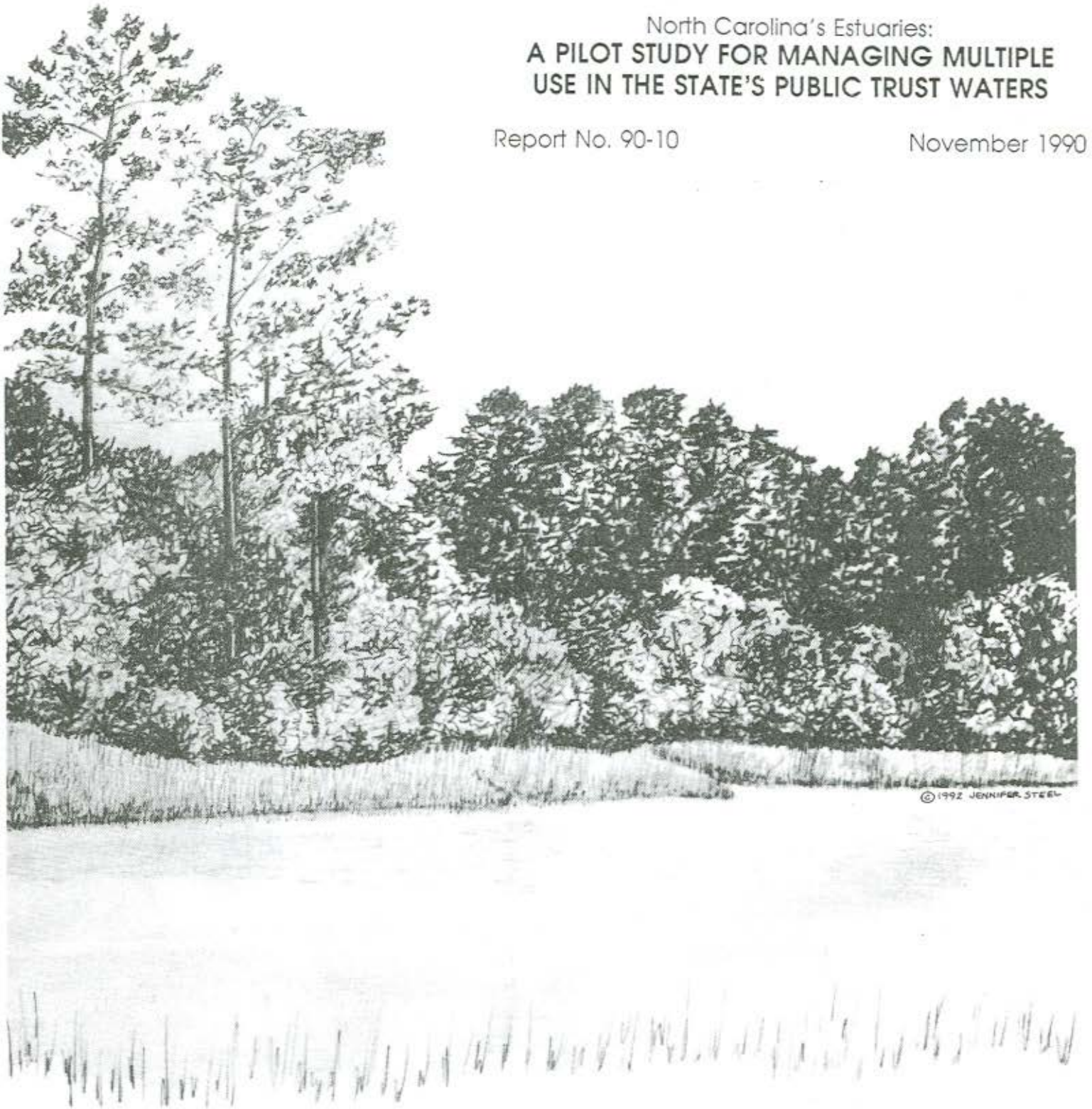
North Carolina's Estuaries:

A PILOT STUDY FOR MANAGING MULTIPLE USE IN THE STATE'S PUBLIC TRUST WATERS

Report No. 90-10

November 1990



ALBEMARLE-PAMLICO ESTUARINE STUDY

NC Department of
Environment, Health,
and Natural Resources

Environmental
Protection Agency
National Estuary Program

Albemarle-Pamlico Study Report 90-10

North Carolina's Estuaries: A Pilot Study for Managing Multiple Use in the State's Public Trust Waters

November 1990

Principal Investigator:
Walter F. Clark
Ocean and Coastal Law Specialist
UNC Sea Grant College Program

North Carolina's Estuaries:
A Pilot Study for Managing Multiple Use
in the State's Public Trust Waters

Albemarle-Pamlico Estuarine Study Report 90-10

November 1990

This report was developed under an agreement between the Albemarle-Pamlico Estuarine Study; the N.C. Department of Environment, Health and Natural Resources; the U.S. Environmental Protection Agency/National Estuary Program; and the University of North Carolina Sea Grant College Program.

Principal Investigator: Walter F. Clark
Editor: C.R. Edgerton
Sub-contractees: Edward D. Stone Jr. and Associates/ Glenn R. Harbeck, AICP
N.C. Center for Geographic Information and Analysis.

Acknowledgments

This study was conducted with financial support from the United States Environmental Protection Agency through its agreement with the N.C. Department of Environment, Health and Natural Resources as part of the Albemarle-Pamlico Estuarine Study. Substantial resources were contributed by the University of North Carolina Sea Grant College Program in staff time, equipment and operations. Special thanks go to Dr. B.J. Copeland, director of UNC Sea Grant.

Considerable contribution was provided by several institutions, agencies and individuals. Glenn Harbeck and the firm of Edward D. Stone Jr. and Associates contributed enormously by bringing to the project their coastal planning expertise and creativity. I am grateful to the staff of the Center for Geographic Information and Analysis for their professionalism and friendliness in completing a task that proved to be greater than any of us had predicted. I would particularly like to thank Karen Siderelis and Tom Tribble for their enthusiasm and Zsolt Nagy for his expertise and humor.

My most special thanks go to those who contributed ideas and time for no compensation. Ms. Lynn Phillips, planning director for Carteret County, gave tirelessly to the project in her encouragement and with her knowledge of the county. I am also grateful to Daniel F. McLawhorn of the N.C. Department of Justice for helping plant the seed for the project; to David Owens of the North Carolina Institute of Government for his expertise and support; to John Crew of the N.C. Division of Coastal Management for his time and advice; to Jeanette Brockington for her assistance with legal research; to C.R. Edgerton of UNC Sea Grant for his editorial assistance; and to Debra Lynch and Julie Snyder, both of UNC Sea Grant, for staff assistance.

I want to extend a special thank you to the members of the project's Advisory Board, which represented the user groups of Carteret County's waters. These people gave of their time out of love and concern for one of the county's most valuable resources. The individuals and the groups they represent are : Dewey Bordeaux, recreational boating; Don Brock, coastal development; Irv Hooper, environmental organization; Kenneth Kirkman, coastal development; Don McMahan, shipping; Clifton Moss, recreational fishing; Tom Piner, military; William "Billy" Smith, commercial fishing; Carl Tilghman, local government; Paul Warren, local government; Clinton Willis, commercial fishing.

Abstract

This report contains a model water use plan for the coastal public trust waters of Carteret County, North Carolina. The report combines legal analysis, inventories of aquatic resources and uses, policy development and GIS computer modeling to develop the plan. Though specific to Carteret County, the plan is designed as a model to be used in addressing the growing number of use conflicts in the public trust waters of the entire Albemarle-Pamlico Estuarine Study project area.

Table of contents

List of tables

List of maps

List of figures

Introduction

In 1896, North Carolina lamented the demise of the shellfish industry in other states. In a book published almost 95 years ago, the problems associated with this decline were eloquently described:

> "The consequence is the depletion of many grounds once regarded as inexhaustible, the diminution in other waters where diminution seemed impossible, followed by the assertion of local rights, attempts at the exclusion of invading trespassers, contention, bloodshed; finally legislative action and the effort to define rights by law, with power to assert and secure them by force; and all this made necessary because human nature knows no moderation in the use of the free gifts of Providence, or in the attainment of that which leads to competency or wealth.
>
> The attempt to retrace the steps of past waste and neglect is what invariably follows in locking the stable door after the horse has gone — vain regrets and fruitless self-reproach. All the deep research of science, all the labor of planting new territory of waters, will not bring back to Connecticut, New York, Maryland and Virginia the store they wasted and the abundance they so universally squandered."
>
> *--State Board of Agriculture, 1896*

The same book, however, described North Carolina's shellfish beds as "ample for all time." It described the state as the "one treasure-house not yet plundered; one great water granary whose doors are not yet thrown open."

In 1990, North Carolina's ample treasure-house is being threatened.

In the last 25 years, North Carolina's coastal area has witnessed unprecedented development. Among the reasons are the state's mild climate, beautiful beaches, fishery resources and relatively inexpensive land values. With development has come economic opportunity and, unfortunately, stress on the state's public trust resources.

More people are competing for coastal resources. Population growth in North Carolina's coastal area (20 counties as defined by the N.C. Coastal Area Management Act) averaged 9.9 percent between 1980 and 1985. This compares to a 6.4 percent growth rate statewide for the same period (Danielson 1987). Current estimates anticipate that this trend will continue.

It has been estimated that in the Albemarle-Pamlico Estuarine Study area, growth between 1980 and 1990 averaged 15.5 percent. The statewide estimate for the same area and time period is 12.5 percent (APES Status and Trends 1989). The growth rate differential is even greater for some of the counties that border on a coastal sound and/or the Atlantic Ocean. Carteret, Currituck and Dare counties are among the fastest growing in the state. Carteret county grew at a rate that was double the state's growth rate during the 1970s, and is now experiencing growth at approximately two and one half times the state's current rate (Armingeon 1989).

Permits and licenses for development and use of natural resources are increasing. For example, permits for development issued under the Coastal Area Management Act (CAMA) increased from approximately 900 in 1981 to approximately 2,800 in 1986. Between 1986 and 1988 the total number of CAMA permits for the entire coastal area declined but the number of

permits issued in many of the counties bordering one of the sounds or the Atlantic Ocean continued to increase (Armingeon 1989).

Licenses to use or extract public resources from coastal waters have dramatically increased. Commercial fishing vessel licenses issued by the Division of Marine Fisheries increased from 2,600 in 1954 to almost 21,000 in 1988 (DMF Reports 1988).

Conflicts Between Users

The increase in population and the greater demand on aquatic public trust resources have brought conflict. There has been conflict between fishermen and developers over the building of marinas adjacent to shellfishing waters.

Conflict has arisen between various recreational users of the state's coastal public trust waters. For example, at the urging of swimmers, boaters and shoreline residents, some local governments are searching for ways to control the use of jet skis.

And there has been conflict between those who desire to appropriate public trust land and water for private use (for marinas and aquaculture facilities etc.) and those who want these areas to remain open for public use.

Just as the demise of shellfishing in the late 1800s generated "efforts to define rights", the many conflicts of today have left law and policy-makers searching for equitable solutions. The result has been a plethora of laws and regulations. Perhaps the most notable is the state's Coastal Area Management Act.

CAMA, which became law in 1974, recognized that the state's coastal area was being subjected to pressures "which are the result of the often conflicting need of a society expanding in industrial development, in population and in the recreational aspirations of its citizens." GS [General Statutes of N.C.]113A-102. The Act established a strategy for state and local cooperation to manage environmentally sensitive and important resources. Public trust waters are one of the areas singled out by the Act as environmentally important and in need of management attention.

Even with CAMA's management directives, conflicts in the state's public trust waters have continued to increase. Consequently, policy-makers are still searching for innovative management schemes.

The Albemarle-Pamlico Study

In 1986, the Environmental Protection Agency funded the Albemarle-Pamlico Estuarine Study. The study is designed to combine scientific research and evaluation of potential management alternatives to ensure the long range productivity of our estuarine waters. The study's basic purpose was succinctly described in 1987 by Congressman Walter Jones, chairman of the U.S. Congressional Committee on Merchant Marine and Fisheries. In an address at a public participation workshop in Washington, N.C. Jones stated that "the study is a means for federal, state and local governments to join forces in a common effort to explore and understand the estuary."

It was from the Albemarle-Pamlico Estuarine Study that this project and report were born. The report contains a management option for the public trust waters of the state's estuaries. The option presented is a model water use plan for the public trust waters of Carteret County, North

Carolina.

The local planning process was used as a management option for two reasons. First, CAMA has already established a strategy for state and local cooperation to manage coastal resources, including public trust waters. The Act requires local governments within the 20-county coastal area to develop their own land use plans in accordance with state guidelines.

To date, CAMA mandated plans have only addressed land uses even though the jurisdictional boundaries of several counties encompass large areas of coastal water and there is no prohibition forbidding the planning process from including public trust waters. CAMA clearly states that the management of water areas is important in achieving the balanced use and preservation of coastal resources. GS 113A-102.

Second, over the last few years local governments have been playing a greater role in the management of natural resources. There has been a shift from a strong state role with restricted local involvement in the management of natural resources to a more open situation with greater local involvement (Liner 1985).

This trend is likely to continue with the recognition that many environmental problems are caused by activities (such as land use) that are normally regulated by local government. The alternative would be for the state to assume powers that have traditionally been the province of local government, an action that would likely injure state and local relations.

Several benefits are derived from using comprehensive planning as a management option. First, expanding land use planning to cover aquatic areas provides a wholistic view of the land and water interface-- a view that can consider inter-relationships between functional (jurisdictional) and natural systems. Too often, management strategies are built around jurisdictional considerations without integrating the natural systems for which the strategy is intended to protect or enhance.

A comprehensive planning strategy can provide predictability for users of the state's public trust waters and adjacent shoreline. This predictability is important for all users. For example, environmentalists generally want a long-term commitment to protection of the estuary and public trust waters while developers want to know what development is possible before they make major investments.

Comprehensive plans can act as a collecting point for all existing federal, state and local law, regulations and policies. A frequent criticism of management programs is that they are often disjointed and confusing, making it difficult for resource users to determine their legal responsibilities. A properly structured water use plan could alleviate some of this confusion.

Finally, plans can act as collecting points for new research information. One of the objectives of the Albemarle-Pamlico Estuarine Study is the development of an effective management structure that would have the ability to accommodate new information.

A Summary of This Report

The first chapter of this report is a discussion of the current laws and regulations that impact the resources and uses of Carteret County's public trust waters. This is important because local plans must be consistent with state and federal requirements. Existing laws and regulations must be viewed as the minimum foundation on which local water use plans and accompanying ordinances are built. Understanding the law enables planners and policy-makers to know when and where it is appropriate for local governments to manage natural resources.

The second chapter of the report contains the model water use plan for Carteret County. The plan is divided into three sections. Section one contains a discussion of the county's key growth and water use indicators.

Section two contains policies regarding use of the county's public trust waters. The policies were developed with the assistance of a citizen advisory board. The members of the board represented the major users of the county's waters. Also, a public forum was held last year to give the citizens of the county an opportunity to identify important policy issues (see Appendix for a list of these issues).

The final section of Chapter Two describes the public trust waters use classification system. This system was developed to assist the county in the implementation of the model policies.

Chapter Two also contains several Geographic Information System (GIS) maps. These maps, developed by the North Carolina Center for Geographic Information and Analysis, depict aquatic resources and uses and the water classification system for the county's public trust waters. The maps do not cover the entire county, but focus on a segment of public trust water in the Morehead City/Beaufort area. The project team identified this area as having the greatest variety of water use conflicts.

Chapter Three describes different options for implementation of the model water use plan. Two options are discussed: interfacing with state commissions and agencies and county ordinance development.

It must be emphasized that the specific policies contained in this report are not recommendations to Carteret County as to how it should manage its public trust waters. They are merely examples of policies that might be developed through a water use planning process.

Chapter One

The Legal Foundation For Local Water Use Planning and Zoning

Written by

Walter F. Clark
University of North Carolina Sea Grant College Program
North Carolina State University
Raleigh, N.C.

The Legal Foundation

To fully understand the model water use plan for Carteret County, some background information is important. It is necessary to define public trust water and public trust rights. A complete definition must include a description of the jurisdictional boundaries of trust waters and a brief discussion of the rights that users can exercise within these areas.

It is also important to understand the existing regulatory structure as it applies to the public trust. This structure defines our management and stewardship responsibilities for public waters. A local water use plan and any attempt by local government to regulate public trust water must not be in conflict with existing laws and regulations. Local plans and ordinances must interact with and, in some cases, refine existing law.

Public Trust Water

The concept of public trust has ancient origins. Roman law held that "[b]y the law of nature" certain resources were considered "common to all": air, running water, sea, and shores of the sea (*Institutes of Justinian* 1841). Old English common law, from which much of the law in this country evolved, allowed the King to own the beds of navigable waters, but gave the public the right to use the waters. It is from this history that the American idea of public trust evolved. The concept holds that the states own the tidelands and their associated resources, but hold them in "trust" for the people (Selmi & Manaster 1989).

In North Carolina we adhere to this concept by recognizing public or state ownership of land covered by tidal waters. All the water that covers this land, as well as navigable water covering non-tidal lands, is also within the public trust. Consequently, all the water in the coastal rivers and sounds of Carteret County is public trust water and all land below mean high tide is public trust land. North Carolina recognizes one situation in which land beneath tidal water can be privately owned. (For a full discussion of this exception see page 19). In this situation, however, the owner's private property rights cannot be exercised if they are opposed to the public trust.

We all enjoy the right to use public trust land and water. These rights, called public trust rights, include the right to navigate, swim, hunt, fish and enjoy all recreational activities in the water courses of the state and the right to freely use and enjoy the state's ocean and estuarine beaches and public access to the beaches. New rights may be added if the needs of society dictate.

Our Stewardship Responsibility Over The Public Trust

North Carolina takes seriously its responsibility to protect and enhance the public trust. The concept is embodied in the state's constitution, case law and statutory law. Article XIV, Section 5 of the Constitution says that:

> "It shall be the policy of this State to conserve and protect its lands and waters for the benefit of all its citizenry and to this end it shall be a proper function of the State of

North Carolina and its political subdivisions to acquire and preserve park, recreational, and scenic areas, to control and limit the pollution of our air and water, to control excessive noise, and in every other appropriate way to preserve as a part of the common heritage of this State its forests, wetlands, estuaries, beaches, historical sites, open lands, and places of beauty."

The Constitution directs both state and local government to assume a stewardship role over public trust lands and waters.

There is no federal public trust doctrine, but federal law is important in managing the environment in which public trust rights are exercised. Therefore, the discussion below, though centered on state law, considers federal law, particularly in those areas where it is directly connected to state law and/or local ordinances.

The State's Role

Before turning to the specifics of public trust management, it will be helpful to look at North Carolina's process for developing laws and regulations.

North Carolina's law-making body, the General Assembly, is only in session part of the year. As a consequence, it often lacks the time to refine the laws it passes. Instead it relies on several state commissions that, with the assistance of state administrative agencies, develop the broad directives established by statute. These directives are in the form of specific administrative rules which are better able to accommodate the complex nature of estuarine public trust waters. Rules are developed according to procedures found in the state's Administrative Procedure Act. GS 150B. The APA encourages strong public input in regulation development. For example, the act requires that the public (including county government) be given an opportunity to present data, opinions, and arguments at hearings held to discuss the adoption, amendment or repeal of a rule. GS 150B-12. The act also states that petitions may be presented to an agency or commission to adopt, amend or repeal a rule. GS 150B-16. Both of these provisions provide important avenues for county involvement with the state's administrative process.

Though North Carolina takes public trust stewardship seriously, the legislature has never assigned the management of the public trust to any specific entity. Instead, management responsibility for the public trust and for the environment necessary for the enjoyment of public trust rights (access, water quality, etc.) is delegated by a variety of laws to several state commissions and agencies. Most of these agencies and commissions are housed in the Department of Environment, Health and Natural Resources. However, the state's Department of Administration does have a hand in managing the public trust. Following is a discussion of these entities and the role each plays.

The Department of Environment, Health and Natural Resources

Article 13 of the General Statutes confirms the constitutional provision that the marine, estuarine and wildlife resources of the state belong to the people of North Carolina. The Department of Environment, Health and Natural Resources and the North Carolina Wildlife Resources Commission are charged by this statute with stewardship of these resources.

The department is given the following powers to help it carry out its stewardship responsibilities. The department can:

- Comment on and object to permit applications submitted to state agencies which may affect public trust resources to conserve and protect the public trust rights;
- Investigate alleged encroachments upon, usurpations of, or other actions in violation of public trust rights;
- Initiate proceedings for review of permit decisions by state agencies which will adversely affect public trust rights or initiate civil actions to remove or restrain any unlawful or unauthorized encroachment upon, usurpation of, or any other violation of public trust rights or legal rights of access to such public trust areas. GS 113-131(b).

There are several state commissions associated with the Department of Environment, Health and Natural Resources that are central to the management of public trust waters within North Carolina and Carteret County. These are: the Environmental Management Commission; the Marine Fisheries Commission; the Coastal Resources Commission; and the Wildlife Resources Commission. The commissions are staffed, respectively, by the divisions of Environmental Management, Marine Fisheries and Coastal Management.

An office that is not directly associated with one of these commissions but still plays an important role in the management of public trust resources is the department's Shellfish Sanitation Branch. This branch supplies the Division of Marine Fisheries with information about fecal coliform levels in the state's estuarine waters. Fecal coliform is used as the determinate to decide if shellfishing waters should be closed because of pollution.

Following is a more detailed discussion of these commissions and their associated divisions.

The Environmental Management Commission and The Division of Environmental Management

The Environmental Management Commission has responsibility for developing regulations to protect, preserve and enhance the state's water resources. The commission's jurisdiction covers all waters of North Carolina including the public trust waters of Carteret County. The commission develops and administers its water quality standards based on the guidelines of the federal Clean Water Act.

The Act requires the commission to develop water quality classifications. Each classification is adopted with a primary reference to the best use of waters to which it is assigned. When the classifications are in place the commission develops regulatory standards that prohibit any use that would create water quality conditions that are below the standards that define the water's classification.

North Carolina has eight water quality classifications - four classifications for non-saline waters and four classifications for saline waters. The classifications for saline waters and the ones most pertinent to this report are:

- **Class SA** : (waters suitable for commercial shellfishing and all other tidal salt water uses);
- **Class SB** : (waters suitable for swimming and primary recreation);
- **Class SC** : (waters suitable for secondary recreation and fish propagation); and

• **Outstanding Resource Waters:** (A classification that may overlay the other classifications. These are areas where additional protection is necessary to preserve outstanding resources).

The Water Quality map on page 86 shows the four classifications for Carteret County's public trust waters.

Regardless of the classification, a permit is required for activities that lead to the point-source discharge of waste (from a pipe, ditch, etc.) into the state's waters. This permit is called a National Pollutant Discharge Elimination System (NPDES) permit. The most common examples of the types of activities that would require NPDES permits are discharges from industrial facilities or municipal sewage plants.

Point-source discharges into the public trust waters of the focus area are shown on the GIS Water Quality map.

The U.S. Coast Guard, though not a state agency, has a role in managing pollution sources in state waters. The Clean Water Act gives the Coast Guard authority to regulate and enforce the use of marine sanitation devices. 33 USC 1322. These devices receive, retain, treat and discharge sewage generated on boats. The Clean Water Act does not prevent the state from exercising greater environmental protection over these types of discharges.

In fact, the law allows the state to petition the EPA for a ban on treated or non-treated discharges from boats. 33 USC 1322(f)(3). One of the criteria used by EPA to determine if a request for a non-discharge area will be granted is the availability of adequate facilities for the safe and sanitary removal and treatment of sewage from vessels.

In recent years there has been increasing attention given to non-point source pollution. Non-point sources are dispersed and can't be traced to a specific source, such as a pipe or ditch. A good example is runoff from agricultural lands .

In the Clean Water Act Reauthorization of 1987, Congress took steps to address non-point sources of pollution. The act places primary management responsibility at the state level since non-point source pollution problems are usually traceable to land use patterns and land use is typically a regulatory function of local government.

Under section 319 of the act, the states are required to prepare assessment reports and management plans. The assessment reports must:

• Identify streams, rivers, lakes and estuaries that are not likely to meet water quality standards without additional non-point controls;

• Identify the categories of non-point sources and, where appropriate, the specific non-point source causing the problem;

• Spell out the process, including public participation, for identifying measures for controlling each category of non-point source pollution; and

• Identify state and local programs for controlling non-point source pollution.

