Chapter 10
Water Quality Management Strategies for Coastal Waters

10.1 The Role of State Government

Several commissions, agencies and programs handle state policies governing actions and activities in coastal areas. The *Environmental Management Commission* (EMC) is a 19-member panel that is appointed by the governor and legislative officials and is responsible for adopting rules for the protection, preservation and enhancement of the state's water and air. Water related rules include stormwater management, basinwide planning, nutrient management strategies and discharge permits.

The North Carolina Coastal Area Management Act (CAMA) established a cooperative program of coastal area management between local and state governments. The Act states that local governments shall have the initiative for planning, while the state government establishes areas of environmental concern. With regard to planning, the state government is directed to act primarily in a supportive, standard-setting, and review capacity, except in situations where local governments do not elect to exercise their initiative. In addition, the CAMA established the *Coastal Resource Commission* (CRC) within the Department of Environment and Natural Resources, whose duties include approval of Coastal Habitat Protection Plans and designation of Areas of Environmental Concern (AEC). After designation of these areas, the Commission is responsible for issuing all permits and establishes regulations to control development. The CRC is a 15-member board appointed by the governor to adopt rules and policies for coastal development and certify local land use plans for the 20 coastal counties and their communities. These regulations are implemented and permitted by the Division of Coastal Management (DCM) (see website http://dcm2.ehnr.state.nc.us/). An example of these rules is the establishment of a 30-foot buffer zone for building along estuarine waters.

The Division of Marine Fisheries is responsible for the stewardship of the state's marine and estuarine resources, which encompasses all coastal waters and extends to 3 miles offshore. Agency policies are established by the 9-member *Marine Fisheries Commission* and the Secretary of the Department of Environment and Natural Resources.

The N.C. Divisions of Water Quality, Coastal Management, Land Resources, Marine Fisheries, Soil and Water Conservation, Parks and Recreation and Environmental Health are responsible for many coastal activities and policies including stormwater management, development permits, erosion control programs, agriculture and land preservation, shellfish protection and recreation monitoring, just to name a few. Additional state programs include the Albemarle-Pamlico National Estuary Program (APNEP) and many inter-agency and group partnerships that work together to protect the resources found in coastal waters and communities.

The Coastal Zone Management Act requires NOAA to evaluate the performance of federally approved state coastal management programs. During a review of NC's CAMA specific recommendations call for the assessment of existing NC laws and regulations to minimize redundancy and avoid conflict with other regulations, prioritize emerging coastal issues and use adaptive management.

10.2 Coastal Habitat Protection Plan

North Carolina has approximately 2.9 million acres of estuarine and marine waters, comprising the largest estuarine system of any state along the Atlantic coast. North Carolina has a billion-dollar commercial and recreational fishing industry and ranks among the nation's highest seafood-producing states. Fish and shellfish species important to these industries depend on the quality and quantity of habitats found along our rivers, sounds and ocean waters. Pressures from development, loss of habitat, pollution and degraded water quality threaten fish habitats. Shellfish beds, mud flats, marshes, sea grass beds, freshwater streams and swamps are in jeopardy. The loss of these vital fish habitats threatens fishing industry central to North Carolina's history and economic growth.

Recognizing these threats, the N.C. General Assembly passed the Fisheries Reform Act of 1997. Included within this law is a requirement for three of the state's regulatory commissions (Marine Fisheries, Environmental Management, and Coastal Resources commissions) to adopt a plan to manage and restore aquatic habitats critical to North Carolina's commercial and recreational fisheries resources. DENR developed the Coastal Habitat Protection Plan (CHPP) through a cooperative, multi-agency effort with public input. The CHPP was adopted by the three commissions in December 2004 and sets the stage for unprecedented improvements in fish habitat protection and restoration in North Carolina.

The CHPP is a detailed document that describes the six major fish habitats and provides scientific information on their ecological functions and importance to the species that inhabit them. It identifies threats and management needs for each habitat and recommends administrative, regulatory and non-regulatory steps necessary to protect, restore and enhance each habitat. These recommendations are a result of scientific studies, deliberations of the three commissions, and input from citizens who attended 20 public meetings held during the development of the CHPP. The CHPP identifies six habitats that need protection or enhancement:

- Water Column
- Shell Bottom
- Submerged Aquatic Vegetation (SAV)
- Wetlands
- Soft Bottom
- Hard Bottom

DENR and the three commissions developed and adopted specific plans to implement the CHPP recommendations, with a focus on actions that could be taken based on existing resources and within the 2005-2007 budget cycle. The implementation actions are organized according to four habitat management goals:

GOAL 1. Improve effectiveness of existing rules and programs protecting coastal fish habitats

North Carolina has a number of programs already in place to protect coastal fisheries and the natural resources that support them. The Marine Fisheries Commission (MFC) has adopted rules addressing the impacts of certain types of fishing gear and fishing practices that may damage fish habitats. The Coastal Resources Commission (CRC) regulates development impacts on certain types of critical coastal habitats, such as saltwater marshes and primary nursery areas. The

Environmental Management Commission (EMC) has issued water quality standards that address pollution of coastal waters from both direct discharges and runoff. The Coastal Habitat Protection Plan (CHPP) identifies a number of gaps in the protection provided for critical fish habitats under these programs, but also notes that these habitats would benefit from stronger enforcement of existing regulations and better coordination among agencies.

Recommendation 1.1- Enhance enforcement of, and compliance with, Coastal Resources Commission, Environmental Management Commission and Marine Fisheries Commission rules and permit conditions.

