



Albemarle-Pamlico Estuary Program

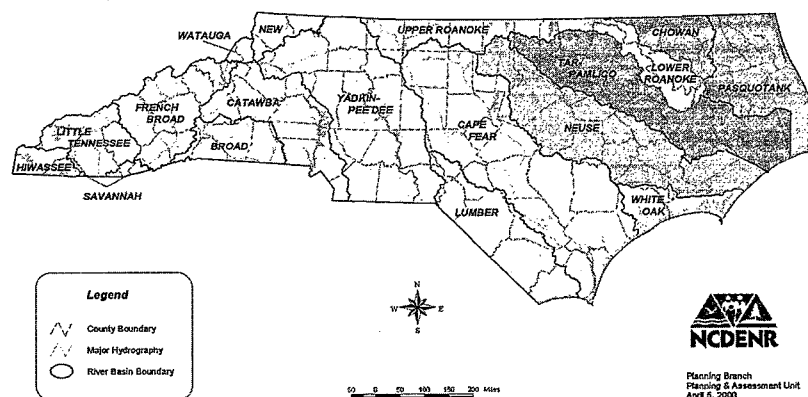
Taking Control of Nonpoint Source Pollution

BACKGROUND

The Albemarle and Pamlico Estuary forms a complex and dynamic ecosystem that provides a bounty of natural resources, essential for North Carolina's economy. The rivers, creeks, wetlands, and watershed supply food, recreation, jobs, transportation, and a vital habitat for fish and shellfish. Economically, the Albemarle and Pamlico sounds represent the region's key resource base through commercial fishing, tourism, recreation and resort development, while the watershed supports mining, forestry and agriculture. Additionally, the diverse ecological communities provide a rich natural heritage for people living in the region.

Several signs of environmental stress have been recognized in the Albemarle-Pamlico system. Among these are declining fisheries, frequent algal blooms, closure of shellfish waters, losses of historic submerged aquatic vegetation beds, and degradation of wetland, fish and upland habitats. Much of this stress can be linked to declines in water quality, due to nonpoint source pollution.

RIVER BASINS IN THE ALBEMARLE / PAMLICO REGION



The National Estuary Program

Estuaries and other coastal and marine waters are national resources that are increasingly threatened by pollution, habitat loss, coastal development, and resource conflicts. Congress established the National Estuary Program (NEP) in 1987 to provide a greater focus for coastal protection and to demonstrate practical, innovative approaches for protecting estuaries and their living resources.

As part of the demonstration role, the NEP offers funding for member estuaries to design and implement Action Plan Demonstration Projects that demonstrate innovative approaches to address priority problem areas, show improvements that can be achieved on a small scale, and help determine the time and resources needed to apply similar approaches basin-wide.

The NEP is managed by the U.S. Environmental Protection Agency (EPA). It currently includes 28 estuaries: Albemarle-Pamlico Sounds, NC; Barataria-Terrebonne Estuarine Complex, LA; Barnegat Bay, NJ; Buzzards Bay, MA; Casco Bay, ME; Charlotte Harbor, FL; Columbia River, OR and WA; Corpus Christi Bay, TX; Delaware Estuary, DE, NJ, and PA; Delaware Inland Bays, DE; Galveston Bay, TX; Indian River Lagoon, FL; Long Island Sound, CT and NY; Maryland Coastal Bays, MD; Massachusetts Bays, MA; Mobile Bay, AL; Morro Bay, CA; Narragansett Bay, RI; New Hampshire Estuaries, NH; New York-New Jersey Harbor, NY and NJ; Peconic Bay, NY; Puget Sound, WA; San Francisco Bay-Delta Estuary, CA; San Juan Bay, PR; Santa Monica Bay, CA; Sarasota Bay, FL; Tampa Bay, FL; and Tillamook Bay, OR.

