

Contents

6.1	Local and Regional Initiatives	2
6.1.1	Sturgeon City, Jacksonville, NC.....	2
6.1.2	North Carolina Coastal Federation	3
6.1.3	New Hanover County Soil & Water Conservation District (NHCSWCD).....	5
6.1.4	Councils of Governments (COG).....	5
6.1.5	Coastal Habitat Protection Plan (CHPP).....	6
6.1.6	North Carolina Coastal Land Trust.....	8
6.1.7	Defense Coastal/Estuarine Research Program (DCERP)	8
6.2	Statewide Initiatives	8
6.2.1	Stream Watch.....	9
6.2.2	It’s Our Water	9
6.2.3	Project WET.....	9
6.2.4	Watershed Wisdom.....	9
6.3	Growth Management and Land-Use Planning.....	9
6.3.1	Forest Management and Reforestation	10
6.3.2	Conservation of Forests.....	11
6.3.3	Conservation and Preservation	12
6.4	Division of Coastal Management	13
6.5	Division of Marine Fisheries.....	13
6.6	Grants and Funding Opportunities	14
6.4.1	Grants Administered by the Division of Water Resources (DWR)	14
6.4.2	North Carolina Land and Water Fund (NCLWF).....	14
6.4.3	Grants Administered by the Division of Water Infrastructure (DWI).....	15
6.4.4	Cost Share Programs for Best Management Practices (BMPs).....	17
6.7	References.....	19

Chapter 6

Water Quality Initiatives and Funding

The future of our rivers, streams, wetlands, and estuaries are closely linked to land use decisions made on both a public and private scale with private landowners playing a major role in protecting waters of the state through conservation and various land use management practices. This chapter explores various options for protecting natural resources and includes general information as it relates to local, regional, and state initiatives along with planning resources and funding opportunities.

6.1 Local and Regional Initiatives

Working at the local level, local organizations and agencies can combine professional expertise in a watershed. Involving a wide array of people in water resource projects brings together a wide range of knowledge and interests and encourages others to become involved and invested in protecting water resources in their own backyard. Local initiatives are essential because people within the immediate area can make decisions that affect change in their own community. It also encourages the community to understand holistically the challenges and opportunities for protecting these resources. Working in coordination across jurisdictional and agency lines can also open the door for more funding opportunities. More diversified funding allows local entities to do more work and be involved in more activities.

The collaboration of local efforts is key to water quality improvements and there are good examples of local agencies and groups using these cooperative strategies throughout the state to protect natural resources. The Division of Water Resources' (DWR) Basin Planning Branch (BPB) applauds and supports the foresight and proactive response of local watershed groups and local governments to protect and manage water resources.

6.1.1 Sturgeon City, Jacksonville, NC

[Sturgeon City](#) is a recreational greenspace and environmental education site located on the New River, Wilson Bay, in Jacksonville, North Carolina. Several University of North Carolina schools are academic partners. Sturgeon City serves as a case study of how to build an enduring and effective academic community partnership.

Historically, Wilson Bay and the New River were popular areas for boating, fishing, swimming, and commercial fishing. The estuarine Wilson Bay once supported a broad range of aquatic species. However, it also served as the discharge site for Jacksonville's municipal waste treatment plant. Eight additional treatment plants, one a short distance above Wilson Bay, and the others farther downriver, served local military bases. As the city and military base populations grew, the plants proved inadequate to handle the growing volume of wastewater. Discharges from the plants and runoff from communities degraded water quality, and the bay was closed to recreational use and commercial fishing. Levels of fecal waste routinely exceeded environmental sanitation standards. High loads of organic material accelerated the eutrophication of the bay, creating low dissolved oxygen on the bottom and markedly reducing its ability to support benthic organisms. Six treatment plants operated by the U.S. Marine Corps were consolidated into a modern tertiary treatment facility, and a seventh was upgraded. Subsequently, to The Wilson Bay Initiative, Riverworks, and the Sturgeon City Partnership 123 accommodate the growing needs of the community, the City of Jacksonville invested \$50 million to develop a land-waste application system for

its waste and closed the municipal waste facility located on Wilson Bay (City of Jacksonville, 2011). Decommissioning the wastewater treatment plants was the first step toward the recovery of Wilson Bay and the New River.

6.1.2 North Carolina Coastal Federation

The North Carolina Coastal Federation has worked since 1982 to protect and restore the North Carolina coast. They work with people from all walks of life for clean water, living shorelines that reduce sound side erosion, thriving oysters that support the environment and economy, sound coastal management and a coast that is free of marine debris. They are a member-supported nonprofit organization committed to protecting and restoring the North Carolina coast. The North Carolina Coastal Federation has been a partner in the following projects in the White Oak River basin.

□ [Swansboro Watershed Restoration Plan](#)

In 2017, the Town of Swansboro proactively developed a watershed restoration plan to reduce the effects of stormwater runoff and enhance its environmental stewardship of the White Oak River and surrounding waters. This document provides an overview of the current and historical conditions of the major Swansboro watersheds and proposes methods and strategies intended to reduce the flow of stormwater runoff to improve water quality in the river and its watersheds. The Swansboro Watershed Restoration Plan emphasizes the application of the Environmental Protection Agency (EPA) Nine Minimum Elements, the North Carolina Department of Environmental Quality (DEQ) Section 319 office guidelines and practiced coastal watershed restoration methods developed by the plan's partners.