The state's management plan must:

• Identify measures needed to control non-point source problems specified in the assessment report;

• Identify steps needed to implement those measures;

• Identify all sources of funding for non-point source control;

• Certify that its laws are adequate to implement the program; and

• Set out a schedule for implementing the program.

The requirements of these amendments will have implications on the local planning process that could extend to water use planning. North Carolina has submitted two non-point source pollution reports to the Environmental Protection Agency -the N.C. Nonpoint Source Assessment Report and the N.C. Nonpoint Source Management Program (WRRI Report, No.261). The proposed program outlines a strategy which emphasizes interagency efforts that encourage response at the local level.

The GIS Land Use map on page 88 shows the predominant land use patterns adjacent to Carteret County's public trust waters. These patterns often have an effect on the type and quantity of non-point source pollution flowing into the waters.

In 1988 and 1989 the Environmental Management Commission classified more than 200,000 acres of coastal estuarine waters in North Carolina as Outstanding Resource Waters. A large percentage of these waters fall within Carteret County (see the GIS Water Quality map for ORWs within the study area, page 86).

All new development 575 feet landward of the mean high water line of the ORWs must comply with low density requirements. These requirements can be found in the commission's Coastal Stormwater Runoff Disposal Rule. 15A NCAC 2H. 1003(a)(2). These rules limit the density of development to 25 percent built-upon area adjacent to SA waters and 30 percent built-upon area adjacent to other classifications.

The commission can adopt more stringent requirements for specific sites (Carter 1990). Additional site-specific standards have been adopted for most ORWs, including those in Carteret County. These standards include limitations on NPDES permitted discharges and on marina construction. For example, in Carteret County no new marinas will be allowed in the ORW at Back Sound and all marinas in the Core Sound ORW must be located in upland basins. 15A NCAC 2B.0216(e).

The Marine Fisheries Commission and the Division of Marine Fisheries

The Marine Fisheries Commission has jurisdiction over all coastal fishing waters in North Carolina. This includes the public trust waters of Carteret County up to a dividing line that separates coastal from inland fishing waters.

Inland fishing waters are managed by the Wildlife Resources Commission. In some instances the Marine Fisheries Commission's jurisdiction overlaps the jurisdiction of the Wildlife Commission. These areas are called joint fishing waters and their management is shared by the two commissions.

The Marine Fisheries Commission exercises enforcement and regulatory authority over the conservation and management of marine fishery resources. More specifically, as stated in GS 113-182, the commission and the Division of Marine Fisheries are responsible for regulating the time, place, equipment, etc., that may be used to take fish; the seasons for taking fish; the quantities of fish that may be taken; the opening and/ or closing of coastal fishing; and the possession, cultivation, transportation, importation, exportation, sale, purchase, acquisition and disposition of all marine and estuarine resources. Marine and estuarine resources include aquatic plant life and the entire ecology supporting plant and fish life.

In accordance with these responsibilities, the commission and the division have developed

regulations that identify areas in public trust waters where specific restrictions apply to protect resources and uses.

Protected Resource Areas

The commission and the division have designated certain areas as unique because of their resource value. Many of these areas are found in Carteret County.

Primary Nursery Areas — These are areas where the initial post-larval development of young finfish and crustaceans occurs. Consequently, these areas need to be protected in their natural state so the juvenile organisms can develop normally. Without this protection the state's fishery and the livelihood of the state's fishermen would suffer.

Primary nursery areas are located in the uppermost reaches of the estuaries. The division attempts to mark nursery areas by posting signs at the downstream boundaries. Primary nursery areas in the focus area of Carteret County are depicted on the GIS Marine Resource map on page 85.

Because it is important to protect nursery areas in their natural state, the use of bottom-disturbing fishing gear is prohibited. It is unlawful to use any trawl net, long haul seine, swipe net, or dredge for the purpose of taking any marine fishes in a primary nursery area. 15A NCAC 3B .1401 and .1404.

Secondary nursery areas — When juvenile fish are large enough to leave the primary nursery areas, they move further downstream into secondary nurseries where they continue to develop.

In some secondary nursery areas it is unlawful to use any trawl net at any time for the purpose of taking marine fishes. In other secondary nursery areas the use of trawl nets is unlawful only at certain times. The director of the Division of Marine Fisheries may open these areas to shrimp or crab trawling. 15A NCAC .1402 (2) and .1406. Secondary nursery areas for the focus area are shown on the GIS Marine Resource map.

Crab spawning areas — Because it is important for crabs to have an undisturbed area in which to spawn, the division may close certain areas to trawl nets and prohibit the taking of crabs with commercial fishing equipment. The areas that may be closed in the focus area are shown on the GIS Marine Resource map . These areas are closed by proclamation and only during April 1 - August 31. 15A NCAC 3B .0802.

Aquatic vegetation beds — Aquatic vegetation beds are defined as estuarine areas where eelgrass, shad grass, widgeongrass and smooth or saltwater cordgrass are found growing. These areas provide valuable habitat for marine resources and consequently require special protection.

Clams can be harvested from aquatic vegetation beds only by hand or by hand tongs or rakes. 15A NCAC 3B .0901 (b). The Coastal Resources Commission recognizes the importance of aquatic vegetation. Under the CRC's rules the excavation or destruction of aquatic vegetation is discouraged. Areas of aquatic vegetation have not been extensively mapped on a statewide basis. However, maps from two studies do exist for Carteret County. The results of these

studies are shown on the GIS Marine Resource map on page 85.

Protected Uses and Use Areas

The commission and the division have developed other regulations that control uses in designated estuarine public trust areas.

Rules governing the use of eel pots, crab pots, fish pots, and shrimp pots — If not properly located and marked, pots suspended in the water column or placed on the bottom of public trust waters can pose a hazard to navigation and other public uses. To reduce this hazard, the commission and the division have designated locations for crab pots. 15A NCAC 3B .0504. Designated crab pot areas are shown on the GIS Water Use map on page 87.

Net rules — Rules have been developed to control the placement of nets in public trust waters. These rules are designed to minimize conflict with the other water uses. For example, no fixed or stationary nets may be used or set in the channel of the Intracoastal Waterway or in any other location where they may constitute a hazard to navigation. Nets are considered a hazard to navigation if they block more than two-thirds of any natural or man-made waterway, sound, bay, creek, inlet or any other body of water or are set in the middle third of any marked navigation channel. 15A NCAC 3B .0301-.0413. The Intracoastal Waterway and most natural and man-made channels in the focus area are shown on the GIS Water Use map.

Shellfish aquaculture — The commission and the division administer a leasing program for the cultivation of shellfish on state-owned submerged lands and in state-owned public trust waters. Those interested in leasing submerged lands must apply to the division and select a site that satisfies the following criteria:

- The area leased must be suitable for the cultivation and harvesting of shellfish in commercial quantities (commercial quantity being defined as 25 bushels of shellfish per acre per year);
- The area must not contain a natural shellfish bed. A natural shellfish bed is an area of public bottom where 10 bushels or more of shellfish per acre are growing;
- Cultivation of shellfish in the leased area must be compatible with the lawful use by the public of other marine and estuarine resources. Other public uses which may be considered include, but are not limited to, navigation, fishing and recreation;
- Cultivation of shellfish in the leased area will not infringe upon the rights of riparian owners. The commission's regulations require that all leases be 100 feet from developed shorelines unless permission is given by the adjacent riparian property owner. In an area bordered by any undeveloped shorelines, no minimum setback is required;
- The leased site must not include an area designated for inclusion in the department's Shellfish Management Program;
- The area leased must not include an area that the state health director has recommended for closure to shellfish harvest because of pollution; and

• The area leased may not be heavily used for recreational purposes. GS 113-201 - 202.

Bottom leases can include the water column if the following additional criteria are satisfied:

• Aquaculture use of the water column must not significantly impair navigation. The leased area must not be within a navigation channel marked or maintained by a state or federal agency;

• The leased area must not be within an area traditionally used and available for fishing or hunting activities incompatible with the activities proposed by the leaseholder, such as trawling or seining; and

• Aquaculture use of the leased area must not significantly interfere with the exercise of riparian rights by adjacent property owners including access to navigation channels from piers or other means of access. GS 113-202.1.

Currently, the commission's rules limit leases to 10 acres for oyster culture; five acres for clam culture; and five acres for any other species. If an applicant can establish a necessity for greater acreage, up to 50 acres may be leased. 15A NCAC 3C .0302(b).

In recent years the shellfish leasing program has become increasingly controversial. Riparian property owners have claimed that leases impede their right of access to deep water. Boaters are claiming that leases hinder navigation and other public trust uses. As a consequence, the above criteria contain provisions designed to protect the public interest.

If counties are to join with the state in the management of public trust waters, the trends found in these criteria should be carefully noted, for they are trends that have evolved out of conflict between public trust users.

Specific leases are not depicted on the GIS maps. However, various factors that affect the lease criteria are shown on the following maps: waters closed to shellfishing are found on the Water Quality map (page 86); areas with highly significant shellfish habitat are found on the Marine Resource map (page 85); navigation channels are found on the Water Use map (page 87); and areas with developed shorelines are found on the Land Use/Cover map (page 88).

Closure of polluted coastal fishing waters — The division and the commission have the authority to close coastal fishing waters for the taking of marine or estuarine resources. It is unlawful to take or sell oysters, clams or mussels from a closed area. The department's Shellfish Sanitation Branch supplies the division with information regarding the pollution (based on fecal coliform levels) of the state's estuarine public trust waters. Areas that are traditionally closed to the taking of shellfish can be found on the Water Quality GIS map.

Artificial reefs in public trust waters — The division may prohibit or restrict the taking of fish and the use of any equipment in and around any artificial reef. 15A NCAC 3B .0111.

Military restricted areas — The U.S. Army Corps of Engineers has adopted regulations that restrict access to and activities within certain areas of coastal fishing waters. These areas are used for military exercises that may include bombing. They are described in the division's regulations. 15A NCAC 3B .0117.

In 1965 the General Assembly abolished all local fishing regulations, ending a long history

of local regulation. GS 113-133. The General Assembly took this action recognizing that marine and estuarine resources belong to all the people of the state and that these resources are best managed on a state-wide basis rather than by a multitude of local acts.

In 1989, the legislature clarified the commission's authority by giving it jurisdiction over all activities connected with the conservation and regulation of marine and estuarine resources, except as otherwise provided by law, including the regulation of aquaculture facilities. GS 113-132 (a).

These statutory provisions have important implications for local water use planning. Some regulatory actions by local government regarding fishery resources could be invalid, at least so far as those actions attempt to regulate activities as identified in GS 113-182 (i.e. fishing equipment, seasons, limits on take, opening and closing of fishing waters, etc.).

However, it is not clear whether local government is completely excluded from regulating activities and resources that are related to fisheries.

This lack of clarity is embedded in the statute that abolished local fishing acts. The statute states that it is not the intent of the law to do away with local ordinances that exercise valid powers over subjects other than the conservation of marine and estuarine resources. The statute recognizes that the law may allow for overlapping jurisdiction in cases not essential to the statute's conservation objectives. This language exemplifies the confusion that may occur when trying to find the appropriate arena for local government's involvement in public trust management.

Over the last 20 years there has been evidence that the General Assembly recognizes that local governments should play a more active role in resource management. The most pronounced example of this trend was the passage of the North Carolina Coastal Area Management Act (CAMA) in 1974. That act creates a unique state and local partnership to manage coastal and estuarine resources. It emphasizes the importance of local planning and zoning.

CAMA was intended to provide a comprehensive management system for the state's coastal resources. The act states that, "the General Assembly....finds that an immediate and pressing need exists to establish a comprehensive plan for the protection, preservation, orderly development and management of the coastal areas of North Carolina." GS 113A-102(a).

CAMA, the Coastal Resources Commission and the Division of Coastal Management

CAMA recognizes that the state's coastal area is being subjected to pressures "which are the result of the often conflicting need of a society expanding in industrial development, in population and in the recreational aspirations of its citizens...." GS 113A-102(a).

In developing its coastal management program, North Carolina has attempted to address these pressures. Pursuant to CAMA, the Coastal Resources Commission has developed regulations that manage resources and uses in and around public trust waters. CAMA applies to twenty of North Carolina's coastal counties. This jurisdictional area, referred to as the coastal area, is defined as "the counties that (in whole or in part) are adjacent to, adjoining, intersected by or bounded by the Atlantic Ocean or any coastal sound." GS 113A-103(2). Carteret County and its public trust waters are included in the coastal area.

Within its 20-county jurisdiction, CAMA authorized the CRC to establish areas of environ-

mental concern (AECs). There are thirteen AECs that are divided into four broad categories: the estuarine system; ocean hazard areas; public water supplies; and natural and cultural resource areas.

These areas need special protection because of their resource values and environmental sensitivity. To provide this protection, the CRC has developed state management guidelines and regulations for each area. The CRC has also established a permit program, administered by the Division of Coastal Management, for all development occurring within an AEC. Development within these areas must be consistent with state guidelines.

Under CAMA, development includes:

> Any activity in a duly designated area of environmental concern involving, requiring or consisting of the construction or enlargement of a structure; excavation; dredging; filling; dumping; removal of clay, silt, sand, gravel or minerals; bulkheading; driving of pilings; clearing or alteration as an adjunct of construction; alteration or removal of sand dunes; alteration of the shore, bank, or bottom of the Atlantic Ocean or any sound, river, creek, stream, lake or canal. GS 113A-103(5).

Development is divided into major and minor categories. Major development is any development which requires permission, licensing, approval, certification or authorization from any other state or federal agency; occupies a land or water area in excess of 20 acres; contemplates drilling for or excavating natural resources on land or under water; or contemplates, on a single parcel, a structure or structures in excess of a ground area of 60,000 square feet. GS 113A-118(d).

Minor development is any other type of development. Permits for major development are issued by the Division of Coastal Management while all minor development permits are issued by the local government in which the development is to occur.

In 1983, the Coastal Resources Commission adopted a mitigation policy which allows for the approval of development that would otherwise be inconsistent with the Commission's regulatory standards. 15A NCAC 07M .0700. To be eligible for mitigation the development proposal must meet the following criteria:

- There is no reasonable or prudent alternate design or location for the project that would avoid the losses to be mitigated;
- The entire project for which the permit is requested is dependent upon being located within or in close proximity to public trust waters and coastal wetlands;
- Benefits to the public interest will clearly outweigh the long range adverse effects to the environment; and
- All reasonable means and measures to lessen the impacts of the project have been incorporated into the project design. 15A NCAC 07M. 0703.

In addition to the regulatory component of the coastal management program, there is a strong directive within CAMA for coastal area planning. GS 113A-106-112. The act requires local governments within the coastal area to develop land use plans under the general guidelines developed by the CRC. The CRC reviews all local plans and plan updates to determine if they are consistent with the general standards. The plans are intended to provide

a mechanism for local governments to establish their own development priorities within the framework of state guidelines.

There are two things to keep in mind regarding local plans. First, no permit for development may be issued by the state or local government if the development is inconsistent with the land use plan. It is important to remember that permits are required only for development that impacts an area of environmental concern. Second, local (city or county) ordinances must be consistent with plans but only when the ordinance affects an AEC. GS 113A-111. Since AECs comprise about three percent of the total land area of the coastal counties, this requirement has limitations.

It is a goal of the CRC to give high priority to coordinated management of the whole estuarine system to protect its biological, social, economic and aesthetic values. To fully understand North Carolina's coastal management program and how its goals and implementation strategies affect Carteret County's public trust waters, it is important to briefly review the Areas of Environmental Concern that apply to the county's estuarine waters.

The estuarine waters — The CRC recognizes that estuarine waters are among the most productive natural areas in the state. These waters are extremely valuable to commercial and sports fisheries. All but one of the 10 leading species in North Carolina's commercial fishery are dependent on the estuary for survival. 15A NCAC 7H .0206(b).

The estuarine water AEC classification includes all waters of the Atlantic Ocean within the boundary of North Carolina and all waters of the bays, sounds, rivers and tributaries seaward of the dividing line between coastal fishing waters and inland fishing waters. GS 113A-113(b)(2) and 15A NCAC 7H .206(a).

Some of the important components of estuarine waters are mud and sand flats, eelgrass beds and other submerged vegetation, clam and oyster beds, coastal wetlands and nursery areas. The highest priority in the management of estuarine waters is given to the conservation of these components.

When development is necessary, only development that is water dependent is allowed. Examples of water dependent uses are access channels, navigation channels, docks and marinas. 15A NCAC 7H .208(a)(1).

In selecting a site for a water dependent use, a developer is encouraged to find a location that will have minimum adverse impacts upon the productivity and biological integrity of the estuary. For example, navigation channels, canals and boat basins must be constructed in a manner that avoids primary nursery areas, highly productive shellfish beds, beds of submerged aquatic vegetation or significant areas of coastal wetlands 15A NCAC 7H .208(b)(1).

Though water dependent, marina siting and development in estuarine waters has caused substantial controversy in the last few years. As a general rule, the CRC prohibits marina development in wetland areas and stipulates that marina construction should not disturb valuable shallow water habitat or submerged aquatic vegetation. Also, marinas must not be located in documented natural shellfish beds or adjacent to such areas if shellfish closure is anticipated as a result of the marina operation. This rule does not apply to shellfish water already closed because of pollution.

The CRC has developed four criteria for siting marinas. They are, in order of descending preference:

- An upland marina site that requires no dredging;
- An upland marina site that requires some dredging;
- An open water site located outside a primary nursery area which uses piers and docks rather than channels to reach deep water; and
- An open water site requiring excavation of an intertidal habitat, and again only if dredging does not involve a primary nursery area.

These criteria have not eliminated the conflict. Many developers still seek to buy and develop land according to its allowable land use often overlooking the allowable uses of adjacent waters.

Public trust waters — As discussed earlier, public trust waters belong to the state and are held in common for the use and enjoyment of the public. Only development that is water dependent is allowed in these waters. 15A NCAC 7H .0208(a)(1). Development in public trust waters cannot impede navigation or restrict use of a federally maintained channel. 15A NCAC 7H .0208(a)(2)(H).

Marinas, though allowed in public trust waters, can occupy only a limited area. For every one linear foot of shoreline owned by a riparian owner, 27 square feet of public trust water can be used for residential marina development. 15A NCAC 7H .0208(b)(5)(D). This rule is an attempt to limit the increasing private use of public trust waters in conjunction with high density shoreline development. North Carolina does not require that the public trust be leased for marina purposes although this position has come under increasing attack as more public trust water is occupied by marina developments.

Piers and docks, whether associated with marinas or not, must be sited in public trust waters in a way that minimizes the adverse effects on navigation and other public use of the water. They may not extend beyond the common pier lines along the same shoreline and cannot extend across more than 1/3 of the width of a natural body of water or man-made canal. 15A NCAC 7H.0208(b)(6)(C)(iii).

Estuarine shoreline — The estuarine shoreline is an upland area but, because of its proximity to public trust and estuarine waters, it is considered part of the estuarine system. The estuarine shoreline is defined as the area extending from the mean high tide water mark to a line 75 feet toward land. Development within this area requires a permit and must meet certain standards.

One of the greatest concerns in the estuarine shoreline AEC is stormwater runoff from upland development. Runoff has been shown to carry with it bacteria and other pollutants that can degrade estuarine waters. This can lead to the closure of shellfish harvest areas. The CRC can require buffer zones and has established impervious surface limitations for development on the estuarine shoreline. 15A NCAC 7H .0209(e). The Environmental Management Commission also has developed standards to protect estuarine waters from stormwater runoff. These standards are particularly stringent for shorelines along areas designated as Outstanding Resource Waters.

The Wildlife Resources Commission

The Wildlife Resources Commission has two primary responsibilities in its management

of public trust waters. It has jurisdiction and management responsibility for the state's inland fishery resources including co-jurisdiction with the Division of Marine Fisheries over joint fishing waters. And it is responsible for developing and administering boating safety regulations for all the state's waters (except for private ponds). GS 75A-3.

The WRC issues vessel identification numbers for boats -- GS 75A-5.1; develops and administers regulations regarding boating equipment including lights and muffling devices -- GS 75A-6 and 75A-9.1; and develops and administers regulations regarding the safe operation of boats, including rules regarding the operation of boats while intoxicated and the discharge of litter from boats -- GS 75A-10.

This commission is also responsible for developing and administering rules regarding skin diving and scuba diving -- GS 75A-13.1; speed zones and no wake zones -- GS 75A-15; and rules authorizing and administering regattas, races, marine parades, tournaments or exhibitions -- GS 75A-14.

The General Statutes allow local governments to sponsor water safety committees to inform the WRC of matters regarding water recreation and safety. GS 75A-26. Members of a local committee are under an obligation to keep themselves informed about problems of water recreation and safety in their area; to study water recreation problems; to make periodic reports on problems of water recreation and safety with suggestions of remedies where they are feasible; and to take part in and, where necessary, to help coordinate water safety education programs.

The law allows counties to apply to the Wildlife Resources Commission for special regulations on waters within their territorial limits -- GS 75A-15(b). This provision has not been extensively used and usually only for special regulations establishing no-wake zones.

In addition to the WRC, the U.S. Coast Guard plays an important role in developing and enforcing boating safety rules. The Coast Guard is responsible for the establishment, maintenance and operation of maritime aids to navigation . 33 CFR 60.01. The Coast Guard may also establish anchorage grounds for vessels in navigable waters whenever it is apparent that these are required for safe navigation. 33 USC 1221. State or local government can petition the Coast Guard for new anchorage areas.

The Department of Administration

Compared with the Department of Environment, Health and Natural Resources, the Department of Administration plays a minor role in managing the state's public trust waters. DOA is responsible for the control and disposition of all vacant and unappropriated lands in the state, including public lands lying beneath the state's public trust waters. GS 146-1.

In the case of public submerged lands, the state may not transfer ownership to individuals or private entities. The state may grant easements in these lands to adjoining riparian property owners but only for submerged lands in front of the tract owned by the riparian owner. GS 146-3 and GS 146-12. However, the State Property Office (the division of DOA responsible for the management of state lands) does not require easements for the use of offshore submerged riparian areas.

Private ownership of submerged lands has been recognized only under one set of circumstances. During the 1920s and 1930s deeds to some submerged lands were issued to private individuals through the state's Board of Education. Most of these deeds were for public trust

lands located between the Cape Fear River and Topsail Sound. The deeds conveyed private ownership to regularly flooded marshlands and lands beneath open tidal waters (McLawhorn 1984).

After several years of conflict, the General Assembly recognized the validity of the deeds in 1985. GS 146-20.1. Though title was conveyed through these deeds, the statute subjects ownership of the submerged bottom to public trust rights. Consequently, the landowner may not interfere with navigation, fishing or any other public trust right.

Before turning to the role that local government can play in public trust management, it is important to note that North Carolina has a comprehensive Environmental Policy Act. This law requires any state agency to submit an environmental impact statement for development projects (or for proposed legislation) that will significantly affect the environment and which involves the expenditure of public money. GS 113A-4. The Act also empowers local governments to require any unit of government or any private developer to submit an impact statement for major development projects. Major development projects are those that involve more than two contiguous acres and can include shopping centers, subdivisions, housing developments, etc. GS 113A-9(1).

The Local Role

Since 1971 North Carolina has witnessed a shift from strong state-mandated environmental regulation to greater local involvement (Heath 1984). Perhaps one of the most pronounced examples of this shift is the previously discussed Coastal Area Management Act. CAMA and other similar laws are closely related to land use regulation, a traditional province of local government. As discussed in the previous section on state law, CAMA requires that local governments within the 20-county coastal area develop land use plans. CAMA also requires that the plans be consistent with state guidelines developed pursuant to the goals of the Act. GS 113A-102 and 108. The Coastal Resources Commission must approve all plans and subsequent plan updates. GS 113A-110. Finally, all local ordinances must be consistent with the land use plan where the ordinances affect areas of environmental concern. GS 113A-111 and Worthy v. Town of Bath and Bath Preservation Association, 82 N.C. App. 32 (1986).

Local government's ability to develop ordinances comes from the state legislature in the form of a statutory grant of power (enabling legislation). These grants traditionally allow local governments to regulate such things as the height, location and use of buildings, size of lots, etc. For county governments, this grant of power is found in the General Statutes at 153A-340. The enabling legislation for municipalities is found in the statutes at 160A-381.

In 1983 the legislature gave coastal counties the additional power to regulate development over public trust estuarine waters within their jurisdictional boundaries. This gave coastal counties the power to go beyond their traditional limits and into areas that have been generally reserved for state regulation. County governments have been slow to utilize this power.

