animals and sequester carbon in the roots of seagrass, trunks of trees, and wetland soil. Forested watersheds protect drinking water quality. Wetlands, such as peatland pocosins and salt marshes, help mitigate flooding and provide wildlife habitat. Urban forests lessen extreme heat and

improve air quality. Coastal restoration projects can buffer communities from storm surges. Prescribed burning can help lessen the threat of catastrophic wildfires. Conserving, restoring, and managing natural and working lands helps to ensure that they continue to provide these benefits in the future.

1.2 History and purpose of natural and working lands planning

The purpose of this plan is to guide effective action to protect and improve North Carolina's natural and working lands. It includes conservation, restoration, research, planning, and policy strategies to safeguard and restore these spaces and the benefits they provide. This plan is both a tool for communicating the importance of natural and working lands and a library of recommendations on which significant progress could be made by 2030 with adequate staff, funding, and support. It integrates and builds on the input of the natural and working lands sector stakeholders who have been collaborating since 2018.

Implementing recommendations in the 2025-2030 Natural and Working Lands Action Plan will help conserve and enhance natural and working lands for the benefit of all North Carolinians and contribute to North Carolina's goal of carbon neutrality by 2050. Strategies in this plan also align with coastal wetland and forest protection and restoration goals in North Carolina's Priority Climate Action Plan and have been incorporated into NCDEQ's Comprehensive Climate Action Plan. If implemented in full, projects to restore forests and wetlands identified in North Carolina's Priority Climate Action Plan would result in estimated GHG reductions of 20.2 MMT CO_2e in North Carolina between 2025 and 2030.

Initial catalysts for developing the 2020 Natural and Working Lands Action Plan included the development of a statewide greenhouse gas inventory and Governor Roy Cooper's Executive Order 80 in 2018. This EO set a goal of reducing statewide greenhouse gas emissions to 40% below 2005 levels by 2025 and directed NCDEQ to develop a Climate Risk Assessment and Resilience Plan "with the support of cabinet agencies and informed by stakeholder engagement." Originally an appendix of the Risk Assessment and Resilience Plan, the 2020 NWL Action Plan began with NCDEQ convening stakeholder input from across public, private, and nonprofit sectors. This community formed six subcommittees focused on forestry, floodplains and wetlands, pocosins, coastal habitats, agriculture, and urban lands. State staff facilitated input from a steering committee composed of subcommittee leads who guided an 8-month process in 2019 to develop and prioritize NWL recommendations that provide natural climate solutions.

The 2020 NWL Action Plan and associated efforts have led to meaningful progress in advancing the conservation and restoration of NWLs and advancement of natural climate

solutions in North Carolina. In the intervening years, NWL partners have continued to collaborate to develop consensus-based recommendations, secure grants, and implement projects recommended in the 2020 NWL Action Plan. NWL progress reports produced in 2022 and 2024 detail accomplishments in support of 2020 NWL Action Plan recommendations.

A notable outcome of the 2020 NWL Plan is the "Atlantic Conservation Coalition" (ACC), established in 2024 and catalyzed by a $421 million grant from the EPA to fund projects in a four-state region that includes North Carolina, South Carolina, Virginia, and Maryland. The primary goals of the ACC are to 1) achieve meaningful GHG reductions, 2) provide benefits to communities, 3) leverage EPA grant funds to expand climate and community benefits, and 4) develop innovative policies and programs that can be upscaled. The ACC grant funds delivery of natural climate solutions via conservation and restoration projects on natural and working lands, as well as community outreach and research to ensure that carbon storage and sequestration benefits are realized. As of the time of writing, NCDNCR was working with nonprofits, university researchers, and private consulting firms to begin implementing ACC projects. Full implementation of ACC-funded projects would result in an estimated reduction of 3.4 MMT CO_2e by 2030 and 27.7 MMT CO_2e by 2050.

North Carolina's portion of the ACC grant funds the following projects in alignment with NWL Action Plan recommendations:

- Coastal habitat restoration, including natural infrastructure to protect, elevate, and stabilize coastal marshes, and calculate their carbon storage and sequestration benefits.
- Conservation land acquisition in the NC State Park system, to protect land that has high resilience and carbon sequestration potential but is currently threatened.
- Peatland conservation and restoration, led by The Nature Conservancy, to protect these ecosystems that have outsized potential to sequester and store greenhouse gases, and a correspondingly large potential to emit them if damaged or burned.
- Outreach and technical assistance to small forest landowners to implement forestry best management practices, reforest and conserve forestlands, and support land retention.
- Development of a new forestry cost-share program to incentivize tree planting and silvicultural practices.
- An urban tree planting program for small to medium sized cities that lack the capacity to fund urban tree planting on their own.

Additional grant funds will support conservation and restoration planning, mapping, feasibility studies, incorporation of climate data into a statewide ecosystem vulnerability

analysis, and more. Funding for projects will be allocated through 2029, and benefits of projects will be felt for decades. The Duke University Nicholas Institute for Energy, Environment & Sustainability has developed a public dashboard to track ACC implementation progress.

Other notable outcomes since the 2020 NWL Action Plan was published include increased funding for state conservation trust funds, such as the NC Land and Water Fund (NCLWF), the NC Parks and Recreation Trust Fund, and the Agricultural Development and Farmland Preservation Trust Fund (current funding is more than double previous levels). This investment has led to more voluntary protection of natural and working lands across North Carolina.

Figure 2: Protected forestland near Great Smoky Mountain National Park, Michael Schafale

In 2024, Governor Cooper's Executive Order 305 directed NCDNCR to update the NWL Action Plan every three years, incorporating new information that will result in improved outcomes. Continuous improvement of NWL strategic planning supports EO 305's ambitious goals, which include accomplishing the following by 2040:

- Permanently conserving 1 million new acres of forests and wetlands.
- Restoring 1 million new acres of forests and wetlands.
- Planting 1 million new trees in urban areas.

Additional EO 305 provisions aligned with NWL conservation and restoration goals include (but are not limited to) directives to state government to implement a new native plant policy, assess impacts of climate change on vulnerable ecosystems, and map and assess impacts of changing wetland protections. Alignment of the 2025-2030 NWL Action Plan with EO 305 goals is further detailed in Section 1.5.

1.3 How to use this plan

- As a library of major ongoing efforts in NC to conserve and restore natural and working lands, which helps users to identify priorities and remaining gaps. Given the many potential users of this report and the unknowns about future climate impacts, strategies have only loosely been ordered by priority.
- As a starting point for anyone in the NWL sector who is considering a new project, to check this list to see if it or something like it is already being done, and to connect with listed contacts. Readers should consider their own situations and follow the links or contact lead organizations to explore whether a listed example might be replicable in their context.
- As a tool for anyone in the NWL sector to communicate effective NWL protection and restoration strategies when seeking funding or support. Recommendations included in this plan all provide multiple benefits, which may help stretch limited resources of time, funding, and staff.
- As a reference for decision-makers considering funding and personnel needs to ensure that major priorities are included.

At a high level, implementing the strategies included in this plan will help to:

- Build resilience in North Carolina's ecosystems and communities.
- Enhance carbon sequestration and storage on natural and working lands.
- Improve public health and economic opportunities for all North Carolinians.

To guide effective action, under each recommendation, the plan provides:

- Lead organizations, defined as those who already plan, implement, or fund work related to the recommendation, or anticipate doing so by 2030.
- Current or potential partner organizations, defined as those who play a supplemental role in a recommendation's implementation.
- A brief rationale for why the recommendation is important and an overview of the benefits it provides.
- Links to further resources associated with the recommendation.

- Examples of how the recommendation is currently being implemented in North Carolina (for illustration purposes; examples are not comprehensive of all statewide progress).

1.4 Notes on plan development

To develop this update, NCDNCR staff convened a steering committee of 2020 NWL subcommittee chairs and other individuals who actively participated in past plan development. They then interviewed these individuals and other subject matter experts and engaged with workgroups focused on topics including coastal resilience and rare species and habitats. All 2025 steering committee members and interviewees, as well as staff and partners involved in past NWL planning processes, were then invited to review the draft 2025-2030 NWL Action Plan. Those who ultimately contributed are included in below.

Table 3: Individuals who provided input on 2025-2030 NWL Action Plan

Name	Affiliation
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Chris Johnson	NCDEQ, Division of Water Resources – Water Sciences Section
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Emma Hughes	The Nature Conservancy
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Eric Soderholm	The Nature Conservancy
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Grady McCallie	North Carolina Conservation Network
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Guinevere Abernathy	The Conservation Fund
Jacob Boyd	North Carolina Coastal Federation
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John Cox	North Carolina Department of Administration, State Property Office
John Hardin	North Carolina Department of Commerce, Office of Science, Technology & Innovation
Jon Altman	Cape Lookout National Seashore
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Lora Eddy	The Nature Conservancy
Lydia Olander	Duke University Nicholas Institute for Energy, Environment & Sustainability
Mackenzie Todd	NCDEQ, Division of Coastal Management
Marc Recktenwald	NCDEQ, Division of Mitigation Services
Margaux Kerr	North Carolina Coastal Federation
Mark Edwards	North Carolina Department of Administration
Marlena Byrne	NCDEQ, State Resilience Office
Meg Perry	SWCA Environmental Consultants
Michelle Lovejoy	Environmental Defense Fund
Mitch East	NCDNCR, Natural Heritage Program
Misty Franklin	NCDNCR, Natural Heritage Program
Nancy Daly	Wake County
Nicole Goddard	NCDEQ, State Resilience Office
Patrick Guerra	NCDEQ, Division of Mitigation Services
Philip Bell	Coharie Tribe
Rachel Love-Adrick	NCDEQ, Division of Coastal Management
Rania Hassan	Office of Governor Josh Stein
Rebecca Coppa	NCDEQ, Division of Energy, Mineral and Land Resources
Rebecca Ellin	NCDEQ, Division of Coastal Management
Rebecca Sadosky	NCDEQ, Division of Water Resources, Public Water Supply Section
Rich Gannon	NCDEQ, Division of Water Resources – Nonpoint Source Planning Branch
Rick Savage	Carolina Wetlands Association
Rishi Bastakoti	NCDEQ, Division of Water Resources – Nonpoint Source Planning Branch
Robert Bardon	North Carolina State Extension and North Carolina State University
Robin Hoffman	NCDEQ, Division of Water Resources – Nonpoint Source Planning Branch
Sandra Snipes	Town of Vandemere

Sara Ward	NCDNCR, Office of the Secretary
Sarah Spiegler	North Carolina Sea Grant
Scott Pohlman	NCDNCR, Natural Heritage Program
Stacey Feken	NC DEQ, Albemarle-Pamlico National Estuary Partnership
Steve Bevington	NCDNCR, North Carolina Land and Water Fund
Steven Anderson	NCDEQ, Division of Water Resources – Ecosystems Branch
Sylvia Troost	Pew Charitable Trusts
Tancred Miller	NCDEQ, Division of Coastal Management
Tara Nattress	Central Pines Regional Council
Tatyana Ruseva	Appalachian State University
Toby Vinson	NCDEQ, Division of Energy, Minerals, and Land Resources
Whitney Jenkins	NCDEQ, Division of Coastal Management
Will Summer	NCDNCR, Division of Land and Water Stewardship - North Carolina Land and Water Fund

Many more individuals were invited to review the report but either did not respond or did not provide their name associated with their input. Future NWL plan and progress updates will endeavor to solicit further input and examples from individuals and groups who may not have been able to contribute to the 2025-2030 NWL Action Plan. In cases where organizations listed in the 2020 plan could not be reached for input as part of 2025-2030 process, they are carried over as "potential" partners to encourage their continued involvement. Otherwise, all organizations listed as lead or partner organizations in the Plan have specifically volunteered to be listed as such.

All recommendations included in the 2025-2030 NWL Action Plan stemmed from the original 2020 Natural and Working Lands Action Plan, or were identified as new priorities by steering committee members and stakeholders interviewed as part of 2025-2030 Plan development. Steering committee members identified 2020 Plan recommendations on which significant progress had been made since 2020 or could be made by 2030 given funding and leadership support. Additionally, steering committee members and other stakeholders identified new recommendations in response to emerging issues or priorities identified since 2020. Three rounds of steering committee, stakeholder, and leadership review and revision then refined the recommendations ultimately included in this plan, summarized in Table 2 in the Executive Summary.

In the 2025-2030 NWL Plan, some recommendations from the 2020 NWL plan were combined, split, or rephrased based on steering committee input to clarify broad 2020 recommendations, broaden opportunities to implement specific ones, and reduce report length and redundancy. A crosswalk with 2020 recommendations is included in the

Appendix and all are incorporated by reference.

1.5 Executive Order 305 and NWL plan goals

EO 305 sets the following statewide goals to be accomplished by 2040:

- Permanently conserve one million new acres of North Carolina's natural lands, with a special focus on wetlands, as measured from the year 2020.
- Restore or reforest one million new acres of North Carolina's forests and wetlands, as measured from the year 2020.
- Plant one million trees in urban regions of the state as measured from the year 2020.

It also directs cabinet agencies to, "to the fullest extent of their authority under existing law, proactively seek to protect, enhance, and restore North Carolina's natural and working lands including by implementing relevant strategies promoted in the 2020 North Carolina Natural and Working Lands Action Plan".

Methodology is being developed to track progress toward accomplishment of these goals. Interim metrics include FY20-25 statewide land cover change as estimated from geospatial data, actual land acquired and restored by state agencies, and tree planting statistics and estimates reported by NCWRC, NCFS, and the Arbor Day Foundation.

1.5.1 Interim progress tracking on EO 305 conservation goal

Executive Order 305 sets the goal of protecting 1 million new acres of forests and wetlands above the acreage already protected in FY20. Between July 2020 and July 2025, an estimated 219,595 new acres of land were conserved statewide. This brings the total acreage of land and water protected in North Carolina up to 4,418,466, as shown in the table and bar chart below (NC Natural Heritage Program Biotics Database 2025). This amounts to 13.1% of the state, and includes land protected by local, state, federal, and private organizations.