□ [Bradley and Hewletts Creeks Watershed Restoration Plan](#)

Bradley and Hewletts creeks are polluted with unacceptably high levels of fecal bacteria that have resulted in a prohibition on the harvest of shellfish for human consumption. In addition, swimming advisories are frequently issued within the Bradley Creek watershed at Wrightsville Beach due to unacceptable levels of enterococci bacteria. Shellfish closures and swimming advisories are indicators of poor water quality and result in some of these waters being listed as "impaired" by the US Environmental Protection Agency (EPA). With support from the NC Division of Water Quality (DWQ), the City of Wilmington working with the Town of Wrightsville Beach and its partner the North Carolina Coastal Federation (NCCF), developed a comprehensive voluntary watershed [restoration plan](#) in 2006 with the goal of reducing pollution in these waterways. This plan covered these two watersheds for the purposes of qualifying to use EPA Section 319 funding to restore impaired water quality. The North Carolina Coastal Federation and the City of Wilmington received an [EPA 319 grant in 2016](#) in the amount of \$179,784 (including matching funds) to implement elements of the plan. Other grants awarded since 2016 that are supported by this plan are:

[Implementing Public & Private Retrofits to Reduce Stormwater Runoff Volume & Pollutants in the Bradley Creek Watershed](#)

[Reducing Stormwater Runoff Volume on the UNC-Wilmington Campus](#)

[Implementing the Bradley & Hewletts Creeks Watershed Restoration Plan](#)

[Hewletts Creek Water Quality Improvement Project](#)

□ [Beaufort Watershed Restoration Plan](#)

The Town of Beaufort developed a watershed restoration plan to reduce stormwater runoff in the Town Creek, Taylor Creek, and Davis Bay watersheds. This document provides an overview of the past and present conditions of the Beaufort Watersheds and proposes methods and strategies intended to reduce the volume of stormwater runoff to improve water quality in the watersheds. Mimicking natural drainage processes protects life and properties from flooding, improves the aesthetics of urban areas and maintains the water quantity and quality requirements of receiving water bodies. This plan combines low-cost, high-yield strategies such as community outreach initiatives and lot level retrofit projects aimed at reducing the impact of impervious surface by mimicking natural hydrology to reduce flooding and protect water quality. The Beaufort Watershed Restoration Plan emphasizes the application of the Environmental Protection Agency (EPA) Nine Minimum Elements, the North Carolina Department of Environmental Quality (DEQ) Section 319 office guidelines and practiced coastal watershed restoration methods developed by the plan's partners. This plan is the result of nearly two-year long process lead by citizens of Beaufort and the Town of Beaufort, Eastern Carolina Council, and North Carolina Coastal Federation.

□ [White Oak Watershed Restoration](#)

The White Oak River is 48-miles-long and runs through Jones, Onslow and Carteret counties. The river includes saltwater marshes and hardwood swamps that are home to a variety of fish and wildlife. It is used for fishing, swimming, kayaking and boating and has cultural and historical significance. The White Oak River Restoration Plan promotes simple solutions to infiltrate rain and reduce polluted runoff flowing into Dubling Creek, Boathouse Creek, Hills Bay and the waters north of the N.C. 24 bridges in Cedar Point, on the Carteret County side of the river.

□ [Pine Knoll Shores Watershed Restoration Nine-Element Plan](#)

This Watershed Restoration Plan provides a voluntary management framework to address water quality impairments in seven Pine Knoll Shores watersheds. The watersheds have experienced increased volumes of stormwater runoff from land use activities. This increased runoff transports bacteria and other pollutants causing surface water quality impairments. This plan includes strategies for restoring or mimicking the natural, pre-development hydrology of the watersheds prior to water quality impairment. Mimicking natural drainage processes can reduce runoff and nuisance flooding and help restore water quantity and quality requirements of receiving water bodies. This restoration plan will be the beginning of a multi-year process to implement and maintain, manage, and mitigate stormwater runoff pollution. This plan combines low-cost, high-yield strategies such as community outreach initiatives and targeted retrofit projects aimed at reducing the impact of impervious surface by mimicking natural hydrology to reduce flooding, protect water quality, and provide the community with clean, usable waters. The nonregulatory Pine Knoll Shores Watershed Restoration Plan includes all Nine Minimum Elements of a watershed management plan as recommended by the EPA to qualify to be eligible to apply for federal 319 Grant funding opportunities. The information provided in this plan enables the participating partners to easily source technical information necessary to apply for other state and national grant opportunities. This plan seeks to:

- Restore and maintain the water quality of seven Pine Knoll Shores watersheds.
- Reduce instances of localized flooding to improve safety and protect property.
- Prioritize cost effective Low Impact Development and stormwater retrofit techniques to address stormwater management.

6.1.3 New Hanover County Soil & Water Conservation District (NHCSWCD)

The New Hanover Soil & Water Conservation District (NHCSWCD) works collaboratively with county and city departments to improve water quality throughout the county by conserving land, managing stormwater, providing technical support to citizens, and providing education and outreach about natural resources. The City of Wilmington partnered with the NHCSWCD and other local non-profit, government, and private sector organizations to develop a program aimed at reducing the volume of polluted runoff reaching Bradley and Hewletts creeks. [Heal Our Waterways](#) is a City of Wilmington-led initiative to achieve the volume reduction targets identified within the Bradley and Hewletts Creeks Watershed Restoration Plan, which was created in partnership with the North Carolina Coastal Federation (NCCF). The HOW Program regularly partners with the North Carolina Coastal Federation, NC State University, New Hanover Soil and Water Conservation District, UNC-Wilmington, and other local stakeholders to facilitate the implementation of volume-reducing Stormwater Control Measures (SCMs) within the Bradley and Hewletts Creek Watersheds.

NHCSWCD is recognized as a county department and has a budgeted line item from the county for the installation of urban BMPs through the Community Conservation Assistance Program (CCAP). It allows for 100% cost share for CCAP BMPs installed in the Bradley-Hewletts Creek watershed. For 2019-2020, the NHCSWCD was slated to receive \$15,000 with \$5,000 carry-over from previous year funds. Cost share funds are also available for unincorporated areas through the Water Quality Improvement Program. Projects in unincorporated areas will receive 50% cost share. As with many of the programs managed by the NHCSWCD, the goal is to reduce stormwater to local waterways to protect water quality. The NHCSWCD continues to be committed to supporting and recommending more funding for the implementation of stormwater BMPs statewide through CCAP. More information about the [NHCSWCD](#) is available online.

6.1.4 Councils of Governments (COG)

Regional councils of governments (COG) are multi-county planning and development agencies serving different areas of the state. Membership in these councils is voluntary. In North Carolina, 17 councils serve regions that share similar economic, physical and social characteristics. Their function is to aid, assist and improve the capabilities of local governments in administration, planning, fiscal management and development.

