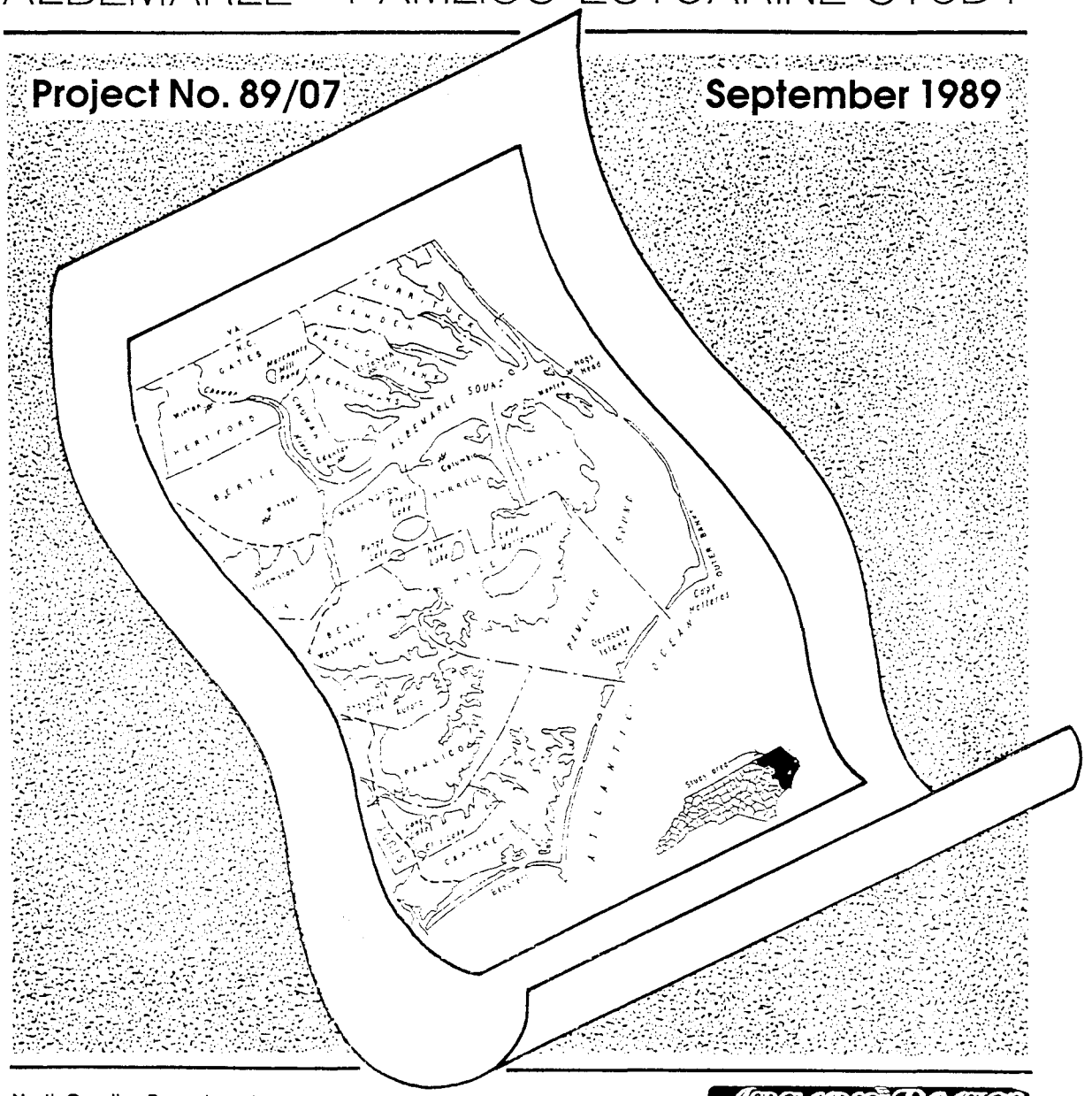
STATE AND FEDERAL INTERRELATED PROGRAMS TO THE A/P STUDY

ALBEMARLE - PAMLICO ESTUARINE STUDY

Project No. 89/07

September 1989



North Carolina Department
of Environment, Health,
and Natural Resources

Funding Provided by
Environmental Protection Agency
National Estuary Program

ALBEMARLE-PAMLICO

STATE AND FEDERAL INTERRELATED PROGRAMS TO THE A/P STUDY

Edited by

Robert E. Holman, Ph.D.
A/P Study Program Director

Project No. 89-07

September, 1989

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STATE AND FEDERAL INTERRELATION TO THE

ALBEMARLE-PAMLICO ESTUARINE STUDY

This compilation of abstracts is intended as a foundation for discussion by different agencies involved with the Albemarle-Pamlico Estuarine Study (A/P Study). The abstracts include seven state agencies and five federal agencies directly involved in the A/P Study. Other agencies are involved with the Study and will be part of subsequent meetings.

It is necessary for good communication and coordination to bring together as many organizations as possible to discuss their role both inside and outside the A/P Study. Coordination of manpower and resources is a key to the success of the A/P Study but also to act as a seed to spur other activities that will further address other critical estuarine questions.

These abstracts and associated meeting on September 13, 1989, hopefully will be the catalyst to foster a better communication network among the state and federal agencies involved in the A/P Study.

Federal Agencies

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

August 11, 1989

MEMORANDUM

Subject: Abstract of U.S. EPA's Region III Programs that Relate to the A/P Study

From: Randall G. Waite

To: Robert E. Holman, Director
A/P Study

Mission: The mission of the Environmental Protection Agency (EPA) is to safeguard the health and welfare of the American people by protecting the environment. EPA was created in 1970 to permit effective governmental coordination of actions that occur on behalf of the environment.

EPA ensures that effective discovery, investigation, containment, and control programs are developed and implemented to protect the public's health and safety and to improve the quality of the environment. EPA integrates research, monitoring, and standard-setting activities in effort to control pollution of air and water.