Table 4: Acreage of protected land in each National Land Cover Type July 2020 and 2025, based on NC Natural Heritage Program Biotics Database 2020 and 2025, and Dewitz 2023

Land Cover Type	2020 Acres	2025 Acres	5-year change
Open Water	643,693	655,127	11,434
Developed, Open Space	66,023	69,168	3,146
Developed, Low Intensity	11,987	14,323	2,336
Developed, Medium Intensity	5,904	7,545	1,641

Developed, High Intensity	1,429	1,788	359
Barren Land	16,028	16,158	130
Deciduous Forest	1,141,74	1,196,02	54,281
Evergreen Forest	354,230	373,495	19,265
Mixed Forest	681,921	699,595	17,674
Shrub/Scrub	34,364	38,787	4,424
Herbaceous	34,576	37,456	2,880
Hay/Pasture	40,523	50,782	10,259
Cultivated Crops	46,843	73,578	26,735
Woody Wetlands	994,372	1,052,55	58,181
Emergent Herbaceous Wetlands	125,235	132,085	6,850
TOTAL	**4,198,872**	**4,418,466**	**219,595**

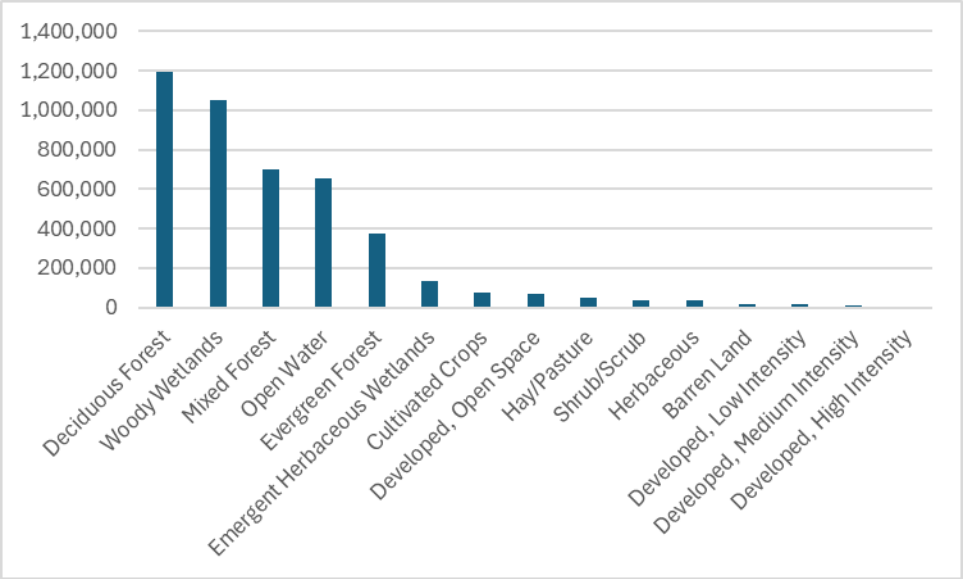

Figure 3: Estimated Acres of Protected Land in Each National Land Cover Category in North Carolina (July 2025)

Change in land protection is a representation of best available information based on reported land transactions from landowners and county parcel data. True change in land protection status may not be immediately reflected in NHP's Managed Areas GIS data due to delays in reporting from landowners and/or representation of land transactions.

Separately, state land acquisition for the purpose of conserving and/or restoring NWLs between July 1, 2020, and June 30, 2025, is summarized in the table below. In FY24-25 alone, state agencies acquired 12,683 acres in natural and working lands using both state

and nonstate funds. These projects represent many years of negotiating with landowners, fundraising, grant management, real estate transactions, and final closing with the State Property Office.

Note that acquisitions shown in this table include only transactions completed with the State Property Office, not projects that were funded but not yet completed. Additionally, this only represents state-protected conservation lands. Nonprofit conservation organizations and local and federal agencies' NWL conservation gains between 2020 and 2025 are not represented in the table due to lack of comprehensive data on these efforts at the time of writing in summer 2025.

Table 5: Land Acquired by the North Carolina State Property Office for Conservation Activities July 1, 2020 – June 30, 2025

Department	Division	New state-protected land FY20-25 (acres)
Agriculture & Consumer Services	Agricultural Development and Farmland Preservation	19,701
Wildlife Resources Commission	Wildlife Resources Commission	19,001
Natural and Cultural Resources	Parks and Recreation	13,674
Natural and Cultural Resources	NC Land and Water Fund	12,632
Agriculture & Consumer Services	NC Forest Service	4,553
Agriculture & Consumer Services	Soil and Water Conservation	2,197
Environmental Quality	Division of Mitigation Services	1,176
Environmental Quality	Division of Coastal Management	640
Agriculture & Consumer Services	Agriculture and Consumer Services	133
Environmental Quality	Environmental Quality General	71
Agriculture	Plant Industry Division	36
	State agency FY20-25 total	**73,813**

State agencies may use different methods of conserving and managing conservation lands. DMS conserves high quality wetlands and places conservation easements on wetland mitigation and riparian buffer mitigation sites. After 7 years' monitoring (in the case of

mitigation wetlands) or 5 years monitoring (in the case of riparian buffers), these sites are transferred to NCDEQ for permanent stewardship.

1.5.2 Interim progress tracking on EO 305 restoration and reforestation goal

The tables and text in this section include measured or estimated acreage of forest, riparian, and/or wetland restoration led by state agencies. Future NWL Action Plans will refine methods of tracking restoration gains to account for forest and wetland restoration conducted by local, federal, nonprofit, and private actors who restore forests and wetlands in North Carolina.

Note that the following accomplishments may overlap with state-purchased conservation lands summarized above, because permanently conserving land to be restored is a best practice and often a necessary first step.

1.5.2.1 Reforestation

From FY20-25, the North Carolina Wildlife Resources Commission restored 5,812 acres of loblolly forest to longleaf pine forest statewide. NCWRC staff report that while these do not constitute "new" restoration acres, these areas should permanently remain longleaf pine forest. Longleaf pine forests currently occupy only 5% of their historic range, making them a priority for restoration (National Fish and Wildlife Foundation 2023). They once covered 90 million acres from Virginia to Texas, including much of North Carolina's Coastal Plain and Piedmont. Essential to North Carolina's historic shipbuilding economy, they were overharvested and much of their range transitioned to farmland or other forest types. Fire suppression also impacted these forests' range. Longleaf pines require fire to maintain a characteristically open savanna understory, home to native grasses and now-rare fauna such as the Red-Cockaded Woodpecker (NCFS 2025a).

Separately, the USDA Forest Service's Forest Inventory Analysis (FIA) program estimated that 108,826 new acres of forest were planted in North Carolina in FY23-24 (Pike et al. 2023). This remains the best estimate for FY24-25 because FIA data collection was discontinued in the summer of 2025. FIA estimates account for 542,855 new acres of forest being planted in North Carolina from FY20 to FY25. Whether these acres remain forested depends on landowners' intended use for reforested land; there is not a guarantee of permanent reforestation on these acres, but, at the present time, they provide resilience and climate benefits.

NCWRC and FIA reforestation estimates should not be summed because of the differences in methods, permanence of restoration gains, and the potential for overlap.

1.5.2.2 Riparian and Wetland Restoration

The table below includes acreage of wetland and/or riparian restoration funded or conducted by state agencies from FY20-25 and in the last fiscal year.

Table 6: FY24-25 State-Funded Wetland and Riparian Restoration

Department	Program	Restoration Subtype (if applicable)	Acres 7/1/2020 - 6/30/2025	Acres 7/1/24 - 6/30/25	Permanence
Environmental Quality	Division of Mitigation Services	Wetland or riparian restoration	479	116	Permanent, by conservation easement; after 5 years' monitoring (for wetlands) or 7 years (for buffers), land is transferred to NCDEQ for stewardship
Natural and Cultural Resources	North Carolina Land and Water Fund (Restoration Program)	Wetland or riparian restoration	850	110	Permanent, typically by conservation easement
Environmental Quality	Water Resources Development Grant*	Riparian restoration	627	19	10- or 15-year maintenance agreement on EQIP projects, otherwise no conservation agreement required
Environmental Quality	Section 319 Nonpoint Source Grant*	Wetland or riparian restoration	67	3	Varies; no conservation agreement required
		Total	2,023	248	Varies by program

*Wetland and forest restoration are only one component of WRDG and 319 grant program missions.

1.5.3 Interim progress tracking on EO 305 urban tree planting goal

The Arbor Day Foundation's Tree City USA program compiles municipal reports of the numbers of trees they plant annually. While these are likely undercounts, as they do not include county-, state- or privately company-led tree planting projects within municipal boundaries, NCFS staff reported that these were the best available urban tree planting estimates as of summer 2025. Developing a more comprehensive estimate would require further coordination and a survey effort beyond current staff capacity.

Table 7: Urban Tree Planting FY20-25

Fiscal year	Urban trees planted
2020-2021	9,787
2021-2022	13,412
2022-2023	12,032
2023-2024	10,995
2024-2025	9,271
Total FY20-25	**55,417**

2 Recommendations

Recommended methods of protecting and restoring natural and working lands outlined below are priorities to implement by 2030 provided there is adequate capacity and funding. Recommendations are separated by those specific to natural, working, or developed lands, and those applicable to more than one of these land use types. Each recommendation lists examples of how it has been implemented.

2.1 Natural lands: Planning and technical assistance

This section outlines tools and methods to inform and expand proactive planning to protect ecosystems as North Carolina continues to be among the fastest-growing states in the nation (NCWRC 2023).

2.1.1 Use targeted mapping and planning to inform conservation and restoration decisions

2.1.1.1 Map and inventory wetlands to inform conservation and restoration efforts

Description: Sea level rise and saltwater intrusion destroy peatlands and can change the character of other wetlands. Mapping and field inventories can help researchers better identify and prioritize vulnerable wetlands that require protection (NCDEQ 2020). They can also show how wetland extent and character have changed over time and provide data that help planners determine adaptation strategies. As resources allow, scenario-based modeling outlined in the 2020 Natural and Working Lands Action Plan can be used to further guide spatially explicit prioritization and evaluate potential interventions.

Current leads: NCDEQ - APNEP and Division of Water Resources (DWR; Ecosystems Branch), NCDNCR - NHP, Duke University and associated Nicholas Institute for Energy, Environment & Sustainability, and the Carolina Wetlands Association.

Current and potential partners: NCWRC, The Nature Conservancy (TNC), local drainage districts, the US Fish and Wildlife Service (USFWS), the United States Department of Defense, the Southeast Conservation Adaptation Strategy (SECAS), NC State University, East Carolina University, and landowners affected by saltwater intrusion and sea level rise.

Examples include (but are not limited to):

With support from APNEP, Duke is currently conducting aerial drone surveys of peatlands across the APNEP region. Knowing the location and characteristics of peatlands is an important first step to prioritize areas for hydrologic restoration. Drone surveys will also be used to improve ditch mapping across the coastal plain. As part of the project, Duke staff will conduct a saltwater intrusion vulnerability assessment to identify where ditches speed

up saltwater intrusion into low-lying coastal plain habitats, including tidal cypress-gum swamps and freshwater marshes as well as peatlands (K. Warnell, pers. comm. 2025). This project will provide data that can also help inform research and management decisions on freshwater wetlands and agricultural land related to saltwater intrusion.

APNEP also continues to facilitate the acquisition of high-resolution land cover data from NOAA's Coastal Change Analysis Program on behalf of several NCDEQ divisions and state agency partners in Virginia and South Carolina. Among other deliverables expected in 2026, this effort will involve mapping high and low salt marsh in North Carolina's 20 coastal counties, which will inform decision support tools and actions in this NWL plan, APNEP's 2025 Comprehensive Conservation and Management Plan, NC Coastal Habitat Protection Plan, and EO 305. APNEP has also partnered with NC State's Center for Geospatial Analytics to develop a tool for long-term estuarine spatial planning assessments and wetland prioritization.

Additionally, NCDEQ – DWR's Ecosystems Branch secured funding to Gauge Accuracy of Wetland Land Cover Mapping in the NC Mountains and will be ground-truthing their wetlands model between 2026 and 2027.

Additionally, a wide range of spatial planning and decision support tools inform statewide planning and implementation efforts. These tools can help practitioners leverage limited resources and make evidence-based decisions to preserve NWLs and catalyze natural climate solutions. For instance, NCWRC uses the NC Wildlife Action Plan and associated GIS tools to prioritize conservation projects that support species of greatest conservation need. USFWS and NCWRC have used these tools to design wildlife crossing structures on US 64 in the Alligator River National Wildlife Refuge in Dare County to reduce wildlife-vehicle collisions. Wildlife Action Plan tools also informed NCWRC, TNC, and partners' work to protect species of greatest conservation need while restoring peatland at Holly Shelter Game Lands.

Many other organizations have created tools for specific geographies or planning processes; some examples are listed below.

- NCNHP's Conservation Planning Tool maps and data display the conservation significance of biodiversity habitat, open space, agricultural and forestlands to help local, state, regional and nonprofit partners make decisions about conservation planning and funding.
- NCFS' North Carolina Forest Action Plan and associated GIS data inform forestry-related management decisions.

- TNC's Resilient Land Mapping Tool and Southeast Conservation Adaptation Strategy resources are a few of many similar resources.
- The Nicholas Institute's NC Conservation Prioritization Tool allows users to prioritize areas for conservation by HUC-12 subwatershed, and their Conservation Benefits Calculator estimates conservation benefits for user-generated areas.
- Resources aggregated by Duke's Nicholas Institute like their searchable database of over 400 tools for practitioners implementing nature-based solutions to challenges like coastal erosion, stormwater management, and wildfire risk, created as part of their Nature-Based Solutions Roadmap project.

2.1.2 Modernize forest policy and tax incentives

2.1.2.1 Extend the Conservation Tax Credit and expand eligible public benefits

Description: Financial incentives can help increase the scope of land conservation, and North Carolina's conservation tax credit has historically provided an important incentive to conserve forests, wetlands, coastal habitats, and other ecosystems. Between 1983 and 2013, every dollar of tax credit promoted $6 worth of land conservation (NCNHP, N.D.(a)).

The conservation tax credit reduces landowners' tax burden based on the value of property interests they donate to a qualified recipient that is certified for one or more legislatively defined public benefits (learn more from the FAQ page). The eligible land uses have varied over time and currently include farmland, forestland, fish and wildlife conservation areas, military buffers, historic landscapes, public trails access, and a specific category of floodplain protection related to natural disaster declarations (N.C.G.S. 105-130.34, 2025). North Carolina's conservation tax credit has recently been amended to include both fee simple donations and conservation easement donations. These changes will help expand the scope of conservation and restoration and expand recreational access.

Land conservation and additional benefits for the people of North Carolina could be further incentivized by expanding eligible land uses to include public beach access or use, public access to public waters, watershed protection, and conservation of one of several specific categories of land: natural areas as defined in statute, wild or scenic river areas, areas susceptible to the effects of sea level rise, and predominantly natural parkland. Additional changes that would expand land conservation opportunities could include removing the $5 million cap and extending or removing the 2-year program sunset.

Current leads: NCDNCR – Division of Land and Water Stewardship (DLWS).

Current and potential partners: TNC, The Conservation Fund (TCF), accredited North Carolina land trusts, the ECU Coastal Studies Institute, Duke University Marine Lab, East Carolina University, NC State Center for Marine Sciences and Technology, UNC-Institute for Marine Sciences, and UNC Wilmington (UNCW).

2.2 Natural lands: Implementation

Recommendations to enhance North Carolina's natural lands have been grouped by conservation, restoration, and combined approaches. Ongoing cross-sectoral partnerships and funding will sustain and grow the impact of these strategies beyond the time horizon of this plan.

2.2.1 Conserve natural lands to improve ecosystem and community resilience

North Carolina has one of the largest estuarine systems in the United States and forests cover more than 60% of the state, offsetting approximately 25% of statewide gross GHG emissions (NCDEQ 2024). Protecting North Carolina's natural lands improves fish and wildlife habitat, provides green spaces for recreation, and helps make communities more resilient to natural hazards such as extreme heat, flooding and wildfire.

2.2.1.1 Conserve forests and wetlands in flood-prone areas

Description: Conserving forests and wetlands in flood-prone areas helps to reduce impacts of flooding, improve water and air quality, and protect wildlife habitat. Southeastern rivers and streams are hotspots for aquatic biodiversity, containing "nearly two thirds of US fish species, over 90% of US mussel species and almost half of the world's crayfish species," (Elkins et al. 2019). Forest and wetland conservation preserves habitat that these aquatic species require to grow, mature, and reproduce.

Current leads: NCDNCR – NCLWF, Parks and Recreation Trust Fund.