Two COGs serve counties in the White Oak River basin. The [Eastern Council COG](#) (Region P) serves Carteret, Craven, Greene, Jones, Lenoir, Onslow, Pamlico, and Wayne counties and the [Cape Fear COG](#) (Region O) serves Brunswick, Columbus, New Hanover, and Pender counties. The Eastern Regional COG has been involved in various planning projects in the White Oak basin including stormwater mapping in Pine Knoll Shores and other municipalities. They also created a partnership with Marine Corps Air Station Cherry Point and the NC Wildlife Resources Commission to implement a Green Growth Project that identified critical habitats and threatened or endangered species on undeveloped properties adjacent to the base and studied impacts from military activity. More information about the COGs serving counties in the Chowan River basin can be found on either the [North Carolina Association of Regional Councils of Governments](#) (NCARCOG) website or on each COGs respective website.

6.1.5 Coastal Habitat Protection Plan (CHPP)

The North Carolina Coastal Habitat Protection Plan (CHPP) is the result of North Carolina's Fisheries Reform Act (FRA) passed by the General Assembly in 1997. The CHPP is a guidance document that addresses habitat and water quality efforts needed to protect, enhance, and restore fish habitat along North Carolina's coasts and aligns closely with APNEP's CCMP. Several agencies within DEQ have jurisdiction over marine fisheries, water quality and coastal management. Representatives from these agencies, along with several agencies outside DEQ, develop and implement the CHPP. The Division of Marine Fisheries (DMF), however, is the lead agency.

There are four major goals (improve effectiveness of existing rules and programs, identify and delineate strategic coastal habitats, enhance and protect habitats from adverse physical impacts, and enhance and protect water quality) with multiple recommendations under each to achieve the overarching goal of long-term improvement of coastal fisheries through habitat protection and enhancement efforts. Recommendations include:

- Coordinate and enhance assessment and monitoring of effectiveness of rules established to protect coastal habitats. (Recommendation 1.2b)
- Continue to coordinate among commissions and agencies on coastal habitat management issues. (Recommendation 1.4)
- Enhance management of invasive species with existing programs. Monitor and track status in affect waterbodies. (Recommendation 1.6)
- Support assessments to classify habitat value and conditions by selectively monitoring the condition and status of those habitats. (Recommendation 2.1b)
- Expand habitat restoration, including increasing subtidal and intertidal oyster habitat through restoration. (Recommendation 3.1a)
- Improve management of estuarine and public trust shorelines and shallow water habitats by revising shoreline stabilization rules to include consideration of site-specific conditions and advocate for alternatives to vertical shoreline stabilization structures. (Recommendation 3.4)
- Protect and restore habitat for migratory fishes by restoring fish passage through elimination or modifications of stream obstructions, such as dams and culverts. (Recommendation 3.5b)
- Prevent additional shellfish closures and swimming advisories by continuing to phase out existing outfalls by implementing alternative stormwater management strategies. (Recommendation 4.3c)
- Maintain effective regulatory strategies throughout the river basins to reduce nonpoint pollution and minimize cumulative losses of fish habitat, including use of vegetated buffers and established stormwater controls. (Recommendation 4.6)
- Maintain adequate water quality conducive to the support of present and future mariculture in public trust water. (Recommendation 4.7)

To implement recommendations in CHPP, the CHPP team develops specific actions in a separate implementation plan. The most recent implementation was developed for 2018-2020. DWR has participated in several of the recommendations identified in the CHPP (Table 6-1).

Table 6.1 Implementation of Recommendations Identified in the 2018-2020 CHPP Implementation Plan

RECOMMENDATION: Provide information to focus students in K-12 understanding of biodiversity in lakes, streams, and estuaries.

ACTIONS:

- Project WET*
- It's Our Water*
- NC Stream Watch*
- Watershed Wisdom*

**More information and interactive links to these programs can be found in the Statewide Initiatives section of this Chapter.*

RECOMMENDATION: Assess invasive submerged aquatic vegetation (SAV) in the APNEP region annually and continue to coordinate invasive SAV treatment with DMF and APNEP.

ACTIONS:

- The DWR Aquatic Weed Control Program (AWCP) maintains a database serving as an archive of management activities. The database contains a query tool to allow users to access data by searching by project name. The AWCP database can be accessed [here](#). Full list of plants designated by DEQ as noxious aquatic weeds can be found [here](#).

RECOMMENDATION: DWR and the Division of Mitigation Services (DMS) will support and pursue aquatic passage barrier removal policies and projects where appropriate.

ACTIONS:

- DWR and DMS support and participate in the [NC Aquatic Connectivity Team](#), the lead organization for aquatic passage improvements in NC. The DWR grant program managers (Section 319 & Water Resources Development Program) and the 401 Permitting Unit provide information to the NC Aquatic Connectivity Team about aquatic barrier removal projects. The Southeast Aquatic Resources Partnership (SARP) maintains a comprehensive list of known dam removal projects in North Carolina and throughout the Southeastern United States.

Currently the CHPP is being amended as called for in the FRA of 1997. The focus of the amendment will be on environmental rule compliance to: protect habitat; monitoring habitat to assess status and regulatory effectiveness; SAV protection and restoration, focusing on water quality improvements, wetland protection and enhancement using nature-based methods; and reducing inflow and infiltration associated with wastewater infrastructure to improve coastal water quality. The goal is to have the amendment finalized and voted on by the three regulatory commissions (Marine Fisheries, Coastal Management, and Environmental Management) during the summer of 2021 for final adoption. Prior to the amendment being adopted, it will be reviewed by DEQ, and a series of public hearings will be held. It is anticipated that no changes will be made to CHPP's source document. More information about CHPP and the implementation plans can be found on CHPP's [website](#).

6.1.6 North Carolina Coastal Land Trust

The North Carolina Coastal Land Trust is a non-profit organization formed in 1992 to help protect locally and regionally valuable natural areas. Since its inception, the Coastal Land Trust has protected over 40,000 acres of barrier island beaches, riparian corridors, and other special natural areas. One of its newest preserves, the Everett Creek Preserve in Onslow County, features 240 acres of longleaf pine and mixed hardwoods, as well as a pollinator garden and hiking trails. The purpose of the preserve is to enhance water quality along Everett Creek as well as serve as an undeveloped buffer to the Marine Corps Base Camp Lejeune. It also strives to protect and restore native plant communities and provide for environmental education opportunities. More information about the NC Coastal Land Trust and all of its many tracts of protected habitat in the White Oak River basin can be found on their [website](#).