Region III Programs in Virginia

Chesapeake Bay Program: The Chesapeake Bay restoration and protection program is the "flagship" of EPA's national estuary initiative. A $27 million research study carried out by EPA at the direction of Congress laid the groundwork for the massive cleanup effort now under way. The study led to the signing of the 1983 Chesapeake Bay Agreement in which Maryland, Pennsylvania, Virginia, the District of Columbia, EPA and the Chesapeake Bay Commission pledged to join in a cooperative approach to deal with the pollution of the Bay. A new and more comprehensive Agreement signed in December 1987 commits these jurisdictions and the Federal Government to specific actions that will carry the program forward through the 1990's.

EPA Region III established a liaison office in Annapolis under the 1983 Agreement to help coordinate Bay restoration activities. The Agency's role became a statutory responsibility under amendments to the Clean Water Act enacted by Congress in 1987. Among other provisions, the amendments direct EPA to coordinate Federal and State efforts to improve the water quality of the Bay and authorize Federal grants to help states implement pollution reduction programs.

EPA, other participating Federal agencies, and Bay watershed jurisdictions teamed to develop a series of strategy documents during the first half of 1988 as stipulated in the 1987 Bay Agreement. Among them were plans to achieve a 40 percent reduction by the year 2000 in levels of

phosphorus and nitrogen reaching the Bay. Steps to stem the flow of nutrients into the Bay range from improvements in treatment technology at sewage disposal plants to the implementation of "best management practices" to control runoff from farms and urban areas.

Other strategies developed to meet Agreements commitments for 1988 deal with issues such as the control of conventional and toxic pollutants, research, monitoring living resources of the Bay, reducing pollution from Federal facilities, the protection of wetlands, and the impact of population growth and development on the health of the Bay

EPA is currently spending some $12 million a year in direct support of the Chesapeake Bay Program, and other Federal agencies contribute nearly $20 million more. This investment helps to generate more than $100 million in Bay related programs carried out by the States.

Near Coastal Waters: Through the provisions of the Clean Water Act and the Marine Protection, Research and Sanctuaries Act, EPA Region III monitors the current conditions and assesses long-term trends in the near coastal waters of the Mid-Atlantic Bight which extends from New Jersey to North Carolina. Monitoring and assessment of marine water quality is accomplished through two complementary activities--nautical and aerial surveillance.

Through use of the Ocean Survey Vessel, Peter W. Anderson, Region III conducts comprehensive sampling and evaluation of the status and trends in water quality during monthly survey cruises from June through September. Waters samples are collected from one to ten miles off the coast and evaluated for both chemical and biological parameters. Bottom sediment samples are also collected near three ocean sewage outfalls and a dredge disposal site. In addition, sightings of dolphins, whales, and sea turtles are added to the National Marine Fisheries Service database to assist in long term trend evaluation of near coastal water quality.

Along with the monthly cruises, Environmental Services Division staff also conduct weekly aerial surveillance of the coastal region to provide a quick and timely visual assessment of changing coastal conditions. The presence of a variety of marine animals is carefully monitored. Aerial surveyors watch for water discolorations possibly indicating algal blooms, floating plastics and garbage, and unusual occurrences such as oil slicks and illegal dumping. Unusual findings are reported to the appropriate state or Federal agency for investigation and appropriate action Aerial survey information is also used as a guide in planning sampling activities on the monthly cruises.

Water Quality Monitoring: The quality of the surface waters within Region III is monitored by a number of Federal, state, and local agencies to assess trends and identify emerging problems. Each state maintains a network of stations at fixed locations where water quality data are generated for trend analysis. These networks are complemented by studies on specific stream segments that provide an intensive assessment of local conditions. These studies are usually in response to a known or suspected problem and are used to initiate corrective action.

Region III also provides water assistance to the states in assessing water quality, managing water quality data using EPA's STORET database, and preparing the state biennial water quality assessment reports required under Section 305 (b) of the Clean Water Act. .

Water Quality Standards Program: Surface water protection in Region III is measured in large part through the use of state water quality standards . These standards designate protected uses for the waters of the state and establish acceptable water quality criteria for their intended uses. They serve as the regulatory basis for both state and EPA surface water pollution control efforts. In 1988 and continuing into 1989, EPA's efforts have centered on working with the states

in revising their water quality standards with particular focus on the needs to adopt additional criteria and procedures for controlling toxic pollutants. State standards are reviewed every three years.

Wetlands: EPA's authority to protect wetlands rests with Section 404 of the Clean Water Act. The provisions of this section give EPA and the U.S. Army Corps of Engineers (COE) joint authority over any activity resulting in the deposition of dredged or fill material in the waters of the United States. While the COE is responsible for actual permit issuance. EPA is directed to issue environmental guidelines for these permits. EPA therefore reviews all permit requests going to the COE and provides comment on their compliance with these guidelines.

In a related area, Region III has been actively involved in advance identification activities where sites are designated to be either generally suitable or unsuitable for the future disposal of dredged or fill material. These projects are usually initiated at the request of a state or local agency. The public meetings held in conjunction with this activity have proven to be useful educational tools for informing the public of the value of their wetland resources. In the past year, an advanced identification project has been completed for Cedar Island in Virginia.

Region III is currently working on an initiative to develop a manual describing advanced identification techniques so that in the future, state and local agencies can participate in this activity.

Nonpoint Source Pollution Control: The Water Quality Act of 1987 authorized a major new initiative to address the growing concern over nonpoint sources of pollution. With financial assistance from EPA, all Region III states met the requirements of the Act to complete a statewide assessment of nonpoint source problems and a management plan to address those problems.

National Pollutant Discharge Elimination System (NPDES): The Clean Water Act of 1972 and its amendments authorize EPA to regulate the wastewater discharges from municipal and industrial facilities through the NPDES program. All facilities discharging into the surface waters of the United States are required to obtain NPDES permits. These permits establish the levels of contaminants allowed in each facility's effluent as established by either industry-wide "technology-based" criteria or stream-specific "water quality based" standards. The latter are established by the states to protect the uses which they have designated for their streams. Region III has delegated the authority to issue NPDES permits and take enforcement actions to Virginia, although EPA maintains the authority to review and comment on permits.