Current and potential partners: NCWRC, North Carolina Forest Service (NCFS), Conserving Carolina and other accredited land trusts throughout the state.

Examples include (but are not limited to):

In 2017, funding from the NCLWF enabled the Foothills Conservancy and Conservation Trust for North Carolina to work with the Wildacres Retreat Center to protect 1,076 acres of forested land in McDowell County between the Pisgah National Forest and the Blue Ridge Parkway. The NCLWF and Conservation Trust for North Carolina both hold conservation easements that permanently protect this property. Among other benefits, protection of this large, forested area in the headwaters of the Catawba River watershed helps to improve water quality there and in downstream areas for people, fish, and wildlife.

At King's Bridge Wildlife Conservation Area in Mills River, the North Carolina Wildlife Resources Commission worked with Conserving Carolina to protect and subsequently restore the hydrology of a portion of the floodplain of the French Broad River, including creating a backwater slough to support muskellunge habitat. The site is currently open to the public for fishing and birdwatching. During Hurricane Helene the restored floodplain stored approximately 475 million gallons of water, keeping water from moving downstream during the hurricane (Lane 2025).

2.2.1.2 Conserve land for salt marsh and other coastal ecosystem migration inland

Description: Salt marshes improve water quality, help reduce coastal flood risk, provide important nursery habitat for fish and shellfish, and sequester and store significant greenhouse gases. They also provide habitat for the Eastern Black Rail, a threatened marsh bird. However, sea level rise along North Carolina's coast is increasingly inundating salt marshes, threatening these benefits.

Figure 4: Salt marsh at Core Banks, credit Michael Schafale

Other coastal ecosystems are also vulnerable to sea level rise; for instance, saltwater intrusion turns freshwater forests into "ghost forests." North Carolina is projected to lose 92,000 acres of coastal marsh and 7,300 acres of seagrass to sea level rise by 2050. Sea

level rise is also projected to convert more than 350,000 acres of coastal uplands (including agriculture and forest land) to coastal wetlands or open water by 2050. Habitat changes are projected to cause the North Carolina coastal zone to transition from a net carbon sink to a net carbon source in the late 2020s, resulting in the emission of 4.4 million metric tons CO2e between 2025 and 2050 (Warnell et al. 2022).

Conserving existing uplands for salt marshes to migrate inland as sea levels rise and inundate them can help losses of marshes and their ecosystem services (Warnell et al. 2022). NC's 2024 Salt Marsh Action Plan details a five-year strategy to protect and restore salt marsh migration corridors. Recommended actions include:

- Focusing agricultural farmland easements within marsh migration areas to avoid their urbanization.
- Concentrating NRCS' wetland protection and enhancement programs to prioritize marsh migration areas.
- Coordinating with land management agencies to align their policies and strategies with marsh migration needs.
- Partnering with NC Department of Transportation, federal Departments of Defense and Agriculture and other agencies to obtain resilience funding and align infrastructure planning with marsh migration goals.

Figure 5: Salt marsh seen through trees, credit Michael Schafale

State agencies have also developed maps of potential salt marsh migration corridors as part of EO 305 implementation, and DCM's Coastal and Estuarine Land Conservation Plan identifies marsh migration corridors designated in the 2024 SMAP as priorities for conservation funding.

Current leads: NCDNCR - NCLWF, North Carolina Coastal Federation (NCCF).

Current and potential partners: NCDEQ – Division of Coastal Management's NC Coastal Reserve and Coastal and Estuarine Research Reserve, APNEP, NCWRC, North Carolina Sea Grant, NCDNCR - Division of Parks and Recreation, TNC, South Atlantic Salt Marsh Initiative (SASMI), Audubon North Carolina, Pew Charitable Trusts, Eastern North Carolina Sentinel Landscapes Partnership (ENCSLP), NC Coastal Land Trust and other accredited local land trusts, coastal local governments, NC Regional Councils of Government, the USDA Natural Resources Conservation Service (NRCS), USFWS, the National Park Service (NPS), National Estuarine Research Reserves (NERRs), National Fish and Wildlife Foundation (NFWF), NOAA, Duke University Marine Lab, the ECU Coastal Studies Institute, NC State Center for Marine Sciences and Technology, UNC-Institute for Marine Sciences, UNCW, and corporations with climate goals.

Examples include (but are not limited to):

In 2008, a project through the Coastal and Estuarine Conservation Program to protect 6,449 acres of the Chowan Swamp in Gates County, including large swaths of forested wetlands, stream buffer, and mixed forest habitats; 14 miles of river and stream frontage; and a direct connection to the existing 14,000-acre Chowan Swamp Game Land (Love-Adrick, pers. comm.) This project and more recent efforts align with strategies recommended in DCM's Coastal and Estuarine Land Conservation Plan and North Carolina's 2024 SMAP.

2.2.1.3 Increase recurring funding for statewide land conservation

Description: Adequate funding for land conservation is essential to conserving North Carolina's forests, wetlands, grasslands, coastlines, and other natural communities. Several state conservation funds already provide essential grants to local and nonprofit partners to implement this work on the ground. For instance, the North Carolina Land and Water Fund provides a principal funding source for conservation organizations such as accredited land trusts to protect natural lands. Increasing funding for NCLWF would directly help to conserve forests, floodplains, and other natural lands. (Any NCLWF funding increases may require additional staff to administer funds, steward protected properties and conduct legal transactions.)

Similarly, the Parks and Recreation Trust Fund funds local park and beach access projects statewide, and the Agricultural Development and Farmland Preservation Trust Fund helps preserve working family farms, further detailed in section 2.4.1.1.

Current leads: NCDNCR – NCLWF and other state conservation funds.

Current and potential partners: NCFS, NCDNCR - DPR, NCWRC, NCDEQ - Flood Resiliency Blueprint Program, and NCDEQ - Division of Coastal Management (DCM – NC Coastal Reserve and Coastal and Estuarine Land Conservation Program).

Examples include (but are not limited to):

Since its inception in 1996, NCLWF funding has enabled the conservation of more than 500,000 acres of land and the conservation or restoration of more than 2,000 miles of streams and rivers (NCLWF N.D.). Project sites and descriptions can be viewed on NCLWF's website.

2.2.2 Restore natural lands to improve ecosystem and community resilience

Restoring natural lands provides many benefits, helping to make local communities more resilient to natural hazards, improving fish and wildlife habitat, and reducing net GHG emissions. Community-led restoration projects also foster a sense of cultural reconnection to local lands and waters.

Different organizations may have different principal goals for the restoration projects they implement. The recommendations below include high-level state restoration priorities through 2030, in partnership with other government, nonprofit, and private sector partners. More detailed recommendations are further developed in section 2.2.3.

2.2.2.1 Expand restoration and reforestation of public land

Description: Restoration and reforestation of public lands can provide opportunities for long-term conservation, research, recreation, and/or public education (NCDEQ 2020). Reforestation has significant GHG benefits. EO 305 sets the goal of reforesting one million acres of land; doing this through a combination of active planting, land management, and natural regeneration would sequester approximately 3.4 million metric tons CO2e each year (NCDEQ 2023). Ongoing funding will help state agencies such as the NCLWF, NCWRC, NCFS and DMS expand the restoration and reforestation work that they currently do in partnership with local governments, nonprofits, and federal agencies across North Carolina.

Current leads: NCDNCR – NCLWF, NCWRC, NCDA&CS Plant Conservation Program, NCFS.

Current and potential partners: NCDNCR – Division of Parks and Recreation, NCDEQ – DMS and DCM (NC Coastal Reserve), TNC, TCF, accredited land trusts, local government parks and open space planning departments, municipal water supply watershed managers, USFS, NPS, and USFWS.

Examples include (but are not limited to):

As of fall 2025, NCWRC and TNC were finalizing a project to restore more than 6,000 acres of previously ditched and drained peatlands on the Angola Bay Game Lands in Pender County. Funding was provided by NCLWF and others to restore pre-drainage groundwater levels and plant Atlantic White Cedar and other pocosin vegetation. A similar, larger project is in the initial stages of design and pre-restoration monitoring at the nearby Holly Shelter

Game Land, which was previously severely damaged by fire.

Figure 6: Restored peatland (foreground) and conserved peatland (background) at Angola Bay Game Land, credit Margaret Fields

2.2.2.2 Expand restoration and reforestation of private land

Description: Over 80% of North Carolina's 18.6 million acres of forestland is privately owned (NC State Extension 2023a), making restoration and reforestation of private land as essential as public land. State agencies, accredited land trusts and other conservation organizations work to restore forests, wetlands, and wildlife habitat statewide. Funding for these organizations to protect and manage reforested land is essential to ensure that restoration benefits persist.

Current leads: NCFS and NCDNCR – NCLWF.

Current and potential partners: NCWRC Private Lands Program, TNC, accredited land trusts, local governments, tribal nations, USFWS, and the USDA – Forest Legacy Program.

Examples include (but are not limited to):

In 2024, 6,538 acres of longleaf pine forest were restored on private lands in North Carolina, in addition to 939 acres on public lands, according to the America's Longleaf Partnership 2024 Accomplishment Report. Longleaf pine forests use less water than loblolly forests, are resilient to drought and fire, and provide habitat for rare species adapted to these ecosystems.

In 2023, the NC Coastal Federation and Coastal Land Trust partnered to acquire and restore over 3,000 acres of forest and floodplains on the Newport River in Carteret County. An additional 1,400 acres were secured with assistance from the General Assembly and the remaining acreage is pending acquisition.

Through its Wildlife Habitat Incentive Program, the NRCS provides cost-share funding for landowners to enter into agreements to protect fish and wildlife habitat on private land.

NCFS funds restoration and reforestation of privately-owned working forestland through their Forest Development Program, which will be augmented by ACC funding between 2025 and 2030.

2.2.2.3 Fund large-scale watershed restoration projects

Description: Large-scale watershed restoration efforts can improve downstream water quality, wildlife habitat connectivity, and reduce flooding risk. Well-planned projects typically target the root cause of watershed ecosystem degradation – for example, restoring the natural hydrology of drained coastal freshwater wetlands to help reduce nutrient loading to estuaries downstream. As with any type of restoration, watershed restoration practitioners must also consider community needs, land use, and other social factors in addition to climate, species, and hydrologic context and goals (Garcia 2023).

Current leads: NCWRC and TNC.

Current and potential partners: NCDEQ - Flood Resiliency Blueprint Program, DWR, DCM (Coastal Reserve), DMF (Habitat Enhancement), APNEP, North Carolina Coastal Federation (NCCF), EDF, American Rivers, Pew Charitable Trust, Conserving Carolina and accredited land trusts statewide, USFWS, NPS, NERRs, NFWF, and NOAA.

Examples include (but are not limited to):

Conserving Carolina's floodplain restoration projects in the French Broad River watershed have reduced flooding impacts and improved biodiversity and water quality there. This PBS article and video further detail the benefits of floodplain restoration in the area.

The NC Coastal Federation and federal and local partners in Hyde County have worked together for over 10 years to assess and remediate water quality issues in the Lake Mattamuskeet watershed. Most recently, in project partners were awarded a 2025 NRCS Regional Conservation Partnership Program (RCPP) grant to conduct wetland restoration, drainage management, and living shorelines projects to conserve and restore the Lake Mattamuskeet watershed.

APNEP and DCM's Coastal Reserve program have worked with federal, state, and local partners to engage communities in the Scuppernong Water Management Study region regarding flooding and water management concerns. Funding from the NCDEQ Division of Water Resources and NOAA's Digital Coast supported the first phase of this effort, profiled as a "Thoughtful Community Engagement Strategy for Watershed Management" to implement study recommendations.

The Nature Conservancy and APNEP have conducted several projects to identify and remove barriers to fish passage that benefit river herring migration in the Roanoke River basin. Additionally, TNC's Sustainable Rivers Program involves partnering with the US Army Corps of Engineers to manage Cape Fear River flows, enabling fish to migrate between fresh and salt waters to complete their life cycles (USACE 2017).

In 2025, North Carolina Flood Resiliency Blueprint work to reduce flooding was funded in the Neuse, Tar-Pamlico, White Oak, Cape Fear, Lumber, and French Broad River Basins.

2.2.2.4 Restore tribal access to natural lands and waters

Description: Rivers are more than just waterways; they are spiritual homelands for tribal nations in North Carolina. Restoring tribal access can help foster cultural reconnection and watershed restoration. For instance, the Coharie Tribe's website describes how "a primary objective of the Great Coharie River Initiative is to allow elders an opportunity to return to their place of sacred memories and provide today's youth with similar experiences."

Current leads: All state-recognized tribes and the Eastern Band of Cherokee Indians, NC Commission of Indian Affairs, and the NC American Indian Heritage Commission.

Current and potential partners: Varies regionally, including APNEP, land trusts and conservation organizations such as the Sierra Club, TNC, TCF, Environmental Defense Fund, Carolina Wetlands Association, and public and private landowners.

Examples include (but are not limited to):

Since 2015, volunteers from the Coharie Tribe and other locals have worked to make the Great Coharie River more accessible to the local community. Today, tribal environmental

leaders describe how they take 400-600 people on river tours each year, and how this project has been a source of healing and connection for all who have lived, worked or paddled on the Great Coharie River (P. Bell., pers. comm. 2025). Grant funding has also enabled 1.5 staff to explore how the Coharie Tribe can engage in broader environmental work, such as how to address invasive alligator weed (K. Bell, pers. comm. 2025).

APNEP's Tribal Coastal Resilience Connections (TCRC) team is working to help develop cross-sector, inter-Tribal partnerships as recommended in their 2023 Phase I Report, TCRC webpage, and the 2024 NWL Progress Report Appendix. The latter recommends actions including working with tribal communities, the Governor's office, and the NC Commission of Indian Affairs to consider policies that encourage co-stewardship, co-management, and recovery conservation frameworks among agencies and tribal nations and communities. The article "Rooted in the Land, Ready for the Future" provides further context, recommendations and examples.

The APNEP TCRC team partnered with Virginia's Department of Conservation and Recreation on a project to acquire 1,900 acres of contiguous forest in the Chowan watershed, which will be registered as a VA Natural Preserve Area. Ultimately, this project seeks to promote resilience, biodiversity conservation, and public access in the Chowan watershed in both Virginia and North Carolina. As part of the project, APNEP will also research and map the area's Indigenous history, assist with engagement of Tribal communities, and facilitate development of co-stewardship and co-management protocols for the site.

2.2.3 Support partnership approaches to conserving and restoring at-risk ecosystems

The recommendations in this section focus on at-risk ecosystems threatened by a combination of natural hazards, past land use and land use change, and/or changing state or federal protections. All would benefit from conservation and subsequent restoration.

2.2.3.1 Prioritize peatland conservation and restoration

North Carolina's Albemarle-Pamlico Peninsula has more peatland pocosins than anywhere else in the US (NCDEQ 2020). Pocosins are "naturally occurring, freshwater, shrub-dominated wetlands of the Southeastern Coastal Plain with deep, acidic, sandy, peat soils" that take thousands of years to build up (NCNHP, N.D.(c)).

Peatland pocosins covered 2.25 million acres in the 1960s, but due to ditching and draining only 700,000 acres remain. Draining makes them vulnerable to severe fires that rapidly release tons of CO_2, converting them from carbon sinks to carbon sources. Conserving and hydrologically restoring peatland wetlands is an essential opportunity to prevent soil loss and catastrophic wildfire that can endanger lives and property, release extensive GHGs, and cause land subsidence (NCDEQ 2020).