Recommendation 1.2 - Coordinate and enhance water quality, physical habitat and fisheries resource monitoring (including data management) from headwaters to the nearshore ocean.

Recommendation 1.3- Enhance and expand educational outreach on the value of fish habitat, threats from human activities, effects of non-native species and reasons for management measures.

Recommendation 1.4- Coordinate rulemaking and enforcement among regulatory commissions and agencies.

GOAL 2. Identify, designate and protect strategic habitat areas

Maintaining healthy coastal fisheries requires consideration of the entire ecosystem and the way different types of fish habitat work together. For example, coastal marshes help prevent erosion of soft bottom habitat. Unobstructed passage through the water column allows certain fish species to reach their spawning grounds in inland wetlands. Fragmenting these habitats, or damaging one of a series of interrelated habitats makes it more difficult for aquatic systems to support strong and healthy coastal fisheries. In 1998, the EMC, CRC, and MFC defined Strategic Habitat Areas. These areas are complexes of fisheries habitat that "provide exceptional functions that are particularly at risk due to imminent threats, vulnerability or rarity." These areas merit special attention and should be given high priority for conservation.

Recommendation 2.1- Evaluate potential Strategic Habitat Areas (SHAs) by a) coordinating, completing and maintaining baseline habitat mapping (including sea grass, shell bottom and other bottom types) using the most appropriate technology; b) selective monitoring of the status of those habitats; and c) assessing effects of land use and human activities on those habitats.

Recommendation 2.2- Identify and designate SHAs using ecologically based criteria, analyze existing rules and enact measures needed to protect SHAs and improve programs for conservation (including voluntary actions) and acquisition of areas supporting SHAs.

GOAL 3. Enhance habitat and protect it from physical impacts

The CHPP identifies a number of ways in which fish habitats can be damaged by direct physical impacts. Some examples include filling of wetlands, dredging of soft bottom habitat, destruction of shell bottom and hard bottom areas, damage to submerged aquatic vegetation by use of certain types of fishing gear, and physical obstructions that block fish movement to and from spawning areas. While large impacts can directly contribute to the loss of habitat functions, the accumulation of many small impacts can make a habitat more vulnerable to damage from which it might otherwise recover quickly. In some cases, historic damage to a habitat can be mitigated through the creation of sanctuaries where the resource can recover. One such program involves creation of protected oyster reefs. In other cases, the cumulative impacts of multiple projects can be more effectively managed through comprehensive planning and plan implementation.

Recommendation 3.1- Greatly expand habitat restoration.
Recommendation 3.2- Prepare and implement a comprehensive beach and inlet management plan that addresses ecologically based guidelines, socioeconomic concerns and fish habitat.
Recommendation 3.3- Protect submerged aquatic vegetation (SAV), shell bottom and hard bottom areas from fishing gear effects through improved enforcement, establishment of protective buffers around habitats and further restriction of mechanical shellfish harvesting.
Recommendation 3.4- Protect fish habitat by revising estuarine and public trust shoreline stabilization rules using best available information, considering estuarine erosion rates, and the development and promotion of incentives for use of alternatives to vertical shoreline stabilization measures.
Recommendation 3.5- Protect and enhance habitat for anadromous fishes by: a) incorporating the water quality and quantity needs of fish in surface water use planning and rule making and b) eliminating obstructions to fish movements, such as dams, locks and road fills.

GOAL 4. Enhance and Protect Water Quality

The water conditions necessary to support coastal fisheries include the right combination of temperature and salinity, as well as the absence of harmful pollutants. Achieving and maintaining good water quality for purposes of fisheries productivity requires management of both direct discharges of pollutants and stormwater runoff. The CHPP provides additional support for policies directed toward better management of point and nonpoint sources of water pollution. In doing so, the CHPP recognizes a need to go beyond relying on regulatory programs alone. Addressing water quality impacts will also require targeted use of land acquisition programs, incentives for conservation, development of effective BMPs, and assistance for local governments to upgrade wastewater and stormwater management infrastructure. Maintaining the water quality necessary to support vital coastal fisheries will not only benefit the commercial fishing industry – it will benefit a large sector of the entire coastal economy built around travel and tourism, and recreational fishing.

Recommendation 4.1- Reduce point source pollution from wastewater.
Recommendation 4.2- Adopt or modify rules or statutes to prohibit ocean wastewater discharges.
Recommendation 4.3- Prohibit new or expanded stormwater outfalls to coastal beaches and to coastal shellfishing waters (EMC surface water classifications SA and SB) except during times of emergency when public safety and health are threatened, and continue to phase out existing outfalls by implementing alternative stormwater management strategies.
Recommendation 4.4- Enhance coordination with, and financial/technical support for, local government actions to better manage stormwater and wastewater.
Recommendation 4.5- Improve land-based strategies throughout the river basins to reduce nonpoint pollution and minimize cumulative losses to wetlands and streams through voluntary actions, assistance and incentives.
Recommendation 4.6- Improve land-based strategies throughout the river basins to reduce nonpoint pollution and minimize cumulative losses to wetlands and streams through rule making.
Recommendation 4.7- Develop and implement a comprehensive coastal marina and dock management plan and policy for the protection of shellfish harvest waters and fish habitat.
Recommendation 4.8- Reduce nonpoint source pollution from large-scale animal operations by the following actions: a) support early implementation of environmentally superior alternatives to the current lagoon and sprayfield systems as identified under the Smithfield Agreement and continue the moratorium on new/expanded swine operations until alternative

waste treatment technology is implemented; b) seek additional funding to phase-out large-scale animal operations in sensitive areas and relocate operations from sensitive areas; and c) use improved siting criteria to protect fish habitat.