Construction Grant Program: The Federal Water Pollution Control Act of 1956 was the first national statute to provide funds for municipal water pollution control. These funds have gone towards construction of municipal wastewater treatment works, pumping stations and various types of sewers; literally the entire gamut of point source pollution control works. In Region III, 8000 projects have been funded, 1450 of which are still active. Under the Water Quality Act of 1987, a transition has begun to supplant the grants program with a loan program capitalized with Federal funds.

Pretreatment: Many industrial facilities, rather than discharge process wastewater directly to surface waters, discharge instead to Publicly Owned Treatment Works (POTWs). The pretreatment program is the way that POTWs control the industrial discharges to their system to protect the treatment plant and its sludge, and to prevent pollutants from passing through the POTW untreated.

Drinking Water Protection: The 1986 Amendments to the Safe Drinking Water Act (SDWA) greatly increased the responsibilities of EPA and the states in protecting the Nation's drinking water. A total of 83 new or revised drinking water standards will be developed by 1989 along with three new treatment requirements for water systems.

Ground Water Protection: Groundwater provides the base flow for the Region's surface waters. All states in the Region have ground water protection policies and action plans which establish the framework for the development of classification systems, monitoring programs, improved date management systems, and other elements needed to form a comprehensive ground water protection strategy, With these strategies in place, the states are now focusing their efforts on implementation.

Clean Lakes Program: The Clean Lakes Program was established by the Clean Water Act of 1972 in order to demonstrate lake restoration and protection techniques with the goal of minimizing man's contribution to lake degradation. Watershed assessment and protection techniques developed under this program can also apply to larger basins as well.

Superfund: The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, more commonly called "Superfund," authorized EPA to clean up those sites where hazardous substances have been disposed without proper regard for the consequences to the environment or public health. Congress has allocated $8.5 billion to fund the program. Most of this money goes to funding government directed cleanup through emergency removal actions in acute emergencies, or long term remedial actions for sites posing chronic risks to public health or the environment.

Preliminary site assessments determine if sites qualify for inclusion on the National Priority List (NPL) and cleanup under Superfund. Sites on this list are those determined to have the greatest hazard based on the type, quantities, and toxicity of wastes present; the number of people potentially exposed; the likely pathways for exposure; the importance and vulnerability of the underlying aquifers; and other factors.

Community-Right-To-Know Legislation: Title III, Section 313 of the Superfund Amendments and Reauthorization Act (SARA) required certain manufacturers to submit annual reports on July 1, 1988, documented the amounts of toxic chemicals their facility releases into the environment either routinely or as a result of accidents.

EPA Headquarters will input the data from the reports into database that will then be made available in the Spring of 1989 to the public and government officials for the purpose of data analysis through the National Library of Medicine. EPA has also developed the Toxic Release Inventory System Database (TRIS) to summarize this information.

Resource Conservation and Recovery Act (RCRA): RCRA was passed in 1976 to manage hazardous waste from its initial generation to its final disposal. The two primary areas of focus in RCRA are hazardous waste management (Subtitle C) and underground storage tank control (Subtitle I).

The objective of Subtitle C of RCRA is to ensure that hazardous waste is managed to protect human health and the environment. To accomplish this goal, regulations were established covering the generation, transportation, treatment, storage, and disposal of hazardous waste. In addition, the Hazardous and Solid Waste Amendments (HSWA) of 1984 gave EPA the authority to require corrective action for past releases of hazardous substances from waste management facilities.

Region III has delegated the base RCRA program to its states but is currently responsible for the implementation of the corrective action provisions of HSWA.

The objective of Subtitle I of RCRA is to ensure that underground storage tanks (USTs) are designed, installed, and operated in a manner to prevent releases from occurring. If a release does occur, there are requirements for cleaning up the release. Owing to the large number of regulated units, EPA has adopted an approach that requires the majority of the workload to be handled by the States.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA): FIFRA charges EPA with regulating the manufacture, distribution and use of pesticides in the United States. Region III continues to provide support and oversight for the states in their pesticide enforcement and pesticide applicator certification and training programs. Under the 1988 FIFRA amendments, there will be increased penalties and registration requirements.

Toxic Substances Control Act of 1976 (TSCA): TSCA protects human health and the environment by developing data on chemical substances and mixtures and regulating those substances which present an unreasonable risk, such as ASBESTOS and Polychlorinated Biphenyls (PCB's).

Compliance Inspections: The success of EPA's compliance program depends not only on its laws but on how well those laws are enforced. Compliance inspections serve as the primary method by which EPA discovers violations. EPA Region III has field investigators located in offices in Philadelphia, Pennsylvania, Annapolis, Maryland, and Wheeling, West Virginia.

National Environmental Policy Act: In 1970, Congress enacted the National Environmental Policy Act (NEPA) to ensure that Federal agencies consider the environmental impacts of their activities and achieve a balance between society's needs and environmental protection. EPA Region III's role under the terms and condition's of NEPA has traditionally been to develop environmental documentation and mitigation plans for EPA projects that could adversely affect the environment. Historically, these projects have centered around the wastewater treatment construction grants program An additional EPA function under NEPA and Section 309 of the Clean Air Act is to review and provide comment on the environmental assessments and environmental impact statements for projects developed by other Federal agencies, e.g, construction projects for dams, highways, and power plants, dredging projects, resources extraction projects, and Federal land use projects.

Federal Facilities: Region III's Federal Facilities Program provides the coordination and scrutiny necessary to ensure Federal facility compliance with EPA statutes.

Hazardous Air Pollutants: Section 112 of the Clean Air Act requires EPA to regulate hazardous air pollutants by promulgating National Emission Standards for Hazardous Air Pollutants (NESHAP's). NESHAP's have been promulgated for arsenic, asbestos, benzene, beryllium, mercury, radionuclides, and vinyl chloride.

Air Monitoring: Current air monitoring efforts center on six pollutants for which National Ambient Air Quality Standards exist: carbon monoxide, elemental lead, nitrogen dioxide, sulfur dioxide, suspended particulates, and ozone. The overall air pollutant measurement program is a cooperative effort between the respective state, county agency, and the EPA Regional Office.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

AUG 2 9 1989

MEMORANDUM

SUBJECT: Abstract of Environmental Protection Agency Activities that Relate to the Albemarle-Pamlico Estuarine Study

FROM: F. Theodore Bisterfeld

TO: Robert E. Holman

AGENCY PURPOSE AND PROGRAMS

Nine pieces of environmental legislation authorize the Environmental Protection Agency to conduct regulatory and planning programs nationwide. In order to safeguard the public's health and improve environmental quality, EPA has a role usually in partnership with the states and often other federal agencies on actions impacting surface and groundwaters, air quality and waste management.