Though municipalities have a history of regulating some types of water uses, they were not granted the specific power to regulate development over public trust estuarine waters. Beginning in the 1800s, incorporated towns could regulate the line on deep water to which wharves could be built. Wool v. Town of Edenton, 23 S.E. 40, 117 N.C. 1 (1893). This is still

true today where municipalities have been granted easements to adjacent waters by the state's Department of Administration. GS 146-12. It is not clear why the power to regulate development over estuarine waters was not extended to municipalities. It may have been an oversight by the General Assembly or the legislature could have assumed that municipalities already have this power through their statutory provisions for extraterritorial jurisdiction.

Under GS 160A-360, a municipality can exercise all powers granted to it by the state legislature within a defined area extending up to three miles beyond its corporate limits. The distance a city is able to include within its extraterritorial jurisdiction depends upon the municipality's population. The statute does not delineate whether this extension is to take place over land or water. As a consequence, some municipalities have extended their jurisdictions to include state public trust waters (Worthy v. Town of Bath).

Carteret County

Carteret County maintains an active comprehensive planning program which manages uses on the land as well as uses over some estuarine surface water. The county has a four-member planning department which manages development activities through the implementation and administration of plans and policies as well as regulations and ordinances.

The 1985 Carteret County Land Use Plan, mandated by the N.C. Coastal Area Management Act, focuses on policies pertaining to the preservation of natural resources as well as economic issues. This document was adopted in September 1985. Because of the rapidly changing nature of Carteret County, the plan is outdated. Consequently, the county is in the process of updating and amending the plan. The 1990 plan will address a broader spectrum of issues, including estuarine waters, expansion of port facilities, development of marinas and preservation of critical marine habitat.

The Carteret County Zoning Ordinance was originally adopted in 1963 and was revised in 1972 and 1985. A revision of the ordinance in 1989 (to be adopted in 1990) addresses water quality concerns. It requires lower density development along shoreline areas and mandates a 30-foot naturally vegetated buffer along all surface water areas.

Pursuant to the legislative grant of power allowing county governments to regulate development over public trust waters, Carteret County has extended its zoning jurisdiction 400 feet into its water. It is hoped that the extension will help in addressing concern over floating structures.

Chapter Two

Carteret County Water Use Plan

Written by

Glenn Harbeck
Manager, Urban Planning Services
Edward D. Stone Jr. and Associates
Wilmington, N.C.

Walter F. Clark
University of North Carolina Sea Grant College Program
North Carolina State University
Raleigh, N.C.

Lynn Phillips
Director, Carteret County Planning Department
Beaufort, N.C.

Karen Siderelis
Director, Center for Geographic Information and Analysis
North Carolina Department of Environment, Health and Natural Resources

Zsolt Nagy
Center for Geographic Information and Analysis
North Carolina Department of Environment, Health and Natural Resources

Introduction to Carteret County

Carteret County is in the central coastal area of North Carolina and consists of nearly 350 square miles of land area and an additional 150 square miles of surface waters. It is bordered on the north by the Pamlico Sound and Neuse River and to the south by the Atlantic Ocean. The White Oak River divides the County from nearby Onslow County. Several barrier islands--Bogue Banks, Shackleford Banks, Portsmouth Island and Core Banks-- form the southern and eastern boundaries of the County. Of these, only Bogue Banks is not classified a National Seashore.

A large amount of the land area within the county is under public ownership. The State of North Carolina holds Fort Macon State Park at the eastern end of Bogue Banks. The federal government owns Shackleford Banks, Portsmouth Island and Core Banks and these islands are managed by the National Park Service. In order to maintain these islands in a pristine state, no new development is allowed. In addition to the Park Service lands, the U.S. Forest Service holds Croatan National Forest, a 115,000 acre reserve that lies in Carteret, Jones and Craven counties (approximately 56,618 acres lie in Carteret County). The national forest sits in the central portion of the county, and growth has occurred along the perimeters of the forest on privately owned land. Because there is so much publicly owned land, development pressures are especially strong on the privately held property.

Regions

Geographically, Carteret County is made up of two distinct regions -- the Down East area and the western area. Personal attitudes and ways of life are noticeably different in each region. Down East is east of the North River and the remainder of the county is considered "the west".

The west is more urban than the east and many of the residents have moved to the area from other parts of the state and nation. Retirees and civil servants comprise a large segment of the population. Since tourism is such an important component of the economy, service-related industries employ a large portion of the population.

Down East residents are usually native and have maintained the culture and traditions of their ancestors. Many are commercial fishermen or maintain small farms. The villages east of the North River serve as centers for wholesale fish sales, fish processing, ice manufacturing or other commercial fishing operations. While there are still many small, family-operated farms, the agricultural economy takes a back seat to fishing. Open Grounds Farm, a superfarm located north of Highway 70 near Otway, is an exception. It comprises nearly 77 square miles and is considered one of the largest and most productive farms on the East Coast.

Topography and Soils

Most of Carteret County is of low elevation. East of the North River, the average elevation is six feet above mean sea level and to the west of Morehead City most land areas average 12 feet above sea level. Nearly 79 percent of the soils within the county are considered hydric and not well suited for septic tank use. The better soils are generally found in the west and other

good soils are located along the banks of the estuaries. Septic tanks are the most widely used form of wastewater treatment and failures have been commonplace, especially in the Atlantic Beach area.

Military Presence

The military maintains a strong presence in Carteret County. Atlantic Field and Bogue Field, both military auxiliary landing fields, are located at Atlantic and Bogue in the eastern and western portions of the county. Both of these installations are active, but Bogue Field maintains a higher traffic volume. Noise generated by jet traffic draws frequent complaints from many of the county's residents.

A bombing range (BT-11) located in the waters of Long and West bays is a concern to the county's commercial fishermen. Undetonated ordnance has been pulled up in fishing nets and the noise from low level flying planes spawns conflict between the military and the fishing industry and other residents of the Down East area.

Public Trust Waters

Carteret County is home to large areas of public trust estuarine waters, including miles of winding creeks, rivers, bays and sounds. Most of these water bodies are 4-8 feet deep and serve as prime habitat for many types of life, including aquatic grasses and fishery resources.

Carteret County's waters are unique in other ways. The Atlantic Intracoastal Waterway crosses the county and serves as a shipping lane for industrial goods and a channel for recreational vessels. The waters of the county are a vital source of income. Fishing and related industries and tourism are strongly dependent on the quality of the county's public trust waters.

1. Key Growth and Water Use Indicators

1.1 Introduction

The preparation of the Carteret County Water Use Plan requires an analysis of certain key growth and water use indicators. The intent of the analysis is to insure that the policies contained in the plan respond as closely as possible to current trends and issues facing the planning area. When combined with information gleaned from the various meetings and discussions with the Water Use Plan Advisory Board, a good foundation for planning is established. The key growth and water use indicators analysis may be discussed in the following subject areas:

- Population
- Housing
- Tourism
- Commercial Fishing
- Recreational Boating
- NC State Ports Authority Activity

Collectively, these indicators summarize past and present growth and water use trends in Carteret County, and provide a base from which to measure future conditions in the planning area.

1.2 Population

Population may be best discussed under two categories: historical growth and permanent versus seasonal population.

Historical Growth

In discussing the growth of Carteret County over time, it is useful to compare the population growth history of the county with that of the state as a whole. As shown in Table 1, the county's population growth since 1950 has outpaced substantially the growth rate of the state over the same period. During the 1950s and 1960s, Carteret County grew at a pace which clearly exceeded that of the State, but not by exceptional amounts. During the 1970s, the rate of growth in Carteret County was nearly double that of the state. During the 1980s, Carteret County likely will grow at a rate three times as fast as the state. These population trends affirm the national phenomenon of the movement of population from the inland areas of the country to the coastal areas.

Table 1
County and State Population Growth
1950 to 1988

Total Population

	Carteret County	State of North Carolina (1000's)
1950	23,059	4,062
1960	27,438	4,556
1970	31,603	5,082
1980	41,092	5,880
1988	52,700 *	6,485 **

Absolute Increase By Decade

	Carteret County	State of North Carolina (1000's)
1950-60	4,379	494
1960-70	4,165	526
1970-80	9,489	798
1980-88	11,608	605

Percent Increase By Decade

	Carteret County	State of North Carolina
1950-60	19%	12%
1960-70	15%	12%
1970-80	30%	16%
1980-88	28%	10%

Source: U.S. Census Bureau for all decennial years
** Estimate of Edward D. Stone, Jr. and Associates*
*** Estimate of Office of State Budget and Management*

Permanent Versus Seasonal Population

If the increase in permanent population of the county has been substantial, then the increase in seasonal population has been dramatic. Table 2 compares the permanent and seasonal populations in 1980 and 1987 with the permanent and seasonal populations of all counties in the Albemarle-Pamlico Estuarine Study area. The table shows that, for example, in 1987 Carteret County's permanent population was estimated at 50,485. During peak seasonal periods, however, the total population of the county may swell to as many as 118,000 persons.

Table 2
Permanent and Seasonal Populations
Carteret County and A-P Area
1980 and 1987

	Carteret County				A-P Area			
	Pop. in Housing Units		Other*	Total	Pop. in Housing Units		Other*	Total
	Permanent	Seasonal			Permanent	Seasonal		
1980	41,092	29,016	13,924	84,032	1,373,541	92,413	71,711	1,537,665
1987	50,485	49,941	17,380	117,806	1,528,009	126,447	91,349	1,745,805

* Includes population in hotels, motels, campgrounds, and marinas.

Source: Tschetter, Paul D., Characterization of Baseline Demographic Trends in the Year-Round and Recreational Populations in the Albemarle-Pamlico Estuarine Study Area (undated).

Table 3 shows the relative percentage increases in permanent and seasonal population during the 1980s. The county's permanent population increased by a healthy 23 percent but, more significantly, the seasonal population of the county increased by more than 70 percent during the same period. Comparing the county's population growth figures with the A-P population growth figures, the attractiveness of Carteret County relative to much of eastern North Carolina is apparent. It is also worth noting that the peak seasonal population levels coincide with peak water use activities in the county's estuarine areas. This seasonal influx of visitors to the county serves to intensify water use conflicts during the summer months.

The A-P Area contains 33 counties in eastern North Carolina, all of which drain into the Albemarle or Pamlico estuaries.

Table 3
Percent Increase in
Permanent and Seasonal Populations
Carteret County and A-P Area
1980 to 1987

Carteret County				A-P Area			
Pop. in Housing Units		Other*	Total	Population in Housing Units		Other*	Total
Permanent	**Seasonal**			**Permanent**	**Seasonal**		
23%	72%	25%	40%	11%	37%	27%	14%

* Includes population in hotels, motels, campgrounds, and marinas.

Source: Tschetter, Paul D., Characterization of Baseline Demographic Trends in the Year-Round and Recreational Populations in the Albemarle-Pamlico Estuarine Study Area (undated).

1.3 Housing

Increases in permanent versus seasonal housing units in Carteret County have been consistent with the changing demographics of the permanent versus seasonal population of the county. Table 4 shows, for example, that from 1980 to 1987 seasonal housing units increased by 71%, while occupied permanent housing units increased by 34%. Further, seasonal housing units comprised 32% of all housing in the county in 1987, up from 27% in 1980. The significance of these figures is made more apparent when compared to the seasonal housing percentages of the A-P area as a whole (i.e. 4% in 1980 and 5% in 1987.)

Table 4
Housing Units
Carteret County and A-P Area
1980 and 1987

	Carteret County Housing Units			A-P Study Area Housing Units		
	Occupied	Seasonal	Vacant	Occupied	Seasonal	Vacant
1980	15,128	6,448	2,164	468,978	23,728	39,139
1987	20,275	11,045	2,723	558,892	30,762	14,315
% Change 1980-1987	34%	71%	26%	19%	30%	- 63%
Seasonal Housing as a percentage of all housing						
1980	—	27%	—	—	4%	—
1987	—	32%	—	—	5%	—

Source: Tschetter, Paul D., Characterization of Baseline Demographic Trends in the Year-Round and Recreational Populations in the Albemarle-Pamlico Estuarine Study Area (undated).

The implications of the seasonal housing stock on water use activities are better understood when it is realized that the overwhelming majority of seasonal housing is concentrated within a short distance of the estuarine waters of the county.

1.4 Tourism

Further evidence of the county's strong movement in the direction of seasonal and tourism related population can be seen by examining historical records of attendance at major tourist attractions. Table 5 shows visitation at four major tourist attractions for selected years over the past two decades. From 1977 to 1987, for example, visitation at Fort Macon State Park increased by 61%. During the same period, attendance at the North Carolina Aquarium increased by 172%, while at the North Carolina Maritime Museum and the Cape Lookout National Seashore visitation was up by 183% and 102% respectively. These increases in visitation are particularly significant when compared with the county's overall increase in permanent population of 23% over the same period.

Table 5
Visitation at Major Tourist Attractions, Carteret County Selected Years, 1967 to 1987

Year	Ft. Macon State Park	N.C. Aquarium	N.C. Maritime Museum	Cape Lookout National Seashore
1967	530,867			
1972	862,711			
1977	761,257	158,265	60,000	45,422
1982	925,084	278,046	116,185	66,391
1987	1,225,520	430,811	169,618	91,640
Absolute Increase 1977 to 1987	464,263	272,546	109,618	46,218
Percent Increase 1977 to 1987	61%	172%	183%	102%

Source: N.C. Dept. of Environment, Health and Natural Resources, Division of Parks and Recreation (East of Atlantic Beach), N.C. Aquarium (Pine Knoll Shores), N.C. Maritime Museum (Beaufort), U.S. Dept. of Interior, National Park Service (Cape Lookout).

1.5 Commercial Fishing

An examination of the commercial fishing industry of Carteret County is included in this study to evaluate overall trends in this important component of the Carteret County economy.

Seafood Landings, Overall

Carteret County historically has dominated the commercial fishing industry of North Carolina. A review of seafood landing statistics affirms the county's leadership position. Of the 18 coastal counties for which seafood landing statistics are maintained, three counties consistently dwarf all others: Carteret, Dare and Pamlico. Together, these three counties have traditionally accounted for over 70% of the total seafood landings in the state. Carteret County alone accounts for about one-third of the total seafood landings in the state in both poundage and dockside value (see Tables 6 and 7). The poundage and dockside value of menhaden is not included in these figures to protect statistical data about private enterprise. However, menhaden is an economically important finfish industry in Carteret County. Generally speaking, the dockside value of menhaden statewide is normally between one and two million dollars annually. Even though data is not broken down by County, most menhaden fishery landings occur in Carteret County.

Table 6
Seafood Landings
Top Three Counties in North Carolina
1978 to 1988

Millions of Pounds

	1978	1980	1982	1984	1986	1988
Carteret	37.2	48.2	32.2	34.3	32.4	35.0
Dare	22.6	41.6	32.5	28.1	27.2	30.7
Pamlico	15.4	21.4	14.0	17.6	10.7	14.5
Total, All Coastal Counties	105.6	153.8	120.9	116.1	102.4	116.7
Carteret County % of Total	35%	31%	27%	30%	32%	30%

Source: N.C. Division of Marine Fisheries

Table 7
Dockside Value

Millions of Dollars

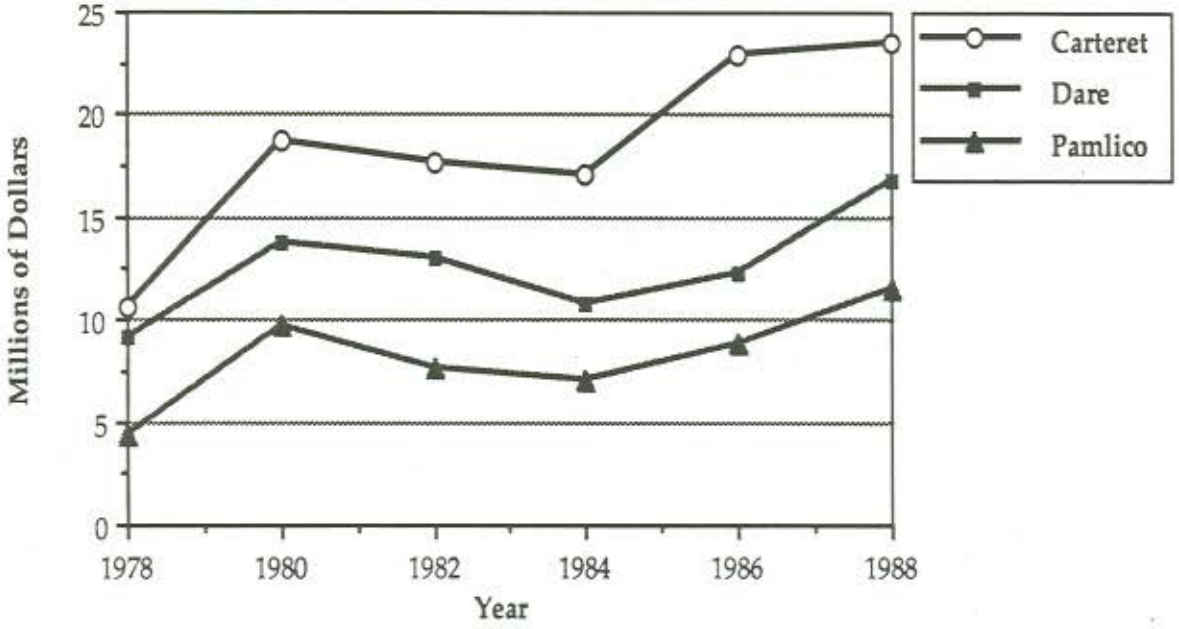
	1978	1980	1982	1984	1986	1988
Carteret	10.6	18.7	17.6	17.0	22.9	23.5
Dare	9.1	13.7	13.0	10.8	12.3	16.7
Pamlico	4.3	9.7	7.7	7.1	8.9	11.5
Total, All Coastal Counties	33.0	61.4	58.0	52.4	61.6	74.9
Carteret County % of Total	32%	30%	30%	32%	37%	31%

Source: N.C . Division of Marine Fisheries

For the purposes of the Carteret County Water Use Plan, overall trends in poundage and value are most significant. Figure 1 indicates a general modest decline in millions of pounds of seafood landings during the 1980s. Carteret County seems to have held steady from 1982 to 1988.

In terms of dockside value, seafood landings in Carteret County from 1978 to 1988 have increased steadily. This is obviously not due to increased poundage, but rather to increased demand for seafood.

Figure 1
Dockside Value of Seafood Landings
Top Three Counties, 1978-1988



Finfish Landings

Tables 8 and 9 summarize finfish landings of the most significant commercial species in Carteret County from 1978 to 1988. Figures 2 and 3 illustrate the same information in graphic form. From a poundage perspective, croaker, sea trout, flounder and spot represent the largest dockside landings in the county. Generally speaking, croaker has fallen from a peak in the late 1970s, while sea trout, flounder and spot have maintained their positions or declined slightly.

Carteret County Finfish Landings - Most Significant Species
1978 to 1988

Table 8
Millions of Pounds

	1978	1980	1982	1984	1986	1988
FINFISH						
Bluefish	.78	1.63	1.05	.83	1.01	.81
Croaker	9.26	8.00	2.59	3.50	4.71	3.13
Flounder	2.19	2.81	2.00	2.62	2.53	2.24
Mullet	.97	1.41	.80	.92	.94	1.89
Sea Trout, Grey	4.49	6.62	4.09	5.42	5.58	5.62
Spot	3.27	4.05	2.81	2.26	2.08	2.00

Table 9 Millions of Dollars						
	1978	1980	1982	1984	1986	1988
FINFISH						
King Whiting	.02	.04	.04	.09	.22	.12
Bluefish	.09	.19	.16	.09	.12	.11
Sea Bass	.02	.08	.06	.14	.10	.09
Croaker	1.28	2.13	1.01	1.01	1.48	1.12
Flounder	1.15	1.45	1.25	1.68	2.64	2.50
Groupers	—	.06	.20	.33	.24	.29
Mullet	.11	.19	.14	.17	.23	1.20
King Mackerel	.01	.05	.10	.10	.11	.16
Sea Trout, Grey	.75	1.20	1.66	1.46	1.25	1.33
Spot	.40	.80	.61	.52	.47	.43
Scups or Porgies	—	.06	.14	.20	.16	.12

Source: N.C . Division of Marine Fisheries

In dockside value, flounder has clearly moved ahead of all other finfish species during the 1980s. Sea trout and croaker have stayed within a range of $1 to 1.5 million during the period, while grouper has emerged from an insignificant commercial finfish in 1978 to providing roughly a quarter of a million dollars annually during the later half of the 1980s.

Figure 3
Dockside Value of Finfish
Carteret County, 1978-1988

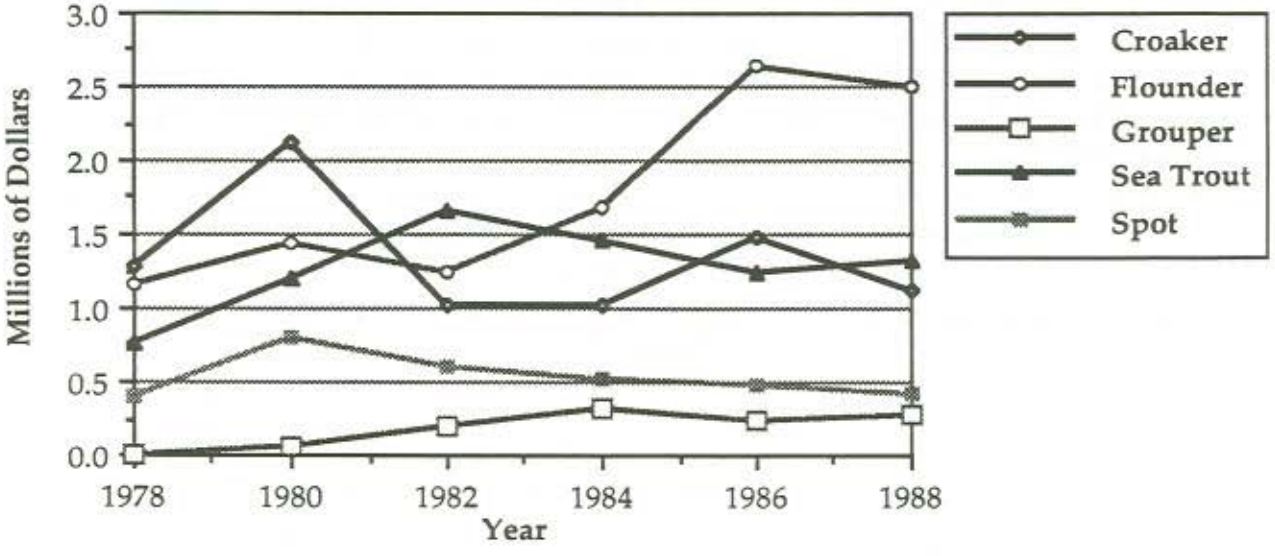
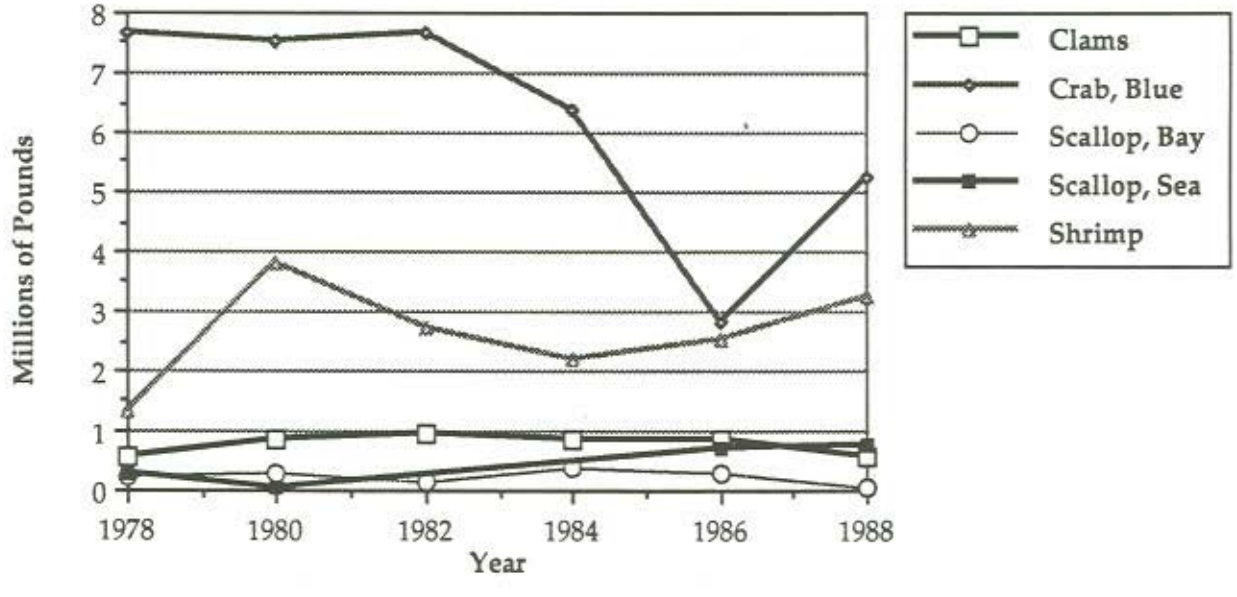


Figure 4
Shellfish Landings, Major Species
Carteret County, 1978-1988



Shellfish Landings

Tables 10 and 11 summarize shellfish landings in Carteret County from 1978 to 1988. Figures 4 and 5 illustrate the same information. The most significant species in the county in terms of poundage are blue crabs and shrimp and, to a lesser extent, clams and scallops. During much of the 1980s, the statistics on blue crabs indicate a general decline in that fishery, but with a substantial rebound occurring in 1988. The other significant shellfish species appear to be holding steady.