The closure of 4,000 acres in Core Sound to mechanical shellfish harvesting to protect SAV habitat is a result of CHPP actions. Other CHPP accomplishments affecting the White Oak Basin include addressing the enhancement of stormwater pollution controls in shellfish waters and management issues associated with siting and operation of multi-slip docking facilities in coastal waters.

Visit http://www.ncdmf.net/habitat/index.html to learn more about the CHPP or to download the plan. Refer questions and comments to chpps@ncmail.net or call (252) 726-7021 or (800) 682-2632.

10.3 Oyster Action Plan

Over the past several years efforts to restore North Carolina's native oyster populations have increased significantly and annual oyster harvests have also increased. However, since the early 1900s, the oyster population has declined an estimated 90 percent due to of a variety factors such as habitat loss, pollution, diseases, and harvest pressure. Recognizing the need for concerted action to reverse this trend and the value of a healthy oyster population, an Oyster Forum was sponsored by the North Carolina Coastal Federation in 2003 and is supported by CHPP. The forum participants, including scientists, fishermen, policymakers and educators, drafted the ***Oyster Restoration and Protection Plan for North Carolina: A Blueprint for Action***. Goals of this plan include:

- To restore and protect North Carolina's native oyster populations and habitat so that estuaries are again robust, diverse, & resilient ecosystems,
- To build broad public awareness & support for the value of estuarine conservation & sustainable fisheries, and
- To work with a strong coalition to make significant, demonstrable & meaningful progress towards oyster restoration in the next 3 - 5 years.

Within the White Oak River Basin, the Oyster Action Plan has identified priority areas where restoration and protection efforts will start.

- High priority growing areas include: Sneads Ferry (C2), Stones Bay (C3), White Oak River (D3), Newport River (E4), and North River (E6).
- Medium Priority areas include: Atlantic Beach, Morehead City (E3), Taylor Creek (E5), Hurst Beach (C4), Bear Creek (D1), and Queens Creek (D2).
- Low Priority areas include: Dear Creek (D4), Broad Creek/ Bogue Sound (E1 / E2), Back Sound (E7), Core Sound (E8), and Nelson Bay (E9).

To achieve the goals of oyster protection and restoration there needs to be an increase in funding and resources allocated to oyster research, public education, regulation enforcement and land acquisition. The Blueprint identifies a need to increase resources available to the Division of Marine Fisheries' Shellfish Rehabilitation Program, planning oyster hatcheries at the NC Aquariums, and designating more oyster sanctuaries. Public education activities could focus on individual actions to include oyster shell recycling and oyster gardening. To promote a

sustainable oyster industry opportunities for increasing mariculture are sought. Cleaning up existing sources of point and nonpoint source pollution in shellfish waters and watersheds is essential along with improving enforcement of discharge regulations. Communities not under stormwater regulations should voluntarily implement effective stormwater rules and include them in their CAMA Land Use Plans. DEH Shellfish Sanitation surveys are a valuable source for identifying water quality concerns and areas that threaten oyster health; supporting these surveys with resources and expanding their mapping capabilities is important for oyster restoration and protection.

The Oyster Restoration and Protection Plan includes land acquisitions, resource enhancements, stormwater projects, and watershed restoration activities as **potential** projects to be undertaken by 2008.

Potential Land Acquisition Projects -

1) Appraisals on land and easements around the White Oak River. Potential properties include: Jones Island property, island off of Boathouse and Dublin Creeks, and land (140 acres) on the west shore of the river. Funding from the existing CWMTF grant will go towards paying for appraisals and start application process to CWMTF.
2) Potential land acquisition north of the headwaters of the Newport River. About 5,000 acres of undeveloped Weyerhaeuser properties located north of the river are available, which could have positive impacts on water quality and the oyster resource if protected and restored. This land includes a high potential for partnerships, including habitat enhancement, wastewater treatment, and protection of Cherry Point airspace.
3) Tract of land available behind Lowe's Hardware in Morehead City. A possible partnership exists with the town as the lead agency. The land could be used both for stormwater treatment and as a park available to the public. There is a focus on the interior lots available, as highway frontage is highly expensive.
4) Acquisition of Weyerhaeuser land south of North River Farms, at the headwaters of Ward's Creek.

Potential Resource Enhancement Projects –

1) Oyster enhancement projects in the Newport and North (Wards Creek) Rivers. The potential exists to tie some of these projects in with land acquisition or other restoration projects in order to increase the benefits realized. Currently, projects in the White Oak River north of the bridge are infeasible due to inaccessibility by existing DMF shell planting boats. However, should the proper equipment be acquired, the potential exists to do work in the area surrounding NCCF's Huggins Farm Property on the east shore of the White Oak River. Ward Creek shell planting site could be done by a group of NCCF volunteers.
2) Support the investigation of innovative oyster gardening methods within the existing public health framework. It is important to put policy and methodology into place at the start of the program, rather than waiting for problems to arise and adjusting accordingly.
3) Develop a GIS of oyster rocks and other fishing practices in the three priority areas (White Oak, Newport and North Rivers). Use GIS as a tool to determine where efforts should be concentrated for the best planting sites. Possible funding for a postgraduate student from the NOAA Coastal Services Center to work with DMF.
4) Letter in support of Senate Bill #925, Oyster Restoration & Protection Act, to sponsors of the legislation.