The Albemarle-Pamlico Estuarine Study is one of 12 studies, termed management conferences, convened by the EPA Administrator and funded under the National Estuary Program. Region IV of EPA administers the recently convened Sarasota Bay Project in addition to the A/P Study. The goal of the NEP is to restore the physical, chemical and biological integrity of the nation's estuaries by protecting and enhancing water quality and their living resources. This is to be accomplished through a coordinated effort by government, industry and the public. Similarly, it promotes coordination between EPA's programs toward this goal. Following is a list of the major enabling legislation of EPA and a mention of the Agency's authority.

- Clean Water Act: Establish quality criteria for surface waters; overview state actions regarding water quality standards, water quality monitoring, water quality inventories; conduct Near Coastal Waters Program and the NEP; nonpoint source assessment and implementation of controls; regulatory review of projects impacting wetlands; funding to municipalities for water pollution control; establish effluent standards; regulate industrial pollutant discharges; require area and basinwide water quality planning by states; conduct research and development.

- Clean Air Act: Set national ambient air quality standards and emission standards for new and existing industrial pollutant sources; overview state programs for control of various stationary and mobile emission sources, require State Implementation Plans for attaining areawide compliance with air quality standards; authority to review and rate environmental suitability of other federal agency regulatory or funding actions; conduct research and development.

- Safe Water Drinking Act: Setting standards for drinking water quality in public water supplies; require ground water protection measures.

- Marine Protection, Research and Sanctuaries Act: Regulate ocean disposal of dredged and non-dredged material; consultation on marine sanctuaries selection; and regulate ocean incineration of chemical wastes.

- National Environmental Policy Act: Requires EPA to perform environmental reviews on the issuance of new source pollutant discharge permits to industries and construction grants for municipal wastewater treatment facilities. Only the later applies in North Carolina because the State has been delegated point source (NPDES) authority.

- Federal Insecticide, Fungicide and Rodenticide Act: Administer pesticides registration program and set use standards according to risk/benefit criteria; regulate storage and disposal of suspended or cancelled pesticide products; conduct research on health and environmental effects of pesticides.

- Resource Conservation and Recovery Act: Authority for programs and regulations to ensure safe management of wastes from their origin, treatment and ultimate disposal; reduce the generation of hazardous and non-hazardous wastes; conserve energy and natural resources; assess, prevent or correct soil and groundwater contamination from leaking underground petroleum or other toxicant storage tanks; and conduct waste management research.

- "Superfund" Act and its Reauthorization Bill: Programs for emergency response to releases of hazardous substances to the environment from spills and from inactive or abandoned disposal sites; identification of sites; setting of priorities and assigning liability for cleanup actions; and conducting training and research.

- Toxic Substances Control Act: Testing and regulation of various substances potentially harmful to man or the environment; authority to restrict or prohibit manufacture, import, processing distribution, use, or disposal of individual chemical compounds posing unreasonable health or environmental risks.

AGENCY'S OTHER PROJECTS

Many of the EPA programs and authorities directly pertain to the objectives of the A/P Study. It is the task of the Study to consider better application of or modification to these programs as the rationale for alternative management strategies is established through the review of the Status and Trends Report. Subsequently, the A/P Study will compile the available potential alternative actions, evaluate them and then make recommendations in the Comprehensive Conservation and Management Plan (CCMP) for implementation.

Specific EPA projects within the study area are worthy of being monitored by the A/P Study participants.

- Open Grounds Farms: EPA Office of Research and Development and Duke University Marine Lab are conducting a three year research project investigating the movement, fate, and effects of agricultural pesticides and herbicides upon the estuarine environment.

- Advance Identification of wetlands: Recent Regional planning initiative to identify pocosin and similar freshwater wetland areas of the Carolinas. It will define their functional ecological values and provide public notification of determinations on their suitability or unsuitability for permits to discharge dredged or fill material to them. A workshop is scheduled October 11-13 in Morehead City.

- "Choking Fogs": Scientists in the EPA Air Quality Laboratory at RTP are investigating fogging events along the Pamlico River that are irritating to the skin, eyes and breathing passages. This support is in response to a request by DNRCD. Air monitors will be installed soon.

- Mobil Oil Exploration Proposal: Region IV has received an application form Mobil Oil for a wastewater discharge permit from a proposed exploration facility approximately 40 miles offshore of Hatteras.

- Oregon Inlet: EPA commented on a federal project for stabilizing the south end of the Pea Island bridge. There also are plans by the Corps for maintenance of Oregon Inlet navigability subject to interagency environmental review.

- Special Case 404 Determination: EPA regional staff are handing a Section 404 wetlands jurisdictional determination on a tract of land in Washington and Hyde County, composed of pocosin vegetation. A/P Study strategies for protecting various critical natural areas will be affected by the outcome of this determination.

- Cherry Point Naval Air Station Superfund Site: Site investigations continue at this site and at other potential sites within the A/P Study area. This site is not on the National Priority List but there are four others on the NPL in the study area. Remedial actions to correct toxics contamination will be useful information in formulating the CCMP.

- Nonpoint Source Pollution Control: Region IV has approved North Carolina's statewide assessment of nonpoint source problems and the management plan to address those problems. This action is required by Section 319 of the Clean Water Act. Up to this time, no implementation funding has been appropriated by Congress and this year's grant to the State is not large enough to enable much if any implementation. However,the A/P Study is funding several priority projects.

- Wasteload Allocations: EPA's Office of Research and Development has prepared a manual (now in peer review) assessing various water quality models applicable to estuarine areas.

This listing of authorities and projects is not exhaustive. It does give an overview of the breadth of the Agency's responsibilities and activities.