2.2.3.1.1 Conserve and restore peatlands on state-owned and/or large tracts of land

Description: Conservation and restoration of peatlands can maintain or enhance these lands' ability to sequester carbon, improve wildlife habitat, and help reduce flood and fire risk. In North Carolina's Coastal Plain, drainage of peatlands has made their deep soils highly flammable. Severe fires can burn their dry, deep soil for months and become hard to control, presenting a hazard to nearby communities and releasing extensive CO2.

Where peatlands have been altered by past land management, simple solutions can sometimes have outsize effects. "Rewetting" peatlands by installing water control structures in drainage ditches that are no longer in use helps retain water, allowing them to recover and rebuild soil. This "hydrologic restoration" also helps prevent catastrophic wildfires. State agencies including DNCR (NCLWF) and NCWRC work with TNC and other organizations to restore publicly owned peatlands and dedicate additional funds toward the conservation of new large-scale peatlands available for purchase.

Figure 7: TNC & WRC staff monitor water levels at new water control structures in restored peatlands at Angola Bay Game Land, credit Margaret Fields

Figure 8: New weirs help retain precipitation and restore water levels previously drained by ditches in peatlands at Angola Bay Game Land, credit Margaret Fields

Current leads: NCDNCR – NCLWF and Division of Parks and Recreation, NCWRC, and TNC.

Current and potential partners: NCDEQ – DCM (NC Coastal Reserve) and APNEP, NCCF, accredited land trusts, USFWS, engineering firms, and corporations with climate goals.

Examples include (but are not limited to):

As of fall 2025, The Nature Conservancy was working with state and federal agencies and other partners to purchase large tracts of peatlands for conservation and restoration. Ultimately, as part of ACC grant-funded efforts from 2025 to 2030, they plan to protect and restore approximately 30,000 acres of peatlands across NC and VA. TNC's peatland conservation strategy in NC prioritizes conserving "resilient and connected networks" of large-scale peatlands (their Resilient Land Mapping Tool provides more information.) TNC's ACC-funded work will also include monitoring and assessing carbon outcomes via peer-reviewed carbon sequestration accounting methods.

2.2.3.1.2 Engage private landowners in peatland conservation and restoration

Description: At least 70% of North Carolina's peatlands have been drained, and up to 31% of mapped peatlands in North Carolina may be privately owned (NWL Action Plan 2020). Conservation and restoration of private peatlands is an essential component of an overall peatland conservation and restoration strategy.

Current leads: NCDNCR – NHP, NCWRC, NCDEQ – DWR (Water Sciences Section, Ecosystems Branch), and TNC.

Current and potential partners: NCDA&CS Division of Soil and Water Conservation, NCDEQ – APNEP, Carolina Wetlands Association, Soil and Water Conservation Districts, NCSU Cooperative Extension, and private peatland landowners.

Examples include (but are not limited to):

As of summer 2025, as part of ACC grant-funded work, TNC was working to purchase and restore peatlands on private lands.

In 2025, APNEP contracted NCNHP biologists to inventory privately-owned peatlands in the Albemarle-Pamlico region. Of 330 landowners invited to participate in the study, 40 granted permission for biologists to survey 64 parcels totaling 20,387 acres (52 tracts had been surveyed as of fall 2025). Study results will be released in a 2026 report to help guide

future peatland conservation and restoration efforts (M. Franklin, pers. comm. 2025).

2.2.3.2 Continue to dedicate funding for wetland conservation and restoration

Description: North Carolina's forested floodplains and woody wetlands store approximately 2.1 billion MT CO2e and sequester 10 MMT CO2e each year (NCDEQ 2020). Wetlands also help improve water quality, store floodwaters, provide habitats for a wide variety of plants and animals, and provide areas for outdoor recreation.

Voluntary efforts to protect isolated wetlands have gained heighted importance since SL-2023-63 removed statutory protection for these ecosystems (NCCF 2025). Expanding and leveraging state, local, federal, and private funding will help enable the continued conservation and restoration of North Carolina's wetlands and the important services they provide. For instance, as of summer 2025, NCDWR staff were updating North Carolina's Wetland Program Plan. This has historically helped NCDEQ and partners successfully win Wetland Program Development Grants from the US EPA (S. Anderson, pers. comm. 2025).

Current leads: NCDNCR – NCLWF.

Current and potential partners: NCDEQ – DMS and DWR (Water Sciences Section, Ecosystems Branch), NCFS, NCWRC, Carolina Wetlands Association, TNC, TCF, NC Conservation Network, NCCF, SASMI, Pew Charitable Trusts, accredited land trusts, Nicholas Institute at Duke University, and corporations with climate goals.

Examples include (but are not limited to):

A 2021 NCLWF grant supported stabilizing an area of the French Broad River and its tributary Little Willow Creek and enhancing 15 acres of adjacent bog wetland. The site's streambanks had been eroded and native plants removed due to prior use as a golf course. The project restored streambanks and wetlands, replanted riparian areas with native vegetation, and created breeding habitat for the muskellege ("musky") fish.

Figure 9: Slough and musky monitoring station, credit Damon Hearne

Between 2025 and 2030, ACC grant funding will allow the North Carolina Coastal Federation (NCCF) and partners to identify and restore 131 acres for salt marshes to migrate inland as sea levels rise and flood their current coastal sites. The North Carolina Coastal Federation's NC Salt Marsh Action Plan and the South Atlantic Salt Marsh Initiative (SASMI)'s multi-state salt marsh restoration plan will be used to prioritize sites and guide restoration efforts.

Additionally, DMS has for two decades collaborated with NCDNCR's Division of Parks and Recreation, land conservation groups, and local governments to conserve and restore streams, wetlands, and riparian buffers through DMS' stream and wetland mitigation program.

2.2.3.3 Partner across sectors to conserve and restore coastal habitats

Description: A recent study on the economic value of wetlands protecting the Atlantic and Gulf coasts estimated that one square mile of coastal wetland in North Carolina provided more than $2.5 million of storm protection (Sun et al. 2020). Partnerships extend limited resources to restore coastal ecosystems will become more important as hurricane and other natural hazard impacts increase.

Current lead: NCDNCR – NCLWF.

Current and potential partners: NCDEQ – DMS, DCM, DMF (Habitat Enhancement), and APNEP, NCWRC, NC Department of Military and Veterans Affairs, NC Sea Grant, SECAS, NCCF, the Southeast Regional Partnership for Planning and Sustainability (SERPPAS), TNC, TCF, ENCSLP, American Rivers, NC Wildlife Federation, Carolina Wetlands Association, Sound Rivers, Pew Charitable Trusts, Audubon North Carolina, Currituck Sound Coalition,

Onslow Bight Partnership, Cape Fear Partnership, local governments, NC Regional Councils of Government, State Ports, USFWS, NPS, NERRs, NFWF, NOAA, Duke University Marine Lab, the ECU Coastal Studies Institute, NC State Center for Marine Sciences and Technology, UNC-Institute for Marine Sciences, UNCW, and corporations with climate goals.

Examples include (but are not limited to):

SERPPAS is a partnership among leaders from the Department of Defense and the military services, six states (AL, FL, GA, MS, NC and SC), and the federal natural resource, wildlife, ocean, and working lands agencies in the Southeast working together to identify where the interests of military readiness, conservation, working lands, and communities overlap, depend on each other, are incompatible, or are complementary. Focus areas include increasing coastal resilience and adaptation and implementing prescribed fire to reduce risk at military installations while restoring species and habitats.

A large network of restoration practitioners collaborates to prioritize and implement salt marsh restoration actions outlined in North Carolina's 2024 Salt Marsh Action Plan. The network includes the North Carolina Salt Marsh Steering Committee, led by the North Carolina Coastal Federation in coordination with the South Atlantic Salt Marsh Initiative (SASMI). The SASMI coalition includes a regional network of more than 350 partners from local, state, and federal stakeholders from universities, governmental agencies, communities, and nongovernmental organizations across North Carolina, South Carolina, Georgia, and Florida.

A broad team of Duke University researchers have worked to study impacts of saltwater intrusion and sea level rise through the Saltwater Intrusion Research Collaborative Network.

2.2.3.4 Conserve and restore submerged aquatic vegetation

Description: Underwater meadows of "submerged aquatic vegetation" (SAV) improve water quality and provide essential nursery habitat for commercially important fish and the small invertebrates that they eat (Sutherland 2021). SAV also absorbs excess nutrients, produces oxygen, and reduces erosion by holding sediment in place and decreasing wave energy along coastlines (APNEP, N.D.). The North Carolina Coastal Habitat Greenhouse Gas Inventory estimated that the state's approximately 86,412 acres of SAV sequestered 55,140 metric tons of carbon dioxide equivalent (2023).

SAV declines in North Carolina waters threaten these ecosystem services. Adopting water clarity standards can help to preserve the clear water that SAV requires to photosynthesize and grow. Adopting a numeric water clarity standard for SAV waterbodies as defined in Table 4.5 and Figure 4.1 of the 2021 NC Coastal Habitat Protection Plan will help complement watershed actions such as nutrient and sediment reduction, wastewater upgrades, stormwater retrofits, coastal development standards, and riparian buffers. In addition, as recommended in the 2024 NC Salt Marsh Action Plan, projects to protect salt marsh from stormwater runoff and pollution can be designed to protect surrounding ecosystems such as SAV beds and oyster reefs.

Current leads: NCDEQ – DMF, DWR and APNEP.

Current and potential partners: NCDEQ – DMF (Habitat Enhancement), DCM, NC Sea Grant, NCCF, Pew Charitable Trusts, Audubon North Carolina, Currituck Sound Coalition, USFWS, NERRs, NFWF, NOAA, Duke University Marine Lab, the ECU Coastal Studies Institute, NC State Center for Marine Sciences and Technology, UNC – Institute for Marine Sciences, UNCW, and corporations with climate goals.

Examples include (but are not limited to):

In cooperation with the Nutrient Criteria Development Plan's Scientific Advisory Council and Criteria Implementation Committee, DWR is developing numeric water clarity standards to protect SAV. Working to implement these standards will complement others, such as the section of North Carolina's Administrative Code focusing on coastal shorelines, which states that "development shall not have a significant adverse impact on estuarine and ocean resources. Significant adverse impacts include development that would directly or indirectly impair water quality, increase shoreline erosion, alter coastal wetlands or Submerged Aquatic Vegetation…" (15A NCAC 07H .0209).

APNEP leads the SAV Partnership, which works to implement SAV protection and restoration actions in APNEP's 2025-2030 Comprehensive Conservation and Management Plan. Current Partnership efforts include working with the Currituck Sound Coalition to develop low-salinity SAV monitoring and assessment protocols, continue mapping and monitoring of high salinity waters, and conduct data analysis. As of fall 2025, APNEP staff has also partnered with NC Sea Grant to host a STEM Policy Fellow to conduct a comprehensive assessment of SAV protection and restoration policies (S. Feken, pers. comm. 2025).

2.3 Working lands: Planning and technical assistance

Working lands are a significant part of North Carolina's economy and heritage. They can also provide wildlife habitat, preserve soil and water quality, and store carbon. This section introduces working lands planning strategies that underpin the implementation strategies outlined in Section 2.4.

2.3.1 Increase agricultural and forest landowner access to technical and financial assistance

Adequate funding and technical assistance make it possible for agricultural and forestland owners to implement best practices to preserve working lands and their ecosystem services. Recommendations noted below include both new and existing projects, programs, and partnerships.

2.3.1.1 Support diverse forest product markets that sustain working forestlands

Description: In 2023, the forest sector in North Carolina had a total economic value of about $40.5 billion. Having adequate revenue sources allows forest landowners to retain and properly care for working forests. Harvesting trees for wood products is forestland owners' primary source of revenue, and access to diverse forest product markets offers landowners different potential revenue streams. (Forest products also vary in their carbon footprint; construction products and furniture last longer and thus have smaller carbon footprints than nonrenewable products.)

In addition to their economic benefits, working forests support water quality and wildlife habitat and sequester and store carbon. Under forest management plans, foresters manage forests using strategies such as removing trees of a certain size, quality, and/or species.

Current leads: NCFS and NC State Extension.

Current and potential partners: NC Forestry Association and forestry industry organizations.

Examples include (but are not limited to):

The NC Primary Forest Product Assessment Act levies an assessment on primary forest products harvested within the state, which helps to fund the NC Forest Development Program (N.C.G.S. 1061028, 2023). Forest Development Program assistance helps private forestland owners to increase forest productivity and ensure responsible forest operations.

The Southern Group of State Foresters' Keeping Forests campaign provides resources and assistance for forestland owners focused on traditional and emerging markets and the ecosystem services of forests.

2.3.1.2 Increase state funding for the Forest Development Cost Share Program

Description: The Forest Development Cost Share Program is an important source of funding eligible to working forest landowners who have a forest management plan approved by NCFS. The program helps pay for the establishment of working forests and implementation practices that improve forest productivity for commercial timber products on up to 100 acres of land per year. It covers cost-share for practices including "site preparation, seedling purchases, tree planting, release of desirable seedlings from competing vegetation, and other forest improvement practices needed to establish a new [working] forest," (NCFS N.D.).

Increasing technical and financial assistance would help make forest ownership and retention more financially sustainable for landowners. FY24 legislative appropriations included annual recurring funds for the Forest Development Cost Share Program. Forestry cost-share demand still exceeds available funding, and additional support would be beneficial.

Current lead: NCFS.

Current/potential partner: NC Forestry Association.

2.3.1.3 Share resources about voluntary forest carbon offset options

Description: Education and technical assistance about voluntary forest carbon offset programs can help landowners evaluate if they are a good fit. Maintaining or increasing forest carbon benefits can offer alternative revenue streams for landowners while improving air quality, water quality, and wildlife habitat.

Current leads: NC State Extension.

Current and potential partners: NC Forest Service, Family Forest Carbon Program by the American Forest Foundation, The Nature Conservancy, EcoForesters, Appalachian Carbon Research Group (at Appalachian State), and private consulting foresters.

Examples include (but are not limited to):

NC State Extension publications provide information about voluntary carbon offset programs as an 'alternative enterprise for woodland owners' (for more detail, see An

Introduction to Forest Carbon Offset Markets and Current Forest Carbon Markets at a Glance.) NCFS also provides technical assistance on this topic as requested.

2.3.1.4 Expand access to information about agricultural conservation practices

Description: Expanding access to education and research on agricultural conservation practices and new agricultural technologies supports producers in implementing them. These practices can improve food security and local food system resilience, and the North Carolina Center for Environmental Farming Systems studies how to optimize their soil carbon benefits.

Current lead: NCDA&CS Division of Soil and Water Conservation.

Current and potential partners: NCDA&CS Research Stations Division, NCWRC, NC Cooperative Extension, Soil and Water Conservation Districts, the North Carolina Center for Environmental Farming Systems ("CEFS" is a partnership among NC State University, NC A&T, and NCDA&CS), and USDA NRCS county staff.

Examples include (but are not limited to):

Local soil and water conservation districts and NRCS provide free, nonregulatory technical assistance to agricultural producers and homeowners to recommend, design, and install agricultural best management practices funded by cost share programs.