6.1.7 Defense Coastal/Estuarine Research Program (DCERP)

The [Defense Coastal/Estuarine Research Program \(DCERP\)](#) was a U.S. Department of Defense (DoD) project implemented to verify the science behind ecosystem-based management at a DoD coastal installation. An ecosystem-based management approach is required by all DoD facilities. Ecosystem-based management is an environmental management approach that recognizes the array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation ([Christensen et al. 1996](#)).

Marine Corps Base Camp Lejeune in Jacksonville was chosen as the host installation for this 10-year integrated research and monitoring program. The results of this study are being used to identify ecosystem indicators and develop associated threshold values, tools, or models to inform DoD installation management needs.

DCERP was conducted over two contract periods. DCERP1 ran from July 2006 through January 2013, and focused ecosystem evaluation relative to a military training environment. DCERP2 ran from February 2013 until October 2017. This effort focused on the coastal ecosystem response to climate change and to understand what environmental conditions result in changes to the carbon cycles in these ecosystems.

Development encroachment around coastal military bases and environmental regulations places military training and testing at risk. Therefore, the goals of DCERP are: to understand MCBCL's diverse coastal and estuarine ecology and its interaction with training activities; impact of climate change on infrastructure and training lands; develop practical decision support tools, models and other management resources to facilitate mindful training needs balanced with sensitivity to natural systems; and develop plans for future carbon goals.

6.2 Statewide Initiatives

In addition to local and regional projects and initiatives, there are several state and federal agencies that work statewide to protect and educate people about our natural resources. Examples of a few such initiatives are identified here.

6.2.1 Stream Watch

Stream Watch is housed within DWR, but it relies on information collected by citizens across the state. The program encourages neighbors, civic groups and businesses to adopt a local stream, keep an eye out for any problems that might occur, and work together to ensure that the stream is healthy and able to support wildlife habitat, recreation and other uses. For more information about Stream Watch and how to get involved, visit the Stream Watch [website](#).

6.2.2 It's Our Water

It's Our Water is a complete curriculum divided into five modules. Each module begins with a short video that presents a water quality topic, reviews scientific principles, shows real-life examples of current water issues, and introduces students to various professions related to water. Classroom demonstrations, discussions, homework, quizzes, and hands-on activities reinforce major concepts and prepare students for field investigation. Students develop an understanding of how these water resource issues affect them directly by investigating the stream nearest their school. The skills and knowledge required in each module build on earlier modules. Students will work towards completing a final project that examines the status of the water quality in their stream and offers recommendations for managing the stream. More information about It's Our Water can be found [here](#).

6.2.3 Project WET

Project WET aims to engage children, parents, teachers and members of the community in water resources education by advocating awareness of water and community involvement in water-related issues. This program achieves this by facilitating training workshops and community events that bring together science, social studies and health education topics. The end result of these community level engagement efforts is a connected network of citizens, professionals and scientists. More information on how to participate in Project WET can be found [here](#).

6.2.4 Watershed Wisdom

[Watershed Wisdom](#) is a UNC-TV science-based curriculum, geared toward 4th and 5th grade but useable for all ages, that combines hands-on projects and interactive components to provide a robust blended lesson that introduces the value of water and maintaining healthy watershed ecosystems. Watershed Wisdom was developed in partnership with North Carolina Sea Grant, Project Wet, North Carolina Watershed Stewardship Network ([WSN](#)), and North Carolina Resources Institute (PBS Learning Media and UNC TV, 2020).

6.3 Growth Management and Land-Use Planning

Growth management can be defined as the application of strategies and practices that help achieve sustainable urban development and redevelopment while also conserving environmental qualities and features. Growth management tools range from on-the-ground best management practices (BMPs), such as stormwater wetlands, living shorelines, cisterns and vegetated (riparian) buffers, to establishing water, wastewater and/or stormwater authorities.

Several resources are available for protecting and managing water resources and include information about how to incorporate management strategies into existing and new development or changes in land use. Some examples include:

[Watershed Academy](#): The Watershed Academy is available online through EPA’s website. Online training modules, webcasts and publications are available for review.

[Center for Watershed Protection \(CWP\)](#): The Center for Watershed Protection (CWP), also referred to as the Center, is a nonprofit organization dedicated to research and education on the impacts of land use on watersheds throughout the nation. Several articles, reports, etc., are available through an online watershed library (OWL).

[Low Impact Development \(LID\) Center](#): The Low Impact Development (LID) Center is a nonprofit national research organization that focuses on sustainable stormwater management solutions. Several projects are available for review.

[Stormwater Design Manual](#): The Stormwater Design Manual, developed by the North Carolina Division of Energy, Mineral and Land Resources (DEMLR), is a technical guidance document about implementing the rules pertaining to post-construction stormwater measures. The companion manual, Stormwater Control Measure (SCM) Credit Document, includes the state’s estimation of each SCM’s effectiveness in protecting hydrology and removing pollutants.

[Green Growth Toolbox \(GGT\)](#): The Green Growth Toolbox (GGT) is a technical assistance tool designed to help communities conserve high-quality habitats as municipalities continue to grow. The toolbox is the result of a cooperative, non-regulatory effort led by the Wildlife Diversity program of the North Carolina Wildlife Resources Commission (WRC). A handbook, GIS dataset, training workshops and technical assistance are available for review and download.

[Living Shorelines Academy](#): The Living Shoreline Academy has created tools to “evaluate the understanding, importance and practice of using living shorelines to enhance on-the-ground storm resiliency and create wetlands.” The Academy provides training modules and includes a database of white papers and reports on existing living shoreline projects, a library of living shoreline resources and a map highlighting living shoreline projects across the United States. The Academy was developed in partnership by the NC Coastal Federation, Restore America’s Estuaries, the Southern Environmental Law Center, and the Environmental Protection Agency (EPA). The NC Coastal Federation and DEQ’s Division of Coastal Management (DCM) (Coastal Management Estuarine Shorelines) also has several resources available their websites.

6.3.1 Forest Management and Reforestation

Private forest landowners can work with the North Carolina Forest Service (NCFS) and/or forestry consultants to plan the management of their resources. The NCFS offers several types of plans that can be prepared depending on landowner objectives. The two most frequently used plans are [Forest Management Plans and Forest Stewardship Plans](#). NCFS personnel often prepare Forest Management Plans for landowners whose primary objective is timber management. These plans provide written prescriptions for specific forestry activities and include recommendations for minimizing impacts to water quality. Forest Stewardship Plans are prepared for landowners who want to enhance natural areas on their property and manage for additional resources beyond timber, including wildlife habitat, cultural resources, recreation, non-timber forest products, or aesthetics.