U.S. FISH AND WILDLIFE SERVICE

Purpose: The mission of the U.S. Fish and Wildlife Service (Service) is to provide the Federal leadership to conserve, protect, and enhance fish and wildlife and their habitat for the continuing benefit of the people. The Service consists of a headquarters office in Washington, D.C., eight regional offices, and a variety of field units and other installations. Among these are national wildlife refuges, fish hatcheries, fish and wildlife enhancement field stations and law enforcement offices located strategically throughout the States. The Service facilitates the balanced development of this Nation's natural resources by timely and effective provisions of fish and wildlife information and recommendations to assure the natural diversity and continuing survival of fish and wildlife.

APES Project: In 1988-89 the Service conducted an APES-funded study to determine the historic extent of anadromous fish excursion in the Albemarle Pamlico Estuarine Study (APES) area, to determine areas which are presently being utilized as anadromous fish habitat, and to identify physical barriers to the upstream and downstream migration of anadromous fish. The methods used to accomplish these objectives included interviews with recognized experts, review of the literature, aerial surveys and ground surveys. The products of this investigation are maps depicting historic and present anadromous fish utilization of streams in the study area and impediments to or blockage of fish movements. The latter are identified both by maps and by latitude and longitude coordinates.

Service Projects in the APES Study Area: During the past four years, the Service has undertaken several studies in this area to attempt to bring together baseline information essential to informed management decisions, both on our refuges and as a regulatory review agency. Many of these studies are known as "community profiles." A "community profile" essentially is a report synthesizing all the available literature for a selected critical ecosystem into a comprehensive and definitive reference source for use by environmental planners, managers, students, ecologists, and laymen. A listing of these studies is presented in Table 1, and it is evident that many of these studies complement the State-Federal Albemarle-Pamlico Estuarine Program.

The Service is responsible for conducting the National Wetland Inventory (NWI), and this is in progress in North Carolina. All of the NWI maps for the APES Study Area, with the exclusion of the Rocky Mount NW and SW quads, will be completed in draft by the end of 1989. Also, in response to a directive from Congress, the Department of the Interior is undertaking a nationwide study on the loss of wetlands. As a part of that effort, the FWS Raleigh Fish and Wildlife Enhancement Office is preparing a report on the impact of Federal programs on forested wetlands in North Carolina with an emphasis on pocosins.

During the summer 1986, the Service initiated work on a limnological assessment of Lake Mattamuskeet and Pungo Lake in relation to acidification and metal flux. The objectives of this study were to determine the water budgets for the two lakes, assess their basic water-quality parameters, qualitatively characterize the biological communities, and determine metal

concentrations (cadmium, copper, chromium, lead, mercury, nickel, selenium, and zinc) in sediments, aquatic vegetation and fish.

In 1986, the Service initiated a three-year study designed to investigate nutrient cycling and fishery utilization of high marsh (e.g., Juncus roemerianus) habitats in coastal North Carolina. Dr. Mark Brinson, East Carolina University, and Dr. Gordon Thayer, NOAA Laboratory in Beaufort, conducted this study. The final report was recently released.

The red wolf is one of the most endangered mammals in North America with only 75 animals existing as a captive breeding population. In November 1986, the Service undertook the first stage of a major effort to restore this endangered species to a part of its former range by transporting four pair of red wolves to Alligator River NWR where they underwent an acclimation period followed by release in the spring of 1987 of three pair on refuge lands. This effort by the Service marked the first time in North America that an animal extirpated from the wild was reintroduced from a captive breeding program.

In 1987 and 1988 the Service conducted an assessment of environmental contaminants in fish and wildlife resources of the Albemarle-Pamlico Peninsula. The objectives of this study were: (1) to determine baseline levels of organic contaminant and toxic trace metals in aquatic invertebrates, fishes, reptiles, and some water birds; (2) to examine if differences in contaminant levels exist between developed and underdeveloped drainage areas; and (3) to attempt to determine if such information will be useful in predicting impacts associated with future land-use changes.

As part of its overall national emphasis on anadromous fish, in 1987 the Service participated in a multi-agency effort in cooperation with the North Carolina Division of Marine Fisheries and the North Carolina Wildlife Resources Commission to develop restoration plans for anadromous fish. This project focuses on striped bass restoration in Albemarle Sound, but eventually restoration plans for other species, such as shad and herring, may be developed.