Potential Stormwater Projects –

1) Investigate the management plan for Cow Pen Creek developed by a Duke student. This was completed at the last committee meeting, and it was found that the plan would be most useful as an educational tool for homeowners in the area.
2) Stormwater project at Wading Creek – A new drainage ditch along highway 101 was noticed by numerous committee members, and was investigated. It appeared that this ditch was in violation of stormwater regulations, so is going to be investigated by the Coastkeeper before further action will be taken.
3) Continue restoration and preservation efforts to remove point sources. One new project is the "Unpaving Paradise" project headed by NCCF, which will involve the replacement of the existing parking lot at Hammocks Beach State Park with permeable materials. Another project involves the removal of a drainage pipe that currently discharges into Hoop Pole Creek.
4) Partner with the City of Newport on stormwater projects and programs. The committee has been in discussion with city planners and wastewater managers from Newport about the potential for partnerships in the future.
5) Investigate potential stormwater projects as part of a conservation easement in the Carteret County Industrial Park.
6) Support an attempt to mandate detention ponds for all new developments, including low-density areas.

Potential Watershed Restoration Projects –

1) Ward Creek Feasibility Study – This project involves looking at various different possibilities for restoration work in Ward Creek to address the increasing closures in the watershed. Possibilities include the introduction of large culverts in place of the existing causeway through the creek, attempts to pinpoint which creeks and other sources contribute the most to pollution within the creek, and education/outreach projects directed at landowners surrounding the watershed. APNEP has taken the lead on this effort, and has already applied for funding. If successful, this area could serve as a model for projects to be carried out in other areas.
2) NCCF White Oak 319 Project – The possibility exists to use data currently being collected to determine if a retrofit project behind the new hotel along Highway 24 would be beneficial or feasible.

10.4 NC Coastal Nonpoint Source Program

Section 6217 of the Federal 1990 Coastal Zone Act Reauthorization Amendments (CZARA) requires every state participating in the Coastal Zone Management Act Program to develop a Coastal Nonpoint Source Program (CNPSP). The purpose of this requirement, as stated in the Act, is to "strengthen the links between Federal and State coastal zone management and water quality management programs and to enhance State and local efforts to manage land use activities that degrade coastal waters and coastal habitats." To accomplish these goals, the federal agencies established 56 Management Measures that are to be used by each state to address the following nonpoint source pollution categories (first five items) and that provide tools to address the various sources of nonpoint pollution (last item):

- Agricultural Sources
- Forestry
- Urban Areas *(urban runoff; construction activities; existing development; on-site disposal systems; pollution prevention; and roads, highways and bridges)*
- Marinas and Recreational Boating *(siting and design; and marina and boat operation/maintenance)*
- Hydrologic Modification *(channelization and channel modification; dams; and streambank and shoreline erosion)*
- Wetlands, Riparian Areas and Vegetated Treatment Systems

At the federal level, the program is called the Coastal Nonpoint Pollution Control Program and is administered jointly by the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency (EPA). Within North Carolina, the state program is administered by the Division of Water Quality (DWQ) and the Division of Coastal Management (DCM) and is referred to as the Coastal Nonpoint Source Program.

The 56 Management Measures are defined in Section 6217(g)(5) of CZARA as: "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through application of the best available nonpoint pollution control practices technologies, processes, siting criteria, operating methods or other alternatives." Detailed descriptions of the management measures, where they are intended to be applied, their effectiveness, and their costs can be found in EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* at the following website: http://www.epa.gov/owow/nps/MMGI/.

North Carolina received approval from NOAA and EPA for its state program in August 2003. To receive this approval, North Carolina had to identify it has enforceable policies and mechanisms for the 56 Management Measures and establish our program boundary. The State is now required to develop a strategy to ensure all applicable Management Measures to protect and restore water quality are implemented within 15 years.

North Carolina is relying on existing authorities and programs and proposed projects to meet federal requirements, but it may become apparent in the future that additional Management Measures and new regulations are needed to address significant sources of nonpoint sources. If a need arises for new or modified regulations, they would be proposed under existing agency frameworks.

The core of the state's CNPSP is increased communication and coordination between DWQ and key state agencies that have regulatory responsibilities for controlling nonpoint sources of pollution. This increased dialogue is facilitated in part by the state's CNPSP Coordinator and promotes identification of gaps, duplications, inadequacies and/or inefficiencies of existing programs and policies. Responsibilities of the state program coordinator also include developing the 15-year Strategy Plan, serving as a liaison between DWQ and DCM, and participating in the development of nonpoint source outreach and educational activities. For more information, contact the NC Coastal Nonpoint Source Program Coordinator at (919) 733-5083.

10.5 Community Conservation Assistance Program

The landscape of North Carolina is changing and Soil and Water Conservation Districts have voiced concern about a void in program areas to address the growing threat of nonpoint source pollution issues on non-agricultural lands. In the summer of 2005, a survey was distributed to all districts to inventory their level of interest and best management practices (BMP) needs on urban, suburban and rural lands. Many districts completed surveys about their needs for this program, and they requested over $6.5 million for local projects. Division of Soil and Water Conservation (DSWC) staff used the survey responses to develop two grant applications for program funding. In July 2006, while the grant applications were still under review, the legislature unanimously passed H2129, creating the Community Conservation Assistance Program (CCAP). Shortly after, both grants were approved at 100 percent funding.