Part of NC Cooperative Extension's routine work and NCDA&CS Research Station Divisions' Agricultural field days includes sharing information about new agricultural conservation practices, research, and technologies to improve cost savings and efficiency, such as targeted irrigation and use of remote sensing technologies. (Staff note that education programs are most effective when implemented by the target audience. Producers who have implemented agricultural conservation practices informally present to their peers, and extension programs provide support as needed).

2.3.1.5 Expand access to cost-share funding for controlled drainage infrastructure and other peatland best management practices

Description: Improving management of agricultural and forestlands with shallower peat deposits (of 2-4 feet depth) could reduce the impacts of current drainage management practices while keeping these lands in production. Wider access to cost-share funding could defray costs to landowners and increase implementation of controlled drainage infrastructure and other peatland best management practices (BMPs) that preserve organic peat soil and its stored carbon. Broader implementation of peatland BMPs could also help

to reduce land subsidence, store shallow groundwater during droughts, reduce the likelihood of fire, retain soil currently lost to wind erosion, and improve water quality by reducing agricultural drainage runoff to nearby waterbodies (NCDEQ 2020).

Current lead: NCDA&CS Division of Soil and Water Conservation and Soil and Water Conservation Districts.

Current and potential partners: NCDEQ – APNEP, Soil and Water Conservation Districts, NC Cooperative Extension, TCF, Working Lands Trust, Carolina Wetlands Association, TNC, NCCF, EDF, NC Foundation for Soil & Water Conservation, county drainage districts/boards, USFWS, USACE, and corporations with climate goals.

Examples include (but are not limited to):

As of fall 2025, APNEP and other state, federal, local, and university partners were seeking funding to expand agricultural and forest landowners' access to peatland BMP cost-share funding or other financial incentives to enable them to implement pilot projects (S. Feken, pers. comm. 2025). This work would build on the Scuppernong Regional Water Management Study completed in spring 2025.

While there is not currently a cost share program focused on peatland BMPs, the NC Agriculture Cost Share Program has a BMP for water control structures and the NRCS's Environmental Quality Incentives Program (EQIP) provides technical and financial assistance to agricultural producers and forest landowners for ground and surface water conservation. Farmers can request cost share assistance for BMP implementation through local Soil and Water Conservation Districts and USDA NRCS local offices.

2.4 Working lands: Implementation

This section outlines on-the-ground strategies to promote working lands' resilience, including both long-standing programs and new efforts.

2.4.1 Support programs that promote working lands' resilience and ecosystem services

These projects and programs help North Carolina agricultural and forestland owners manage working lands to improve soil health and retention and water quality and reduce natural hazard risks.

2.4.1.1 Support sustainable management of working forestland

Description: According to NC State Extension, in 2023, working forests provided timber valued at $499.8 million. The most recent North Carolina data summary from the United States Forest Service's Forest Inventory and Analysis program estimates that forested land in North Carolina stores 1.6 MMT of carbon (primarily in living trees and soil, but also in standing dead trees and leaf litter on the forest floor.) Working forests can also provide wildlife habitat, especially when managed on long rotations. Management practices that improve forest health and forest carbon sequestration include fertilizing soils, extending forest rotations, reforestation, accelerating restocking, managing competition to enhance overall growth, preventing the spread of pests and pathogens, and producing climate-adapted native tree seedlings.

Current lead: NCFS.

Current and potential partners: NC Forestry Association, Sustainable Forestry Initiative, and NC Tree Farm Program, and USFS.

Examples include (but are not limited to):

As mentioned in section 2.3.1.2, the Forest Development Program provides financial assistance to eligible landowners to establish forest stands or implement silvicultural practices to increase productivity on privately owned forests so that they maximize commercial production levels for timber harvest. In FY24, FDP enabled forest landowners to plant approximately 7.8 million seedlings. Overall, in FY24, FDP allocated $2,985,918 in cost-share funds for forestland owners on 57,565 acres (NCFS 2025).

Between 2025-2030, ACC grant funding will expand the FDP program and fund implementation of approximately 10,000 acres of climate-smart forestry and soil health

practices in partnership with small forest landowners in counties served by the Roanoke Cooperative's Sustainable Forestry and Land Retention Project. The Roanoke Cooperative will also provide technical assistance on reforestation and conservation easement implementation as part of ACC grant-funded work.

Figure 10: NCFS Forest Health Specialist evaluating adelgid pressure on a severely declining hemlock, credit NCFS

Forest management challenges are evolving. Pests such as the southern pine beetle, emerald ash borer, and hemlock woolly adelgid have substantially impacted North Carolina's forests. Trees stressed by drought, warmer winters, and other climate impacts are more vulnerable to these infestations. NCFS treats these pests at state forests and training facilities, and trains forest landowners to do the same on their property.

2.4.1.2 Expand agricultural conservation practice implementation

Description: Agricultural conservation practices help to improve water quality and soil health, reduce erosion, and improve the sustainability and resilience of agribusiness in North Carolina. Some of these practices include:

- Reducing tillage.
- Planting cover crops.
- Managing nutrient and pesticide inputs.
- Agroforestry.
- Prescribed grazing.

Figure 11: New growth coming up through cover crop residue, credit NCDA&CS Division of Soil and Water Conservation

Approximately 69% of North Carolina agricultural landowners implement at least reduced tillage (NCDEQ 2020). Expanding number and area of agricultural conservation practices implemented could help increase local and regional adaptive capacity, farm productivity and profitability, and enhance farm management skills. It can also help improve food security, community

health, and workforce development, such as through the Center for Environmental Farming Systems' veteran mentoring program. Agroecology and agroforestry practices can also help sequester GHGs, and practices that reduce nutrients and sediment in runoff help to restore and enhance stream habitat for North Carolina's fish and other aquatic species (NFWF 2023).

Current leads: NCDA&CS Division of Soil and Water Conservation and Soil and Water Conservation Districts.

Current and potential partners: NCWRC, North Carolina Cooperative Extension, and NC Center for Environmental Farming Systems.

Examples include (but are not limited to):

NC Cooperative Extension staff helps producers apply for cost-share assistance that makes implementing agricultural conservation practices more financially feasible (K. Sosa, pers. comm. 2025).

NCWRC works with private landowners to enhance habitat in forage production systems by introducing native warm season grasses and pollinator plant species. NCWRC staff provides technical guidance and maintains and lends farmers equipment to prepare sites and plant native seeds (B. Massa, pers. comm 2025). These efforts have enhanced wildlife habitat, improved drought resistance in forage production, and increased carbon sequestration and storage capacity relative to planting nonnative herbaceous grasses.

2.4.1.2.1 Increase funding for Soil and Water Conservation District cost-share programs

Description: North Carolina's Agriculture Cost Share Program consistently receives more applications than available funding. Each year, soil and water conservation districts request funding for each program based on documented and anticipated need. In 2019, state funding could only support 18% of eligible applicants (NCDEQ 2020). As of summer 2024, NCDA&CS staff estimated that North Carolina's Agriculture Cost Share Program would need an additional $15 million per year to meet statewide demand.

Current lead: NCDA&CS Division of Soil and Water Conservation.

Current/potential partners: Soil and Water Conservation Districts, NC Farm Bureau Federation, and other relevant nonprofits.

Examples include (but are not limited to):

Agricultural conservation and best management practices implemented in FY24 on 51,548 acres of land through the Agriculture Cost Share Program saved an estimated 274,490 tons

of soil, managed 125,343 pounds of phosphorus, and prevented 506,676 pounds of nitrogen from entering watersheds statewide (A. Jones, pers. comm. 2025). These ecosystem services could be multiplied if cost-share funding corresponded with producers' requests.

2.4.1.3 Preserve working farmland and enhance ecosystem services

Description: 11.6% (nearly 1.2 million acres) of North Carolina's farmland are projected to be converted to urban and residential development by 2040 (Xie et al. 2023.) Retaining North Carolina's farmland can help to increase food security and maintain farming as a way of life and main sector of the economy. Sustainable agriculture and pasture-raised livestock operations can also help build more resilient landscapes and maintain or increase carbon sequestration on farms.

Current leads: NCDA&CS and NC State Extension.

Current and potential partners: NCDA&CS Division of Soil and Water Conservation, Soil and Water Conservation Districts, ENCSL, NRCS.

Examples include (but are not limited to):

NCDA&CS' Agricultural Development and Farmland Preservation Trust Fund is an essential source of farmland preservation grants.

Counties' voluntary agricultural districts (VADs) (and "enhanced" voluntary agricultural district) designations allow farm operators who put their land under 10-year agricultural conservation easements to benefit from cost-sharing programs and priority consideration for grants.

The Present Use Value program modifies how property is taxed to make it more financially feasible for farmers to continue farming when market forces might otherwise pressure them to sell their land. Property is typically taxed on its theoretical market value, which encourages farm owners to sell their land for development. The Present Use Value (PUV) system allows landowners to apply for property taxation based on how the current use of their land instead (as agricultural, horticultural, forest land, or a combination).

Finally, the NC Farm Link program connects older and younger farmers to help make it more financially feasible for young farmers to establish themselves as the workforce ages.

2.4.1.4 Restore natural floodplain conditions that benefit working lands, reduce risk, and improve water quality

Description: When major storms flood agricultural operations in floodplains, it can become unsafe and unprofitable to keep land in production. Compensating producers for flooded operations can provide a measure of economic stability, prevent spills of animal waste into waterways, reduce risk to producers and downstream communities, and bolster natural floodplains' ability to store water safely (NCDEQ 2020).

Lead: NCDA&CS.

Current and potential partners: NCDNCR – NCLWF (as requested) and USDA – NRCS.

Examples include (but are not limited to):

Since Hurricane Floyd in 1999, the NCDA&CS Division of Soil and Water Conservation has administered the Floodplain Swine Buyout Program to acquire conservation easements to remove eligible swine operations from the 100-year floodplain after major storms. Participating producers voluntarily enroll their land in easements that allow continued agricultural use of properties with restrictions such as limiting the kinds of structures that can be built, restricting future farming to crop production, and taking steps to restore natural floodplain conditions (such as by planting forested buffers). The General Assembly has funded the program with additional support from the USDA – NRCS Emergency Watershed Protection program. Demand for funding has consistently exceeded supply (NCDEQ 2020).

2.5 Developed lands: Planning and technical assistance

This section details planning and technical assistance strategies to support resilience and preserve ecosystem services in developed areas. Common challenges across North Carolina include maintaining healthy urban forests and managing stormwater runoff.

2.5.1 Promote urban forest assessment, management, and reforestation

This section outlines how state agencies can support local governments with their planning and technical assistance needs related to urban forest inventory and analysis, management, forestation, and protection.

2.5.1.1 Support planning efforts to retain urban forest ecosystem services

Description: 2010 data showed North Carolina to be among the top five states in the country for total number of urban trees, as well as for trees' associated benefits including carbon sequestration and storage, air pollution removal, and avoided energy use (Nowak et al 2018). A 2013 US Forest Service study found that urban forests in North Carolina stored an estimated 37.5 million tons of carbon. However, urban and suburban growth into forested areas threatens these ecosystem services (Nowak et al. 2018).

Current leads: NCFS and NCDEQ – State Resilience Office.

Current and potential partners: NC DHHS Climate and Health Team and local governments.

Examples include (but are not limited to):

Wake County's Tree Canopy Assessment (summarized in a North Carolina Resilience Exchange case study) shows how tree canopy assessments can help communities plan to retain urban forest canopy and the many benefits it provides.

North Carolina's Heat Action Plan Toolkit and Planning for Extreme Heat Cohort program share approaches for adding trees to developed areas and using tree canopies to manage extreme heat.

2.5.1.1.1 Develop statewide best practices for tree protection, management, and care

Description: Developing and implementing statewide best management practices for urban tree protection, management, and care can help to retain and improve the vitality of the urban canopy, protect local investments in trees, and help maximize ecosystem services.

As of summer 2025, NCFS' Urban and Community Forestry Program was actively working to develop statewide best management practices for urban tree protection, management, and care. Current U&CF program guidance on tree planting, management, and maintenance can be found here.

Current lead: NCFS.

Current and potential partners: NC Cooperative Extension, local government urban foresters, NC Regional Councils of Government, and tree care industry representatives.

2.5.1.1.2 Maintain urban tree lists to recommend trees that will thrive in urban areas

Description: Urban tree lists help foresters plant the right trees in the right places, increasing trees' chance of survival. Foresters aim to create species diversity to ensure that the urban canopy can withstand climate impacts, disease, pests, drought, and other threats. Resources for identifying site-appropriate trees include those from NCFS' Urban Forestry program (see recommended tree guide and other U&CF resources.) The US Forest Service also provides a Tree Atlas.

Current lead: NCFS.

Current and potential partners: NC State Extension, NC Urban Forestry Council, local government urban foresters, and tree care industry partners.

Examples include (but are not limited to):

The Town of Apex includes in their design and development manual recommended native tree lists, acceptable nonnative species, and trees that are inadvisable to plant based on NC Invasive Plant Council recommendations. Urban foresters avoid planting invasive species and strive to avoid planting species that could become invasive in future. Planting noninvasive exotic trees is common, to add biodiversity and visual interest in urban spaces. Full-size native trees can also be hard to keep alive in cities due to significant urban constraints on space, soil, water, and light (A. Johnson, pers. comm. 2025). Smaller native plants are more robust to these limitations.

2.5.1.1.3 Use tree canopy cover data to identify opportunities to restore urban forests

Description: Tree canopy cover data help foresters identify gaps in tree cover and identify locations to conserve land to restore forests or prevent their loss. Identifying large open spaces is an efficient way for urban foresters to find sites to quickly increase urban canopy cover. Large open spaces can accommodate planting high numbers of trees and larger tree species that are otherwise harder to site, as described above in 2.5.1.1.2.

Current lead: NCFS.

Current and potential partners: State, county, and local governments; public schools; colleges and universities; nonprofits; and NC Regional Councils of Government.

Examples include (but are not limited to):

Tree canopy assessments can be used to identify large potential planting areas.

2.5.1.2 Standardize tree canopy assessment data

Description: Standardizing the data that jurisdictions collect helps state and local urban foresters compare urban tree canopies across the state and learn from regional differences to better protect urban forests.

Current lead: NCFS – Urban and Community Forestry Program.

Current and potential partners: Local governments and NC Councils of Government.

Examples include (but are not limited to):

NCFS' Urban and Community Forestry Program requires municipalities that receive funding for canopy cover assessments to collect consistent geospatial data categories. Communities may collect additional data if they have the capacity to do so.

2.5.1.2.1 Compile urban tree canopy assessment GIS data in a state-managed database

Description: Incorporating urban tree canopy assessment GIS data into a state database is an important step to inform statewide urban forest conservation and restoration efforts.

Current lead: NCFS.

Current and potential partners: Local government urban foresters.

Examples include (but are not limited to):

As of summer 2025, NCFS staff were seeking contractual support to compile urban tree canopy data into a single database.

2.5.1.3 Increase technical assistance, training, and funding for urban forestry

Description: Urban foresters stretch limited resources to manage diverse, healthy urban tree canopies under difficult conditions. Increased technical assistance, training, collaboration, and financial resources would help them to maintain tree health and expand

urban forests as environmental conditions change rapidly. NCFS awards urban forestry grants to communities when federal funding is available; further resources are needed.

Current lead: NCFS and professional forestry associations.

Current and potential partners: NC Regional Councils of Government, local government urban foresters, and NC State University – College of Natural Resources.

Examples include (but are not limited to):

Urban foresters, landscape designers, architects, and other service providers could benefit from opportunities to network, share resources, and learn from one another and from researchers about species that survive and adapt well to changing conditions.