Between July 2007 and June 2012, the NCFS assisted with 120 Forest Management Plans on 9,584 total acres and 8 Stewardship Plans on 903 total acres.

Between July 2012 to June 2017, the NCFS assisted with 93 Forest Management Plans on 5,279 total acres and 12 Stewardship Plans on 657 total acres.

Between July 2017 and June 2020, the NCFS assisted with 42 Forest Management Plans on 2,097 total acres and 12 Stewardship Plans on 732 acres (Table 6.2) (Coats, 2020).

Table 6.2 Forest Management and Stewardship Plans in the White Oak River Basin

Time Period	Forest Management Plans	Total Acres	Forest Stewardship Plans	Total Acres
07/2007 - 06/2012	120	9,584	8	903
07/2012 - 06/2017	93	5,279	12	657
07/2017 - 06/2020	42	2,097	10	732

The NCFS also administers the [Forest Development Program](#) (FDP). The FDP is a reforestation, afforestation, and forest-stand improvement cost-sharing program. To qualify, a landowner must have a forest management plan approved by NCFS. Under the FDP, a landowner is partially reimbursed for the costs of site preparation, seedling purchase, tree planting, release of desirable seedlings from competing vegetation, or any other work needed to establish a new forest. The FDP can complement federal cost-share programs such as the Conservation Reserve Program (CRP) through the U.S. Department of Agriculture (USDA).

Between July 2007 and June 2012, the NCFS assisted with reforestation after 54 harvests, on a total of 3,323 acres and at 6 additional non-forested tracts, on a total of 258 acres.

Between July 2012 and June 2017, the NCFS assisted with reforestation after 14 harvests, on a total of 437 acres and at 5 additional non-forested tracts, on a total of 38 acres.

Between July 2017 and June 2020, the NCFS assisted with reforestation after 6 harvests, on a total of 221 acres. The values do not include tracts that may have been reforested without NCFS assistance, converted to other uses, or left alone to revegetate naturally (Table 6.3).

Table 6.3 Forest Development Program (FDP) in the White Oak River Basin

Time Period	Reforestation (After Harvests)	Total Acres	Non-Forested Tracts	Total Acres
07/2007 - 06/2012	54 Harvests	3,323	6	258
07/2012 - 06/2017	14 Harvests	437	5	38
07/2017 - 06/2020	6 Harvests	221	-	-

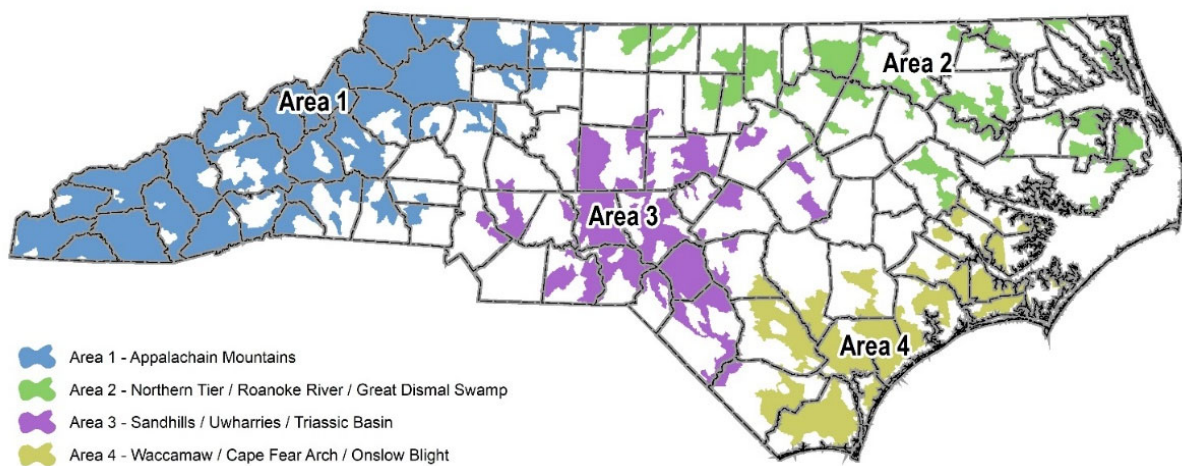
More information about forestry in the White Oak River basin can be found in Chapter 1 which provides an overview of basin characteristics including land use and potential impacts from nonpoint source pollution.

6.3.2 Conservation of Forests

There are multiple public and private sources of funds for conserving lands. For forestlands, the [Forest Legacy Program](#) (FLP) is administered by the NCFS for conserving working forests in priority areas that are at-risk of loss or conversion. Funding is provided by the [USDA Forest Service](#), and often matched by other federal or state grant funds, in concert with willing landowners. A proposed project's eligibility to be

included in the Forest Legacy Program is determined by both the guidelines outlined by the USDA-Forest Service, plus any requirements identified within the state’s Forest Action Plan or other pertinent state law. A portion of the White Oak River basin is included in the state’s Forest Legacy Priority Areas, illustrated in Figure , which is excerpted from the 2020 North Carolina Forest Action Plan. Priority lands are defined by the USDA as those areas that will support continuation of traditional forest uses yet also contain scenic, cultural, and recreation resources, fish and wildlife habitats, water resources, and other ecological values that are regionally and nationally significant. Participating landowners must follow a management plan designed for their forest. Activities consistent with the management plan, including timber harvesting and recreational activities such as hunting, fishing, and hiking, may be permitted ([USDA](#), n.d.).

Figure 6.1 North Carolina Forest Legacy Priority Areas Map



6.3.3 Conservation and Preservation

Conservation and preservation are closely linked and both involve a degree of protection, but conservation is generally thought of as the “proper use of nature” and preservation “protects nature from (human) use” (NPS, 2019). Both have many benefits especially in headwater areas and along stream corridors. Both preserve open and green spaces, preserve fish, wildlife, and rare species habitat, promote biodiversity, and protect water and air quality. Both also maintain scenic landscapes and recreational amenities, prevents soil erosion, reduces flooding, and limits fragmentation.