Current Status

CCAP will support the installation of stormwater BMPs. This program is an innovative approach to controlling the amount of stormwater runoff that enters our surface waters. Through locally led conservation, the Division of Soil and Water Conservation and Soil and Water Conservation Districts have been successful in implementing voluntary agricultural BMPs, which have addressed many different water quality parameters. The intent is for CCAP to operate under the same guidance and accountability as the NC Agriculture Cost Share Program and achieve the same successes.

CCAP will focus its efforts on stormwater retrofits to existing land uses. Practices under consideration include: impervious surface conversion, permeable pavement, grassed swales, critical area planting, bioretention areas, backyard rain gardens, stormwater wetlands, backyard wetlands, diversion, riparian buffer, stream restoration, stream stabilization, cisterns/rain barrels and pet waste receptacles. It will not be used to assist in new development sites to meet state and federal stormwater mandates. Districts have the technical expertise to install stormwater BMPs and a successful history of promoting voluntary conservation practices. The program will give the districts the structure and financial assistance to carry out this mission. CCAP will encourage local governments, individual landowners and businesses to incorporate stormwater BMPs within their landscape. The economic incentive, 75 percent of average installation costs, will encourage voluntary conservation to be installed.

Funding

The DSWC was recently awarded two grants that will fund CCAP implementation in 18 counties across the state; a grant from the Clean Water Management Trust Fund in the sum of $557,000 and an award from Section 319 program for $277,425. Since this is a grant-funded program, only districts that participated in the surveys will receive an allocation. The maximum amount of assistance per practice is limited to $50,000. DSWC will seek additional funding sources, including recurring state appropriations, to offer this program statewide in the future. The DSWC and the Districts are excited about the possibilities that this program offers in addressing current stormwater pollution issues.

10.6 The Role of Local Government in Land Use Planning

As residential and commercial development expands inward from the coast, many local governments are now faced with making land use decisions to limit the extent and areas of land development. Several coastal counties still have no zoning ordinances, or have large areas of the

county that are not under zoning ordinances. In addition, property owners are being faced with the decision to continue historical uses of their land or sell their property for development. This is happening in both rural and coastal communities. According to a recent survey conducted by the Raleigh News and Observer, more than 34,000 houses and condominiums are planned or underway in the 20-county area of the coast from Currituck County to Brunswick County.

10.6.1 Land Use Plans

The Coastal Area Management Act (CAMA) requires each of the 20 coastal counties to have a local land use plan in accordance with guidelines established by the 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. Each land use plan includes an inventory and assessment of existing environmental conditions along with local policies and a future land use map that address growth issues related to designated Management Topics: land use compatibility, infrastructure carrying capacity, natural hazards, public access, areas of local concern, and water quality.

Inventory and assessment specific to water quality include the identification of existing surface water quality, current situations and trends on permanent and temporary closures of shellfish waters, areas with chronic wastewater treatment system malfunctions, areas with water quality or public health problems related to nonpoint source pollution, and locations where land use and water quality conflicts exist. Policies to address water quality issues are prepared based on the management goal, CRC planning objective, and land use plan requirements specified for the water quality Management Topic. For water quality, the management goal 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 the planning jurisdiction to help ensure that water quality is maintained if not impaired and improved if impaired. 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 CRC's guidelines provide a common format for each plan and a set of issues that must be considered during the planning process; however, the policies included in the plan are those of the local government, not of the CRC. By law, the role of the CRC is limited to determining that plans have been prepared consistent with State Land Use Plan guidelines, do not conflict with State or federal rules, and are consistent with the State's Coastal Management program. Once a land use plan is certified by the CRC, the Division of Coastal Management (DCM) uses the plan in making CAMA permit decisions and federal consistency determinations. Proposed projects and activities must be consistent with the policies of a local land use plan or DCM cannot permit a project to go forward.

At the local level, land use plans provide guidance for both individual projects and a broad range of policy issues, such as the development of regulatory ordinances and public investment programs. Although DCM monitors use of the land use plans through an implementation status report, strict adherence to land use plan policies and implementation actions is largely up to the

local government. For this reason, community and local official support of the land use plan is critical to successfully achieving the goals for each management topic, including water quality.

10.6.2 Land Use Plans for Communities in the White Oak River Basin

The following Table 49 presents counties and their municipalities within the White Oak River Basin and their status on completing a CAMA Land Use Plan.

Table 49 Local Planning Jurisdictions

Multi-County Planning Region P		**CAMA Land Use Plan CRC Certification (as of November 2006)**				
County	Municipalities	CRC Certified	In Review	Under State Review	In Process	Beginning 2007
Craven	None					X
Jones	Maysville					
Carteret County				X		
Carteret	Atlantic Beach			X		
	Beaufort	2007				
	Bogue					
	Cape Carteret			X		
	Cedar Point					
	Emerald Isle	2004				
	Indian Beach			X		
	Morehead City			X		
	Newport	2006				
	Peletier					
	Pine Knolls Shores			X		
Onslow County					2007	
Onslow	Jacksonville				2007	
	North Topsail Beach*					
	Richlands					
	Swansboro				2008	

* Located in more than one major river basin.

After review of several CAMA Land Use Plan (LUP) drafts, DWQ recommends that all communities adopt low impact development strategies and technologies for both new development and as options in retrofitting existing infrastructure. It is important for communities to undertake stronger stormwater controls and to update old or failing wastewater systems (e.g., on-site and treatment plants) to prevent future deterioration in water quality. Communities need to address development issues in regards to water quality by implementing the best available control options and by implementing enforcement. DWQ views LUPs as a tool to improve and protect the water quality that these communities' economies depend on. Unfortunately, many of the reviewed LUPs do not adequately reflect proactive planning above and beyond state minimum criteria. DWQ also recognizes and supports the importance of low impact development and appropriate technologies education for developers and local leaders. Overall, LUP policy framework is too general. A large number of policies address adoption of ordinances and procedures by the local government, or defer to the State and Federal agencies' rules to meet the LUP requirements. The policies should provide specific guidance to aid in the development of local ordinances and procedures, not merely state that they will be adopted.