Further context: To thrive in urban settings, tree species must be able to tolerate low soil quality and volume, drought, heat, and disturbance to their root systems due to construction or underground utilities. Trees appropriate for urban settings may also be limited to those of a size and growth form that accommodate overhead powerlines and motorist sightlines. Relatively few native, appropriately sized tree and shrub species thrive under all these conditions. Additionally, most native understory trees are not adapted to full sun, and shrubs tend to reproduce by suckering, which can compromise sidewalks or infrastructure. Maintaining a diverse urban tree canopy given these constraints typically requires using nonnative species in urban landscaping.

2.5.1.3.1 Secure sustainable funding for adequate Urban & Community Forestry Program staff

Description: NCFS' Urban and Community Forestry (U&CF) Program staff help municipalities achieve a sustainable level of urban forest management that matches their need and capacity. Current U&CF staff levels fluctuate based on federal funding, which constrains their ability to provide technical assistance to local governments. Sustainable, consistent funding for the program would help staff assist urban foresters statewide. Specifically, funding is needed for three regional urban forestry specialists, a program coordinator, and a program manager (NCDEQ 2020).

Current lead: NCFS.

Current and potential partners: Local governments and NC Regional Councils of Government.

2.5.2 Provide technical assistance and training on nature-based resilience solutions for developed areas

Maintaining resilient communities, infrastructure, and ecosystems in developed areas will become more challenging as extreme weather events increase in frequency and severity. The recommendations that follow outline ways that state agencies can support local planning and capacity building to achieve these goals.

2.5.2.1 Build local government capacity to address stormwater and flooding impacts

Description: Stormwater runoff contributes to flooding and can compound the impacts of extreme storms, especially when (gray) stormwater infrastructure such as pipes, culverts, catch basins, and curb inlets are broken, clogged, or undersized. Ensuring that local governments have stormwater infrastructure capacity sufficient for current and future rain events enables them to better manage flooding and water quality and protect public and private property in urban spaces.

Gray stormwater infrastructure (such as pipes, drains, and curb inlets) conveys runoff away from roofs, roads, and other assets. Green stormwater infrastructure (such as trees and bioretention basins) helps infiltrate stormwater into the ground near where it falls (USEPA, 2024a). Using a combination of green and gray stormwater infrastructure can help communities to address stormwater-driven flooding while protecting water quality and watershed ecosystem functions.

A significant challenge is that stormwater infrastructure, unlike many types of infrastructure, has only recently begun to be underwritten by utilities with fee structures to support infrastructure maintenance. This lack of funding mechanism can make it difficult for local governments to hire staff to clean out, repair, replace, and expand their stormwater infrastructure. Connecting local government staff with hydrology, engineering, stormwater management, utility finance, and water quality expertise can help them to build capacity to proactively address stormwater issues (UNC Environmental Finance Center 2021). This is especially important in smaller and more rural communities that have fewer staff.

Current leads: NCDEQ – DWR (Nonpoint Source Planning), State Resilience Office, Flood Resiliency Blueprint Program, and APNEP.

Current and potential partners: DCM (Resilience Coastal Communities Program, or RCCP), NC Sea Grant, NC Water Resources Research Institute, NCCF, and NC Regional Councils of Government.

Examples include (but are not limited to):

NCDEQ – DWR's 205j Water Quality Planning grant program makes grants eligible to NC Regional Councils of Government to map and inventory stormwater infrastructure in areas where stormwater runoff degrades water quality. A stormwater infrastructure inventory yields geospatial data showing where infrastructure needs maintenance, enabling local government staff to address these issues. Inventories may also help identify hotspots where erosion and polluted stormwater runoff enter area streams (Piedmont Triad Regional Council, N.D.).

Figure 12: Regular maintenance can prevent water pollution and ponding around clogged stormwater infrastructure, credit Maya Cough-Schulze

As of fall 2025, NCDEQ's State Resilience Office was launching a program supported by APNEP to help local governments in the Albemarle region better manage stormwater. The program will include a peer learning network, development of regional drainage data, and identification and development of local stormwater projects that support long-term resilience (S. Feken, pers. comm. 2025).

NCDEQ's Flood Resiliency Blueprint decision support tool simulates flood events, climate scenarios, and more to help local government and other users prioritize regional actions to improve watershed hydrology and increase resilience. The program is also funding flood resiliency projects and River Basin Action Strategies in six watersheds.

NCDEQ's Division of Mitigation Services works to implement stormwater infrastructure to improve nutrient management and reduce flooding.

2.5.2.2 Incentivize local implementation of green stormwater infrastructure and other nature-based solutions

Description: In developed areas, green stormwater infrastructure, such as street trees and rain gardens, help slow down and absorb stormwater runoff before it contacts pollution on impervious surfaces. This green infrastructure can help control erosion, absorb and filter water, provide wildlife habitat, and beautify public spaces. Communities that share resources about green stormwater infrastructure and financially incentivize its implementation have seen wider uptake of these practices.

Current leads: NCDEQ – DWR, DMS, NCFS, NCCF, NC WRRI, and local governments.

Current and potential partners: NCDEQ – State Resilience Office, APNEP, Carolina Wetlands Association, Central Pines Regional Council's Clean Water Education Partnership and other council-of-government-based stormwater education partnerships, and Sound Rivers (Campus Stormwater program).

Examples include (but are not limited to):

The City of Raleigh pays up to 90% of project costs for qualified private residents that apply to the Rainwater Rewards Program.

In 2023, the North Carolina Coastal Federation piloted a Stormwater Retrofit Cost-Share Program for coastal communities.

The City of Wilmington's Heal Our Waterways program shares resources about residential-scale solutions that community members can implement to reduce impacts of stormwater runoff on their property. Residential-scale green stormwater infrastructure collectively

helps reduce pollution delivered to nearby Bradley and Hewletts' Creeks, contributing to the goal of reopening these waters for shellfish harvesting.

NCFS U&CF program provides resources about trees' role as green infrastructure.

2.5.2.3 Maintain and expand NC Resilience Exchange resources and training capacity

Description: North Carolina's Resilience Exchange provides resources for communities to better understand their climate vulnerabilities, identify adaptation strategies, find funding and planning tools, and connect with experts. The State Resilience Office worked with many partners to design the Resilience Exchange website to support goals and strategies in the 2020 and 2025-2030 National and Working Lands Action Plans.

State Resilience Office staff train local government and other climate change professionals to use and apply tools in the Resilience Exchange. They also work with partners to ensure the website remains functional and up to date. Ongoing support will ensure that State Resilience Office staff can maintain and expand resources and training they offer to local governments.

Current lead: NCDEQ – State Resilience Office.

Current and potential partners: Local governments, NOAA, EPA, and the NC State Climate Office.

Examples include (but are not limited to): Resilience Exchange case studies on successful projects and lessons learned are provided as a resource for communities considering implementing similar projects.

2.6 Developed lands: Implementation

Developed lands contain trees, plants, soil, and waterways that help to reduce natural hazard and urban heat island effects, sequester carbon, and improve water and air quality. Some challenges to protecting these ecosystem services include a lack of funding and education on best practices.

2.6.1 Promote land management strategies that improve ecosystem and community resilience

The following recommendations include ways that land management and restoration strategies can improve ecosystem and community resilience in the built environment.

2.6.1.1 Support and expand urban tree planting

Description: NCFS and partners' grant and cost-share programs help North Carolina communities to maintain and expand their urban forests. Several of the many benefits of urban tree canopies are further described in Section 2.5.1.1. Expanding urban tree planting efforts is crucial to maintaining robust urban tree canopies as drought, other climate impacts, and pests present challenges to maintaining their health.

Current leads: NCFS – Forest Management and Development Branch (Urban and Community Forestry program).

Current and potential partners: NC Cooperative Extension, local government urban foresters, USFS, and USFWS.

Examples include (but are not limited to):

Between 2025 and 2030, ACC grant funding will allow NCFS to plant approximately 1,200 new trees at K-12 public schools, neighborhood parks, and on residential and main streets.

As funding allows, NCFS' existing Urban and Community Forestry program provides cost-share programs and technical assistance to communities across the state to plant and maintain urban tree canopies.

2.6.1.2 Encourage best practices for site preparation and soil during development

Description: Following best practices to reduce soil compaction and retain topsoil during development can help to support healthy trees and plants. Trees planted in degraded soil are less healthy and may fail to reach full maturity and require more costly maintenance and replanting. Trees planted in healthy soil are more likely to survive and provide benefits

such as shade, clean air, carbon sequestration and storage, and infiltration of stormwater runoff.

Site construction activities typically remove topsoil, compact subsoil, restrict water infiltration, and increase runoff. Reducing mass grading on large developments can improve soil and therefore tree health. Where this is not possible, subsoil compaction can be mitigated prior to finished grading by mechanical ripping. Amending topsoil with high grade soil to achieve 5-10% organic matter (via topdressing and blending compost with existing site soils) can also help improve soil quality and support plant survival (NCDEQ 2020).

Additional practices to help slow and infiltrate runoff during development can include establishment of landscape buffers, daylighting of streams and wetlands, and reduction of impervious areas to increase root paths for trees planted in dense urban settings (NCDEQ 2020). Implementing these practices can help to protect residents from flooding, especially where development occurs near streams and drainage channels (K. Paramore, pers. comm. 2025).

Current leads: NCDEQ – Division of Energy, Minerals, and Land Resources, and local governments.

Current and potential partners: NCDEQ – Department of Environmental Assistance and Customer Service (composting technical assistance program) and compost manufacturers.

2.6.1.3 Inform, assist, and/or fund voluntary property buyouts in high-hazard areas

Description: North Carolina property owners that have been impacted by repeated flooding may be unable to sell their land and its structures through typical pathways. However, if a funding program is available, they may be eligible to voluntarily sell their land to a governmental agency. Voluntary buyouts of frequently flooded properties can help make communities more resilient to future extreme weather events. For example, the new open space can be managed to retain water onsite, helping to reduce future flooding nearby. Governments with these programs may sell purchased parcels to land trusts or other conservation organizations to ensure that ecosystem and flood protection benefits are protected long term.

State and local governments can coordinate and leverage a range of existing funding sources (such as DMS, NCLWF, Parks and Recreation Trust Fund, and NFWF) to help restore purchased properties. Recovery, philanthropic, and local government operational

funding may also be used. NC Main Street & Rural Planning Center can share resources and information about voluntary buyout opportunities.

Current leads: DPS – NCEM (Hazard Mitigation).

Current and potential partners: NCDEQ – DMS, DCM, and State Resilience Office, NC Department of Commerce – NC Main Street and Rural Planning Center, local governments affected by flooding, NC State University's Coastal Dynamics Design lab, and FEMA.

Examples include (but are not limited to):

Since 1999, Charlotte-Mecklenburg Storm Water Services has used grant and stormwater utility funds to pay property owners in floodplains for voluntary buyouts. A North Carolina Resilience Exchange case study shares further details and benefits of the program.

Towns including Kinston, Lumberton, Farmville, Hendersonville, and Seven Springs have used a combination of local and state funding to purchase frequently flooded properties and transition them into green space or parks (S. Bevington, pers. comm. 2025).

2.6.1.4 Preserve natural and working lands' ecosystem services during infrastructure development

Description: Communities need infrastructure, and there are ways to site and implement it that protect ecosystem services. For instance, The Nature Conservancy's approach to siting and developing energy infrastructure in a way that preserves natural and working lands includes:

- Avoiding high priority conservation areas.
- Minimizing impacts by restoring native vegetation on chosen sites.
- Co-locating projects with compatible land uses when possible.

Additional best practices outlined below can help preserve wildlife habitat on natural and working lands during infrastructure development of various types.

Current leads: NCWRC (through pollinator guidance), NC Department of Commerce – Office of Science, Technology and Innovation, and the Economic Development Partnership of North Carolina.

Current and potential partners: TNC, local governments, and energy companies.

Examples include (but are not limited to):

First published in 2018, the North Carolina Pollinator Conservation Alliance's Solar Technical Guidance is a joint product of their work with NCWRC to recommend ways to

protect pollinator habitat on renewable energy installation sites. Several Piedmont-area solar companies have implemented recommendations since the guidance was released (G. Garrison, pers. comm. 2025). The Nature Conservancy's "Making Solar Wildlife-Friendly" and NCWRC's solar facilities siting recommendations in the Green Growth Toolbox contain additional recommendations that support the same goal.

Compensating landowners to manage their land for multiple uses can be an additional strategy for protecting ecosystem services during infrastructure development. For example, Apex Clean Energy's Timbermill Wind project on agricultural and industrial forestland in Chowan County will pay annual lease payments to farmers who host wind turbines over their projected 30-year lifespan. As of spring 2025, TNC was pursuing research with NC State University on impacts to wildlife on this site (E. Kalies, pers. comm. 2025). In their 2023 paper, Feng et al. also outline broader strategies to minimize impacts of wind power on wildlife and habitat.

Taking steps to preserve ecosystems and economic benefits to landowners during other types of infrastructure development would also be beneficial.

2.7 Multiple land uses: Planning and technical assistance

This section outlines ways that planning and technical assistance can support conservation and restoration goals on natural, working, and/or developed lands.

2.7.1 Integrate NWL and resilience strategies into planning efforts

Incorporating NWL and resilience strategies into planning efforts helps to elevate these strategies as priorities for future funding and implementation. The recommendations in this section include important, often invisible efforts that lay the groundwork for on-the-ground projects to protect and restore NWLs and the communities that depend on them.

2.7.1.1 Incorporate NWL programs, resources, and recommendations into planning efforts

Description: Urban and regional planning underpins development, conservation, and restoration decisions. Incorporating recommendations to protect NWLs into comprehensive plans, multi-hazard mitigation plans, flood resilience plans, and other types of plans help increase the likelihood of their implementation.

Current leads: NCDEQ – State Resilience Office, Flood Resiliency Blueprint, DCM, APNEP, NCDNCR – NHP, NCEM, NCWRC – Green Growth Toolbox, North Carolina Commission of Indian Affairs, NCCF, local governments, and NC Regional Councils of Government.

Current and potential partners: Local government planning consultants.

Examples include (but are not limited to):

In spring 2025, Wake County conducted stakeholder engagement and explored modeled scenarios to incorporate land use and climate projections into their One Water plan. Modeled scenarios will be used to assess water management strategies that improve carbon sequestration, public health, heat island/temperature mitigation, and soil health. This plan's release, expected in January 2026, will align with the Wake County Comprehensive Plan's Growth Development Framework.

NCDEQ's Flood Resiliency Blueprint, Decision Support Tool, and River Basin Action Strategies incorporate future climate conditions through 2100 and support multiple NWL plan recommendations. Additionally, DMS watershed planning underpins their compensatory mitigation work that involves restoring streams, wetlands, and riparian buffers.

Through the Tribal Coastal Resilience Connections project, APNEP's team of Tribal representatives and liaisons is helping to build inter-Tribal coalitions to share resources

and information about coastal climate adaptation. The team also seeks to strengthen relationships between resilience planners, state agencies, tribal communities, and organizations representing Tribal interests such as the NC Commission of Indian Affairs. The team is currently conducting analysis of tribal-led plans and using community-directed mapping to begin developing a regional adaptation framework and toolbox for conservation and resilience planning.