Carteret County Shellfish Landings - Most Significant Species
1978 to 1988

Table 10
Millions of Pounds

	1978	1980	1982	1984	1986	1988
Clams	.58	.88	.97	.84	.85	.55
Crab, Blue	.22	.29	.12	.37	.30	.04
Scallop, Sea	.29	.03	NA	NA	.72	.78
Shrimp	1.34	3.81	2.70	2.20	2.53	3.22

Source: N. C. Division of Marine Fisheries

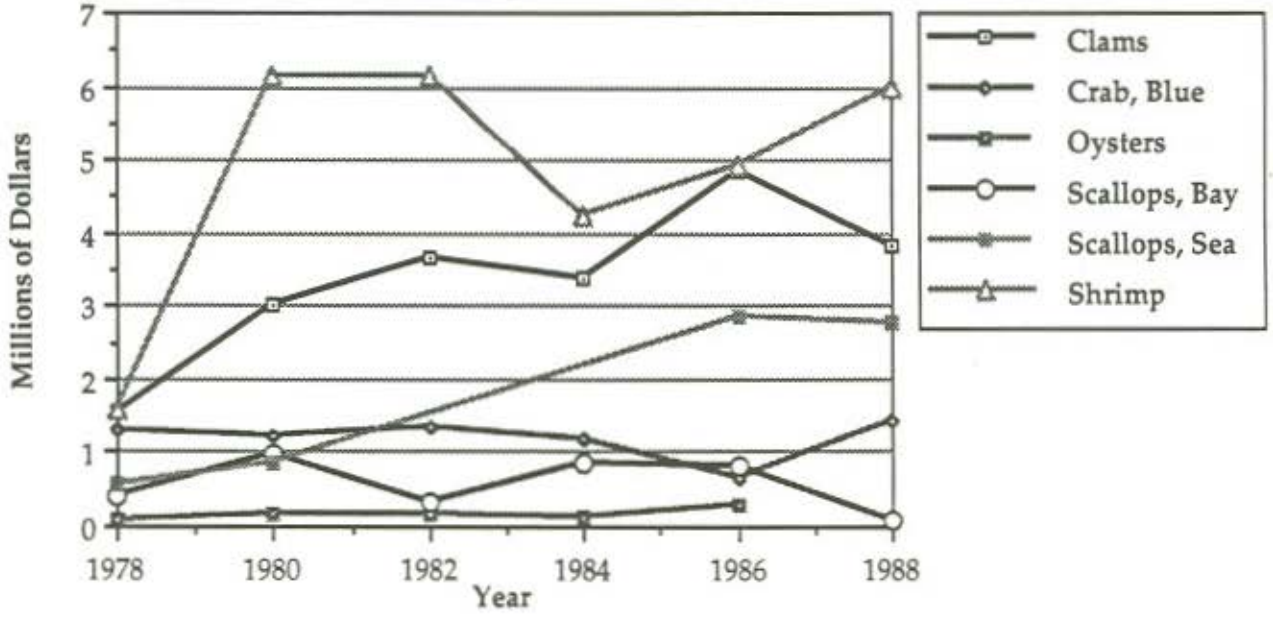
Table 11
Millions of Dollars

	1978	1980	1982	1984	1986	1988
Clams	1.54	3.01	3.66	3.39	4.84	3.83
Crab, Blue	1.30	1.24	1.34	1.16	.67	1.41
Oysters	.10	.18	.15	.13	.30	
Scallop, Bay	.39	.97	.32	.84	.82	.07
Scallop, Sea	.58	.87	NA	NA	2.84	2.77
Shrimp	1.58	6.13	5.67	4.25	4.91	5.99

Source: N. C. Division of Marine Fisheries

In dockside value, shrimp, clams and sea scallops have shown steady increases in value from 1978 to 1988. In 1988, for example, shrimp alone accounted for $6 million at the docks, while clams accounted for $4 million and sea scallops a bit under $3 million.

Figure 5
Dockside Value of Shellfish
Carteret County 1978 - 1988



Seafood Dealers

Since 1978, Carteret County seafood dealers have comprised about 15% of the seafood dealers in the state. This ranks Carteret number one (See Figure 6). Table 12 and Figure 7 summarize statistics on the various types of seafood dealers operating in Carteret County from 1978 to 1988. Shrimp processors, shell stock shippers and finfish processors have been the most plentiful seafood dealers in the county. In 1988, for example, there were 58 shrimp houses, 43 shell stock shippers and 39 finfish processors. During the 1980s as many as three menhaden processing plants have operated in the county.

Table 12
Seafood Dealers By License Type
in Carteret County
1978 to 1988

	1978	1980	1982	1984	1986	1988
Shellstock Shipper	39	67	69	61	53	43
Shucker-Packer	21	12	21	18	32	17
Finfish	40	38	44	36	42	39
Shrimp	40	53	55	52	64	58
Unprocessed Crab	21	27	25	27	20	27
Processed Crab	3	3	5	5	3	4
Menhaden	3	2	2	3	1	2
Non-Duplicate County Total	94	116	127	111	112	106
Statewide Total	657	704	867	609	630	696
County % of State Total	14.3	16.5	14.6	18.2	17.8	15.3

Source: N. C . Division of Marine Fisheries

Figure 6
Number of Seafood Dealers
Carteret County and N.C., 1978-1988

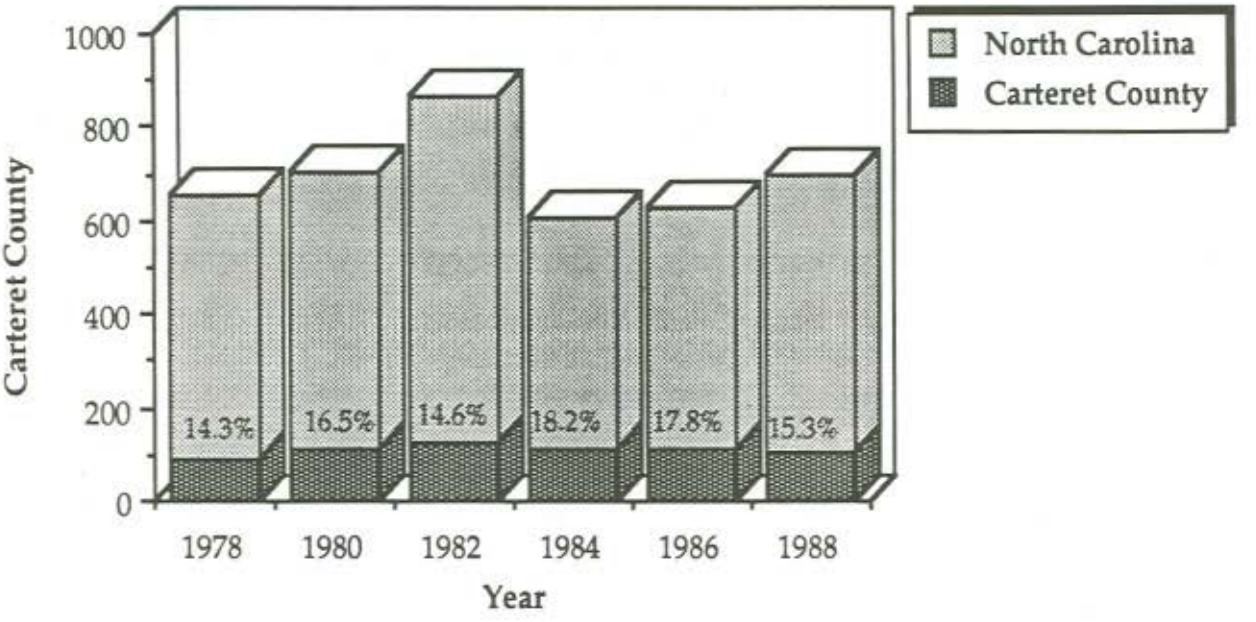
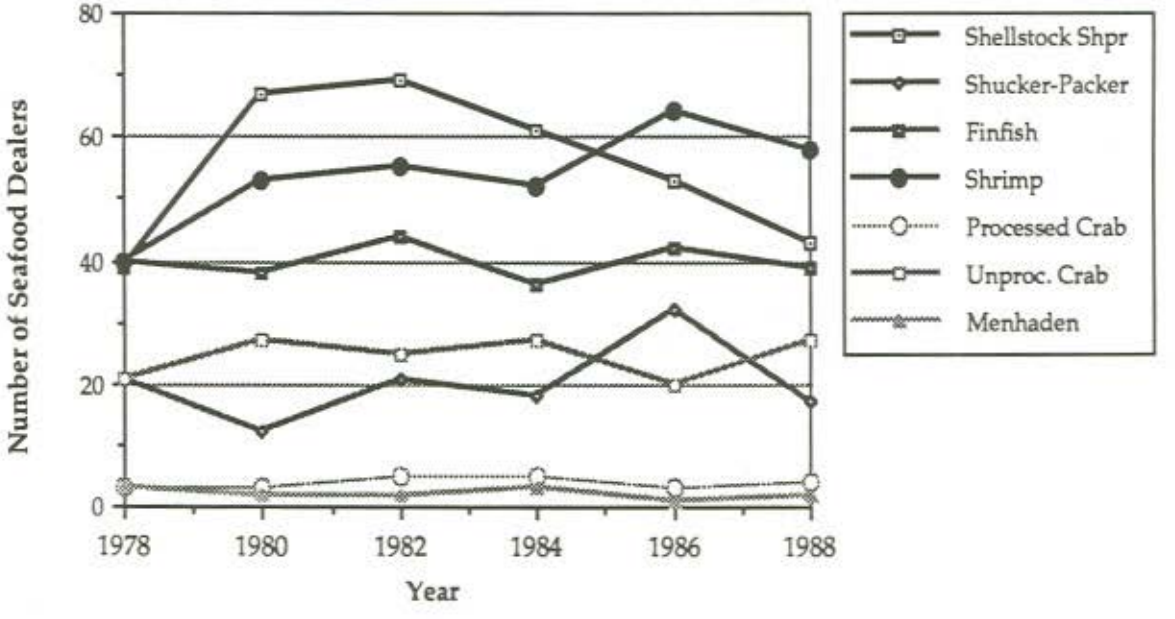


Figure 7
Seafood Dealers by Type
1978-1988



Seafood dealers and processors are showing no dramatic gains in numbers, but neither are they declining. This is in keeping with the overall trend in commercial fishing, which appears to be holding steady, or showing early signs of modest decline.

Oyster and Clam Licenses

Statistics on oyster and clam licenses during the period from 1985 until 1988 are summarized in Table 13 and Figures 8 and 9. While this is a short time frame within which to measure trends, the numbers would indicate that oyster and clam licenses are showing a slow but steady decrease in Carteret County. In 1985, for example, oyster and clam licenses issued in Carteret County comprised 33% of all licenses issued in the state. In each of the next three years, this figure dropped by one percentage point so that by 1988, Carteret County accounted for about 30% of all licenses issued in the State.

Table 13
Oyster and Clam Licenses
Carteret County
1985 to 1988

	1985	1986	1987	1988
Full-time Commercial	1,403	1,372	1,283	1,295
Part-time Commercial	1,696	1,988	1,905	1,620
Pleasure	578	570	453	411
County Total	3,677	3,930	3,641	3,326
State Total	11,023	12,376	11,869	11,274
% of State	33%	32%	31%	30%

Source: N. C . Division of Marine Fisheries

More specific information on oyster and clam licenses, as shown in Figure 9 also shows modest declines in the three different types of licenses for which records are kept: full-time commercial, part-time commercial, and pleasure.

Figure 8
Oyster and Clam Licenses
Carteret County and N.C., 1985-1988

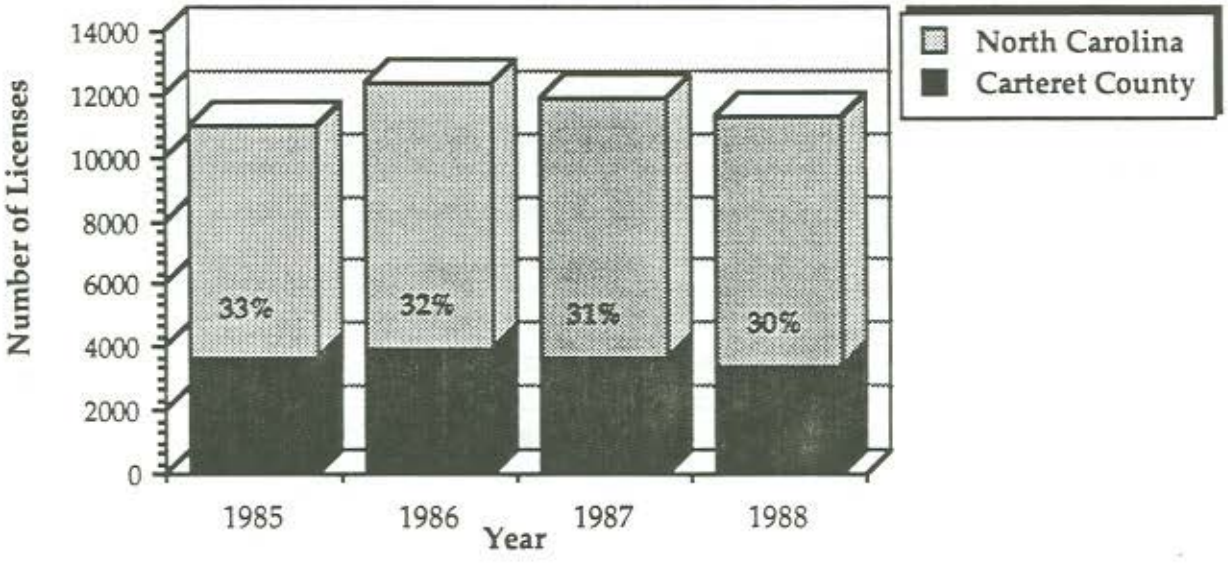
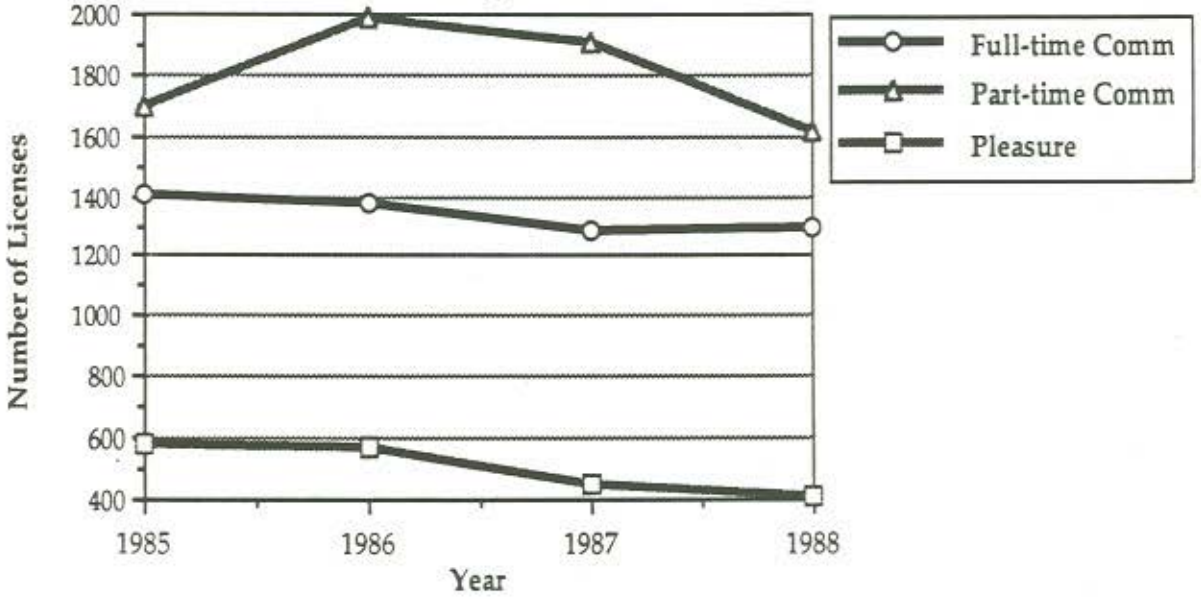


Figure 9
Oyster and Clam Licenses
Carteret County,1985-1988



Commercial Vessel Licenses

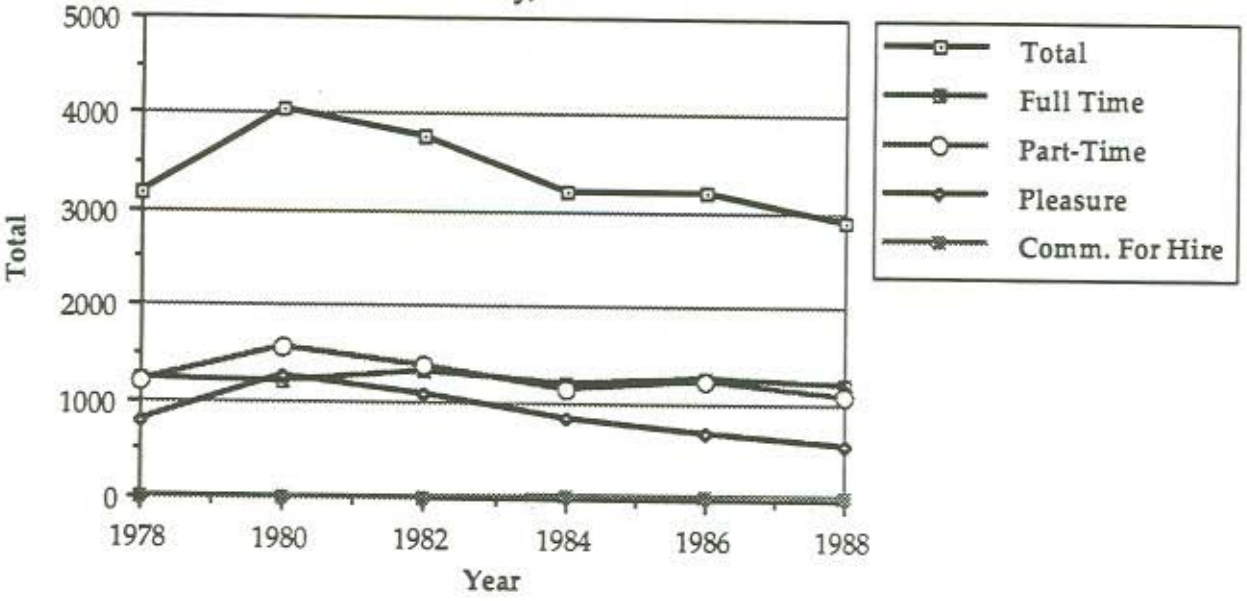
Table 14 and Figure 10 summarize statistics on the issuance of commercial vessel licenses in Carteret County from 1978 to 1988. Figure 10 reveals the overall decline in part-time and pleasure commercial vessel licenses. Only full-time commercial licenses have maintained a steady level during the 1980s. Vessel licenses in the "commercial for hire" category have maintained a small but consistent share of all vessel licenses issued in the county during the period. From these numbers it would appear that many part-time fishermen are dropping out of the commercial fishing industry.

Table 14
Commercial Vessel Licenses
in Carteret County
1978 to 1988

	1978	1980	1982	1984	1986	1988
Vessels Licenses (Total)	3,187	4,033	3,761	3,193	3,202	2,895
Full-time Vessels	1,235	1,210	1,303	1,190	1,251	1,206
Part-time Vessels	1,184	1,560	1,372	1,131	1,228	1,067
Pleasure Vessels	768	1,263	1,086	837	687	580
Commercial For Hire	—	—	—	35	36	42

Source: N. C . Division of Marine Fisheries

Figure 10
Commercial Vessel Licenses by Type
Carteret County,1978-1988



1.6 Recreational Boating

Recreational boating is a primary use of the public trust waters of Carteret County. Information measuring recreational boating in the county consists primarily of statistics on motorboat registrations, marinas, numbers of wet and dry boat slips, and bridge openings for traffic on the Intracoastal Waterway through the county. Each of these statistics will be examined further.

Motorboat Registrations

Table 15 provides statistics on motorboat registrations in Carteret County as compared to the state for selected years from 1972 to 1987. Figures for Carteret County reveal that motorboat registrations more than doubled during the fifteen year period from 1972 to 1987. Figures available for the state for 1982 and 1987 show a 26% increase in motorboat registrations. During the same five year period, motorboat registrations in Carteret County increased by 15%. The smaller increase in boat registrations in the county relative to the state during the 1980s may be attributed, in part, to two factors. First, Carteret County has a larger number of boat registrations per capita than the State, meaning that a 15% increase in the County's boating stock is "hard earned". Secondly, a national trend toward dramatic increases in recreational boating have caused the population of inland areas of the State to buy and own trailored boats. Many of these trailored boats are registered in other counties but end up in the waters of Carteret County and other coastal counties in North Carolina.

Table 15
Motorboat Registration, Carteret County and the State of North Carolina, Selected Years 1972 to 1987

	Carteret County	State of North Carolina
1972	3,135	—
1977	5,267	—
1982	5,901	191,399
1987	6,766	241,858
% Increase 1972 to 1987	161%	—
% Increase 1982 to 1987	15%	26%

Source: N. C . Wildlife Resources Commission

Marina Development

In 1989, Paul D. Tschetter performed an extensive survey of marina and boat slip development in the Albemarle Pamlico Estuarine Study Area, focusing on the period between 1970 and 1987. This survey "excluded those facilities that only did marine repairs, those that only docked commercial fishing boats and those listed in the Waterway Guide that had no dockage other than for refueling". The results of Tschetter's work is displayed in Table 16. During the 1970s, for example, the number of marinas in Carteret County nearly doubled while the number of slips in those marinas more than tripled. During the 1980s, boat slips in Carteret County increased by 33%, compared to 37% for the A-P area. As of 1987, boat slips in Carteret County accounted for 38% of all boat slips in the full 33 county A-P area.

Wet Slips/Dry Slips

One interesting trend that has been developing during the 1980s, particularly in Carteret County, is the increasing use of dry stack storage for recreational boats. Table 17 illustrates this. In 1980 wet slips comprised 60% of all boat slips in Carteret County. By 1987 this percentage had dropped to 50%, implying that the remaining 50% of all boat slip capacity is comprised of dry stack storage. Compare these figures with the entire A-P area, where wet slips accounted for nearly 80% of all boat storage slip capacity. By 1987, this figure had dropped only four percentage points to 75%. The implication of these figures is that opportunities for

additional wet slip marina development in Carteret County are diminishing more rapidly than in the A-P area as a whole. Past and current development pressures and limited additional opportunities for marinas have forced marina developers to look toward dry stack storage as an alternative.

Table 16
Marinas and Boat Slips
Carteret County and A-P Area
1970, 1980, and 1987

	Carteret County		A-P Area	
	Marinas	Slips	Marinas	Slips
1970	13	548	32	1,448
1980	24	2,093	62	4,191
1987	29	2,774	91	5,726
% Increase in No. of Slips 1980-87	—	33%	—	37%
% of all A-P Area Slips in Carteret County (1987)	—	38%	—	—

Source: Tschetter, Paul D., Characterization of Baseline Demographic Trends in the Year-Round and Recreational Populations in the Albemarle-Pamlico Estuarine Study Area (undated)

Table 17
Wet Slips As a Percentage of
Total Boat Slips
Carteret County and A-P Area
1980 and 1987

	Carteret County		A-P Area	
	Wet Slips	% of Total	Wet Slips	% of Total
1980	1,261	60%	3,319	79%
1987	1,375	50%	4,287	75%

Source: Tschetter, Paul D., Characterization of Baseline Demographic Trends in the Year-Round and Recreational Populations in the Albemarle-Pamlico Estuarine Study Area (undated).