An evaluation of 40 CAMA LUPs written during the mid 1990's concluded, "local planning efforts are procedurally strong, addressing the ranges of issues they are required to cover, but analytically and substantively weak, providing little meaningful attention to regional environmental protection concerns" (Norton, 2005). This evaluation found that many LUPs completed the various required analysis in regards to identifying hazards, flood zones, soil limitations and environmentally sensitive areas, but later in the plan made future land classifications for development with no reference to these analyses (e.g., high density development on oceanfront property zoned as high hazard) (Norton, 2005). The plans did not adequately explain how land was determined suitable for future growth and development and did not adequately address potential adverse environmental impacts, beyond state compliance standards (Norton, 2005). Almost all the communities addressed the environmental impacts and thus need for improved wastewater systems, but "they uniformly failed to discuss the potential growth-inducing effects and resulting environmental impacts that come with infrastructure expansions" (Norton, 2005). In addition, stormwater management was addressed for controlling runoff and associated flooding, but the LUPs did not address the water quality related issues associated with stormwater management (Norton, 2005). In conclusion, regional environmental concerns and cumulative and secondary impacts of development were not addressed with specific management strategies in the LUPs.

Atlantic Beach Draft LUP

Citizens of Atlantic Beach in a town meeting discussed key issues of growth and environmental concerns. Four of the top ten issues stood out as key issues for designating regulations or town goals in improving and/or protecting water quality. These include: density of future development, development regulations, development of sewer system, and stormwater management. Atlantic Beach is currently exploring options for a centralized wastewater collection and treatment system. However, as stated in the LUP, the cost of a central sewer system may result in high density development, which opposes the desires of the community to reduce or maintain densities and retain open space. Atlantic Beach has adopted higher than state minimum criteria of erosion and sedimentation controls, but the LUP does state what actions or BMPs it plans to adopt to prevent water quality degradation. The LUP does recognize the need for stormwater controls, but it does not include low impact development practices for these controls. Atlantic Beach pledges to protect, maintain and improve existing ocean and sound shoreline access for year round and seasonal users. They also plan to support commercial and recreational fishing marinas.

Carteret County Draft LUP

Carteret County's LUP identifies many sources of water quality degradation as problems it needs to address. Uncontrolled stormwater runoff, closing of shellfish waters, lack of central sewer system to eliminate problems with malfunctioning septic tanks, limited soil suitability for septic tanks, and seasonal population fluxes stressing sensitive waterfront areas are a few of the identified problems in Carteret County. The County also acknowledges that economic development is in conflict with resource protection, while their local land use and development regulations provide no additional protection beyond state and federal standards. In the absence of a central sewer system, the LUP states it will rely on septic and private package plants (except those areas with discharge to wetlands), with educational programs on alternative septic systems and will pursue funding opportunities to upgrade failing systems. Centralized sewer services will be supported if zoning is in place prior to the extension of the service and if service will encourage a more compact development pattern preserving farmland and open spaces, and if it limits encroachment on environmentally sensitive areas. Contrary to their desire to improve

protection of water resources, Carteret County's LUP does not have a specific policy to reduce stormwater runoff beyond the state requirements. Carteret County's efforts to reduce stormwater runoff and improve water quality include various public educational programs, small-scale stormwater controls, limiting density in areas near shellfishing waters and encouraging the use of permeable surfaces and other low impact development techniques.

Emerald Isle- Certified October 28, 2004 and Amended November 18, 2005
Emerald Isle's LUP does include policy statements that encourage development patterns that foster a specific community character. Emerald Isle has established town center areas that encourage mixed-use developments and corridor enhancements. These areas will include higher density residential and commercial uses that are compatible with nearby residential neighborhoods. The developments also meet site design elements that have not traditionally been incorporated in development throughout the town. The town has also proactively adopted local ordinances to control and reduce stormwater runoff.

Indian Beech Draft LUP
Controlling stormwater runoff and the need for a centralized sewer system were two of the top ten issues discussed at a town meeting of Indian Beach citizens. The LUP states Indian Beach will comply with federal and state regulations aimed to protect water quality. However, the LUP does not recognize that to preserve its coastal characteristics and economic resources it will have to take its own initiative to require stronger stormwater controls, and maintenance of on-site and package plant waste treatments. The LUP concludes that increased stormwater runoff, infringement of growth on sensitive areas, and water quality degradation are possible negative impacts of the LUP.

Morehead City Draft LUP
In 2004, the city outlined mitigation measures to minimize potential adverse impacts of increased stormwater as a result of increased development. These measures include no sewer service to USACE delineated 404 wetlands, Sugarloaf Island, Haystacks Marshes, Newport Marshes and Phillips Island, no additional or enlarged stormwater discharge points into SA waters, to pursue grants to enhance and protect wetlands and environmentally sensitive areas, monitor stormwater projects, and to conduct a self-evaluation of existing ordinances and policies utilizing the Watershed Protection Manual. Specific concerns with water quality in Calico creek create the need for retrofits of stormwater discharges.