US FISH AND WILDLIFE SERVICE

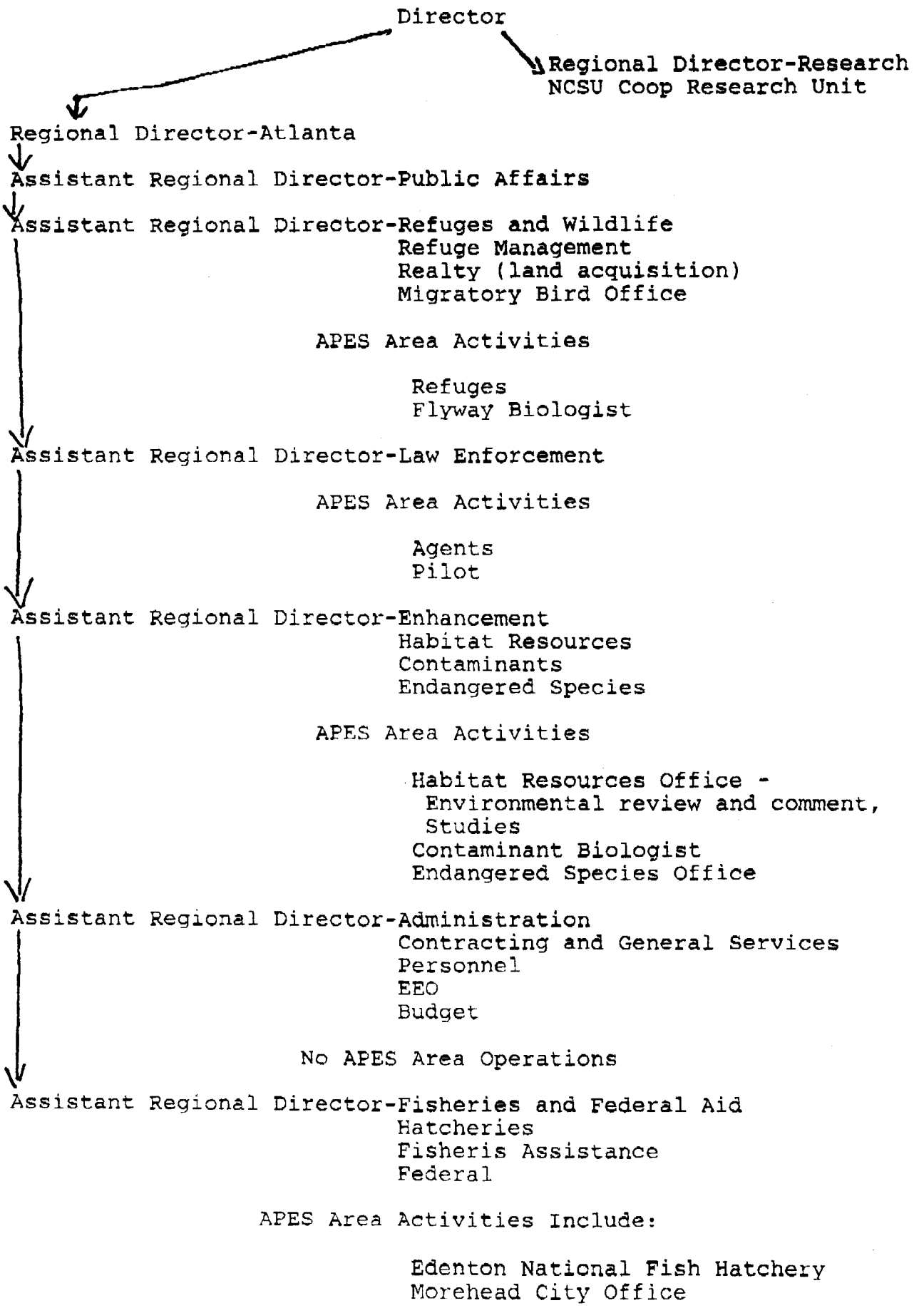

Table 1.--Fish and wildlife studies relating to the Albemarle-Pamlico area

Publication	Publication No.
The Ecology of Intertidal Flats of NC: A Community Profile	FWS/OBS - 79/39, Nov. 1979
The Ecology of Intertidal Oyster Reefs of the South Atlantic Coast: A Community Profile	FWS/OBS - 81/15, May 1981
The Ecology of Tidal Freshwater Marshes of the U.S. East Coast: A Community Profile	FWS/OBS - 83/17, Jan. 1984
The Ecology of Bottomland Hardwood Swamps of the Southeast: A Community Profile	FWS/OBS - 81/37, March 1982
Albemarle Sound Estuarine Profile	FWS/OBS - 83/01, Sep. 1983
Pamlico River Estuarine Profile	FWS/OBS - 82/06, April 1984
The Ecology of Southeastern Shrub Bogs (Pocosins) and Carolina Bays: A Community Profile	FWS/OBS - 82/04, Nov. 1982
Maritime Forest: A Community Profile	In progress
Atlantic White Cedar Swamps: A Community Profile	In progress

U. S. GEOLOGICAL SURVEY

Mission and Funding

The water-resources mission of the U.S. Geological Survey is to provide the hydrologic information needed by others to help manage the Nation's water resources. To accomplish its mission the Survey, in cooperation with other State and local governments, and other Federal agencies:

- Collects data on a systematic basis to determine the quantity, quality, and use of surface and ground water, and the quality of precipitation.
- Conducts water-resources investigations and assessments at national, State, and local scales, characterizes water-resources conditions, and provides the capability to predict the impact on the resource of managerial actions, proposed development plans, and natural phenomena.
- Acquires information useful in predicting and delineating water-related natural hazards.
- Coordinates the activities of all Federal agencies in the acquisition of water data, and operates water information centers.
- Disseminates data and the results of investigations.
- Provides scientific and technical assistance in hydrology to other Federal agencies, to State and local agencies, to licensees of the Federal Energy Regulatory Commission, and to international agencies.
- Administers the provisions of the Water Resources Research Act of 1984.

Authority for carrying out the Survey's mission originally derives from legislation of 1879, which established the Geological Survey, and from subsequent legislation, which expanded that mission. Congressional appropriations have been made annually since 1894 for gaging streams and performing other functions relating to water resources. Presently, funds to support the water-resources activities performed by the Survey are derived from four principal sources:

- Federal Program--These funds are used to support research, data collection, high-priority topical programs, the coordination of all Federal water-data collection programs, and internal support.

- Federal-State Cooperative Program--Federal funds are used to match those furnished by State and other tax-supported agencies on a 50-50 basis. These funds are used for a variety of hydrologic data-collection activities and water-resources investigations in which the Geological Survey represents national responsibilities and the cooperating agencies represent State and local interests. The North Carolina District A/P investigations fall under this program.

- State Water Resources Research Institute and Research Grant Program--Federal funds are used to match those from 54 State Water Resources Research Institutes.

- Other Federal Agencies Programs--Funds are transferred to the Survey as reimbursement for work performed at the request of another Federal agency.

North Carolina District A/P Activities

The North Carolina District of the U.S. Geological Survey has actively supported the A/P Study from the inception of the study. Jim Turner, District Chief, serves as a member of the Technical Committee and chairs the Technical Review Subcommittee. Turner also serves on the Monitoring and the Publications Review Subcommittees. Other personnel in the District have played an active role in the A/P Study by serving on committees, reviewing proposals and publications, and speaking on behalf of the Study on numerous occassions.