Increasing use of dry stack storage means that higher concentrations of boat storage and recreational boating will be concentrated in smaller, more intensive sites. It also means that more boats will have access to the water without consuming the surface area of public trust waters on a permanent basis.

Intracoastal Waterway Traffic

One proxy for estimating boating traffic on the Intracoastal Waterway is to examine required bridge openings by year over an extended period. Table 18 summarizes the number of openings of the NC 101 bridge over Core Creek (Intracoastal Waterway). In 1967, the bridge was opened 5,257 times. The number of bridge openings appears to have peaked during the late 70s and early 1980s at nearly 9,000 openings per year. By 1987 the number of bridge openings had dropped to about 8,500 openings per year. The overall trend is toward increased bridge openings, with a 62% increase in such openings from 1967 to 1987.

Table 18
Bridge Openings
Intracoastal Waterway Traffic *
Selected Years 1967 to 1987

1967	5257
1972	6588
1977	8930
1982	8922
1987	8532
% Increase 1967-1987	62%

* Core Creek/NC 101 Bridge in Carteret County

Source: N.C. Dept. of Transportation, Division of Highways; U. S . Army Corps of Engineers

The Governor's Coastal Initiative has placed increased emphasis on more intensive use of North Carolina's Intracoastal Waterway to encourage economic development in the State's small coastal communities. Should this initiative prove successful, Carteret County could see continued increases in the level of traffic on the Intracoastal Waterway, as well as additional demands on overnight dockage facilities, marine supplies, etc.

1.7 N.C. State Ports Authority Activity

Table 19 summarizes shipping traffic to the N.C. State Ports Authority at Morehead City from 1978 to 1987. The figures show that the number of ships docking at the port has remained steady over the decade, averaging about 200 ships per year. Barge traffic has increased dramatically from 382 barges in 1978 to nearly 1,100 barges in 1987. Discussions with port officials revealed that the significant increase in barge traffic can be attributed in large measure to increased shipments of phosphate from Texas Gulf operations at Aurora. Much of this barge traffic is focused on the Intra-Coastal Waterway between Aurora and the Port Authority in Morehead City. Long range plans for the future development of the Morehead City ports have been altered in recent years with the transfer of one of the major cranes at Morehead to the Wilmington port. Principal commodities passing through the port in Morehead City include tobacco, phosphate, pot ash, lumber, hardboard, wood pulp, and military equipment and supplies.

Table 19

N.C. State Ports Authority, Morehead City
Shipping Traffic
Selected Years, 1978 to 1987

	Ships	Barges
1978	200	382
1982	182	463
1987	217	1,071

Source: Cary Lewis, Superintendent of Shipping and Receiving, N.C. State Ports Authority, Morehead City

2 Policies For Use Of Public Trust Waters

2.1 Introduction to the Policies

The policy statements contained in the Water Use Plan serve as the basis for future decisions on land and water related development proposals. They also provide local government perspectives to state and federal agencies regarding the county's policies toward water use.

Policy Format

Each of the major policy categories contained in the Water Use Plan is addressed according to the following format:

Discussion - a brief summary of the issues and relevant findings.

Policy statements - statements of local government principle designed to achieve legitimate public objectives related to the issue.

The narrative contained in each discussion section is not policy, and does not carry the same degree of importance as the policy statements. The narrative is designed to provide background information and rationale for the ensuing policy statement(s). In most instances, the discussion serves to identify a problem or issue, and may present a summary of findings from other sources, including public input. There is no intent to establish policy within any discussion section, but some clarification as to the intent of the policy statement may be found there.

Information presented in the narrative may become outdated and subject to change over time. The policy statements, on the other hand, must be viewed in a different light. As statements of local government principle, the policies should remain basically constant until the next update to the Water Use Plan. Frequent changes to the policies would undermine their effectiveness in achieving intended objectives. Indeed, the policies are designed to maintain a consistent and predictable course for local government decisions affecting the use of public trust waters in the county.

2.2 Policies for Resource Protection

Section 2.2.1 - Water Quality

The issue of water quality is at the heart of any plan for the protection, conservation and management of public trust waters. A recent publication of the Division of Coastal Management, *Protecting Coastal Waters Through Local Planning*, pointed out that "without unpolluted water, the coastal area would no longer provide the seafood, recreation activities, and lifestyles that people have increasingly come to enjoy". At the same time, the report noted that water quality is declining throughout the coastal area of the state. At the time the report was issued, three of the six major estuarine systems in the coastal area had more than 30% of their waters closed to shellfishing.

Unfortunately, the problem of declining water quality can seldom be attributed to a single pollution source. While recent state and federal laws have helped to reduce point-source pollution (generally waste water discharges from public or private treatment facilities), non-point source pollution has proven particularly difficult to contain. Examples of non-point source pollution include septic systems and storm water runoff from urban areas and agriculture and forestry activities.

North Carolina has four water quality classifications which pertain to the estuarine waters of Carteret County:

- **Class SA Waters** – Waters suitable for commercial shellfishing and all other tidal salt water uses.
- **Class SB Waters** —Waters suitable for swimming and primary recreation.
- **Class SC Waters** —Waters suitable for secondary recreation and fish propagation.
- **Outstanding Resource Waters** —A classification that may overlay other classifications. These are areas where additional protection is necessary to preserve outstanding resources.

Nearly all of Carteret County's estuarine waters are classified SA (see the GIS water quality map on page 86).

Recently, the waters of Core Sound, Back Sound, and western Bogue Sound in Carteret County were designated as Outstanding Resource Waters (ORW) by the Environmental Management Commission. According to the guidelines of the commission, the ORW classification lists five values or uses which, in addition to exceptional water quality, comprise the criteria on which the determination is made. These criteria are:

- Outstanding fisheries habitat;
- High level of water based recreation;
- Special land use designation;
- Important component of state or national park or forest; and
- Special ecological or scientific significance.

The regulation implementing the ORW classification further requires that to designate a body of water as ORW there must be a finding that the existing assigned water classification will not adequately protect the special features of the waters, and maintain existing uses.

Discussions with the Water Use Plan Advisory Board revealed that the western end of Carteret County adjacent to Bogue Sound is likely to continue as a major area of growth and development over the next decade or more. It is therefore important that state and local area management plans be put in place now to anticipate and mitigate the probable conflicts surrounding these Outstanding Resource Waters.

Policy 2.2.1 A **Carteret County shall take no action, nor approve of any action public or private, which would reduce the water quality classification of local area waters.**

Policy 2.2.1 B **Carteret County will work with the state and, if applicable, other local governments in the development and periodic updating of a special area land and water use management plans for areas surrounding the waters designated Preservation and Conservation. The preparation of such plans shall include the full participation of representatives of the development, agriculture, and commercial forestry industries.**

Policy 2.2.1 C **Carteret County will work with the state and other local governments to develop a plan for managing non-point pollution sources as required by Section 319 of the federal Clean Water Act.**

Policy 2.2.1 D **Treated or untreated discharges from land side or waterborne wastewater facilities into Preservation or Conservation water use areas shall be prohibited. Treated discharges into Developed waters may be considered only after all other reasonable alternatives have been explored.**

Section 2.2.2 - Coastal Wetlands

The Coastal Area Management Act defines a coastal wetland as any marsh subject to regular or occasional flooding by lunar or wind tides. Coastal wetlands contain some, but not necessarily all, of the following plant species: smooth cord grass, black needlerush, glasswort, salt grass, sea lavender, bullrush, saw grass, cat-tail, salt meadow grass, and salt reed or giant cord grass.

The critical importance of coastal wetlands to the estuarine ecosystem is well established. Without coastal wetlands, the complex food chains and high productivity levels typically found in the estuaries could not be maintained. Ninety-five percent of commercial and recreational seafood species (including shrimp, flounder, oysters, crabs, and menhaden) depend on coastal wetlands during part of their lives.

In Carteret County, the sound-side shore is generally covered by coastal marsh grass, as evidenced by mapping in the National Wetlands Inventory, proposed by the Fish and Wildlife Service of the U.S. Department of the Interior. The position of these wetlands, often between buildable high ground and deeper navigable waters, has placed considerable pressure on these environmentally significant areas. However, stricter enforcement of state and federal dredge/fill laws in recent years has done much to curtail the destruction of valuable wetlands. The official "policy objective" of state and federal government is that there shall be no net loss of wetlands. Carteret County supports this position.

Policy 2.2.2 **Carteret County shall take no action, nor approve of any action public or private, which would result in a net loss of coastal wetlands, except in instances of overriding public benefit with minimal loss.**

Section 2.2.3 - Primary and Secondary Nursery Areas

Chapter Three of Title 15 of the North Carolina Administrative Code sets forth the criteria for determining primary and secondary nursery areas. These criteria may be generally expressed as follows:

Primary Nursery Areas

Primary nursery areas are those areas in which, for reasons such as food, cover, bottom type, salinity, temperature and other factors, the initial post-larval development of young finfish and crustaceans occurs. For this reason, these areas need to be protected in their natural state so the juvenile organisms can develop in a normal manner. Without these areas the state's fishery and, consequently, the livelihood of the state's fishermen would suffer.

Primary nursery areas are usually located in the uppermost reaches of the estuaries. The Marine Fisheries Division attempts to mark these areas by posting signs at the downstream boundaries. Boundaries are described in the fisheries regulations.

Secondary Nursery Areas

Secondary nursery areas are those portions of the estuarine system in which juvenile development takes place. When juveniles are large enough to leave the primary nursery areas in the upper reaches of estuarine creeks, they move into an area further downstream where

they can continue to develop. These areas are economically important and require special protection.

In Carteret County, the upper reaches of nearly all rivers, creeks, and bays in the estuary are designated as primary nursery areas. Exceptions include most of the south river estuary, the upper reaches of Turnagain Bay, West Bay and Back Bay. As might be expected, secondary nursery areas frequently include those parts of the rivers, creeks and bays immediately downstream from the primary nursery areas. Secondary nursery areas of significant size can be found in sections of North River, Club Foot Creek, Jarrett Bay, Nelson Bay, Thoroughfare Bay, Cedar Island Bay, West Thoroughfare Bay, and Long Bay. Carteret County's primary and secondary nursery areas are depicted on the GIS Marine Resources map on page 85.

Policy 2.2.3 A **All primary nursery areas, with the exception of those areas irrevocably and significantly altered by adjacent urban level development, shall be designated as Preservation on the Water Use Classification Map (see maps on pages 90 and 91).**

Policy 2.2.3 B **Secondary nursery areas shall be designated as either Preservation or Conservation on the Water Use Classification Map. Factors determining the final designation shall be outlined in Section 3 of this Plan.**

Section 2.2.4 - Significant Shellfish Areas

Significant shellfish areas include those areas of the estuary determined by the State Division of Marine Fisheries as having highly productive habitat for the propagation of shellfish including oysters, clams, scallops, mussels or any other species of mollusks suitable for cultivation, harvest and marketing. Nearly all of the estuarine waters of Carteret County are considered to have highly significant shellfish habitat. According to maps prepared by Epperly and Ross (1986), most of Carteret County's primary and secondary nursery areas provide prime habitat for oysters. Bay scallop habitat can be found primarily in the submerged aquatic vegetation beds of Core Sound, Back Bay and Bogue Sound. Nearly all of the balance of the estuary provides suitable habitat for clams. This information is shown in generalized format on the Marine Resource Map.

As shown on the Water Quality Map, Carteret County has experienced a large number of shellfish area closings. Not surprisingly, such closing are particularly evident in the waters around the urban areas of Morehead City and Beaufort. In addition, most of the upper reaches of the county's small creeks, rivers and bays have also been closed to shellfishing. Typically, these are creeks that are narrow and shallow in depth and therefore most susceptible to the impacts of adjacent land use and development, as well as marina and navigation improvements. It should be noted that of some one hundred issues identified at the public forum for the Water Use Plan four of the top five issues dealt with the impacts of development on water quality, wetlands, and primary nursery areas.

Policy 2.2.4 A **Carteret County shall take no action, nor approve of any action public or private, which would result in a net loss of naturally productive shellfish beds, except in instances of overriding public benefit and minimal loss.**

Policy 2.2.4 B **Carteret County shall support special land and water use planning activities which serve to keep shellfish areas open or allow closed shellfish areas to be reopened.**

Section 2.2.5 - Submerged Aquatic Vegetation Beds

Chapter Three of Title 15A of the North Carolina Administrative Code defines aquatic beds as estuarine areas where eelgrass, shad grass, widgeongrass, and smooth or salt water cord grass grow. Submerged aquatic vegetation beds are highly productive ecologically and serve as nursery areas for a number of organisms. They are essential for the life cycle of some aquatic species such as bay scallops. There are two major types of submerged aquatic beds occurring in the Albemarle-Pamlico estuary. High salinity seagrass meadows, characterized by eel grass (*Zostera marina*) are located throughout Core Sound and eastern Pamlico Sound. Brackish water beds are found in the upper estuaries of the Neuse and Pamlico Rivers and in Albemarle and Currituck Sounds (Davis and Brinson, 1976, Davis and Brinson, 1983, and Davis et. al. 1985). Brackish water beds contain such species as wild celery (*Vallisneria americana*), widgeongrass (*Ruppia maritina*), and Eurasian watermilfoil (*Myriophyllun spicatum*).

The Marine Fisheries Commission and the Coastal Resources Commission have adopted policies and/or regulations to protect these areas. For example, clams can be taken from aquatic vegetation beds only by use of hand tongs, hand rakes or by hand. In addition, there are restrictions on the harvesting of bay scallops, which typically thrive in seagrass areas. These restrictions include the prohibition of dredges weighing more than 50 pounds or equipped with teeth. Any device which is designed to drag the bottom is also prohibited in the harvesting of bay scallops.

The Coastal Resources Commission discourages activities which would cause aquatic vegetation areas to be excavated or destroyed. These activities include, for example, the drainage of navigation channels, canals, and boat basins.

In Carteret County, subaquatic vascular plants have been mapped twice in recent years. The first mapping was conducted under the auspices of the Coastal Energy Impact Program (Carraway and Priddy, CEIP Report No. 20, 1983). This mapping effort identified 16,901 acres of submerged aquatic vegetation with major distribution as follows: Western Bogue Sound 12%; Back Sound 13%; and Core Sound 70%. The vast majority of all acreage identified was concentrated along the lower southeastern side of Core Sound. A more recent (1988) mapping project funded through the Albemarle-Pamlico Estuarine Study identified an area similar to that of the CEIP study, but with the addition of considerable acreage in the northern areas of Core Sound, in Back Sound and in eastern Bogue Sound. This study estimated between 30,000

and 40,000 acres of submerged vegetation in Core, Back and Bogue Sounds. The results of these mapping efforts are shown on the Marine Resources map.

While the destruction of grass in scalloping areas was identified as an issue at the public forum held for the Water Use Plan, it was not given priority as a major concern. Discussion at the advisory board level revealed mixed perceptions about the current status and prognosis for seagrass areas in the county's waters. There was general agreement, however, about the overall significance of these areas to the continued productivity of the estuary.

Policy 2.2.5 **Carteret County shall take no action, nor approve of any action, public or private, which would result in a net loss of submerged aquatic vegetation beds, except in instances of overriding public benefit and minimal loss.**

Section 2.2.6 - Cultural and Historic Resources

Comments received from the State Division of Archives and History confirm the likelihood of an abundance of archaeological resources within the public trust waters/submerged lands of Carteret County. (Letter from David Brook to Glenn Harbeck dated December 6, 1989). However, the deputy state historic preservation officer noted that "...a search of our research files reveals that neither comprehensive archival studies nor underwater field surveys have been conducted for the purpose of locating submerged archaeological sites...[in Carteret County]."

Despite the lack of an organized survey or similar study, the Division was able to offer a few possible locations of submerged archaeological remains in Carteret County. Locations having the following features might be expected to have a higher probability of possessing archaeological resources:

- harbors and waterways of historic use.
- creek headwaters—used for wintering/abandoning vessels.
- natural hazard areas —e.g. shoals.

The Division also indicated that... "A comprehensive archival study of the maritime history of the county is necessary to delineate past usage patterns. Based on this study, Carteret County submerged lands can be assigned probability designations for containing submerged archaeological remains." The county may therefore wish to consider the merits of authorizing such an archival study.

Policy 2.2.6 **The identification and protection of water use sites of cultural, historic or archaeological significance shall be encouraged.**

Section 2.2.7 - Reserved

Section 2.2.8 - Land Use and Development

The land use and development policy section of the Water Use Plan addresses the critical shoreline interface between land-side development and use activities and the public trust waters of the county. For the purposes of this plan, land use and development is considered to be any land-disturbing activity, including building construction, roads, parking lots, cleared areas, etc. as well as agriculture, forestry and other land disturbing resource activities.

This policy section is significant because any of the above mentioned activities, if left unchecked, can have a profound impact on the visual and environmental quality of the public trust waters resource. Urban level development currently occupies much of the barrier islands and mainland areas bordering Bogue Sound. Areas of particularly intensive development are centered around the communities of Beaufort, Morehead City and Atlantic Beach. It is not a coincidence that the public trust waters around these communities exhibit the most altered environmental conditions.

Similarly, extensive agricultural and commercial forestry operations, if not properly managed, can significantly increase sediment and chemical loading of nearby streams and other water bodies. The result of improperly managed urban development or agriculture can be "eutrophication", the extensive growth of aquatic plants triggered by the presence of excessive amounts of nutrients, primarily nitrogen and phosphorus.

The management response to the impacts of urban and agricultural development typically occurs on two levels: general locational requirements for development activities and site specific design standards. In the area of general locational requirements, for example, Carteret County's CAMA land use plan can require urban level development to locate only in certain designated parts of the county. The objective of the plan is to contain intensive development within the geographically defined limits of an area that can be economically serviced or an area that is environmentally suited.

It is not unreasonable to apply the same approach in identifying appropriate water use areas under the Carteret County Water Use Plan. Also, when future amendments are proposed to either the County's Land Classification Map, or the Water Classification Map the adjacent land and water classifications should be considered as part of the review process. By doing so, the land and water use classification schemes will work to direct higher density development to areas of the county considered appropriate for urban level development. Conversely, land areas adjacent to the most pristine and environmentally significant waters of the county will be less likely to be adversely impacted by inappropriately located and designed urban level development.

On a site specific level, there are a number of design standards which can be employed to minimize the impacts of development or adjacent water bodies. For example, in recent years it has become increasingly common in many parts of the country to require special setbacks and/or vegetated buffer strips along the edges of protected water bodies. Jonathan Phillips (1989) has noted that Maryland's Critical Areas Program requires that development be controlled within 1000 feet of estuarine shorelines and wetlands. In New Jersey, a protective buffer zone of 300 feet is recommended for wetlands and waterways of the New Jersey pine

lands. In a case study of Carteret County, Phillips examined such factors as soil conditions, slope, vegetation types, etc. and concluded that the most appropriate buffer to adequately address non-point source pollution in Carteret County would be about 260 to 265 feet.

This plan suggests that the County adopt interim buffer standards along shorelines commensurate with the classification of the adjacent water. Thus, a minimum 100-foot naturally vegetated buffer is to be required along shorelines adjacent to preservation water use areas while a 75 foot minimum buffer is required along shorelines adjacent to conservation water use areas. In turn, development along shorelines adjacent to developed waters need only comply with the minimum requirements of state, local and federal regulations. Thus, while these standards are considerably less restrictive than those recommended by scientific research and environmental advocates, it is the position of this plan that some standards be put in place now before irreparable damage is done to the estuarine resource.

Finally, this plan recognizes that local government can be instrumental in making the public aware of development proposals so that constructive comments can be received as early as possible in the formulation of development plans. The County can serve to facilitate improved communication between primary water users (e.g. commercial fishermen, marina operators, etc.) and the public.

Policy 2.2.8 A **Adjacent area classification water use shall be considered in reviewing requests for land classification amendments.**

Policy 2.2.8 B **Higher density development shall be encouraged to locate in areas adjacent to developed water use areas. Conversely, such uses shall be discouraged from locating near preservation or conservation water use areas.**

Policy 2.2.8 C **Properly managed forestry, acquisitions, open space, and very low density residential shall be the preferred land uses in areas adjacent to preservation and conservation water use areas.**

Policy 2.2.8 D **Water use impacts as well as water quality impacts shall be considered in reviewing development and land use proposals.**

Policy 2.2.8 E **Land use activities along shorelines adjacent to preservation water use areas shall retain or create a naturally vegetated buffer no less than 100 feet landward from the water's edge. Such buffer shall be 75 feet for conservation water use areas. Shoreline development adjacent to developed waters shall comply with all State and Federal requirements. Carteret County will work with the state and other local governments to develop a plan for managing non-point pollution sources as required by Section 319 of the federal Clean Water Act.**

Policy 2.2.8 F **Public involvement shall be encouraged in decisions on water use by making the public aware of proposed private water use activities at the earliest opportunity, as well as fostering communication between water users and the public.**

Section 2.2.9 - Special Area Plans and Programs

The Water Use Plan for Carteret County provides an overall management scheme for the use of public trust waters in the county. In this regard, the Water Use Plan is similar in purpose to a land use plan such as the one required by the CAMA program in all 20 coastal counties in North Carolina. Following the preparation of a countywide land use plan, some local governments begin the process of preparing more detailed land use management plans for smaller sub-areas within the county. Examples of such sub-area or "special area" plans include; downtown plans, highway corridor plans, historic district plans, special neighborhood plans, etc. This hierarchy of planning recognizes that one set of policies prepared for an entire county cannot usually provide the kind of detailed guidance to particular parts of the county and the individual property owners within those smaller areas.

In similar fashion, this water use plan recognizes the need for more detailed management planning for the various smaller sub-areas within Carteret County's public trust waters. Examples would include management plans for individual creeks, bays, inlets, navigation channels, etc. The preparation of specifically tailored sub-area water use plans, therefore, can give particular attention to the unique problems, constraints, and opportunities associated with that water area.

Once a special area plan has been prepared, the local government has a detailed document from which to evaluate development proposals. These plans are also instrumental in providing local government perspectives to state and federal agencies regarding their reviews of any proposed developments within the jurisdiction of the special area. This plan, therefore, recommends that several smaller water areas of critical importance be selected soon after the completion of the water use plan for more detailed planning and the development of area-specific policies and recommendations.

In addition to special geographic area plans, there is also a need for special subject area plans and programs. While specific sub-area plans traditionally focus on a geographically defined area of the county, specific subject or program area plans may evaluate and plan for certain functional or biologic areas of the estuary. For example, there may be a need to prepare a specific management plan for submerged aquatic vegetation beds throughout the county. Another special program plan may involve a strategy for enhanced aquaculture within the waters of Carteret County. Finally, certain habitats in the county's estuarine area may provide suitable living laboratory space for students, academicians, and others interested in long and short-term research and continued productivity of these natural systems.

Policy 2.2.9 A **The preparation of special area plans shall be encouraged to foster public involvement in the production of closely tailored, action-oriented bay, creek, inlet or other area plans and programs.**

Policy 2.2.9 B **The benefits of education and research to the long term productivity of the estuary shall be recognized through support for such programs.**

Policy 2.2.9 C **Carteret County supports the development and periodic updating of an environmental management plan specifically tailored to agricultural and commercial forestry production in Carteret County. The preparation of such plans shall include the full participation of representatives from these industries. The development of the plan will be tailored to fit the requirements of the federal Clean Water Act.**

2.3 Policies for Resource Production

Section 2.3.1 - Commercial and Sport Fisheries

Commercial and recreational fishing are an integral part of the economic, social and cultural heritage of Carteret County. As shown in Section 1 of this Plan, Carteret County has been the leader in commercial fisheries landings in the state for many years. Over the past decade, Carteret County has accounted for an average of one-third of all seafood landings in the state by both poundage and value (see Tables 6 and 7). In addition, 15% of all seafood dealers in North Carolina are located in Carteret County, giving Carteret the top ranking in the state. There are also more than 1,200 fulltime commercial fishing vessels registered in Carteret County.

While levels of commercial fishing activity have remained steady over the past decade or more, interest in recreational fishing has increased enormously. During the 15 year period from 1972 to 1987, for example, motor boat registrations in Carteret County increased 161 percent from just over 3,000 to nearly 7,000. Statewide in 1988, there was roughly one registered motor boat for every 26 people in the state. By contrast, Carteret County had one registered motor boat for every eight persons.