There are several federal and state funding sources for land conservation available to public and private landowners. State programs that offer funds for land conservation include the [Parks and Recreation Trust Fund](#) through the [NC Department of Natural and Cultural Resources’ \(DNCR\) Division of Parks and Recreation \(DPR\)](#), the [Environmental Enhancement Grant \(EEG\) Program](#) through the Attorney General’s Office, and the [Agricultural Development and Farmland Preservation \(ADFP\) Trust Fund](#) administered by the NCD&CS. Federal programs include the US Department of Agriculture’s (USDA) [Agricultural Conservation Easement Program \(ACEP\)](#) administered by the [Natural Resource Conservation Service \(NRCS\)](#) and the [Conservation Reserve Enhancement Program \(CREP\)](#) administered by the Farm

Service Agency (FSA). More information about each of these program can be found on the program's website.

6.4 Division of Coastal Management

The NC DEQ [Division of Coastal Management's](#) (DCM) works to protect, conserve, and manage North Carolina's coastal resources through an integrated program of planning, permitting, education and research. DCM works with and receives part of its funding from NOAA's Office of Ocean and Coastal Resource Management.

DCM is responsible for several programs, including permitting and enforcement; land-use planning; public beach and waterfront access; North Carolina Coastal Reserves; and grants for marine sewage pumpout stations. To assess the impacts of coastal development, DCM collects, hosts and analyzes data for oceanfront construction setback and erosion rates ([link](#)) as well as wetland conservation and restoration opportunities ([link](#)). DCM also has several tools available online for stormwater management, environmental justice and social vulnerability indicators, statewide flooding, coastal flooding ([link](#)), community assessments, planning and engagement ([link](#)), and shoreline management ([link](#)).

DCM also manages the Coastal Area Management Act (CAMA), which requires each of the 20 coastal counties have a local land use plan in accordance with guidelines established by the NC Coastal Resources Commission (CRC). A land use plan is a collection of policies, maps, and implementation actions that serves as a community's blueprint for growth. The management goal for water quality is to maintain, protect, and where possible, enhance water quality in all coastal wetlands, rivers, streams, and estuaries. The CRC's planning objective is for communities to adopt policies for coastal waters within their planning jurisdiction to help ensure that water quality is maintained if not impaired and improve impaired waters. Local communities are required to devise policies that help prevent or control nonpoint source discharges (sewage and stormwater) through strategies, such as impervious surface limits, vegetated riparian buffers, maintenance of natural areas, natural area buffers, and wetland protection. They are also required to establish policies and future land use map categories that are aimed at protecting open shellfishing waters and restoring closed or conditionally closed shellfishing waters. The Certified Land Use Plans by county can be found here ([link](#)). Four counties (Carteret, New Hanover, Onslow, and Pender) and several municipalities have certified land us plans.

6.5 Division of Marine Fisheries

The NC DEQ [Division of Marine Fisheries](#) (DMF) is responsible for the stewardship of the state's marine and estuarine resources. DMF's jurisdiction encompasses all coastal waters and extends to three miles offshore. Agency policies are established by the 9-member Marine Fisheries Commission and the Secretary of the DEQ. North Carolina is a member of the Atlantic States Marine Fisheries Commission, the Mid-Atlantic Fishery Management Council, and the South Atlantic Fishery Management Council.

North Carolina has one of the most active reef enhancement programs in the country due in part to wide public support and dedicated DMF staff. Artificial reefs and oyster sanctuaries are supported by DMF staff who develop, maintain, evaluate and administer the reef system. Biologists monitor North Carolina's artificial reefs for material stability, material durability, material performance, essential fish habitat and more. Information from these studies helps guide future enhancements. GPS Coordinates and details for each oyster sanctuary ([link](#)), artificial reef ([link](#)), and cultch planting ([link](#)) are available in the interactive Artificial Reef Guide ([link](#)).

6.6 Grants & Funding Opportunities

DWR's [Use Restoration Watershed \(URW\) Program](#) was established to help restore the beneficial uses of impaired waters of the state while also ensuring that protective measures are in place to prevent future degradation. Several guidance documents are available online including factsheets about watershed planning and how to develop a watershed plan. The program also has a list of financial resources available through federal, state and private entities. Examples of financial resources include the [Nonpoint Source EPA Section 319 Grant](#), [Clean Water Management Trust Fund \(CWMTF\)](#), [Water Resources Development Grant \(WRDG\)](#), [Z. Smith Reynolds Foundation](#), and voluntary cost share programs managed by the North Carolina Department of Agriculture & Consumer Services (NCDA&CS) [Division of Soil & Water Conservation \(DSWC\)](#). Additional information about each of these funding sources can be found on each program's website.

6.6.1 Grants Administered by the Division of Water Resources (DWR)

Several grants are administered by DWR. A brief overview of the EPA Section 319(h) and 205(j) grants and the Water Resources Development Grant (WRDG) are included here.

Section 319(h) Grants

Through [Section 319\(h\)](#) of the Clean Water Act, EPA provides funds to state, territory and tribal agencies to reduce nonpoint source pollution. Funds must be used to help restore waterbodies currently impaired by nonpoint source pollution. The waterbody must also be located in an area with an approved watershed restoration plan ([9 Element Watershed Restoration Plan](#)). Funds are allocated through a competitive grant process and are used to implement stormwater and agricultural BMPs and restoration projects on impaired waterbodies. More information about the program can be found on DWR's [319 Grant Program's](#) website.

205(j) Water Quality Management Planning Grants

The [205\(j\) Grant Program](#) is also funded through EPA and provides funding to complete water quality management planning projects. Projects can involve identifying the nature, extent and cause of water quality problems or developing plans to address these problems (i.e., 9 Element Watershed Restoration Plan). Limited competitive funding is available to regional COGs for water quality management planning efforts. More information can be found on DWR's [205\(j\) Grant Program's](#) website.

Water Resources Development Grants (WRDG)

The purpose of the [Water Resources Development \(WRDG\) Program](#) is to provide cost-share grants and technical assistance to local governments throughout the state. Applications for grants are accepted for seven eligible project types: general navigation, recreational navigation, water management, stream restoration, water-based recreation, Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) stream restoration projects, and feasibility/engineering studies. The non-navigation projects are collectively referred to as state and local projects. The program provides 50% cost share on approved projects.