The District is presently cooperatively funding four investigations with the A/P Study. Those investigations are:

- Compilation and Analysis of Existing Hydrologic and Water-Quality Data, Albemarle-Pamlico Estuarine System

- Evaluation of Off-Site Changes in Hydrology and Water Quality Resulting from BMPs in the Albemarle-Pamlico Region

- Determination of Flows and Flow Patterns in the Pamlico River and Neuse River Estuaries

- Continous Monitoring of Estuarine Water Quality

Numerous other water-resources investigations are conducted in the A/P Study basin. The Survey operates a network of streamflow gaging stations, ground-water level wells, and water-quality measurement sites throughout North Carolina, with many sites in the A/P basin. Other ongoing investigations include the following:

- Water-Quality Characteristics of Pristine Streams
- Urban Hydrology of the Coastal Plain
- Water Quality of Inflow to Falls and Jordan Lakes
- Effects of Treyburn Development on Surface-Water Quality in the Upper Neuse River Basin
- Water-Use Data Collection Program
- Effects of Channelization on the Hydrology of Chicod Creek Watershed
- Open Marsh Water Management of Salt Marshes at Hobucken and West Onslow Beach
- Low Flow Characteristics of Streams and Rivers
- Coastal Plain Aquifer Study
- Central Coastal Plain Aquifer Study
- Ground-Water Supply and Potential for Contamination, Cherry Point Marine Corps Air Station
- Appraisal of the Ground Water Resources of Camp Lejeune, Marine Corps Base

Additional information about the activities of the U.S. Geological Survey in North Carolina may be obtained from:

District Chief
U.S. Geological Survey
P. O. Box 2857
Raleigh, NC 27602
(919) 856-4510

USDA SOIL CONSERVATION SERVICE
ABSTRACT OF AGENCY PROGRAMS SUPPORTING APES

Mission of the Soil Conservation Service

The Soil Conservation Service (SCS) helps individuals, groups organizations, cities and towns, and county and state governments reduce the costly waste of land and water resources and put to good use these national assets. The guiding principle is use and conservation treatment of the land in harmony with its capability and needs.

The SCS mission covers three major areas: soil and water conservation, natural resource surveys, and community resource protection and development. The help SCS provides is technical and in some cases financial, and it is guided by conservation objectives and priorities established by the U.S. Department of Agriculture (USDA) in cooperation with citizen groups, local conservation districts, and other local, state, and federal agencies.

To carry out its mission in North Carolina, SCS has a network of conservation specialists who help people understand and protect their land and water. The SCS staff includes soil conservationists, engineers, soil scientists, agronomists, biologists, economists, foresters, geologists, plant materials specialists, and environmental specialists.

SCS focuses its assistance on non-federal land. Land users get help from SCS mainly through the locally organized and locally run conservation districts in North Carolina. At the district level, SCS soil conservationists provide on-site assistance and call upon all of the agency's expertise to solve specific problems of land users.

Programs of the Soil Conservation Service Applicable to the APES Area.

A. Conservation Operations is authorized by Public Law 74-46. Activities include:

1. Conservation technical assistance is provided to district cooperators and other landusers in the planning and application of conservation treatments to control erosion and improve the quantity and quality of soil resources, improve and conserve water, enhance fish and wildlife habitat, conserve energy, improve woodland and pasture conditions, and reduce upstream flooding; all to protect and enhance the natural resource base.

   SCS has offices in each APES area county and provides this technical assistance to all categories of recipients on request. SCS currently has underway a major effort to carry out its responsibilities from the Food Security Act of 1985, Title XII, in the area of erosion control, proper land use,

and wetlands protection using this CTA program. Through CTA, SCS is also helping implement the Merchants Millpond Water Quality pilot project, a project partially funded through APES.

2. Soil surveys are made to inventory the state's basic soil resources and to determine land capabilities and conservation treatment needs. Soil survey publications include interpretations useful to cooperators, other federal agencies, state and local organizations. Eighteen North Carolina APES counties have modern published soil surveys. Nine counties have modern soil surveys with field mapping completed and are awaiting publication; and three counties have older published surveys. Five counties have modern soil surveys in progress--one of these is Hyde County which is partially funded by APES. Only one county in the area has no modern soil survey in progress.

3. Inventory and monitoring to provide soil, water, and related resource data for land conservation, use and development; guidance of community development; identification of prime agricultural producing areas that should be protected; use in protecting the quality of the environment; and to issue periodic inventory reports of resource conditions. These inventories are repeated periodically to maintain up-to-date information for USDA uses. The data is currently developed for use on a statewide basis.

B. River Basin Surveys and Investigations

This program is authorized by the Watershed and Flood Prevention Act, Public Law 83-566.

The program involves cooperation with other federal, state, and local agencies in the conduct of river basin surveys and investigations, flood hazard analysis, and flood plain management assistance to aid in the development of coordinated water resource programs, including the development of guiding principles and procedures. SCS represents the Department on river basin regional entities and river basin interagency committees for coordination among federal departments and states.

C. Watershed Planning

This activity is carried out under the Watershed and Flood Prevention Act, as amended, Public Law 83-566. The program consists of (a) making preliminary investigations to assess proposed small watershed projects in response to requests made by sponsoring local organizations and (b) assistance to sponsors in the development of watershed work plans. SCS is responsible for development of guiding principles and procedures.

D. Watershed and Flood Prevention Operations. Small Watersheds Authorized by Public Law 83-566, as amended

This program provides for cooperation with local sponsors, state, and other public agencies in the installation of planned works of improvement in approved watershed projects. Such works of improvement reduce erosion, floodwater, and sediment damage. They also further the conservation, development, utilization, and disposal of water including the development of multipurpose facilities for such uses as recreation, improvement of fish and wildlife habitat, and water supply to municipal and industrial users. Examples of small watershed projects in the APES area include Fishing Creek in Granville County; Upper Contentnea Creek in Wilson, Wake, Johnston, Franklin, and Nash Counties, and Crabtree Creek in Wake and Durham Counties.

E. Resource Conservation and Development Program

Section 102 of the Food and Agriculture Act of 1962 (Public Law 87-703), and Sections 1528-1538 of the Agriculture and Food Act of 1981 (Public Law 97-98) provide authority to assist locally sponsored Resource Conservation and Development Projects to conduct programs of land conservation and use in areas where acceleration of present conservation activities are needed and where projects add economic opportunities to the people. Two RC&D areas, Mid-East and Albemarle, encompass 15 APES counties in the northeastern corner of the state.

F. The agency participates in various other interagency programs and initiatives that have benefits mutual to those of USDA in the general area of soil, water and related resource use and management.