Commercial fish landings, vessel licenses, and motor boat registrations are not the sole indicators of the impact of the fisheries resource on the overall economy of Carteret County. Much of the county's tourism-driven economy is derived from both the real and perceived image of an area with close ties to the sea. Support for the continuation of a healthy fisheries resource was made most clear in the list of issues identified by Carteret County residents at the water use planning forum. Residents felt very strongly about the need to control landside development to minimize adverse impacts on water quality in the estuary, including wetlands and primary nursery areas (see Appendix I).

In North Carolina, the Marine Fisheries Commission and the Division of Marine Fisheries are responsible for managing, regulating and conserving the state's marine fisheries resource GS 113-127 to 113-225 and 143B-289.1 to 289.12.

State law prohibits local governments from regulating the marine fisheries resource, which is considered to be held in the public trust. The Marine Fisheries Commission and Division of Marine Fisheries, however, welcome the input of local governments and residents in decisions regarding marine fisheries regulations. In keeping with this policy, Carteret County has appointed a Marine Fisheries Advisory Committee to comment on all decisions of the Marine Fisheries Commission. The committee, which reports directly to the County Commissioners, is comprised 50% of sport fishermen and 50% of commercial fishermen.

Policy 2.3.1A **The continued productivity and cultural heritage of commercial and recreational fishing activities shall be fostered through restoration and protection of the unique estuarine ecosystems upon which they depend.**

Policy 2.3.1B **The county shall review and comment upon decisions of the Marine Fisheries Commission regarding the management of fisheries resources within the public trust waters of Carteret County.**

Section 2.3.2 - Aquaculture

Aquaculture may be defined as the controlled growth of fish, shellfish or marine plants for economic benefit. The U.S. Department of Agriculture's Economic Research Service recently reported that the wholesale value of fish and shellfish "farmed" in the U.S. in 1988 was $700 million, up from $192 million in 1980. Total poundage produced nearly quadrupled during the same period. These figures include both land-side containments as well as open water marine sites.

While North Carolina has had trout aquaculture operations for more than 20 years, this activity has been limited to the western mountain areas of the state. And, although catfish production has grown substantially, U.S. Department of Agriculture statistics show that North Carolina's 581 acres of water area in use for aquaculture in 1988 were dwarfed by Louisiana's 8,000 acres, Alabama's 13,466 acres, Arkansas' 16,000 acres, and Mississippi's 88,000 acres (as reported in the Wilmington *Morning Star*, 11-12-89, page 1).

Principal species with high potential for aquaculture development in the coastal waters of North Carolina include hard clams, soft-shell crabs and oysters. (Aquaculture Development Plan for NC, Appendix D, 1988). As noted earlier, Carteret County waters include some of the most productive shellfish areas on the east coast of the United States. Water depth, salinity and bottom conditions combine to create an excellent habitat for shellfish propagation. There is little reason to believe that Carteret County would not be a leader in coastal aquaculture development as the industry continues to emerge.

Policy 2.3.2A **The County shall review and comment upon all shellfish and aquaculture lease decisions of the Marine Fisheries Commission and the Division of Marine Fisheries. Visual as well as navigational and environmental impacts shall be considered.**

Policy 2.3.2B **Shellfish and other aquaculture leases shall not be supported in developed water use areas. Leases may be supported in Conservation and Preservation areas if the lease would not threaten aquatic resources and would not substantially interfere with other public trust uses.**

Section 2.3.3 - Mineral Extraction

Most coastal counties in North Carolina have adopted some sort of policy on mineral production as part of their CAMA land use plan. Implied in most of these policy statements is the assumption that such policies apply equally to land as well as water based mining operations. Minerals of chief importance in the coastal area include phosphate, peat, oil and

gas, and sand and gravel. In Carteret County, most attention related to mineral production has focused on the development of fossil fuel resources on the outer continental shelf. The county's land use plan includes several actions designed to help the county deal with OCS development.

Unlike neighboring Pamlico County to the north, Carteret County has had few, if any, major proposals for mining operations on the mainland or in the immediately adjacent public trust waters. Even so, comments from the Water Use Plan Steering Committee reflected uniform opposition to the development of mining activities anywhere within the estuarine waters of Carteret County. Exceptions to this opposition were limited to the removal of silt, sand, and other materials from navigation channels.

Policy 2.3.3 **Mineral extraction activities, including but not limited to gas and oil, shall not be supported within the estuarine areas of Carteret County. Exceptions to this policy may include the removal of materials to keep navigation channels open, and for use in approved beach nourishment projects.**

2.4 Policies for Other Public Trust Water Uses

Section 2.4.1 - Water Dependent Uses, Generally

General use standards adopted by the North Carolina Coastal Resources Commission state that only "water dependent" uses will be permitted in coastal wetlands, estuarine waters and public trust areas. Water dependent projects include navigation channels, dredging projects, docks, piers, bulkheads, boat ramps, groins, and bridges. Projects that are not water-dependent, such as restaurants, homes, motels, stores, factories, roads and parking lots, are to be placed elsewhere, preferably in upland areas. 15A NCAC 7H, 0208(a).

The following is a summary of various other standards of the CRC applicable to water-dependent uses:

- Give highest priority to the conservation of natural resources.
- Protect public rights of navigation and recreation.
- Cause least possible damage to natural features.
- Not violate state water and air quality standards.
- Not measurably increase siltation.
- Not create a stagnant body of water.
- Be timed to minimize adverse impacts.
- Not cause major damage to archaeological or historic resources.
- Not impede navigation or public access.
- Comply with the local land use plan.

(*A Guide to Protecting Coastal Resource Through the CAMA Permit Program*, 1988, pp. 36-38).

The public trust waters and near shoreland areas of Carteret County exhibit a broad spectrum of water dependent uses.This spectrum includes everything from the heavy industrial characteristics of the state ports, to individual boat docks at single-family homes. In the middle of this range are numerous fish houses and independent boat builders found throughout the County.

This water use plan seeks to direct intensive water dependent activities, such as major commercial or port activities, to areas of the county where similar activities already exist. The intent is to protect and conserve remaining areas of the county for continued biological and resource-based economic productivity. At the same time, advisory board members emphasized the need to continue to allow smaller independent boat builders and fish houses to locate in more remote areas of the county as approved on a case-by-case basis.

Policy 2.4.1 **Port facilities and other significant water dependent commercial activities shall be located within developed water use areas. Certain resource linked, water dependent activities may be approved in preservation or conservation water use areas, after careful review on a case-by-case basis.**

Section 2.4.2 - Marinas

The N.C. Administrative Code defines a marina, for regulatory purposes, as "any publicly or privately owned dock, basin or wet boat storage facility constructed to accommodate more than 10 boats and providing any of the following services: permanent or transient docking spaces, dry storage, fueling facilities, haulout facilities and repair service. Excluded from this definition are boat ramp facilities allowing access only, temporary docking and none of the preceding services. 15A NCAC 7H .0208(b)5.

The following is a summary of various other standards of the state which must be met before a CAMA permit may be issued for a marina:

Marinas...

- Should be built on non-wetland sites or in deep water not requiring dredging.
- Should be designed to meet one of the following four alternatives, in order of priority:
  - upland site, no wetland/habitat alteration, good water circulation.
  - upland site, dredging only for access, minimal damage to fisheries or wetlands.
  - deepwater site, not in a primary nursery area, not requiring excavation or wetland alteration.
  - open water site, excavation of unproductive areas no deeper than depth of connecting channels.
- Must not be located in primary nursery areas nor require dredged access through such nursery areas.
- Must provide for adequate spoil disposal areas for future maintenance.
- Must not be enclosed with breakwaters that hinder water circulation.
- Should minimize encroachments into public waters through a mix of dry storage, public launching and berthing spaces.
- Must not create obstacles to navigation and public use of waters.
- Should minimize release of pollutants related to marina operations.
- Must display a sign showing availability of nearest pumpout facility or other waste disposal services.

As discussed in Section 1 of this plan, marina development in Carteret County, as measured by the number of boat slips available, has been occurring at an accelerating pace over the past three decades. The Water Use map on page 87 of this plan shows the relative distribution of marinas in the county. Most marinas are concentrated in the area around Morehead City and Beaufort. Not coincidentally, this is also the area of greatest urban level development. In turn, the Water Quality map on page 85 shows that this same area includes the single largest acreage of closed shellfish areas in the county.

This water use plan suggests a policy which encourages that future marina development occur in areas of the County classified as developed. Preservation and conservation areas are thereby more likely to be protected and conserved for the biological and resource based economic values they hold.

Discussion at the advisory board level focused on problems of waste discharge from boats into marina waters. One suggestion was to petition the U.S. Coast Guard for a "no discharge area" for any new marinas in the county. It was also suggested that the county require a special use permit as part of the local development review process.

Policy 2.4.2 **Preferred locations for marina development shall be in developed water use areas, provided that all other State and Federal regulations can be met. The County shall carefully scrutinize marina development proposals in conservation water use areas. New marinas and marina expansions in preservation areas shall be discouraged.**

Section 2.4.3 - Dry Stack Boat Storage

As suitable locations for traditional marina developments have become more scarce, the impetus for dry stack boat storage and related launching facilities has grown. As discussed in Section 1 of this plan, Carteret County has been no exception to this trend. Dry stack boat facilities have become an increasingly common element of planned waterfront communities in the County in recent years.

Foremost among the planning issues related to dry stack storage facilities are visual impacts and fire safety concerns. With regard to visual impacts, for example, dry stack storage facilities can be three to four stories tall and can be massive. As a result, adequate visual buffering from adjacent residential areas and public trust waters is usually needed. The size of the facility and flammable nature of boats, motor fuels, etc. creates concern over the ability of local and volunteer fire departments to deal with a major fire event.

Despite these drawbacks, dry stack boat storage facilities offer an environmentally attractive alternative to traditional marina development. In fact, CAMA standards support the appropriate development of dry stack storage as a means of minimizing private use of public trust waters.

This water use plan suggests that future dry stack storage facilities be encouraged to locate in developed areas, where their visual qualities can blend with urban level development and where fire protection services are more readily available.

Policy 2.4.3 **Provision of private dry stack storage facilities may be allowed adjacent to developed areas to help relieve the demand for publicly financed facilities and to minimize the consumption of public trust surface waters. Proper buffering and fire safety considerations shall be required of all such facilities. Dry stack boat storage facilities shall be discouraged adjacent to preservation and conservation areas.**

Section 2.4.4 - Private Use of Public Waters

Historically, North Carolina has taken a permissive stance with regard to the private use of public waters. Private uses which fall into this category include, for example, marina development, private docks and piers, floating homes, and, to a lesser extent, shellfish houses. For the most part, the state has established minimum development and use standards, reviewed projects in accordance with those standards and issued permits or leases after noting that the standards have been met. With the exception of certain state and/or local development review processing fees and minimal fees for shellfish area leasing, there has traditionally been no significant cost for private use of public trust waters.

Attitudes about this policy are beginning to change in some parts of the country. In Florida,

for example, developers are required to enter into a "submerged land lease" with the Florida Department of Natural Resources when using public trust waters for marina development. The money is deposited in an "Internal Impact Fund", distribution of which is determined by a board of trustees.

Comments received from the Water Use Plan Steering Committee support the institution of similar lease arrangements in Carteret County. The steering committee felt that the state should establish a leasing program for private use of any public trust waters in the state. The monies collected would then be earmarked for the enhancement of the public trust water resource in the county in which the money was collected.

Policy 2.4.4 **Carteret County supports a policy of cost recovery for private use of local area public trust waters. The State should apply the proceeds of such recovery to restore and enhance the public trust waters resource within Carteret County.**

Section 2.4.5 - Harbor Management Planning

In recent years, state and local governments in the New England area have taken a leadership role in the development of what has been termed "harbor management planning". This is a form of special area planning which deals more directly with the functional requirements of marine uses. Specific uses which are addressed in a harbor management plan typically include locations of mooring areas and anchorages; pierhead, bulkhead and harbor lines; designation of channels and boat basins; floating home areas; location of pumpout facilities and no discharge zones; leased aquaculture beds; unique wildlife areas; prohibitions against water skiing in certain areas; no wake zones, etc..

A harbor management plan is most effective when it is prepared in concert with a broad-based special area plan for the same body of water and its adjoining land areas. Such a plan may include specific policies and regulations for managing and policing the harbor.

In North Carolina, state enabling legislation has not set clear parameters regarding the ability of local governments to police the waters within their corporate limits. Yet, there is increasing demand for direction in this area, as local governments face a growing need to exercise local control over these issues.

Policy 2.4.5 **Carteret County supports the development of local area harbor management plans, including policies and/or regulations concerning mooring areas, no wake zones, no discharge zones, and other vessel regulations necessary to protect the public health, safety and general welfare. The preparation of such plans should be coordinated with the U.S. Coast Guard, the N.C. Wildlife Resources Commission and the involved user groups. Enabling legislation should be sought as necessary to allow for the beneficial implementation of such plans.**

Section 2.4.6 - Waterways

The proper management, use and maintenance of public waterways in Carteret County includes economic as well as environmental concerns. From an economic standpoint, public waterways in the county are corridors of intense commerce. While the state ports are the most recognizable form of water dependent commerce, the larger measure of the local economy comes from the many smaller users who rely upon a good system of maintained waterways. Examples include the commercial fishing fleet, sportfishing enterprises, as well as the hundreds of smaller powered and wind driven recreational boats.

In recent years the governor's "Coastal Initiative" has added even greater importance to the role of public waterways in the regional and local economy. This initiative has as its purpose the economic development of waterfront communities on the North Carolina coast, while maintaining the environmental qualities that make the area a valuable statewide resource. Especially important to the objective of the governor's initiative is the ability of these water-oriented communities to capitalize on the east coast boat traffic passing through the state on the Intracoastal Waterway.

For this reason, it is important that the state's waterways be functional as well as aesthetic and that service be convenient as well as inviting to the boating public. One way to ensure that the county's waterways achieve these objectives is to prepare special waterway corridor plans. Included in such planning would be coordination on channel maintenance and dredge spoil areas, waterfront land use controls (including vegetated corridor buffering, water-dependent use requirements etc.) and signage standards both in the water and on the land. The preparation of such plans at the county level would require the involvement of appropriate interests including the U.S. Coast Guard, the U.S. Army Corps of Engineers, the N.C. Wildlife Commission and adjacent property owners.

Policy 2.4.6A **The use of existing navigation channels shall be preferred over the creation of new channels as an economic and environmentally sound means of meeting area navigation needs.**

Policy 2.4.6B **The economic, environmental and aesthetic significance of waterways through the planning area shall be recognized through the preparation and implementation of waterway corridor plans.**

Policy 2.4.6C **Advertising signs and billboards shall be prohibited from public trust waters.**

Section 2.4.7 - Public Access

As Carteret County's permanent and seasonal population continues to increase, the demand for public access to area sounds and waterways grows commensurately. At the same time, opportunities for public access grow smaller each year as more of the developable shoreline is built upon. The state's policy on shorefront access is stated clearly in 15A NCAC 7M .0300: "It is the policy of the State of North Carolina to foster, protect, improve, and insure optimum access to recreational opportunities at ocean and estuarine water beach areas consistent with public rights, rights of private property owners and the need to protect natural resources, especially sand dunes and marsh vegetation. The state's ocean and estuarine water beaches are a resource of statewide significance held in trust for the use and enjoyment of all the citizens."

As a result of statewide concern for continued public access to North Carolina's beaches, the state created the Coastal and Estuarine Beach Access Program for acquiring, improving and maintaining recreational property along the oceanfront and estuarine shoreline. This program has provided limited amounts of money each year to carry out the intent of the program.

Carteret County's 1985 CAMA land use plan notes that "Public access points for recreational boats are extremely limited" (p. 159). While some improvements have been made in boat access opportunities since that time, the overall shortage of launching facilities remains. As a result, this water use plan puts forth a series of policy statements designed to create long and short term opportunities for enhanced boat access, as well as other forms of needed public access.

Policy 2.4.7A **Public boat ramps shall receive the highest priority for shoreline use adjacent to Developed and Conservation water areas.**

Policy 2.4.7B **Advanced planning and acquisition of sites suitable for public boat ramps, swimming areas, and other public access facilities shall be supported to achieve desirable locations at cost effective levels.**

Policy 2.4.7C **Density transfers or bonuses will be considered for developments adjacent to developed water use areas which provide for public access and parking.**

2.4.8 Floating Structures

General policy guidelines for the coastal area of North Carolina define a floating structure as "any structure, not a boat, supported by means of flotation, designed to be used without a permanent foundation, which is used or intended for human habitation or commerce" 15A NCAC 7M .0600. According to state policy, any structure which meets this definition shall "not be allowed or permitted within the public trust waters of the coastal area except in permitted marinas" and "be in conformance with local regulations for on-shore sewage treatment." 15A NCAC 7M .0603.

In addition, the state allows local governments to adopt ordinances regulating floating structures. In keeping with this authority, Carteret County established a "Residential Marine District" within the county's zoning ordinance. This district operates as a "floating zone", meaning that the regulations may be brought to bear at any location in the county where a floating house marina has been proposed. The consensus of the Water Use Plan advisory board was that floating structures should not be allowed anywhere in the county until specific local standards are adopted.

Policy 2.4.8 **Floating structures shall be permitted only in an approved floating structure marina and only when such structure is provided with permanent water and sewer systems approved by the Carteret County Health Department. The County shall develop specific standards for the placement, construction and use of floating structures.**

2.4.9 Military Restricted Areas

The federal government maintains a strong military presence in the coastal area of North Carolina. The geographic extent of the military can be described at two levels: ground presence and use of airspace. For the purposes of this water use plan, ground presence shall be interpreted to mean land and water areas.

In the past year, considerable controversy has arisen regarding the military's use of ground and airspace in the coastal area. Most of the controversy has focused on existing and proposed military use of airspace. Since there are other, more pertinent forums in which to address the airspace issue, this water use plan focuses on ground use by the military, particularly involving restrictions on access to surface waters of the county.

In Carteret County, the military maintains two target areas, for which special restrictions on civilian access apply.

Periodically, the military allows coastal fishermen access to these restricted waters. When such opportunity is announced, the response of the commercial fishing fleet is generally immediate and the harvesting of the available fisheries resource completed in short order.

Problems associated with this arrangement appear to be few at this time. A proposal from a CRC-appointed task force recommended that specific rules be adopted governing military targets in state waters. These rules would include:

- Guarantees for seasonal access by fishermen to restricted waters.
- Required testing of water quality to monitor environmental impacts.
- Guarantees for protection from eye-damaging laser beams used in target practice.

Other than these general recommendations, the only other specific concern noted at the steering committee level, was the need to describe restricted areas by more easily identifiable geographic points of reference on the ground. Currently, certain limits of restricted areas are described, in part, in terms of circular arcs around the target. While this looks logical in map form, it is oftentimes difficult to determine from a boat on the water.

Finally, while local residents have generally accepted the existence of target area restrictions, it should be noted that there is little support for further expansions or additions to these areas.

Policy 2.4.9A **Carteret County supports the development of a combined federal, state and local agreement on the use of public trust waters by the military.**

Policy 2.4.9B **The expansion of military restricted areas in Carteret County waters shall not be supported. The County shall also continue to work with the military to minimize noise conflicts and hazardous flight paths.**

3. Public Trust Water Use Classification

3.1 Purpose of Water Area Classification and Relationship to Policies

A water area classification system has been developed as a means of assisting in the implementation of the policies adopted by the county. By delineating water classes on a map, local government and its citizens can specify those areas where certain policies (local, state, and federal) will apply. Although specific areas are outlined on the Water Classification maps, it must be emphasized that water classification is merely the tool to help implement policies and not a strict regulatory mechanism. The designation of water classes allows the county to illustrate its policy statements as to where and at what intensity water use activities should occur, and where natural resources should be conserved.

3.2 Water Area Use Classification System

To maintain a diversity of values and resources, the County's public trust waters have been divided into water management areas. A management area is a discrete geographic area defined by physical, biological and cultural characteristics within which certain management objectives and priorities are promoted or encouraged.

Each management area is assigned a classification which defines a management objective and provides a general policy framework for the area. The water area classification system consists of three management classifications: Preservation, Conservation and Developed. The classifications are defined below in terms of the general attributes and characteristics of geographic areas falling into each category. The management objective for each classification is also stated.

1. Preservation Water Area

Preservation water areas are those areas which are needed to assure the protection of significant fish and wildlife habitats, of continued biological productivity within the estuary and of scientific, research, and educational needs. These shall be managed to preserve the natural resources in recognition of dynamic natural, geological and evolutionary processes.

Permissible uses in preservation areas shall include low-intensity water-dependent recreation; research and educational observation, navigational aides, such as beacons and buoys; protection of habitat, nutrient, fish, wildlife and aesthetic resources, and passive restoration measures; and, where consistent with the resource capabilities of the area and the purpose of the water area, aquaculture and communication facilities, and active restoration measures.

Management Objective: To preserve, protect and where appropriate, enhance these areas for the resource and support values and functions they provide.

2. Conservation Water Areas

Conservation water areas shall be designated for long-term uses of renewable resources that do not require major alteration of the estuary except for the purpose of restoration. These areas shall be managed to conserve natural resources and benefits. These shall include areas needed for maintenance and enhancement of biological productivity, recreational and aesthetic uses, and aquaculture.

Permissible uses in conservation areas shall be those allowed in one above; active restoration measures; aquaculture; and communication facilities. Where consistent with resource capabilities of the area and the purposes of this water area, high-intensity water-dependent recreation, maintenance dredging of existing facilities, minor navigational improvement, and water-dependent uses requiring occupation of water surface area by means other than fill shall be appropriate.

Management Objective: To conserve, protect and, where appropriate, enhance renewable estuarine resources for long term uses and to manage for uses which do not substantially degrade the natural or recreational resources or require major alterations of the estuary.

3. Developed Water Areas

Developed water areas shall be designated to provide for navigation and other identified needs for public, commercial, and industrial water dependent uses. Such areas shall include deep water areas adjacent to or in proximity with the shoreline, navigation channels and areas of minimal biological significance needed for uses requiring alteration of the estuary.

Permissible uses in areas managed for water-dependent activities shall include navigation and water-dependent commercial and industrial uses. Where consistent with the resource capabilities and the purposes of the water area, water-related or water-dependent uses, not requiring fill; and activities identified in (1) and (2) above, shall also be appropriate.

Management Objective: To provide for water dependent and water related development.

WATER MANAGEMENT CLASSIFICATION	SUMMARY OF APPROPRIATE ACTIVITIES
Preservation	Preservation Area Uses
Conservation	Preservation Area Uses Conservation Area Uses
Developed Area	Preservation Area Uses Conservation Area Uses Developed Area Uses

The water use classification system exhibits a pyramidal form for managing activities on and in the water. The pyramid refers to the fact that permitted uses are cumulative from the highest, least intensive class (preservation) to the lowest, most intensive class (developed). The permitted use base is narrowest at the top and widest at the bottom.

The foregoing Water Area Use Classification System is based largely on the Estuary Planning System developed under the State of Oregon's Coastal Management Program.

3.3 Factors Used In Characterization of Water Area Use Classifications

The factors listed below are intended to describe the prevailing characteristics which can be generally associated with each of the three water area use classifications: preservation, conservation, and developed. In characterizing each area, it is not expected that a given area will meet each and every factor. Rather, it is the combined "weight of the evidence" which must be examined.

In some instances, the presence of only one factor will be determinant. For example, a maintained turning basin will qualify an area as developed regardless of how many other non-developed characteristics are present. Similarly, a large primary nursery area will probably qualify as preservation despite the presence of several other development-like characteristics within the area. In other words, determinate factors represent uses or resources that are associated with specific water areas and are considered important enough to cause that area to automatically fall within one of the classifications. In areas where the determinate factors are absent, it is a combination of the non-determinant factors that dictates the classification.