The Problem

Nonpoint source pollution is the greatest cause of impairment to both salt and fresh water resources in the Albemarle-Pamlico region. Of the miles of impaired streams in the Roanoke River basin that do not meet criteria for supporting aquatic life, 81% are impaired due to nonpoint sources of pollution. The most significant land use in the watershed is agriculture, including crop farming and cattle farming. Although agriculture is not the only land use that contributes to nonpoint source pollution, agricultural practices are often cited as the major contributor to nonpoint source pollution. Stream bank erosion, sedimentation, and nutrient loading all contribute to water quality degradation and can be traced to detrimental agricultural practices.

A current demonstration project seeks to enhance Roanoke River water quality and to provide education and outreach with transferable benefits to others. The demonstration project is expected to restore approximately 36 acres of riparian habitat along the Roanoke River, located in Halifax County, northeast of the town of Norfleet. Expected benefits include improving water quality and wildlife and fish habitats for species such as anadromous fish and migratory birds. This will be accomplished by reducing stream bank erosion, sedimentation and nutrient loading through removal of cattle from the riverbank. Methods being used include fencing out cattle from the riverbank, establishing river and tributary buffers through the planting of hardwood trees, supplying an alternate watering source for the cattle, and providing a cattle crossing to allow for a pasture rotation system.

The Albemarle-Pamlico Sounds

The Albemarle-Pamlico estuarine system is the second largest estuarine complex in the United States, second only to the great Chesapeake Bay. The system supports an abundant and rich variety of organisms and encompasses important habitat for fish and shellfish, including key nursery areas for East Coast fisheries.

The system is composed of seven sounds: the Albemarle, Currituck, Croatan, Pamlico, Bogue, Core and Roanoke, and is drained by several major river basins: the Chowan, Tar-Pamlico, Neuse, Roanoke, Pasquotank, Perquimans, Little, North, Pungo and Alligator. The rivers drain a basin of over 30,000 square miles, including 36 counties in northeastern North Carolina and 16 counties and independent cities in southeastern Virginia. They discharge fresh water largely into the western side of the sounds.

North Carolina's sounds are characterized by wind-driven tides, which affect circulation patterns within the sounds and saltwater concentrations in their tributaries. In contrast to lunar tides, wind tides are more variable and contribute to



unpredictable changes along the coast. On the eastern side of the sounds, a chain of islands constituting North Carolina's beautiful Outer Banks, forms a barrier (with very few inlets) between the sounds and the Atlantic Ocean.

The Albemarle-Pamlico estuarine system supports an array of ecological, economic, recreational, and aesthetic functions that are of regional and national importance. For these reasons, the sounds were included in the EPA's National Estuary Program (NEP) in November of 1987.

The Albemarle-Pamlico Estuarine Study (APES, as it was known then) completed its Comprehensive Conservation and Management Plan (CCMP) in November, 1994, bringing to a close the research and development phase of the program, and commencing the implementation phase. At this time the program was renamed as the Albemarle-Pamlico National Estuary Program (APNEP).

Fortunately the Albemarle-Pamlico ecosystem is relatively healthy when compared to heavily populated and industrialized estuarine systems in other parts of the country, such as Boston Harbor or Long Island Sound. Nevertheless, nonpoint sources of pollution have impacted this largely undeveloped and agricultural region.

Project Overview

One of the five major river basins included in the APNEP region is the Roanoke River basin. It begins in the Blue Ridge Mountains of northwestern Virginia and flows in a southeasterly direction for 400 miles before emptying into the Albemarle Sound in eastern North Carolina. By the time it reaches the fall line near Roanoke Rapids, water from nearly 8,000 square miles of watershed has drained into it. From Roanoke Rapids to the coast, another 2,000 square miles are drained, giving the Roanoke the distinction of carrying more water than any other river in North Carolina. The lower portion of the basin contains the largest intact

and least disturbed bottomland hardwood and cypress-tupelo ecosystems on the Atlantic coast of North America.

Forestry and cultivated cropland account for approximately 22 percent of the land use in the basin. Cotton, peanuts, tobacco and soybeans are among the most commonly grown crops, and only six percent of land use falls within the urban/developed category.