6.6.2 North Carolina Land and Water Fund (NCLWF)

Created in 1996, the Clean Water Management Trust Fund (CWMTF) provides grants to local governments, state agencies and conservation non-profits to help finance projects that specifically address protecting and restoring North Carolina's water resources. Over the years, however, the mission

has expanded beyond the original focus of water quality, and in 2019, the General Assembly voted to rename the CWMTF to the North Carolina Land and Water Fund (NCLWF). Projects funded through the NCLWF include land acquisitions to protect land and water resources, capital improvements to stormwater infrastructure and improving stormwater management, and restoring and improving degraded stream segments. NCLWF is managed within the [NC Department of Natural and Cultural Resources](#) (DNCR), Division of Land and Water Stewardship. More information (including eligibility requirements and funded projects) can be found [online](#).

6.6.3 Grants Administered by the Division of Water Infrastructure (DWI)

DEQ's [Division of Water Infrastructure \(DWI\)](#) provides financial assistance for projects that improve water quality. Programs administered by DWI fund wastewater collection and treatment systems, drinking water treatment and distribution systems, stormwater quality management systems, and stream restoration. The division also supports the nine-member [State Water Infrastructure Authority \(Authority\)](#) which was created by the North Carolina General Assembly in 2013 under [General Statute 159G-70](#). The Authority is an independent body with primary responsibility for awarding federal and state funds for water and wastewater infrastructure projects, recommending ways to maximize the use of available funding resources, and recommending best and emerging utility management practices.

In 2017, the Authority published [North Carolina's Statewide Water and Wastewater Infrastructure Master Plan: The Road to Viability](#). The master plan presents the state's roadmap for viable water and wastewater utilities that safeguard public health, protect the environment, support vibrant communities, and encourage economic growth and development. The three key areas that require focus to move toward viability are in long-term infrastructure management, organizational management and financial management. The master plan applies broadly to owners and operators of water and wastewater utilities and systems that serve the public, and emphasizes that local elected officials, town and county managers, utility governing boards, customers, and stakeholders, as well as the public, play key roles in achieving viable utilities.

Loans and Grants Administered by the Division of Water Infrastructure (DWI)

DWI administers financial assistance programs for projects that improve water quality through low-interest loans and grants to local governments and certain other non-profit entities for water and wastewater infrastructure. Programs within the division include the Clean Water State Revolving Fund (CWSRF), the Drinking Water State Revolving Fund (DWSRF), the Community Development Block Grant-Infrastructure (CDBG-I) Program, the State Wastewater and Drinking Water Reserve Programs, Asset Inventory and Assessment Grant Program, and Merger/Regionalization Feasibility Grant Program. More information about each of these programs can be found on DWI's website under "[I Need Funding](#)". Projects funded by the State Water Infrastructure Authority can be found in Table 6.4.

Clean Water State Revolving Fund (CWSRF)

The [Clean Water State Revolving Fund](#) receives federal funding through the US Environmental Protection Agency (EPA) under the Clean Water Act (CWA). This program is available for local governments (counties, cities, towns, sanitary districts, etc.) for wastewater treatment, wastewater collection, reclaimed water, stormwater quality BMPs, stream restoration, and energy efficiency projects for treatment works or collection systems. The CWSRF provides funding through low-interest loans and limited-amount principal interest loans.

Table 6.4 Infrastructure Projects Funded by State Water Infrastructure Authority using State and Federal Loans and Grants in the White Oak River Basin (January 2014 – July 2020)

PWS ID / Permit or Registration #	Applicant	Project Description	Amount	Funding Program	Date	County	Council of Government (COG)
04-16-010	Beaufort	Water System AIA	\$150,000	AIA	Jan-17	Carteret	Eastern
04-16-010	Beaufort	Wastewater AIA	\$150,000	AIA	Feb-20	Carteret	Eastern
04-16-015	Morehead City	New Pump Station and FM	\$2,500,000	CWSRF	Dec-14	Carteret	Eastern
04-16-015	Morehead City	2019 AMI System	\$3,000,000	DWSRF	Jul-19	Carteret	Eastern
04-16-031	Pine Knoll Shores	Advanced Metering	\$507,000	DWSRF	Jan-16	Carteret	Eastern
04-52-010	Maysville	Sewer AIA	\$140,000	AIA	Jan-17	Jones	Eastern
04-52-011	Maysville	Portable Generator	\$113,500	CWSRF	Mar-19	Jones	Eastern
04-52-012	Maysville	W&S MRF w/Pollocksville	\$50,000	MRF	Mar-19	Jones	Eastern
04-52-013	Maysville	Radio Road Meters	\$157,000	DWSRF	Feb-18	Jones	Eastern
04-52-014	Maysville	WWTP Rehabilitation	\$226,728	CWSRF	Jul-20	Jones	Eastern
04-67-010	Jacksonville	Wardola-Thompson School Creek Restoration	\$480,200	CWSRF	Jan-17	Onslow	Eastern
04-67-035	Onslow WSA	Sewer Rehab	\$776,243	CWSRF	May-15	Onslow	Eastern
04-67-035	Onslow WSA	New PS and Forcemain	\$2,063,600	CWSRF	Jan-14	Onslow	Eastern
04-67-035	Onslow WSA	WWTP Long Term Improvements	\$3,202,800	CWSRF	Jul-19	Onslow	Eastern
04-67-035	Onslow WSA	Water Line replacement evaluation	\$50,000	DWTAG	May-14	Onslow	Eastern
CU3227	Scientific W/S Corporation	Lauradale Consolidation	\$4,394,242	DWSRF	Jan-16	Onslow	Eastern

Drinking Water State Revolving Fund (DWSRF)

The Drinking Water State Revolving Fund (DWSRF) receives federal funding through the EPA under the Safe Drinking Water Act (SDWA). This program is available for local governments (counties, cities, towns, sanitary districts, etc.) and certain other non-profit entities for source, treatment, storage, transmission and distribution systems. The DWSRF provides funding through low-interest loans and limited-amount principal interest loans.

Community Development Block Grant-Infrastructure (CDBG-I)

Funding for the federal Community Development Block Grant-Infrastructure (CDBG-I) Program is provided by the US Department of Housing and Urban Development (HUD). The program provides grants to local government units to address water and wastewater infrastructure needs in HUD-qualified low- to moderate-income communities.