Table 20
Characterization Factors for Water Area Use Classifications

FACTOR	Preservation Area	Conservation Area	Developed Area
Water quality	SA and ORW	SA and SB	SA, SB, & SC
Adjacent land use	Undeveloped, agricultural with buffers, low density residential	Medium density development	Higher density development
Adjacent CAMA land classification	Conservation or Rural	Conservation, Rural or Transition	Transition or Developed
Water depth	Shallow to deep	Shallow to deep	Generally Deep
Shellfish areas	Generally open and productive, but may be closed temporarily	May be Closed	Permanently closed
Dredged areas	Minimal	Limited	Maintained channels, waterways, basins

(Table continued on next page)

Table 20
Characterization Factors for Water Area Use Classification

(Continued from previous page)

Vegetation	Marsh grass, eelgrass, submerged vegetation may be present	Marsh grass, eelgrass, submerged vegetation may be present	General absence of bottom vegetation
Shoreline	Minimal hardening	Limited hardening	Bulkheads, rip rap, etc.
Nursery areas	Primary and secondary	Secondary and none	None
Marinas	Small or few	Few	May be several
Point-source discharges	None or few	Few	May be several
Wildlife or fisheries sanctuaries	May be present	Not present	Not present
Estuarine stream segment	Uppermost reaches	Middle reaches	Lower reaches

3.4 Process Used to Classify Water Area Uses

A computer model was developed to assess the determinant and non-determinant factors and to assign classifications to the public trust waters. The model was implemented using the Geographic Information System (GIS) that is operated by the state's Center for Geographic Information and Analysis (CGIA).

The Center for Geographic Information and Analysis, an agency in the North Carolina Department of Environment, Health, and Natural Resources, operates the State's GIS. CGIA builds and maintains a database of digital geographic data for the State of North Carolina and provides GIS services to federal, state, and local government agencies and to the private sector.

A GIS is a specially designed computer system used to capture, store, measure, display, and analyze spatial data. The GIS provides the capability to make custom maps and to inventory resources, but more importantly, to incorporate spatial analysis into efforts such as water quality modeling, site suitability studies, and trends analysis. Data are stored in the GIS as a series of data layers. Examples of data layers contained in the CGIA database include a land use data layer, a soils data layer and a layer for fisheries nursery areas. One of the capabilities inherent in a GIS is the ability to perform automated map overlays for identification of areas that possess characteristics of two or more data layers. This technique, popularized in manual context by Ian McHarg (1969), virtually combines two or more data layers in an overlay fashion using the computer.

The GIS model developed for this study was employed to delineate water management areas and to classify the public trust waters of a portion of Carteret County according to the Water Use Classification System (Preservation, Conservation, or Developed). The study area includes the immediate area of Beaufort and Morehead City.

Application of the water use classification model consisted of seven major steps. The steps were: 1) identification of a digital resource inventory, 2) identification of determinant and non-determinant factors, 3) segmentation of public trust waters into zones, 4) assessment of land factors, 5) assessment of water factors, 6) assignment of factor values to each of the water tracts and 7) assignment of water area use classifications.

3.4.1 Identification of a Digital Resource Inventory

A list was compiled of environmental and cultural resources that were considered significant to the evaluation of public trust water use and management. Most of these resources were represented in digital map form as data layers on the CGIA database. Examples of these data layers include hydrography, land use and land cover, and fisheries nursery areas. Some of the data layers, such as point source dischargers, required updates by the data custodian prior to use in the model. Still other data layers, such as crab spawning sanctuaries, were not available from CGIA and were mapped by resource managers on a suitable base and then digitized by CGIA staff. Table 21 is a list of the data layers initially identified for use in the model.

Table 21
CGIA Data Layers Used in the Water Use Classification Model

Data Layer	Data Custodian
City Limits	Center for Geographic Info. & Analysis
County Boundaries	"
Hydrography	"
Land Use/Land Cover	"
Military Prohibited Areas	"
Navigation Channels/Turning Basins	"
Transportation	"
Coastal Area Management Act Major Development Permits	N.C. Div. of Coastal Management
Outstanding Resource Waters	N.C. Div. of Environmental Management
Point Source Dischargers	"
Tidal Salt Water Quality Classifications	"
Crab Pot Areas	N.C. Div. of Marine Fisheries
Crab Spawning Sanctuaries	"
Fisheries Nursery Areas	"
Oyster Cultch Sites	"
Shellfish Evaluation Areas	"
Existing Marinas	"
Submerged Aquatic Vegetation	NOAA-Natl. Marine Fisheries Service

3.4.2 Identification of Determinant and Non-Determinant Factors

A primary purpose of the water use classification model is to assess the combined influence of non-determinant factors on water areas. The model quantifies the influence of the non-determinant factors and provides local governments with combined factor data that can be reviewed and used to classify water areas. The project team selected 11 data layers from the digital resource inventory to apply in the model. Each data layer was categorized as a determinant or non-determinant factor. Table 22 lists the data layers selected for the model.

Table 22
Determinant and Non-Determinant Factor Data Layers

Determinant Factor Data Layers	Non-Determinant Factor Data Layers
Navigation Channels/Turning Basins	Land Use/Land Cover
Fisheries Nursery Areas	Coastal Area Management Act Major Permits
Outstanding Resource Waters	Marinas
Crab Spawning Sanctuaries	Point Source Dischargers
	Submerged Aquatic Vegetation
	Shellfish Evaluation Areas
	Tidal Salt Water Quality Classifications

3.4.3 Segmentation of the Public Trust Waters

The waters of the study area were geographically segmented using the GIS to accomplish the water area use classification. The first step in segmentation of the study area was to separate water areas that contain determinant factors from other waters. The remaining water areas were divided into 13 water zones, all of similar size and hydrographic properties. The purpose of segmenting the waters into zones was to produce areas that are homogeneous with respect to adjacent land activities and that are practical to discern for future administration of the water use plan. The water zones were delineated on a study area map and incorporated into the GIS as a data layer.

3.4.4 Assessment of Land Factors

The assessment of land factors began with the delineation of regions of influence for each water zone. For this application of the model, it was determined that land activities within 1,000 feet of the public trust waters should influence the water use area classification. The GIS was used to create regions of influence by generating a 1,000- foot buffer to each of the 13 water zones. The regions of influence were also stored as a data layer in the GIS.

Through the use of overlays, the GIS was used to estimate the impact of land activities occurring within the regions of influence on each of the water zones as follows:

Land Use and Land Cover - Factor 1

The GIS was used to overlay each of the regions of influence with the land use and land cover data layer. The percent of urban land, as a part of total land area for the specific region of influence, was calculated to quantify the impact of adjacent development on the water zone. The data values for this factor are shown in Table 23.

CAMA Permit Concentration - Factor 2

The regions of influence were overlayed with the data layer of CAMA permit locations and the total number of permits within the regions of influence was calculated. The number of permits per square mile for the specific regions of influence was calculated to represent the permit concentration. The data values for this factor are shown in Table 23.

Marina Concentration - Factor 3

The GIS was also used to overlay the regions of influence with the data layer containing marina locations. Marinas are defined as docking facilities with more than 10 boat slips. The total number of marinas and the number of marinas per square mile within the regions of influence were calculated. The possible values for this factor are shown in Table 23.

Point Source Discharger Concentration - Factor 4

In a similar fashion, the regions of influence were overlayed with the data layer of point source discharger locations. The total number of point source dischargers within the regions of influence and the number of point source dischargers per square mile were calculated.

As a result of the series of GIS overlays, each water zone was encoded with data describing the influence of land activities on the water zone. Table 23 shows the data:

Table 23
Influence of Land Factors by Water Zone

Zone #	% Urban Land	CAMA Permits per square mile	Marinas per square mile	Dischargers per square mile
1	25	5.7	1.7	1.9
2	21	6.1	2.8	3.5
3	4	.7	0	.4
4	3	.6	0	.1
5	9	1.8	.7	1.2
6	53	4.9	1.2	1.8
7	9	4.7	1.1	1.8
8	1	.3	0	0
9	5	0	0	0
10	3	1.1	.4	.4
11	1	0	0	0
12	7	1.6	.2	.4
13	13	5.0	0	1.3

3.4.5 Assessment of Water Factors

The assessment of water factors was conducted in a manner similar to the assessment of land factors, and was an extension of that process. It was accomplished by overlaying the 13 water zones (now encoded with land factor values) with the water factor data layers. The result of the overlay operation was a new data layer containing hundreds of water tracts, each retaining identification of the original water zone, the water factor from which it was derived, and the land factor data value. The assessment of the water factors occurred as follows:

Submerged Aquatic Vegetation - Factor 5

The data layer of submerged aquatic vegetation was overlayed with the water zones. Through the overlay process, each resulting water tract was encoded to indicate the presence or absence of submerged vegetation.

Shellfishing Areas - Factor 6

The shellfishing data layer was overlayed with the water zones and the resulting water tracts were classified as closed shellfishing area or open shellfishing area.

Water Quality Classification - Factor 7

The water quality classification data layer was overlayed with the water zones. The resulting water tracts were encoded with a water quality classification: SA waters, SB waters, SC waters.

Table 24
Influence of Land and Water Factors

Tract#	Zone#	%Urban	CAMA	Marina	Discharge	SAV	Shellfish	WQ Class
1	1	25	5.7	1.7	1.9	yes	open	SA
2	1	25	5.7	1.7	1.9	yes	closed	SA
3	2	21	6.1	2.8	3.5	no	closed	SA
4	2	21	6.1	2.8	3.5	yes	closed	SA
5	2	21	6.1	2.8	3.5	no	closed	SA
6	2	21	6.1	2.8	3.5	yes	closed	SA
7	2	21	6.1	2.8	3.5	no	closed	SA
8	12	7	1.6	.2	.4	yes	open	SA
9	12	7	1.6	.2	.4	yes	open	SA
10	12	7	1.6	.2	.4	no	open	SA
11	12	7	1.6	.2	.4	no	open	SA
12	12	7	1.6	.2	.4	no	open	SA

At the conclusion of the assessment of water factors, the GIS contained a data layer of water tracts with data values for all seven non-determinant factors. A subset of the water tracts and corresponding data values are shown in Table 24.

3.4.6 Assignment of Factor Values to Each Water Tract

The next step in the model was to assign numerical factor values to the data values for each water tract. These factor values were used in the eventual classification of the public trust waters. Fur purposes of this study, the number of categories for each factor was restricted to a maximum of four and the factor values were integers between one and four. The ranges of raw data groupings were selected on the basis of a qualitative and subjective evaluation of the data distribution by the project team. The groupings and possible factor values for each factor are shown in Table 26.

Translations were performed on the data values in order to assign factor values to each item of each water tract. Consequently, each water tract now contained 14 attributes describing the influence of the non-determinant factors, seven items containing the raw data values and seven items containing the numeric factor values. Table 25 illustrates the factor values for the same water tract subset that was shown in Table 24.

Table 25
Factor Values for Water Tracts

Tract#	Zone#	%Urb.	CAMA	Marina	Discharge	SAV	Shellfish	WQ Class
1	1	4	1	1	2	3	3	3
2	1	4	1	1	2	3	1	3
3	2	4	1	1	1	1	1	3
4	2	4	1	1	1	3	1	3
5	2	4	1	1	1	1	1	3
6	2	4	1	1	1	3	1	3
7	2	4	1	1	1	1	1	3
8	12	4	3	3	3	3	3	3
9	12	4	3	3	3	3	3	3
10	12	4	3	3	3	1	3	3
11	12	4	3	3	3	1	3	3
12	12	4	3	3	3	1	3	3

Table 26
Land and Water Factor Values

Factor	Raw Data Value	Description	Factor Value
Land Use	76%-100% Urban	Very High Influence	1
	51%-75% Urban	High Influence	2
	26%-50% Urban	Moderate Influence	3
	0%-25% Urban	Low Influence	4
CAMA Permits	>4/Square Mile	High Concentration	1
	2-4/Square Mile	Moderate Concentration	2
	<2/Square Mile	Low Concentration	3
Marinas	>1.5/Square Mile	High Concentration	1
	.5-1.5/Square Mile	Moderate Concentration	2
	<.5/Square Mile	Low Concentration	3
Dischargers	>2.0/Square Mile	High Concentration	1
	1.5-2.0/Square Mile	Moderate Concentration	2
	<1.5/Square Mile	Low Concentration	3
Sub-Aquatic Veg.	No	Vegetation Absent	1
	Yes	Vegetation Present	3
Shellfish Eval.	Closed	Closed to Shellfishing	1
	Open	Open to Shellfishing	3
Water Quality Class	SC	Suitable for Fish Propagation	1
	SB	Suitable for Swimming	2
	SA	Suitable for Shellfishing	3

3.4.7 Assignment of Water Area Use Classifications

The final step in applying this GIS model was to analyze the factor values and designate classifications to all of the waters in the study area. Waters containing determinant factors were immediately classified according to the following scheme:

Preservation Water Areas

Primary Nursery Areas
Secondary Nursery Areas
Outstanding Resource Waters
Crab Spawning Sanctuaries

Developed Water Areas

Maintained Channels and Turning Basins

Areas represented by conflicting determinant factors were further evaluated. In this study area, navigation channels occur in areas also designated as Outstanding Resource Waters. As a consequence, areas designated as Outstanding Resource Waters received a Developed Water Area classification.

To evaluate the non-determinant land and water factors for designating a water use classification to each water tract, a simple mathematical equation was applied to values for each water tract. The equation is:

$$T = \sum_{i=1}^{n} FiWi$$

where: T is the total weighted sum of factor values;
Fi is the value of each respective factor;
Wi is the weight of each respective factor; and
n is the total number of factors (seven)

In this particular application, all of the weights were given a value of one (see Total Factor Values Map on page 89). Since there were no factor values less than one, the lowest possible value of T is seven; the highest possible value of T is 22. The T value was used to group all water tracts into the Water Area Use Classification System. Water tracts were grouped as Preservation, Conservation, or Developed Water Areas according to ranges of T values. The ranges forming each classification were selected on the basis of an evaluation of the data distribution by the project team. Two alternative classifications were evaluated as shown in Table 27 and Table 28.

Table 27
Water Tract Classification Alternatives

T Value	Area (acres)	Alternative 1	Alternative 2
7	0.0	Developed	Developed
8	14.0	Developed	Developed
9	364.0	Developed	Developed
10	129.7	Developed	Developed
11	1959.3	Developed	Developed
12	230.4	Conservation	Developed
13	1745.2	Conservation	Developed
14	2969.4	Conservation	Conservation
15	3287.3	Conservation	Conservation
16	2345.5	Conservation	Conservation
17	1715.2	Conservation	Preservation
18	1841.5	Preservation	Preservation
19	9806.5	Preservation	Preservation
20	10.5	Preservation	Preservation
21	0.2	Preservation	Preservation
22	197.7	Preservation	Preservation

Table 28
Acreage Summary of Water Tract Classification Alternatives

Water Tract Classification	Alternative 1 Area	Alternative 2 Area
Development Water Area	2697.4	4442.6
Conservation Water Area	12062.6	8602.2
Preservation Water Area	11856.4	13571.6
Total Non-Determinant Area	26616.4 acres	26616.4 acres

The maps on pages 90 and 91 illustrate results of the two classification alternatives. Two final administrative steps can now be implemented to determine the water management areas: 1) contiguous water tracts of like classification can be combined into larger water management areas, and 2) orphaned water tracts that form inclusions in large water tracts or that are adjacent to larger water tracts of a different classification can be grouped with the larger tract to create a water management area boundary that can be practically managed by local officials.

3.4.8 Calibration of the Model

Alternative water use classification strategies can be developed by calibrating the model to accommodate local conditions. Resource managers, scientists, planners, and local officials can

best determine the data layers, factors, factor values, and other variables for a particular area. For example, the region of influence used to measure the influence of land activities on adjacent waters might be defined within 1,500 feet, as opposed to 1,000 feet used in this study. Implementing a different estuarine segmentation scheme is another example of how the model can be adjusted.

Other calibrations should be considered. For instance, if it is determined that submerged aquatic vegetation is a critical resource to the economy of the area, then those areas where the vegetation is present could be classified as a determinant factor to indicate Preservation Water Area. A higher factor value for the presence of submerged aquatic vegetation could also be used to indicate higher factor significance.

Another way to increase the importance of a factor is by weighting it more heavily than other factors. For example, if it is determined that submerged aquatic vegetation is more critical than other non-determinant factors, then the multiplier for submerged aquatic vegetation could be assigned a higher value than the multiplier for other non-determinant factors. Given this scenario, solving the equation would yield a higher value for water areas that included submerged aquatic vegetation.

3.4.9 The Utility of GIS in the Model

A GIS was necessary for the model's success for a number of reasons. First, the data layers accessed from the database are complex and detailed in nature. Spatial data management is best handled by a powerful and proven GIS. Second, the data analysis could involve generation of a series of proximity zones and many overlays. Manual methods have been used to conduct these analyses but the procedures are usually cumbersome, time consuming, and error prone. The constraints associated with manual analysis usually prohibit even simple calibrations to a model such as the one used here. GIS offers the ability to perform many iterations of the model and therefore provides resource managers, planners, and local officials a mechanism to evaluate best management alternatives. Third, for this study the information needed for model implementation existed in one consistent data format on the CGIA database. Access to the data is performed through the GIS at CGIA. These three factors necessitated the use of GIS in the water use classification model.

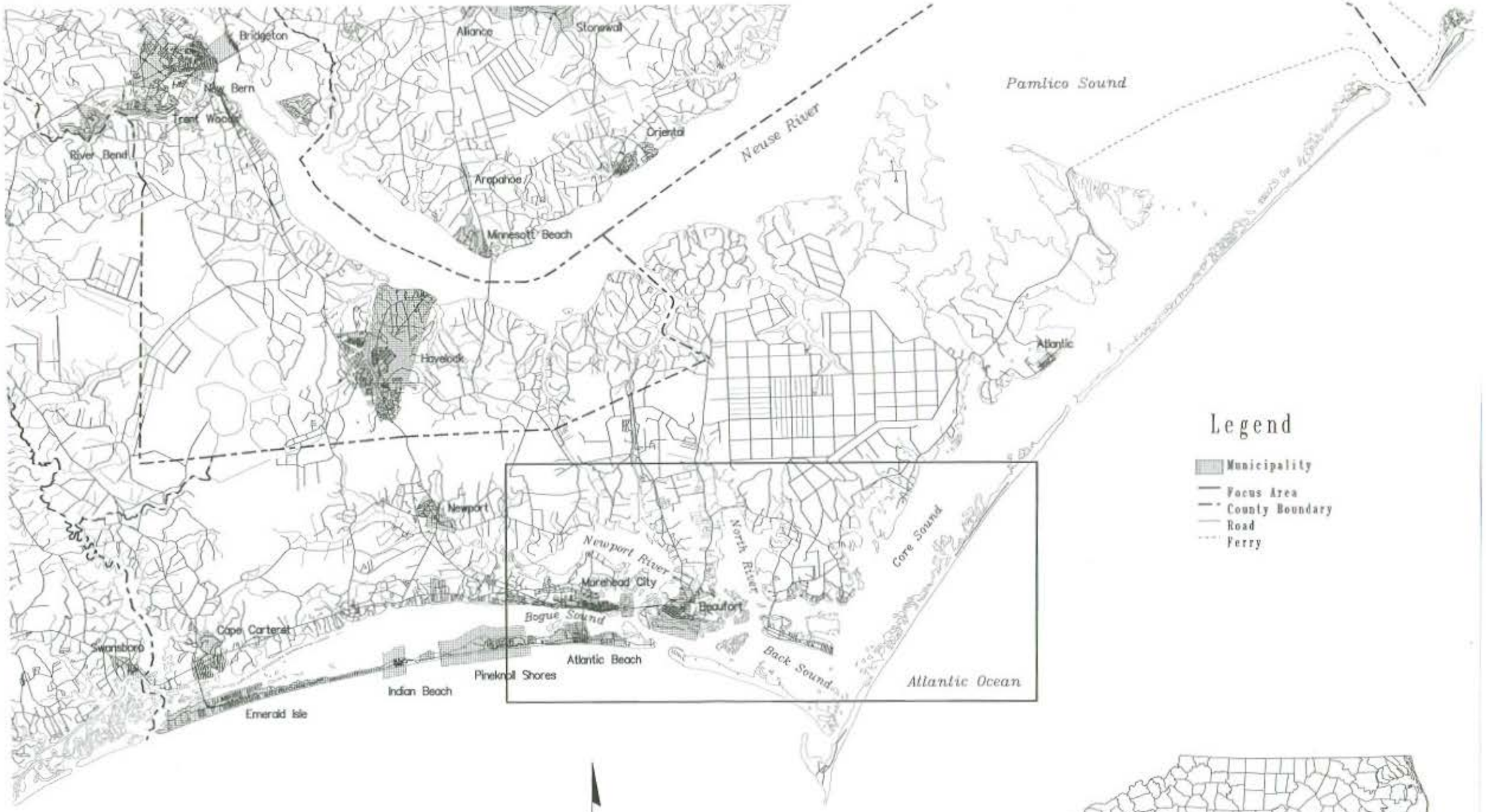
3.4.10 Summary

The application of the water use classification model for the study area in Carteret County was intended solely to illustrate the use of GIS modeling to accomplish water use planning at the local level. Results associated with this study do not represent recommendations for water use classifications in the county. Nevertheless, the project was an effective exercise to prove the concept and served to demonstrate the value of GIS technology in water use planning.

Marine Resources and Use Maps

Water Use Classification Maps

CARTERET COUNTY



Reprinted April, 1993
from original data sets
dated November, 1990.

N.C. Center for Geographic Information & Analysis

Focus Area Marine Resources

Scale = 1:100,000

0 2 4 6 MILES

Vicinity Map

N.C. Center for Geographic Information & Analysis

Reprinted April, 1993
from original data sets
dated November, 1990.

Focus Area Water Quality

Legend

- Outstanding Resource Waters - Buffered 575 feet (Subject to approval by the Environmental Management Commission)
- Water Quality Class SC-Fish Propagation (All other Focus Area waters are classified SA-Shellfishing)
- Shellfish Area (Closed)
- Municipal Boundary
- Road/Trail

Point Source Dischargers:

- Fish Processing Facility
- Fish Packing Facility
- Other Facility

N

Scale = 1:100,000

Vicinity Map

Reprinted April, 1993
from original data sets
dated November, 1990.

N.C. Center for Geographic Information & Analysis

Focus Area Water Use

Scale = 1:100,000

Reprinted April, 1993
from original data sets
dated November, 1990.

N.C. Center for Geographic Information & Analysis

Focus Area Land Use / Land Cover

Scale = 1:100,000

0 2 4 6 MILES

Vicinity Map

Reprinted April, 1993
from original data sets
dated November, 1990.

N.C. Center for Geographic Information & Analysis

Focus Area Total Factor Values

Scale = 1:100,000

Vicinity Map

N.C. Center for Geographic Information & Analysis

Reprinted April, 1993
from original data sets
dated November, 1990.

Focus Area Water Use Classification - Alternative I

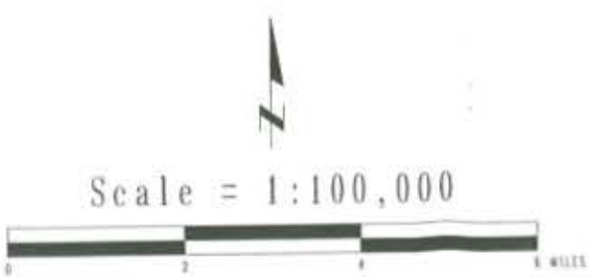
Scale = 1:100,000

Vicinity Map

N.C. Center for Geographic Information & Analysis

Reprinted April, 1993
from original data sets
dated November, 1990.

Focus Area Water Use Classification - Alternative 2



Reprinted April, 1993
from original data sets
dated November, 1990.

N.C. Center for Geographic Information & Analysis

Chapter Three

The Implementation Strategies

Written by

Walter F. Clark
University of North Carolina Sea Grant College Program
North Carolina State University
Raleigh, N.C.

Implementation

If local governments expect to maintain some control over public trust waters, then responsible action must be initiated to resolve use conflicts through local powers. Otherwise, as conflicts continue, the state or federal government will be forced to intervene.

The model water use plan presented in the previous chapter lays the foundation for a county implementation strategy. This chapter discusses two specific strategies: local government interfacing with state regulatory bodies and local ordinance development. These strategies, if tied closely to the plan's policies and water use classification system, will provide local governments with tools for managing conflicts within their jurisdictions.

Interfacing

Despite a shift to greater local control in the management of resources and uses, the State of North Carolina maintains substantial management authority over natural resources in public trust waters. As described in Chapter One, this authority is most often exercised through state commissions via the regulatory process.

Many resources are better suited to management at the state level. For example, the state's fishery would be difficult to manage through local regulation. Since fish often move from one jurisdiction to another, it would be confusing to resource users if every local government had separate regulations. Fishery management by local government could also be detrimental to the resource in that it creates the potential for inconsistent regulation. This was one of the reasons the General Assembly abolished local fishing acts in 1965.