The DCM Coastal Reserve engages local governments with its site-based habitat resilience planning efforts and, where appropriate, participates in local government committees to support landscape connectivity and compatible land management (e.g., "Resilient Beaufort" and Town of Beaufort CAMA land use planning committees).

2.7.1.2 Help local governments integrate hazard resilience in planning documents

Description: Understanding how to manage threats associated with extreme weather is a relatively new skill set for many local governments. As North Carolina continues to experience natural hazards on the order of magnitude of Hurricane Helene, helping communities to identify effective strategies to include in local planning processes makes it likelier that they can implement these strategies on the ground before the next extreme event. Resilience planning efforts can protect NWLs by incorporating ecological goals and recommending implementation of natural solutions such as constructed wetlands or living shorelines where appropriate.

Current leads: NCDEQ – DCM (CAMA Land Use Planning, RCCP, and NC Coastal Reserve), State Resilience Office, Flood Resiliency Blueprint Program, NC Regional Councils of Government, and contracting and engineering firms.

Current and potential partners: NCDNCR – Division of Parks and Recreation, NCDEQ – APNEP, NC Department of Commerce, NCWRC – Green Growth Toolbox, NC Sea Grant, State Ports, NCCF, local governments, and NC State University's Coastal Dynamics Design Lab.

Examples include (but are not limited to):

In 2024, North Carolina's Resilient Coastal Communities Program (RCCP) received a grant from NFWF's National Coastal Resilience Fund to begin integrating resilience policies and objectives into CAMA Land Use Plans. This pilot project, set to begin in fall 2025, will provide an opportunity for communities to formalize resilience in their planning frameworks. This will enable DCM to integrate the RCCP with existing land-use planning guidance and resources and promote resilient policies that reflect a forward-thinking

approach to coastal hazard mitigation, economic and social stability, and environmental sustainability.

The Resilient Coastal Communities Planning Handbook walks communities and contractors through a resilience planning process to identify critical assets, natural infrastructure, and impacted populations. Ultimately this process leads to a resilience strategy that incorporates a portfolio of prioritized projects to help reduce risk and vulnerability to coastal hazards, including at least one nature-based project.

Many other resources exist to support local governments; some include:

- NCDEQ's Resilient Coastal Communities Program (RCCP) and Community Disaster Resilience Zones Program tools, resources, and funding help communities explore how land use decisions and extreme weather impact planning, development, and the viability of building or rebuilding infrastructure.
- The NCDEQ State Resilience Office's Resilient Communities Planning Guide includes planning guidance and a suite of resilience-building strategies for local leaders.
- NOAA's Sea Level Calculator can help local government staff and their contractors understand how to account for SLR in decision-making. Homeowners and the public can use NOAA's Sea Level Rise Viewer to visualize local impacts.
- Ordinance resources for communities listed in the North Carolina Resilience Exchange and Green Growth Toolbox.
- NCDEQ - Flood Resiliency Blueprint.

2.7.1.3 Support local governments' progression from vulnerability assessments to resilience project implementation

Description: Communities may benefit from technical assistance throughout the process of funding, selecting, and implementing resilience projects. The current stage of DCM's Resilient Coastal Communities Program (RCCP) helps communities advance from hazard and resilience planning efforts to shovel-ready project implementation. (Prior stages of RCCP funding focused on helping communities conduct vulnerability assessments and do resilience planning.) RCCP grants do not require financial match and are funded by a combination of state appropriations and competitive grants.

Current leads: NCDEQ – DCM (RCCP), State Resilience Office, and Flood Resiliency Blueprint Program.

Current and potential partners: NCDEQ – APNEP, NCEM, Nicholas Institute at Duke University, NC Sea Grant, NCCF, Carolina Wetlands Association, Lighthouse Environment Partners, NC Regional Councils of Government, and local governments and their planning consultants.

Examples include (but are not limited to):

Communities awarded RCCP program grants can be viewed on this map. Grant awardees have assessed sea-level rise using a minimum 30-year projection, and many choose to look beyond 30 years. For instance, the Town of Beaufort assessed 3- and 6-foot sea level rise inundation to identify and prioritize 14 projects to reduce their risk and vulnerability to sea-level rise.

In summer 2025, NCCF, LegacyWorks, and Lighthouse Environment Partners used NFWF and SECU funding to facilitate coastal community engagement discussions on resilience project design and implementation. (Additional partners include DCM, NC Sea Grant, NC State University's Coastal Dynamic Design Lab, Audubon North Carolina, WithersRavenel, and county managers and commissioners.)

The Regions Innovating for Strong Economies and Environment (RISE) Resilience Portfolios Program was a time-bounded initiative that involved conducting stakeholder engagement across nine Council of Government regions in Eastern North Carolina to complete climate vulnerability assessments and prioritize resilience-building projects. This work helped to lay the groundwork for this recommendation.

The Community Disaster Resilience Zones program works with North Carolina local governments in high-risk census tracts designated by FEMA to connect local officials with training, funding, capacity building, and technical support to advance their resilience priorities.

2.7.2 Provide technical assistance and training on the benefits of NWL strategies

Effectively communicating the importance of natural and working lands is an essential first step to incentivize their protection. The recommendations in this section include best practices and examples for education, training, and communications.

2.7.2.1 Convey the importance of NWL strategies through public education, training, and communications

Description: People protect what they understand and value. Communicating the value of NWLs to decision makers with concrete examples is an important first step to their protection.

Current leads: NCWRC – Green Growth Toolbox, NCDEQ – DCM, NC WRRI, and NC Tribal governments and communities.

Current and potential partners: NCDNCR – NHP, NCFS, NCDEQ – APNEP, Sea Grant, DMF (Habitat Enhancement), TNC, Carolina Wetlands Association, Nicholas Institute at Duke University, and many others.

Examples include (but are not limited to):

Education: The North Carolina Coastal Reserve offers workshops and resources for real estate professionals and decision-makers on topics including low-impact development to support water quality protection and promoting living shorelines for erosion control.

Figure 13: Living shoreline workshop for realtors, credit NC Coastal Reserve

Figure 14: Living shoreline workshop participants visit NOAA Beaufort Lab living shoreline, credit NC Coastal Reserve staff

Training: The US Climate Alliance offers trainings to states to support implementation of their NWL plans and goals (see a past example.)

Communications: The Nicholas Institute at Duke University has created public-facing Story Maps about the importance of NC NWL planning.

2.7.2.2 Provide funding and technical assistance to local governments for conservation planning

Description: Urban and regional planning strategies such as those outlined in NCWRC's Green Growth Toolbox can help local governments protect green space, wildlife habitat and connectivity, and other ecosystem services associated with NWLs. Funding and technical assistance help enable local government conservation planning efforts.

Current leads: NCWRC – Green Growth Toolbox.

Current and potential partners: Local governments, tribal governments, and nonprofits.

Examples include (but are not limited to):

NCWRC's Green Growth Toolbox Program provides trainings, presentations, cost-share assistance, a conservation planning handbook, and other resources to support local

governments in developing plans and ordinances for local and regional government conservation planning.

NCWRC's Partners for Green Growth program "will reimburse cost-share funds up to $20,000 and will provide 80 hours of technical assistance" on conservation planning projects.

2.8 Multiple land uses: Implementation

This section outlines on-the-ground strategies that can help increase ecosystem benefits and community resilience across multiple land uses.

2.8.1 Use proactive nature-based solutions to increase ecosystem and community resilience

Recommendations in this section include conservation, restoration, and resilience strategies applicable to natural, working, and/or developed lands.

2.8.1.1 Protect forested land to protect downstream drinking water sources

Description: North Carolina water supply watershed regulations limit development to protect water quality on land that drains to communities' drinking water utility intakes. However, only about 500,000 acres of the approximate 2.7 million acres of forest lands in water supply watersheds are protected (NCDEQ 2020). Several communities voluntarily conserve land in the watershed upstream of their drinking water source to proactively protect drinking water quality for the future.

Protecting forested watersheds delivers cleaner source water to drinking water utilities because rainfall on forested land slows down and infiltrates into the ground rather than picking up polluted runoff and drawing it into the streams, lakes, and rivers that supply drinking water plants (Ernst 2004). Communities that voluntarily protect their forested source watersheds may also be able to reduce their water treatment costs and reduce downstream flooding.

Current leads: NCDNCR – NCLWF.

Current and potential partners: NCFS, NCDEQ – DWR (Drinking Water Protection Program), accredited land trusts across the state, and partnerships such as the Raleigh Watershed Protection Program and the Waynesville Watershed Conservation Area project.

Examples include (but are not limited to):

The Waynesville Watershed Protection Program implements conservation easements on 8,400 acres of working forestland in North Carolina's mountains to protect the water supply watershed for the Town of Waynesville and other areas of Haywood County. Together, Southern Appalachian Highlands Conservancy, the Conservation Trust for North Carolina, and the State of North Carolina hold conservation easements that protect this property in perpetuity (conservation easements can be tailored to natural and working lands or other

specifications as needed by relevant parties to the agreement.) The Southern Appalachian Highlands Conservancy also permanently protects Woodfin's water supply watershed and the watersheds that previously provided drinking water to Weaverville, Canton, and Marshall. While these three towns' drinking water sources have since changed, the forested mountain watersheds surrounding them remain protected.

Through the Raleigh Watershed Protection Program, water utility customers pay $0.15 for every 1,000 gallons of water that they use, which helps fund land conservation in Raleigh's water supply watersheds. Since 2003, this effort has funded the permanent protection of 15,000 acres of land. Partnership between the City of Raleigh, Triangle Land Conservancy and Central Pines Regional Council makes this program possible.

Figure 15: Protected floodplain forest, credit Scott Pohlman

In 2021, the City of Durham's Department of Water Management, Triangle Land Conservancy, and the Eno River Association were awarded a North Carolina Source Water Protection Award for their work to set up a Durham Water Supply Watershed Protection

Program similar to Raleigh's program. Partners' work involved planning and geospatial prioritization of parcels for land conservation that would have significant downstream water quality benefits.

2.8.1.2 Use prescribed burning to manage forest habitat and reduce wildfire risk

Description: Prescribed fires typically burn finer vegetation such as leaves and twigs, allowing carbon to remain stored in large branches, trunks, and roots. Prescribed burning selects for fire-tolerant and longer-lived tree species and can help to restore Appalachian and longleaf pine forests and improve habitat for threatened species such as the red-cockaded woodpecker and Venus flytrap.

Implementing prescribed burning can help reduce the risk of catastrophic wildfire, which consumes larger trees, releases significant carbon dioxide, and can threaten nearby communities' lives, property, and livelihoods (NHP 2024). NCFS resources note that North Carolina is the state with the highest acreage of wildland-urban interface, meaning that many private landowners are at risk when wildfires occur. Wildfire risk is expected to be high for at least 15 years following Hurricane Helene because the vast number of downed trees the storm greatly increased fuel loads (North Carolina State University 2025). North Carolina's Climate Science Report also projects wildfire risk to increase in frequency and severity over the next century across the state (Kunkle et al. 2020).

Prescribed fires are planned during appropriate weather conditions to reduce ground-level smoke, and NCFS also manages several programs aimed at wildfire prevention and prescribed fire training and safety. (Additional forest management strategies to reduce wildfire risk can include prescribed burning, selective thinning, and removal of invasive species, as detailed on NCFS' website.)

Current lead: NCFS.

Current and potential partners: NCWRC, NCDNCR – Division of Parks and Recreation, Prescribed Fire Council, TNC, accredited land trusts, and prescribed burning associations.

Examples include (but are not limited to): The Addie Barns tract at Bladen Lakes State Forest is a 125-acre block managed for red-cockaded woodpeckers with dozens of nesting cavity trees. Fire plays an essential role in maintaining high quality forage and nesting habitat for these threatened birds. This tract is burned every 2-4 years to mimic the natural fire return intervals and has allowed the birds to thrive here.

Figure 16: Before and after prescribed burning for Red-Cockaded Woodpecker habitat management at Bladen Lakes State Forest, credit NCFS

The NC Prescribed Burning Cost-Share Program promotes prescribed burning to help improve the quality of North Carolina's forests, create wildlife habitat, and reduce the hazard of catastrophic wildfires. (NCFS, the NC Division of Parks and Recreation, NCWRC, The Nature Conservancy, and accredited land trusts routinely conduct prescribed burning to create or restore habitat or desired forest characteristics at sites that they manage and protect.)

The Pisgah Restoration Initiative is a 10-year project to increase prescribed burning and other forest management practices on over 70,000 acres to "reduce wildfire risk, restore fire-adapted ecosystems, treat non-native invasive species, and increase watershed health and resiliency". The project has been made possible by ongoing collaboration among local, state, and federal agencies and nonprofits focused on conservation and outdoor recreation.

2.8.1.3 Use nature-based solutions to reduce stormwater and flooding impacts

Description: Vegetated watersheds and floodplains provide room for water to spread out, slow down, and infiltrate into soil. Buildings and impervious surfaces in floodplains convey water quickly to downslope and downstream areas, which can worsen flooding and water quality in those areas. The State Construction Office's 2024 update to the NC Uniform

Floodplain Management Policy requires that major state construction projects consider implementing nature-based stormwater and flood reduction strategies and limits new construction on state lands subject to flood risk. This policy will help reduce future flood damage to state property, losses of state buildings and infrastructure, and saves the state on the costs of rebuilding.

Current leads: NCDOA – State Construction Office.

Current and potential partners: NCEM, all state agencies that own property, and local governments.

Examples include (but are not limited to):

The Uniform Floodplain Management Policy specifies that "examples of nature-based infrastructure designed to reduce flooding and other water-related impacts to and from construction include, but are not limited to:

- land conservation;
- preservation of trees and other natural landscape features outside of the required footprint for construction;
- wetland restoration and protection;
- floodplain restoration;
- greenways;
- stormwater parks;
- living shorelines, including oyster reefs and dunes;
- green roofs;
- rainwater harvesting with cisterns;
- suspended and other permeable pavement for plazas, parking areas, and sidewalks;
- disconnecting impervious surfaces where such surfaces are used;
- rain gardens;
- bioretention areas;
- tree canopies and trenches;
- and vegetated swales," (NCDOA 2024).

Strategies' design and engineering must be customized to the site's soil type and other constraints of the site and its position in the watershed.

The North Carolina Coastal Federation's 2020 Action Plan for Nature-based Stormwater Strategies is another resource that outlines how such strategies can be implemented

during new development and stormwater retrofits along roadways and on working lands.

2.8.1.4 Implement coastal nature-based resilience projects

Description: Protecting and restoring natural shorelines, wetlands, oyster beds, and seagrass can improve wildlife habitat, buffer storm surge, reduce coastal erosion, and reduce risk to people and property.

Current leads: NCDNCR – NCLWF, NCDEQ – DWR, and NCCF.

Current and potential partners: NCDEQ – DCM, DMF (Habitat Enhancement), State Resilience Office, and APNEP, NCWRC, NC Sea Grant, SASMI, ENCSLP, SERPPAS, Onslow Bight Conservation Forum, Cape Fear Arch Conservation Collaboration, American Rivers, Carolina Wetlands Association, NC Wildlife Federation, Sound Rivers, Pew Charitable Trusts, Audubon North Carolina, NC Coastal Land Trust and other accredited land trusts, Bald Head Island Conservancy, local governments and their consultants, USFWS, NPS, NERRs, NFWF, NOAA, the ECU Coastal Studies Institute, Duke University Marine Lab, NC State Center for Marine Sciences and Technology, UNC – Institute for Marine Sciences, UNCW, and corporations with climate goals.