State Wastewater and Drinking Water Reserve Program

Funding for the State Wastewater Reserve and Drinking Water Reserve Program is provided by the North Carolina General Assembly. The program provides grants and loans for design and construction of critical water and wastewater infrastructure. Funds can be used by units of local government for wastewater collection and treatment projects and public water system projects.

Asset Inventory and Assessment (AIA) Grant Program

Funding for the Asset Inventory and Assessment (AIA) Grant Program is provided by the North Carolina General Assembly. The program provides grants for developing asset inventories, condition assessment of critical assets and other components of a comprehensive asset management program.

Merger/Regionalization Feasibility (MRF) Grant Program

Funding for the Merger/Regionalization Feasibility (MRF) Grant Program is provided by the North Carolina General Assembly. The program provides grants for studies to evaluate the potential consolidation of two or more systems, the potential for interconnection with another system for regional wastewater treatment or regional water supply, and the managerial consolidation of systems without physical interconnection.

Viable Utility Reserve (VUR) Program

Funding for the Viable Utility Reserve (VUR) program works to build a path toward viable utility systems using long-term solutions for distressed water and wastewater units in North Carolina. VUR is currently under development.

6.6.4 Cost Share Programs for Best Management Practices (BMPs)

Several cost share programs are available through both federal and state agencies. The [Division of Soil & Water Conservation](#) (DSWC) in the North Carolina Department of Agriculture & Consumer Services (NCDA&CS) administers multiple state cost share programs while the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) administers several federal cost share programs. The programs typically offer 75% cost share assistance to applicants for the installation of BMPs to protect or improve natural resource concerns. The applicant is responsible for the remaining 25% of the costs, which can include the use of existing material and labor (in-kind services) and/or monetary contributions. There are some cost share and acreage restrictions depending on the BMPs used, the type of operation involved, and/or policies set by the local SWCD or the North Carolina Soil and Water

Conservation Commission (SWCC). Cost share incentive payments are also available to encourage the use of certain agronomic management practices. More information about the cost share programs managed by the DSWC can be found on the DSWC's [website](#). DWR and DSWC are working to identify the BMPs implemented in the White Oak River basin. Once available, these numbers will be made available as an update to this document.

Between July 2012 and June 2020, \$432,632 has been spent on the implementation of voluntary BMPs in the White Oak River basin through the state cost share programs managed by the DSWC (Table 6-5). Each BMP installed has water quality benefits associated with it, and tools are in place to calculate how many acres are affected, how much soil was saved, and the total amount of nitrogen and phosphorus saved. More information about the cost share programs administered by the DSWC and the water quality benefits associated with each can be found on their [website](#).

Table 6.5 Best Management Practices (BMPs) Funded by State Cost Share Programs in the White Oak River Basin (July 2012 – June 2020). (Information provided by DSWC.)

Best Management Practice (BMP)	Units	July 2012- June 2015	July 2015- June 2020	Cost Share \$ Amount Spent
Bioretention areas	EACH	1		\$ 1,787
Cisterns	EACH	1		\$ 1,349
Closure - Waste Impoundments	EACH	2		\$ 6,233
Cover Crops	ACRE	33.65	1,477.03	\$ 59,763
Critical Area Planting	ACRE		1.5	\$ 8,210
Crop Residue Management	ACRE	553	2,953.85	\$ 52,599
Cropland Conversion - Grass	ACRE	131	76.54	\$ 48,198
Cropland Conversion - Trees	ACRE		34.5	\$ 8,452
Disaster Winter Forage Crop Incentive	ACRE		46.19	\$ 923
Emergency Access Restoration	EACH		1	\$ 1,074
Grade Stabilization Structure	EACH		1	\$ 359
Livestock Mortality Management System - Forced Aeration Static Pile Composter	EACH	1	1	\$ 24,320
Marsh Sills	LINEAR FEET		1,730	\$ 61,000
Micro-Irrigation	ACRE	1.2	4.77	\$ 13,190
Non-Field Farm Road Repair	EACH		6	\$ 22,611
Stormwater wetlands	EACH	1	1	\$ 40,783
Stream Protection Well	EACH		1	\$ 3,482
Waste Application Systems - Mobile Application System	EACH		3	\$ 31,500
Water Supply Well & Pump	EACH		11	\$ 46,799

Agriculture Cost Share Program (ACSP)

The North Carolina [Agriculture Cost Share Program](#) (ACSP) was established in 1984 to help reduce nonpoint source runoff and provide guidance to owners and producers on ways to improve their on-farm management of water resources and BMPs. The first BMPs implemented through the program were in

the Chowan River basin. The program is administered by DSWC but managed by the local SWCD. The local SWCD reviews and identifies priorities on an annual basis and calls upon federal, state, local, non-profit, non-government and natural resource groups for technical, financial, planning and implementation support to restore, enhance and/or maintain natural resources throughout their jurisdictional area. BMPs include vegetative, structural or management systems that can improve the efficiency of farming operations while reducing the potential impacts to surface water and/or groundwater. Applications for cost share assistance through ACSP are ranked based on resource concerns identified by the SWCD.

Community Conservation Assistance Program (CCAP)

The [Community Conservation Assistance Program](#) (CCAP) is designed to improve water quality through the installation of various BMPs on urban, suburban and rural lands, not directly involved in agricultural production. CCAP provides educational, technical and financial assistance to landowners through the local SWCDs. This program is open to homeowners, businesses, schools, parks, churches and community groups.

Agriculture Water Resource Assistance Program (AgWRAP)

The [Agricultural Water Resource Assistance Program](#) (AgWRAP) is designed to identify opportunities to increase water use efficiency and available storage, implement BMPs to protect water resources, increase water efficiency, and increase water storage for agriculture.

USDA-NRCS Environmental Quality Incentives Program (EQIP)

Through the [Environmental Quality Incentives Program](#) (EQIP), the [Natural Resources Conservation Service](#) (NRCS) provides financial assistance to cover costs associated with implementing conservation measures. NRCS also provides one-on-one help in planning, constructing, and managing conservation measures. Common conservation practices include cover crops, timber or forest improvement, prescribed grazing, and irrigation practices. In addition to EQIP, NRCS has funds available through the Conservation Stewardship Program (CSP). Information about financial assistance programs to help conserve natural resources on agricultural lands can be found on NRCS's website. Summary data is available for BMPs installed in the White Oak River basin. This data did not, however, include the amount of cost share money spent on BMPs in the basin.

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