The Morehead City WWTP discharges into Calico Creek and has repeatedly exceeded its permitted limits, causing a sewer line moratorium to facilitate a sewer system upgrade project, which started in 2003. This rehabilitation project includes replacing approximately 250 manholes and five miles of sewer lines to help reduce the inflow of rainwater that enters the sewer system. The LUP states that expansion of the sewer system will extend within corporate limits to areas in which poor soil conditions create septic field problems. The town encourages voluntary annexation into the sewer system to avoid additional on-site septic system installation. The LUP supports the use of permeable surfaces, retaining natural vegetation along waterfronts and stormwater retention strategies to prevent runoff into sensitive waters. The town is currently investigating options for a stormwater management program. Stormwater runoff from roadways is being recommended as a priority issue for the 2006-2012 Transportation Improvement Program.

Additional Morehead City Initiatives Associated with Land Use Planning

The City's Unified Development Ordinance allows for cluster developments and include increased landscaping requirements while decreasing parking standards to reduce the amount of impervious surfaces resulting from development. The City's Planning Board is currently working on strengthening the open space regulations and the City is considering elimination of boat/RV storage areas, which often are considered impervious in favor of increased open space areas.

Two comprehensive city-initiated stormwater studies in 1996 and 2002 were conducted that provided GIS mapping data on the stormwater system in the City and it's extra-territorial jurisdiction. These studies identified drainage areas, type of drainage structures and problem areas. The information has proven invaluable to the City's stormwater system maintenance program. Illicit discharges were identified and ongoing efforts continue to prevent and eliminate such discharges, consistent with the requirements of the federal Phase II stormwater standards. The City also sponsored a Countywide Planning Board Forum on Coastal Stormwater Regulations inviting all other municipal and county planning boards and staff to participate.

As noted in Chapter 3, Morehead City partnered with the NCCF and the CWMTF to purchase Sugarloaf Island for conservation in perpetuity.

Morehead City received a State Clean Water Grant/Loan, of which $400,000 was earmarked to construct a water reuse demonstration project.

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Of notable actions, Newport plans to develop a comprehensive town-wide stormwater drainage plan. Rezoning will occur in potential development areas to reduce the amount of impervious surfaces. Newport is also supporting stormwater low impact development activities such as non-paved but stabilized parking lots, use of grass stones, and strip paving of streets. Newport is considering the adoption of an erosion and sediment control ordinance, landscaping ordinance to require vegetative buffers between right-of-ways, limits on impervious surface, the use of water retention ponds, and delineation of wetlands for new developments. Newport plans to develop a central sewer system for both its unincorporated and incorporated planning jurisdictions, while opposing the development of private package treatment plants within town limits (exceptions apply).

Pine Knolls Draft LUP

Citizen participants in the town meeting primarily discussed the changing demographics of the town when identifying land use and development concerns. The protection of Roosevelt Natural Area, managing stormwater, and installing a central sewer system all ranked in the top ten issues identified. The town is currently drafting a local stormwater management ordinance; this ordinance will include recommendations for single-family lots. The town opposes re-zoning to maintain its current low density housing unit conditions. The town continues to support the use of individual septic systems while it explores the possibilities of developing a central sewer system without creating a demand for increased housing unit numbers. Pine Knolls LUP needs to include specific actions for proposed ordinances that will act to protect and improve water quality.

10.7 Management Recommendations for Local Governments

Below is a summary of management actions recommended for local authorities, followed by discussions on large, watershed management issues. These actions are necessary to address current sources of impairment and to prevent future degradation in all streams. The intent of these recommendations is to describe the types of actions necessary to improve stream conditions, not to specify particular administrative or institutional mechanisms for implementing remedial practices. Those types of decisions must be made at the local level.

Because of uncertainties regarding how individual remedial actions cumulatively impact stream conditions and in how aquatic organisms will respond to improvements, the intensity of management effort necessary to bring about a particular degree of biological improvement cannot be established in advance. The types of actions needed to improve biological conditions can be identified, but the mix of activities that will be necessary – and the extent of improvement that will be attainable – will only become apparent over time as an adaptive management approach is implemented. Management actions are suggested below to address individual problems, but many of these actions are interrelated (NCDENR-DWQ, 2003).

(1) Feasible and cost-effective stormwater retrofit projects should be implemented throughout the watershed to mitigate the hydrologic effects of development (e.g., increased stormwater volumes and increased frequency and duration). This should be viewed as a long-term process.

   (a) Over the short-term, current feasible retrofit projects should be identified and implemented.
   (b) In the long-term, additional retrofit opportunities should be implemented in conjunction with infrastructure improvements and redevelopment of existing developed areas.
   (c) Grant funds for these retrofit projects may be available from EPA initiatives, such as EPA Section 319 funds, or the North Carolina Clean Water Management Trust Fund.

(2) A watershed scale strategy to address inputs should be developed and implemented, including a variety of source reduction and stormwater treatment methods. As an initial framework for planning input reduction efforts, the following general approach is proposed:

   (a) Implementation of available best management practice (BMP) opportunities for control of stormwater volume and velocities. These BMPs will help remove pollutants from stormwater and improve aquatic habitat potential.
   (b) Development of a stormwater and dry weather sampling strategy in order to facilitate the targeting of pollutant removal and source reduction practices.
   (c) Implementation of stormwater treatment BMPs, aimed primarily at pollutant removal, at appropriate locations.
   (d) Development and implementation of a broad set of source reduction activities focused on: reducing non-storm inputs of toxics; reducing pollutants available for runoff during storms; and managing water to reduce storm runoff.