Because surface waters in North Carolina are classified according to their best-intended uses, water quality is determined by how well the intended uses are being met. This is known as "use support status" and is expressed as FS, for fully supporting; PS, for partially supporting; NS, for not supporting; and NR for not rated. Intended use categories include aquatic life protection/secondary recreation, primary recreation, fish consumption, shellfish harvesting, and water supply. Data are derived through water quality monitoring, fish tissue studies, benthic macroinvertebrate and fish community sampling, and are compared to use criteria. These comparisons determine the use support status or condition of the water. Water bodies receiving NS or PS ratings are considered to be impaired.

One of the greatest causes of degraded or impaired fresh or salt water is nonpoint source pollution. Forestry, construction, and urban/agricultural waste runoff all contribute significant nonpoint source pollution to the Roanoke River. The river has approximately 178 miles of streams that are impaired with respect to fish consumption and aquatic life/secondary recreation protection. While some loading of mercury and dioxin can be traced to point sources and contributes to the fish consumption impairments, the majority of the river miles are impacted by nonpoint source contributions.

Because nonpoint source pollution had been implicated in water quality impairment in this particular area of the Roanoke, the Roanoke River Basin Regional Council (RRBRC), a member of the APNEP, chose to address it in a demonstration project involving agricultural practices. Detrimental agricultural practices in this area included allowing cattle to enter the riparian zone for water, grazing and shade. The consequences of this practice resulted in cattle excrement being deposited either directly into the river or immediately adjacent to upgradient riverbank slopes. At the same time, allowing cattle access to the river resulted in severe streambank erosion and sedimentation, which further contributed to water quality degradation.

Project Implementation

The "Roanoke River Riparian Zone Rehabilitation Demonstration Project," begun in the summer of 2000 at a cost of \$42,000, consisted of fencing cattle to exclude them

from a two-mile stretch of the Roanoke River in order to reduce stream bank erosion, sedimentation and nutrient loading. To form a 150-foot buffered area extending back from the river and a 75-foot buffered area on both sides of a tributary stream, hardwood plantings were established in winter, 2001 to restore approximately 21 acres of riparian habitat. Water quality will be monitored over the next four years, in conjunction with twice-yearly ground cover inspections.

This project is a joint effort among the Fishing Creek Soil and Water Conservation District, Natural Resources Conservation Service, North Carolina Division of Water Quality, North Carolina Cooperative Extension Service, US Fish and Wildlife Service, the Albemarle-Pamlico National Estuary Program, and a private landowner. As a cost-shared, cooperative effort, the project created cooperation between participating agencies and the landowner. The US Fish and Wildlife Service, Natural Resources Conservation Service, and the landowner installed project fencing in September, 2000. An existing stream crossing with eroded banks caused by cattle use was restored; this involved removing the old pipe, replacing it with new pipe measuring 42 inches, hauling soil, and placing filter fabric and gravel on the site. In addition, an existing but unused water well was repaired and new water lines were installed to new watering troughs to provide a new water source to the cattle.

Project Benefits

The landowner, cattle and the environment will all benefit from the project. The cattle will retain more of their weight by not having to travel as far to their water supply. Rotational pasture grazing is now available, drinking water for cattle will be cleaner, and there will be an annual per acre payment from the USDA for each acre of riparian buffer installed. Benefits accruing to the environment will also be realized through improved water quality and aquatic habitat downstream, and will help to forestall costlier future remedies.



This demonstration project has local and statewide applications. History has demonstrated that during high flows of the Roanoke River in warm months, water quality does not support aquatic life. Fish kills caused by low dissolved oxygen levels are experienced annually in the lower reaches of the river. These events have been accompanied by assertions that the problem is due in part to background, natural or backswamp biochemical oxygen demand, beyond the land managers' control. Land use practices that contribute to impaired water quality should be modified to prevent further impacts to historically marginal water quality. In the western reaches of North Carolina, not only streams but also drinking wells continue to be contaminated by fecal coliform bacteria from cattle excrement. Changing farming practices to include buffers to both riparian and wellhead areas would better protect water quality.

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