Though there are resources and uses that are more appropriately managed at the state or federal level, local government has the opportunity for input. In many cases input is encouraged by the regulatory process. The influence that local government can have on the state regulatory process will be enhanced if based on policies -- supported by sound data -- from a comprehensive water use plan.

North Carolina's Administrative Procedure Act provides an important avenue for local involvement in the rule-making process. The Act allows petitions to be presented to an agency or commission to adopt, amend or repeal a rule. GS 150B-16. The APA also encourages strong public and local involvement in the rule-making process. Any person (including counties) can present data, opinions, and arguments at all rule-making hearings. GS 150B-12. Consequently, if a county identifies a need in its plan and the need can only be addressed by a state commission, the county can petition the state for relief or otherwise become involved in the rule-making process.

In addition to involvement through the APA, there are other laws and regulations pertaining to specific commissions that provide avenues for local involvement. For example, the General Assembly allows counties to apply to the Wildlife Resources Commission for special safety regulations for waters within county jurisdiction. GS 75A-15(b). Local governments are also empowered to sponsor water safety committees. The purpose of these committees is to inform the commission of matters regarding water recreation and safety . GS 75A-26.

Below is one example of how Carteret County might interface with state government based on the policies and classifications in it's water use plan.

Shellfish Aquaculture: Leasing of Public Trust Lands and Waters

It is clear from the statutory prohibition of local fishing acts and from the General Assembly's assignment of the leasing program to the state's Marine Fisheries Commission that local authority over aquaculture and the leasing of state-owned submerged lands and waters is limited.

However, the legislation that establishes the leasing program, coupled with the APA's strong public comment provisions, create numerous opportunities for Carteret County to interface with the Marine Fisheries Commission on leasing issues.

Chapter One of this report discusses the details of the state's aquaculture leasing laws and regulations. These laws and regulations contain a list of site criteria that must be satisfied before a lease can be granted. Several of these criteria raise questions that are of local concern. They also ask for information that local government may be able to provide readily. The commission's regulations require:

- That all leases be set-off 100 feet from developed shorelines unless permission is given by the adjacent riparian property owner. In an area bordered by an undeveloped shoreline, no minimum is required;
- That no new leases be issued for areas that are heavily used for recreational purposes;
- The leased area must not be within an area traditionally used and available or fishing or hunting activities. GS 113-201-202.1 and 15A NCAC 3C .0302.

Based on its water use plan, Carteret County could provide the Commission with information that might be useful in assessing these criteria. The policies in the model water use plan that could be instructive in making leasing decisions are:

Section 2.3.2 Aquaculture

Policy 2.3.2A **The County shall review and comment upon all SHELLFISH AND AQUACULTURE LEASE DECISIONS of the Marine Fisheries Commission and the Division of Marine Fisheries. Visual as well as navigational, recreational and environmental impacts shall be considered. See page 60 for a discussion of this policy.**

Policy 2.3.2B **SHELLFISH AND OTHER AQUACULTURE LEASES shall not be supported in developed water use areas. Leases may be supported in conservation and preservation areas if the lease would not threaten aquatic resources and would not substantially interfere with other public trust uses. See page 60 for a discussion of this policy.**

Section 2.4.4 Private Use of Public Waters

Policy 2.4.4 **Carteret County supports a policy of COST RECOVERY FOR PRIVATE USE of local area public trust waters. The State should apply the proceeds of such recovery to restore and enhance the public trust waters resource within Carteret County. See page 64 for a discussion of this policy.**

Carteret County has established a Marine Fisheries Advisory Board to monitor and make recommendations regarding the county's fishery resources. A county water use plan could compliment the board's efforts and give its recommendations more strength in its interactions with the Marine Fisheries Commission.

Local governments should use water use planning as a tool for influencing state commissions as they look for ways of addressing conflicts in public trust waters. In particular, counties should identify areas where interfacing is possible and develop strategies to meet set goals. One type of strategy might be the establishment of user committees like the one created by Carteret County for commercial fishing. At the same time, state commissions and state agencies need to be more mindful of the valuable role that local governments can play in some aspects of the regulatory process. Local governments are often close to the conflicts and have a history of dealing with user-related issues through local land use planning and zoning.

Local Ordinance Development

Any authority exercised by local government over public trust waters must be based on a grant of power from the state legislature. In 1983, the General Assembly gave counties the right to regulate development over estuarine waters and over lands owned by the state and covered by navigable waters within their jurisdictions. GS 153A-340. This is an important grant of power that provides local governments with a mechanism to solve some of their own water use conflicts. It is also a power that has yet to be fully used by local government.

There is an important condition to the use of this power. As noted in Chapter One, the Coastal Area Management Act requires that all local ordinances be consistent with local plans where the ordinances affect areas of environmental concern (AECs). GS 113A-111. In turn, local plans must be consistent with the goals of CAMA. As currently applied to land areas, these provisions have had little impact since only about three percent of the land in the coastal area is classified as an AEC. A different picture unfolds when the provisions are applied to coastal waters. One hundred percent of Carteret County's coastal water is classified as public trust and estuarine waters AECs. Consequently, any ordinance that the county adopts that applies to its jurisdictional waters will need to be consistent with state guidelines and consistent with any land and/or water use plan. This requirement prevents local governments from weakening the objectives of state guidelines but leaves the counties with a large degree of self determination.

As this project progressed it became clear that it would be difficult to write specific model zoning ordinances for the county's public trust waters. Development of zoning ordinances requires a more in-depth focus on individual water bodies. For this reason, policies are incorporated in the model water use plan that call for the development of special harbor

management and waterway plans as a sub-set of the master county-wide plan. Special area plans can deal more directly with the functional requirements of marine use. Specific uses which are typically addressed in a harbor management plan include locations of mooring areas and anchorages; pierhead, bulkhead and harbor lines; designation of channels and boat basins; no discharge zones; etc.

Below are the policies in the model plan that address special area plans.

Section 2.2.9 Special Area Plans and Programs

Policy 2.2.9 **The preparation of SPECIAL AREA PLANS shall be encouraged to foster public involvement in the production of closely tailored, action-oriented bay, creek, inlet or other area plans and programs. See page 57 for a discussion of this policy.**

Section 2.4.5 Harbor Management Planning

Policy 2.4.5 **Carteret County supports the development of local area HARBOR MANAGEMENT PLANS, including policies and/or regulations concerning MOORING AREAS, NO WAKE ZONES, NO DISCHARGE ZONES, and other VESSEL REGULATIONS necessary to protect the public health, safety and welfare. The preparation of such plans should be coordinated with the U.S. Coast Guard, the N.C. Wildlife Resources Commission and the involved user groups. See page 65 for a discussion of this policy.**

Section 2.4.6 Waterways

Policy 2.4.6B **The economic, environmental and aesthetic significance of waterways through the planning area shall be recognized through the preparation and implementation of WATERWAY CORRIDOR PLANS. See page 66 for a discussion of this policy.**

Water use planning and the development of local ordinances should be wholistic. In other words, general plans should focus on the waters of the entire county. Special area plans can then be developed using these policies and classifications to tailor ordinances to meet the needs of individual bodies of water.

Water use and land use planning should also be integrated. It has long been recognized that land use activities affect adjacent waters and that, in some cases, activities in the water can impact adjacent land. The model plan contains several policies that address the land and water interface (see policies 2.2.8A - 2.2.8F at page 56). Below is a discussion of one activity that involves the land/water interface and has caused substantial controversy in Carteret County.

Local Marina Regulation

For Carteret County to regulate marina development based on the enabling legislation found in GS 153A-340, the following analysis would be necessary.

First, the ordinance would need to be consistent with existing federal and state statutes and regulations. In addition to statutory law, the ordinance could not violate principles found in case law (for example, the common law principles of riparian rights, public trust etc.).

Second, the ordinance would need to be consistent with the policies and water use classifications found in the local plan. The policies in Carteret County's model plan that would affect the creation of a marina ordinance are set out below.

Section 2.4.2 Marinas

Policy 2.4.2 **Preferred locations for MARINA DEVELOPMENT shall be in developed water use areas, provided that all other state and federal regulations can be met. The county shall carefully scrutinize marina development proposals in conservation water use areas. New marinas and marina expansions in preservation areas shall be discouraged. See page 62 for a discussion of this policy. See the maps on pages 90-91 for the identification of the county's water use classifications.**

Section 2.4.4 Private Use of Public Waters

Policy 2.4.4 **Carteret County supports a policy of COST RECOVERY FOR PRIVATE USE of local area public trust waters. The state should apply the proceeds of such recovery to restore and enhance the public trust waters resource within Carteret County. See page 64 for a discussion of this policy.**

Section 2.4.8 Floating Structures

Policy 2.4.8 **Floating structures shall be permitted only in an approved floating structure marina and only when such structure is provided with permanent water and sewer systems approved by the Carteret County Health Department. The county shall develop specific standards for the placement, construction and use of floating structures.**

Section 2.4.3 Dry Stack Boat Storage

Policy 2.4.3 **Provision of private dry stack storage facilities may be allowed adjacent to developed areas to help relieve the demand for publicly financed facilities and to minimize the consumption of public trust surface waters. Proper buffering and fire safety considerations shall be required of all such facilities. Dry stack boat storage shall be discouraged adjacent to preservation and conservation areas.**

The plan contains other policies for resource protection that indirectly apply to marinas. They are:

Section 2.2.1 Water Quality

Policy 2.2.1A **Carteret County shall take no action, nor approve of any action, public or private, which would reduce the water quality classification of local area waters.**

Section 2.2.2 Coastal Wetlands

Policy 2.2.2 **Carteret County shall take no action, nor approve of any action, public or private, which would result in a net loss of coastal wetlands, except in instances of overriding benefit with minimal loss.**

Section 2.2.4 Significant Shellfish Areas

Policy 2.2.4A **Carteret County shall take no action, nor approve of any action, public or private, which would result in a net loss of naturally productive shellfish beds, except in instances of overriding public benefit and minimal loss.**

Section 2.2.5 Submerged Aquatic Vegetation Beds

Policy 2.2.5 **Carteret County shall take no action, public or private, which would result in a net loss of submerged aquatic vegetation beds, except in instances of overriding public benefit and minimal loss.**

Finally, the ordinance would need to address questions actually raised by the policies. For example, when and under what conditions would marinas be allowed in preservation and/or conservation waters? What does the language "overriding benefit and minimal loss" mean?

The county might also need to develop implementation and enforcement mechanisms. To what degree would this responsibility be shared with the state?

There are other examples of implementation strategies for the model water use plan. The two examples discussed above were selected because they involve contemporary issues. It is very important to remember that the policies and strategies presented in this report are intended to be examples of a planning structure and in no way should be interpreted as specific policy recommendations to Carteret or any other coastal county.

Conclusions and Recommendations

To date, coastal planning has been limited to land areas in North Carolina's twenty coastal counties (defined by the state's Coastal Area Management Act). This is true even though the jurisdictional boundaries of several counties encompass large areas of coastal water and there is no prohibition forbidding the planning process from including public trust waters.

It is recommended that the CAMA planning process be expanded to include water use planning. The act clearly states that the management of water areas is important in achieving the balanced use and preservation of coastal resources.

Water use planning could be undertaken in conjunction with the land use plan updating process required by CAMA. All land use plans must be updated every five years. The purpose of the updates is to identify and analyze emerging community issues and problems.

Water use planning would be expensive. Data collection and analysis and policy development can take several months requiring a wide array of expertise. For this reason, it is recommended that additional funding opportunities be explored to help local and state government finance these endeavors. The North Carolina Coastal Resources Commission has explored the possibility of recommending that user fees be charged for the private use of public trust waters (particularly for large marina complexes). This might be one source of revenue that could offset the cost of water use planning.

Because water resources are usually mobile and do not respect jurisdictional boundaries,

water use planning should be multi-jurisdictional. It is recommended that counties utilize existing legislation and organizations that can enhance coordination.

North Carolina General Statute 160A-461 allows units of local government to enter into contracts or agreements with each other. Units of local government that do enter into agreement may establish joint agencies to carry out the agreed upon undertaking. GS 160A-462. To assure coordination and consistency as these agreements are developed, the North Carolina Coastal Resources Commission should develop specific water use planning guidelines.

It is also recommended that counties utilize existing organizations to enhance coordination. For example, North Carolina law allows the establishment of regional Councils of Government. GS 160A-470. The powers of the Councils include the ability to study regional governmental problems such as matters affecting health, safety, welfare, recreation, regional planning and regional development. GS 160A-475.

North Carolina law also allows the establishment of Soil and Water Conservation Districts. GS 139-1 to 139-57. These districts are composed of local governments and constitute a governmental subdivision of the state. Among other things, the Districts have the power "to develop comprehensive plans for the conservation.....and development of soil and water resources." G.S. 139-8(7).

The Council of Governments and the Soil and Water Conservation Districts are organizations that should be integrated into the water use planning process.

During the course of this project, two important needs were identified. First, there are substantial limitations in the amount of reliable available data and the data that is available is often dated or incomplete. Since planning efforts must be based on reliable information, it is recommended that a financial commitment be made toward the collection and storage of resource data.

Second, it became clear that it would be difficult to write specific model zoning ordinances without a more detailed focus on individual water bodies in Carteret County. The Water Use Plan recognizes the need for more detailed management planning for the various sub-areas within the county's public trust waters. The preparation of tailored sub-area plans can give particular attention to the unique problems, constraints and opportunities associated with that water body. Once a special area plan has been prepared, the local government has a detailed document from which to develop zoning ordinances.

It is recommended that funding be made available to carry out sub-area (harbor management) planning and that those plans be based on the broader plan and classification system prepared for Carteret County.

Finally, it is recommended that counties approach water and land use planning with geographic realities in mind. Planning must integrate land and water use. It must also consider entire water bodies and drainage basins. Until land and water resources are managed in a manner that makes geographic as well as political sense, planning will remain an incomplete response to a much bigger problem.

Appendix

Appendix

Carteret County Water Use Planning Forum
February 8, 1989-7:00 PM
Duke University Marine Lab
Beaufort, North Carolina

The following issues were identified at the Forum:

List of Issues	Votes Received
Political intrusion into the regulatory process.	19
High density development.	16
Better land use planning thereby maintaining equal water quality.	13
Wetland losses due to dredge and fill and drainage.	13
Protection of primary nursery areas.	12
Waste treatment water ocean outfall as opposed to estuarine or land disposal.	10
Stormwater runoff.	8
Consideration of economic impact of water use.	8
Upland-watershed land usage-effects of runoff on estuaries, sounds, etc.	7
Reduction in the amount of property available for private uses; 80% Federal and State, 16% 404 Wetlands, 4% available, Balance under CAMA, ORW, or SWRO.	7
Improve and maintain public access to shoreline and water.	7
Secondary effects of development.	6
Eliminate wastewater discharge to surface waters.	6
Continue opportunity for self-employment in fishing and other water-related work.	6
Mapping of wetlands on land use plans.	6
Acknowledge economic importance of scientific research and its need for natural habitats - estuarine sanctuaries, etc.	6
Inform public of full extent of historic loss of our aquatic resources up to present and construct realistic predictions of the future under various scenarios of regulation.	6

Issues	Votes received
Conservation and improvement of water quality/ education and research.	5
CRC and EMC need to have expertise in several disciplines legislatively mandated.	5
All interests fairly represented in water use management process.	5
County-wide sewage treatment.	5
Declining water quality.	5
Pollution from vessel discharge.	5
Private ownership of submerged land.	5
Agricultural runoff.	5
Destruction of water-related heritage.	5
Mobile oil.	4
Public access.	4
Waterfowl habitat protection.	4
Lack of enforcement of existing water quality regulations.	4
Second degree and third degree effects of any development.	4
Plan for sewage disposal county-wide.	4
Continuous degradation of water quality.	4
Definition of wetlands/degradation of wetlands.	4
Conflicts between recreational and commercial fishermen.	3
Sea grass inventory.	3
Military airspace.	3
Eliminate unenforceable regulations in water use.	3
Development quality.	3
Encourage Aquaculture.	3
"Don't Litter" signs in marinas, fish houses, gas docks, etc.	3
Impervious surface cover.	3
Pollution from residential and industrial development.	3
Strength of farm lobby that prevents meaningful regulation of runoff of pesticides and fertilizers.	3
No Cherry Point representative on Advisory Committee.	3
All types of water runoff, specifically highway and forestry.	3

Issues	Votes received
User group conflict; recreation vs. commercial.	2
Destruction of grass in scalloping areas.	2
Lack of cooperation of military bases with civilian interests.	2
Recognize that retirement and tourism are economically important industries that will go elsewhere if water quality is not maintained.	2
Damage to rookery.	2
Public estuarine access.	2
Bottom disturbance in PNA.	2
Public water access.	2
Destruction of wetlands by development.	2
Destruction of beaches.	2
Effects of clam - kicking.	2
Conflict: public trust vs. individual rights.	2
All sewage systems.	1
Water quality and marine resources for commercial fishermen.	1
Maintain existing water quality.	1
For transportation - shipping, traveling.	1
Priority to present residents.	1
Private use of public bottom.	1
Pollution of estuaries/agricultural runoff.	1
Improve degraded water quality.	1
Pollution of water.	1
Quality of life/density.	1
Loss of public access (a) through private ownership of waters and (b) of land.	1
No wake zones.	1
Shoreline erosion.	1
Misrepresentation of facts relative to present environmental status.	1
Lack of maintained channels and inlets/lack of dredging.	1
Private benefit of public waters.	1
Need for regulations similar of Chesapeake Bay critical area programs.	1
Restore habitat.	1
Improved boating access as to channel upkeep and dredging/improved inlets.	1

Issues	Votes received
Prevent further habitat decline.	1
More input from the user groups of the commercial aspects as to growing aquaculture and harvesting of the resource.	1
Resolution of user conflicts.	1
Maintenance of waterway for commercial traffic.	1
Loss of scenic views from waterway.	0
Conservation easements.	0
Forestry runoff.	0
Destruction of marine wildlife.	0
Fishing industry.	0
For residents - beauty, recreation, sea breezes, view of water.	0
Shell-fish pollution.	0
Diminishing shell-fish resources for recreational use.	0
Runoff from streets and highways.	0
Overloaded water traffic at peak times.	0
Conflicts, boating/fishing.	0
Conflicts in fishing practices.	0
Anoxic conditions from thermal affluent.	0
Channel nets out of boat channels.	0
Stormwater management.	0
Maintain existing habitat quality.	0
Water access fees and charges to summer residents.	0

Source: Edward D. Stone, Jr. and Associates/GRH/2-10-89

References

References

Armingeon, Neil Alan. An Analysis of Coastal Growth and Development in North Carolina. May 1989.

Carter, Derb S. Outstanding Resource Waters Classification Provides Protection for N.C. Coastal Waters. Legal Tides. Vol. 4, No. 3. UNC Sea Grant. March 1990.

Clark, Walter F. Living on the Water. Blueprints. UNC Sea Grant. Publication UNC-SG-BP-85-1.

Clark, Walter F. and McLawhorn, Daniel F. North Carolina's Estuaries: Management of Multiple Use. University of N.C. Water Resources Research Institute Program. No. 70070. Undated.

Clark, Walter F. Shellfishing: North Carolina's Aquaculture Regulations. UNC Sea Grant. Publication 84-06. September 1984.

Copeland, B.J. Albemarle-Pamlico Estuarine System: Preliminary Technical Analysis of Status and Trends. Albemarle-Pamlico Study Report 89-13A. December 1989.

Cortright, Robert, Weber, Jeffrey and Bailey, Robert. The Oregon Estuary Plan Book. Published by the Oregon Dept. of Land Conservation and Development. Salem, Oregon. 1987.

Danielson, Leon. Issues in Coastal Development. The Tar Heel Economist. Department of Economics and Business. N.C. State University. November, 1987.

Davis et al. The Decline of Submerged Macrophytes in the Pamlico River, North Carolina. Final Report to the University of N.C. Water Resources Research Institute, Division of Environmental Management, and Dept. of NRCD. 1985.

Davis G. J. and Brinson, M.M. . Trends in Submerged Macrophyte Communities of the Currituck Sound: 1909-1979. Journal of Aquatic Plant Management. Pages 83-87. 1983.

Davis, G.J. and Brinson, M.M.. The Submerged Macrophytes of the Pamlico River Estuary, North Carolina. University of N.C. Water Resources Research Institute. Report UNC-WRRI-76-112. 1976.

Epperly, S.P. and S.W. Ross. Characterization of the North Carolina Pamlico - Albemarle Complex. NOAA Tech. Memo NMFS-SEFC-175. 1986.

Fussell, John O. III, and Wilson, Jeannie. Natural Areas Inventory of Carteret County, North Carolina. NC CEIP Report No. 9. June 1983.

General Statutes of North Carolina. The Mitchie Co. Charlottesville, Va. 1989.

Governor's Task Force on Aquaculture. Aquaculture Development Plan For North Carolina. December 1988.

Heath, M.S. The N.C. Mountain Ridge Protection Law. N.C. Law Review. Vol. 63, No.1. 1984.

Heatwole, Charles A. and West, Niel C. Recreational Boating Patterns and Water Surface Zoning. The Geographical Review. Volume 78, No. 3. July 1982.

Hoban, Tom. Carteret County Telephone Survey on Waste Disposal: Initial Research Results. May 30, 1989.

Institutes of Justinian, The. 2.1.1. T. Cooper, trans. and ed. 1984.

Lincoln County Oregon Department of Planning and Development. Lincoln County Estuary Management Plan. September 1982.

Liner, Charles D. State-Local Relations in North Carolina: Their Evolution and Current Status. UNC Institute of Government. 1985.

McHarg, I.L. Design With Nature. Natural History Press. 1969.

McLawhorn, Daniel F. In Defense of Public Trust Resources. Legal Tides. Vol. 1, No. 1. UNC Sea Grant. 1984.

N.C. Department of Transportation. 1988-89 North Carolina Coastal Boating Guide.

N.C. Division of Coastal Management. A Guide to Protecting Coastal Resources Through the CAMA Permit Program. 1988.

N.C. Division of Coastal Management. Protecting Coastal Waters Through Local Planning. 1986.

N.C. Division of Environmental Management, Water Quality Section. Coastal Outstanding Resource Waters, Intensive Studies . Report No. 89-03. April 11, 1988.

N.C. Division of Marine Fisheries. Preliminary North Carolina Coastal Counties Seafood Landings and Vessel Licenses. Annual Reports. 1978-1988.

N.C. Environmental Management Commission. Guidelines For the Designation of Outstanding Resource Waters in Coastal North Carolina. Adopted July 14, 1988.

N.C. Marine Fisheries Commission. NC Fisheries Regulations for Coastal Waters, 1989 . Title 15, Chapter 3 of the North Carolina Administrative Code.

Neuse River Council of Government. Carteret County Land Use Plan Update. 1985.

North Carolina Administrative Code. Copies on file in the Office of Administrative Hearings. Raleigh, N.C.

Phillips, Jonathan D. An Evaluation of the Factors Determining the Effectiveness of Water Quality Buffer Zones. Journal of Hydrology. Number 107, Pages 133-145. 1989.

Phillips, Jonathan D. Evaluation of North Carolina's Estuarine Shoreline Area of Environmental Concern from a Water Quality Perspective. Coastal Management. Volume 17, Pages 103-117. 1989.

Rhode Island Coastal Resources Management Council. Harbor Management: A New Focus. Briefing 52. January 1989.

Selmi, D.P. and Manaster, K.A. State Environmental Law. Clark Boardman and Co. 1989.

Smith, V. Kerry, Johnson, Jeffrey C., Liu, Jin Long and Jakus, Paul. Trends in Economic and Social Activities In the Albemarle-Pamlico Estuarine Region. Revised Draft. July 10, 1989.

State Board of Agriculture. North Carolina and Its Resources. 1896.

Tschetter, Paul D. Characterization of Baseline Demographic Trends in the Year Round and Recreational Population in the Albemarle-Pamlico Estuarine Study Area. 1989.

U.S. Department of the Interior, Fish and Wildlife Service. National Wetlands Inventory. Draft. Map Quadrangles for Carteret County. 1986.

Water Resources Institute News. University of North Carolina. No. 261. January-February, 1990.

Wilmington Morning Star News. Catfish Farms: Catfish are jumping where cotton once thrived. Page 1. November 12, 1989.

Wilmington Morning Star News. CRC, military clash over coastal airspace. Page 1. July 28, 1989.

Wilmington Morning Star News. Wrightsville Beach may crack down on loitering boats. October 14, 1989.

Wilmington Morning Star News. A Better Way to Protect Coast. October 18, 1989. Page 6A Editorial.