(3) Actions recommended above (e.g., stormwater quantity and quality retrofit BMPs) are likely to reduce nutrient/organic/bacterial loading, and to some extent, its impacts. Activities recommended to address this loading include the identification and elimination of illicit discharges; education of homeowners, commercial applicators, and others regarding proper

fertilizer use, street sweeping, catch basin clean-out practices, animal and human waste management, and the installation of additional BMPs targeting biological oxygen demand (BOD) and nutrient removal at appropriate sites.

(4) Prevention of further degradation will require effective post-construction stormwater management for all new development in the study area.

(5) Effective enforcement of sediment and erosion control regulations will be essential to the prevention of additional sediment inputs from construction activities. Development of improved erosion and sediment control practices may also be beneficial.

(6) Watershed education programs should be implemented and continued by local governments with the goal of reducing current stream damage and preventing future degradation. At a minimum, the program should include elements to address the following issues:

(a) Redirecting downspouts to pervious areas rather than routing these flows to driveways or gutters,
(b) Protecting existing woody riparian areas on all streams,
(c) Replanting native riparian vegetation,
(d) Reducing and properly managing pesticide and fertilizer use,
(e) Reducing and properly managing animal waste, and
(f) Reducing and properly managing septic systems.

10.8 Using Land Use Planning as a Tool to Reduce Impacts of Future Development

Residents or visitors to local communities are beginning to speak out and demand more protection of the natural resources people have come to enjoy. Citizens of Cape Carteret spoke out for protection of Deer Creek; resulting in the town board taking steps to require a new Lowe's home improvement center to install a series of basins to collect parking lot runoff (as much as 8 inches of rain in 24 hours). Like many other waters, Deer Creek drains into Bogue Sound, which is Impaired for shellfish harvesting due to elevated bacteria levels after rainfall. Additional housing developments of 300 to 400 houses are planned along the NC 24 corridor. Without stormwater controls, Bogue Sound will be closed to shellfish harvesting and put many fisherman and related industries out of business.

Bogue Watch, which drains into Bogue Sound, is a new development in Carteret County. The development will boast of 287 lots plus facilities on the water. The development is intended to be built without compromising the environment. The subdivision, which has nearly 25 percent of its land surface planned for impervious surfaces, will have six common areas with five waterfront parks and piers. There will also be five holding ponds for stormwater runoff, vegetated areas to filter runoff, 38 acres of open space, and several large ponds for treated wastewater. Four lots are not being developed to allow for stormwater controls. This developer has determined that it is important to the community being designed to develop Bogue Watch balancing quality of life with environmental protection. Carteret County rejected a moratorium on new development in the eastern portion of the county and the amount of paved surfaces allowed, but did support height restrictions.

Many communities are looking at the challenges and opportunities that development offers to their communities seriously. Outside of the White Oak River basin, the town of Bath approved a 6-month moratorium on new subdivisions to allow them time to assess how the town wanted to

develop its remaining waterfronts lots and where the town needed to protect its resources. In addition, Pamlico County approved an ordinance to limit density and height of developments along the water. Camden County extended a moratorium on new subdivisions until a new school can be completed to hold the additional students the county is experiencing. Woodsong Development in Shallotte drains to Lockwoods Folly, which is Impaired for shellfish harvesting. The development will use pervious concrete to collect stormwater and a man-made wetland to help treat it, as well as courtyard gardens to treat runoff before it goes to a collection system. The developer notes that degradation of the environment does not have to follow development, but believes a quality lifestyle is being sold by clustering home sites and creating large common areas. These types of activities point to a growing market for socially, financially and environmentally viable developments.

Proactive planning efforts at the local level are needed to assure that development is done in a manner that maintains water quality. These planning efforts can find a balance between water quality protection, natural resource management, and economic growth. Growth management requires planning for the needs of future population increases, as well as developing and enforcing environmental protection measures. These actions are critical to water quality management and the quality of life for the residents of the basin. DWQ's review of draft CAMA Land Use Plans finds that the planning efforts do not adequately protect water quality. Many plans do not consider the compounded impact from development on water quality. Land Use Plans need to incorporate proactive measures to meet future growth demands to prevent water quality deterioration.

To prevent further impairment in urbanizing watersheds local governments should:

(1) Identify waters that are threatened by development.
(2) Protect existing riparian habitat along streams.
(3) Implement stormwater BMPs during and after development.
(4) Develop land use plans that minimize disturbance in sensitive areas of watersheds.
(5) Minimize impervious surfaces including roads and parking lots.
(6) Develop public outreach programs to educate citizens about stormwater runoff.

Planning Recommendations for New Development

- Minimize number and width of residential streets.
- Minimize size of parking areas (angled parking & narrower slots).
- Place sidewalks on only one side of residential streets.
- Minimize culvert pipe and hardened stormwater conveyances.
- Vegetate road right-of-ways, parking lot islands and highway dividers to increase infiltration.
- Plant and protect natural buffer zones along streams and tributaries.

Action needs be taken at the local level to plan for new development in urban and rural areas. For more detailed information regarding recommendations for new development found in the text box (above), refer to EPA's website at www.epa.gov/owow/watershed/wacademy/acad2000/protection, the Center for Watershed Protection website at www.cwp.org, and the Low Impact Development Center website at www.lowimpactdevelopment.org. Additional information regarding environmental stewardship for coastal homeowners is available at http://www.soil.ncsu.edu/assist/coastindex.html. Further public education is also needed in the White Oak River basin in order for citizens to understand the value of urban planning and stormwater management. For an example of local community planning effort to reduce stormwater runoff, visit http://www.charmeck.org/Home.htm.