Examples include (but are not limited to):

Local partners in Jacksonville, NC, have used NCLWF and Duke Energy Water Resources Fund grants, along with many volunteer hours, to implement their Oyster Highway project. Oyster restoration improves fisheries, cleans the water, and improves the New River for outdoor recreation.

Between 2025 and 2030, ACC grant funding will allow NCCF to preserve and restore at least 15 acres of peatlands and 595 acres of coastal habitats in NC, including marsh elevation and living shoreline projects. Consultants will help quantify carbon sequestration associated with these projects.

APNEP is currently developing grant opportunities focused on community-led environmental education, stewardship, restoration, and research tailored to meet regional needs and fill gaps in local capacity related to nature-based resilience projects. Funding will support projects that were not competitive for large federal and state grants (S. Feken, pers. comm. 2025).

2.8.1.4.1 Use living shorelines where appropriate to protect coastal ecosystems

Description: Living shorelines are natural alternatives to coastal bulkheads; made of oyster shells and other organic materials, they reduce wave energy and coastal erosion

associated with natural hazards while also providing marine habitat. Living shorelines can be scaled to many sizes. At the individual property scale, North Carolina Coastal Federation's cost share funding for living shorelines can help landowners implement these projects.

Figure 17: Living shoreline with oyster sill, credit NCCF

Figure 18: Living shoreline demonstration project at Rachel Carson Reserve, credit NC Coastal Reserve, NERR

A recent Duke Nicholas Institute report on Challenges and Solutions to Permitting Living Shoreline Projects outlines some key considerations for North Carolina. An "overview of living shoreline permitting and regulatory review" in NC and adjacent states provides further policy context.

Current leads: NCCF and local governments.

Current and potential partners: NCDEQ – DMF (Habitat Enhancement) and DCM, and the Nicholas Institute for Energy, Environment, & Sustainability at Duke University.

Examples include (but are not limited to):

In 2024, the NC Coastal Federation partnered with the NC Aquarium at Pine Knoll Shores and the NC Division of Parks and Recreation to construct a 4,214-foot living shoreline at heavily eroded areas along the Theodore Roosevelt Natural Area on Bogue Sound. This project aligned with NC Salt Marsh Action Plan goals to advance salt marsh protection and restoration. NC Aquarium, Duke University, East Carolina University, and NOAA worked with NCCF to identify priority areas for living shorelines at this site before determining the

ultimate project foodprint. NCLWF and the U.S. Fish and Wildlife Service-Southeast Aquatic Resources Partnership funding made it possible.

Outcomes of the project include protecting and restoring approximately 190 acres of salt marsh and oyster habitats that have been eroding due to storms and rising water levels. Restoring these habitats will help improve water quality in Bogue Sound and protect educational infrastructure and nature trails.

Additionally, this project funds a 3-year ECU and UNC Institute of Marine Sciences study on the relationship between living shorelines and the distribution of seagrass and salt marsh, turbidity, sedimentation, and their impact on fish habitat value and usage. This research will improve understanding of living shorelines' interaction with surrounding ecosystems and help guide their future design and implementation.

3 Next steps

3.1 An ongoing process

Protection and restoration of North Carolina's natural and working lands will require extensive, ongoing collaboration between environmental and natural resources professionals, planners, funders, researchers, and many others. Local, state, tribal, and federal governments, nonprofits, and private sector organizations all have a role to play and valuable skills and experiences to contribute. Fortunately, there is a rich history of collaboration in the NWL sector across different regions, roles, communities, and organizations.

3.2 Tracking progress

As part of future NWL Plan updates, organizations leading implementation of recommendations in this plan will provide input on the best ways to sustainably track their outputs and outcomes (including acreage conserved or restored and if applicable, GHG reduction estimates).

Progress toward NWL project implementation funded by the Atlantic Conservation Coalition grant will also be publicly viewable on a Duke Nicholas Institute dashboard that is updated quarterly.

3.3 Future NWL plan updates

EO 305 stipulates that NCDNCR will publish and deliver to the Governor an updated Natural and Working Lands Action Plan every three years that assesses progress of ongoing efforts and evaluates actions toward achieving EO 305 and 2020 NWL Action Plan goals. The NWL progress report published in October 2024 assessed progress and evaluated these actions for 2020 – 2024. Thus, the next progress update is scheduled to be completed by October 2027.

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5 Appendix

Table 8: Crosswalk between 2020 and 2025-2030 Plan Recommendations

2025 plan section	2025-2030 Plan recommendation	2020 Plan recommendation	2020 plan section	2020 plan internal tracking number
2.1	*Natural lands: Planning and technical assistance*			
2.1.1	**Use targeted mapping and planning to inform conservation and restoration decisions**			
2.1.1.1	Map and inventory wetlands to inform conservation and restoration efforts	Implement targeted interventions to protect peatlands from sea level rise and saltwater intrusion guided by scenario-based modeling	5.5.2 (Strategy 2)	15
2.1.2	**Modernize forest policy and tax incentives**			
2.1.2.1	Extend the Conservation Tax Credit and expand eligible public benefits	Reinstate the Conservation Tax Credit	5.3.1 (Strategy 1)	6b
2.2	*Natural lands: Implementation*			
2.2.1	**Conserve natural lands to improve ecosystem and community resilience**			
2.2.1.1	Conserve forests and wetlands in flood-prone areas	Protect and restore forests and wetlands [in flood-prone areas]	5.1.1	1
2.2.1.2	Conserve land for salt marsh and other coastal ecosystem migration inland	Facilitate salt marsh migration through protection of migration corridors	5.6.1 (Strategy 2)	17

2.2.1.3	Increase recurring funding for statewide land conservation	Increase state funding available to landowners, land trusts, and other conservation organizations for restoration and reforestation	5.3.2 (Strategy 2, Roadmap for Action)	8a
2.2.2	**Restore natural lands to improve ecosystem and community resilience**			
2.2.2.1	Expand restoration and reforestation of public land	Expand restoration efforts on publicly owned lands	5.3.2 (Strategy 1)	7
2.2.2.2	Expand restoration and reforestation of private land	Encourage restoration and reforestation on private lands	5.3.2 (Strategy 2)	8
2.2.2.3	Fund large-scale watershed restoration projects	Develop and implement coordinated landscape scale hydrological restoration strategies	5.6.2 (Strategy 1)	18d
2.2.2.4	Restore tribal access to natural lands and waters	(New recommendation stemming from 2020 plan background: value of the land and ecosystem services)	4.2.1	N/A
2.2.3	**Support partnership approaches to conserving and restoring at-risk ecosystems**			
2.2.3.1	Prioritize peatland conservation and restoration	Rewet hydrologically altered peatlands to prevent soil loss and catastrophic fire	5.5.1 (Strategy 1)	12
2.2.3.1.1	Conserve and restore peatlands on state-owned and/or large tracts of land	Prioritize [peatland] restoration opportunities with focus on state-owned and large scale needs	5.5.1 (Strategy 1, Roadmap for Action)	12a

2.2.3.1.2	Engage private landowners in peatland conservation and restoration	Engage private landowners and other interested parties [in peatland conservation]	5.5.1 (Strategy 1, Roadmap for Action)	12c
2.2.3.2	Continue to dedicate funding for wetland conservation and restoration	Explore dedicated funding and leveraging opportunities to expand scale of peatland restoration on state owned lands	5.5.1 (Strategy 1, Roadmap for Action)	12d
2.2.3.3	Partner across sectors to conserve and restore coastal habitats	Provide incentives to stakeholders for coastal habitat protection	5.6.1 (Strategy 1)	16b
2.2.3.4	Conserve and restore submerged aquatic vegetation	Included in recommendation to "Provide incentives to stakeholders for coastal habitat protection;" also included in "New Ideas: Blue Carbon"	5.6.1 (Strategy 1) and 4.2	16b
2.3	*Working lands: Planning and technical assistance*			
2.3.1	**Increase agricultural and forest landowner access to technical and financial assistance**			
2.3.1.1	Support diverse forest product markets that sustain working forestlands	Support wood products markets	5.3.3 (Strategy 2)	10/10a
2.3.1.2	Increase state funding for the Forest Development Cost Share Program	Included in recommendation to "increase landowner access to forest management assistance, including technical and financial assistance"	5.3.3 (Strategy 1)	9b

2.3.1.3	Share resources about voluntary forest carbon offset options	Facilitate voluntary landowner participation in carbon offset and ecosystem services markets	Adapted from 5.1.2 by authors of 2022 NWL Progress Update	2
2.3.1.4	Expand access to information about agricultural conservation practices	Encourage adoption of high mitigation agricultural conservation practices on croplands and pasturelands	5.8.1 (Strategy 1)	23
2.3.1.5	Expand access to cost-share funding for controlled drainage infrastructure and other peatland BMPs	Included in recommendation to "Enhance soil health and retention of working peatlands via best management practices and drainage management"	5.5.2 (Strategy 1)	14b
2.4	*Working lands: Implementation*			
2.4.1	**Support programs that promote working lands' resilience and ecosystem services**			
2.4.1.1	Support sustainable management of working forestland	Increase landowner access to forest management assistance, including technical and financial assistance	5.3.3 (Strategy 1)	9
2.4.1.2	Expand agricultural conservation practice implementation	Encourage adoption of high mitigation agricultural conservation practices on croplands and pasturelands	5.8.1 (Strategy 1)	23

2.4.1.2.1	Increase funding for Soil and Water Conservation District cost-share programs	Included in recommendation to "Encourage adoption of high mitigation agricultural conservation practices on croplands and pasturelands"	5.8.1 (Strategy 1, Roadmap for Action)	23a
2.4.1.3	Preserve working farmland and enhance ecosystem services	(New recommendation in 2025-2030 NWL plan)	N/A	N/A
2.4.1.4	Restore natural floodplain conditions that benefit working lands, reduce risk, and improve water quality	Protect and restore floodplains	5.4.1 (Strategy 1)	11e
2.5	*Developed lands: Planning and technical assistance*			
2.5.1	**Promote urban forest assessment, management, and reforestation**			
2.5.1.1	Support planning efforts to retain urban forest ecosystem services	Included in recommendation to "Promote urban forests through statewide programs to foster the retention of urban trees and their proper management"	5.7.1 (Strategy 1)	19
2.5.1.1.1	Develop statewide best practices for tree protection, management, and care	Included in recommendation to "Promote urban forests through statewide programs to foster the retention of urban trees and their proper management"	5.7.1 (Strategy 1, Roadmap for Action)	19b
2.5.1.1.2	Maintain urban tree lists to recommend trees that will thrive in urban areas	Research urban forestry climate adaptation and urban canopy baseline needs	5.7.2 (Strategy 2, Roadmap for Action)	22d

2.5.1.2	Use tree canopy cover data to identify opportunities to restore urban forests	Included in recommendation to "Promote urban forests through statewide programs to foster the retention of urban trees and their proper management"	5.7.1 (Strategy 1)	19
2.5.1.2	Standardize tree canopy assessment data	Included in recommendation to "Research urban forestry climate adaptation and canopy baseline needs"	5.7.2 (Strategy 2, Roadmap for Action)	22b
2.5.1.2.1	Compile urban tree canopy assessment GIS data in a state-managed database	Included in recommendation to "Research urban forestry climate adaptation and canopy baseline needs"	5.7.2 (Strategy 2, Roadmap for Action)	22a
2.5.1.3	Increase technical assistance, training, and funding for urban forestry	Included in recommendation to "Promote urban forests through statewide programs to foster the retention of urban trees and their proper management"	5.7.1 (Strategy 1, Roadmap for Action)	19
2.5.1.3.1	Secure sustainable funding for adequate urban and community forestry program staff	Included in recommendation to "Promote urban forests through statewide programs to foster the retention of urban trees and their proper management"	5.7.1 (Strategy 1, Roadmap for Action)	19a
2.5.2	**Provide technical assistance and training on nature-based resilience solutions for developed areas**			
2.5.2.1	Build local government capacity to address stormwater and flooding impacts	(New recommendation in 2025-2030 NWL plan)	N/A	N/A

2.5.2.2	Incentivize local implementation of green stormwater infrastructure and other nature-based solutions	Improve site preparation and soil amendment during land development	5.7.2 (Strategy 1)	21
2.5.2.3	Maintain and expand NC Resilience Exchange resources and local training capacity	Resulted from and builds on 2020 recommendation to "Build a natural and working lands solutions toolbox"	5.1.3	3
2.6	*Developed lands: Implementation*			
2.6.1	**Promote land management strategies that improve ecosystem and community resilience**			
2.6.1.1	Support and expand urban tree planting	Builds on recommendation to "Restore forest land"	5.3.2	7
2.6.1.2	Encourage best practices for site preparation and soil during development	Improve site preparation and soil amendment during land development	5.7.2 (Strategy 1)	21
2.6.1.3	Inform, assist, and fund voluntary property buyouts in high-hazard areas	Included in recommendation to "Protect and restore floodplains"	5.4.1 (Strategy 1)	11b
2.6.1.4	Preserve natural and working lands during infrastructure development	(New recommendation in 2025-2030 NWL plan)	N/A	N/A
2.7	*Multiple land uses: Planning and technical assistance*			
2.7.1	**Integrate NWL and resilience strategies into planning efforts**			
2.7.1.1	Incorporate NWL programs, resources, and recommendations into planning efforts	Builds on recommendation to "Integrate climate adaptation and resiliency into local comprehensive plans"	5.1.4	4c
2.7.1.2	Help local governments integrate hazard resilience into planning documents	Prioritize climate change and sea-level rise in coastal habitat restoration planning	5.6.2 (Strategy 1)	18

2.7.1.3	Support local governments' progression from vulnerability assessments to resilience project implementation	Included in recommendation to "Build a natural and working lands solutions toolbox"	5.1.3	3a
2.7.2	**Provide technical assistance and training on the benefits of NWL strategies**			
2.7.2.1	Convey the importance of NWL strategies through public education, training, and communications	Builds on/expands recommendation to "Provide incentives to stakeholders for coastal habitat protection"	5.6.1 (Strategy 1)	16d
2.7.2.2	Provide funding and technical assistance to local governments for conservation planning	Builds on recommendation to "Build a natural and working lands solutions toolbox"	5.1.3	3
2.8	*Multiple land uses: Implementation*			
2.8.1	**Use proactive nature-based solutions to increase ecosystem and community resilience**			
2.8.1.1	Protect forested land to protect downstream drinking water sources	Protect and restore forested lands in water supply watersheds	5.7.1 (Strategy 2)	20
2.8.1.2	Use prescribed burning to manage forest habitat and reduce wildfire risk	Builds on recommendation to "Increase landowner access to forest management assistance, including technical and financial assistance"	5.3.3 (Strategy 1)	9
2.8.1.3	Use nature-based solutions to reduce stormwater and flooding impacts	Builds on recommendation to "Protect and restore floodplains"	5.4.1 (Strategy 1)	11d
2.8.1.4	Implement coastal nature-based resilience projects	Builds on recommendation to "Provide incentives to stakeholders for coastal habitat protection"	5.6.1 (Strategy 1)	16b

2.8.1.4.1	Use living shorelines where appropriate to protect coastal ecosystems	Builds on recommendation to "Provide incentives to stakeholders for coastal habitat protection"	5.6.1 (Strategy 1, Roadmap for Action)	16