Beaufort Laboratory
NOAA/NMFS
Southeast Fisheries Center
Beaufort, NC 28516

The Beaufort Laboratory is one of six National Marine Fisheries Service research laboratories located in the southeast region of the US between North Carolina, Florida and Texas, and including Puerto Rico and the US Virgin Islands. NOAA's mission is one of exploration to improve man's comprehension and uses of the physical environment and its oceanic life, and includes investigations of the oceans, their basins, and their life and resources. The mission of the National Marine Fisheries Service is to evaluate, develop and conserve the living marine resources important to the economy of the US. Within this context, the Division of Estuarine and Coastal Ecology at the Beaufort Laboratory has developed a research program designed to determine the key fishery habitats and ecological processes which are important in regulating fishery and ecosystem productivity of our coastal and estuarine waters and develop the capability to predict the impact of man's activities on fishery populations and their critical spawning and nursery habitats.

The research program that has evolved is a multidisciplinary, generic program concerned with estuarine-coastal habitats and their use by fishery organisms. Among the environmental issues being investigated in both a generic and specific manner include (1) coastal habitat modification; (2) distribution and composition of wetland habitat types; (3) the value of mitigated habitats to fishery organisms; (4) contaminant loading and metal metabolism; and (5) cumulative/additative effects of habitat loss and contaminant additions on fishery populations.

During the extant A/P program, two research projects at the Beaufort Laboratory have been conducted in cooperation with A/P funding. Under this funding, the Beaufort Laboratory of NMFS conducted a visual aerial survey of Core Sound and eastern Albemarle and Pamlico Sounds and photographed Core and eastern Pamlico Sound at scales of 1:24,000 and 1:50,000. The project also collected seagrass samples in Core, eastern Pamlico, Croatan, Roanoke and eastern Albemarle Sounds and in Currituck Sound to provide ground level verification for interpretation for SAV of both current and anticipated photography and to provide regional data on species composition of SAV. The project also delineated SAV from 1985 photography of southern Core Sound and produced charts of seagrass habitat in Core Sound from Cape Lookout to Drum Inlet.

This project, funded only for the first year of A/P, delineated almost 12,000 acres of SAV habitat in the charted area (the first definitive charts of SAV habitat available for NC). In addition, this project provided the first estimate of SAV acreage for NC, estimated at approximately 200,000 acres from Bogue Inlet to Oregon

Inlet including Bogue, Back, Core and southern and eastern Pamlico Sounds. This estimate of 200,000 acres of SAV in North Carolina is similar to the acreage of salt marshes in the state, and ranks North Carolina second only to Florida in extent of marine SAV in the United States.

In addition to this ecological research, the Beaufort Laboratory is conducting research on the relative values of nursery areas, including marshes, seagrasses, and non-vegetated habitats for fishery species in Core, Back and Bogue Sounds. Monthly sampling of Ocracoke and Oregon Inlets for larval fishery organisms is being employed to delineate the timing of recruitment of larval fishery organisms from both the northern and southern points of major entrance to the A/P's system. These investigations will be employed in future habitat studies to couple estuarine recruitment processes and timing with information on habitat utilization by fishery organisms.

The laboratory also has research underway in the Core, Back and Bogue Sound areas on the impacts of physical changes to fishery habitat as well as the value of measures used to mitigate these changes. With accelerated coastal development, the process of and success of mitigation measures have become important management and research topics. One element of our research is to determine whether the created wetlands have the same or similar habitat value as the original acreage that was destroyed, and use methodologies developed for investigating natural wetland habitats. Thus, these data are compared with data collected from natural systems.

Contaminant loading and the increased incidences of disease among fishery organisms, both of which may be the result of accelerated coastal development, also are of concern at the Beaufort Laboratory. In the southeast selected estuaries and organisms are being monitored as part of the NOAA National Status and Trends, Benthic Surveillance Program. One station is located in Pamlico Sound. This ongoing program is determining the concentrations of both organic and inorganic contaminants in fish and sediments in 19 estuaries in the southeast. In addition to monitoring efforts, studies also are conducted on the processes that control the effects of trace metals on marine organisms. The data derived from these studies and other research on the metabolism of metals on fishery organisms are useful in assessing the potential impacts of contaminants on estuarine processes.

Increased incidences of disease in both fish and shellfish have been reported from different locations in the southeast. The fish disease, ulcerative mycosis, has been identified in fish collected from the Pamlico River, NC, and blue crabs, with an extremely aggressive form of shell disease have been collected in the Pamlico River also. Under funding from the A/P program, the Beaufort Laboratory in cooperation with the College of Veterinary Medicine at North Carolina State University is conducting an investigation to describe the etiology of this disease among blue crab populations. The disease is not unique to the Pamlico River since

investigators have examined crabs with shell disease collected in the Alligator River and southern Albemarle Sound; reports of the disease also come from Florida and Texas. Although the etiology of the disease has yet to be established, the data and observations suggest that some environmental factor or combination of factors predispose the crabs in the Pamlico River to this particularly aggressive form of shell disease.

The holistic research that the habitat program at the Beaufort Laboratory of NMFS addresses is comprehensive. The research is demonstrating both locally and within the southeast region that the prediction or assessment of cumulative or integrated effects of compromised environmental quality requires extensive knowledge of processes that control natural populations before such effects can be successfully described and predicted.

The Division of Fisheries at the Beaufort Laboratory is conducting two research programs that are related to, but not supported by the A/P program. The first study is examining the relative abundance, distribution, and subsequent recruitment of juvenile Atlantic menhaden for estuarine systems along the Atlantic coast of the U.S. Migration and recruitment patterns as well as fishery exploitation rates are obtained from an extensive mark-recapture program. In estuarine systems from Florida to Massachusetts, juvenile (young-of-the-year) Atlantic menhaden were captured, injected with a numbered, internal ferromagnetic tag and released. During the field-release portion of the study from 1970-1987, substantial numbers of juvenile Atlantic menhaden were tagged and released in North Carolina estuaries, many of which were in the A/P system. The tags are still being recovered at menhaden reduction plants. The relative abundance of juvenile menhaden was examined among years and among streams from 1972-1978, and within years from 1979-1986. An additional project examined biotic and abiotic factors which affect the distribution of juvenile menhaden within the Neuse and Pamlico River's main stem estuary, as well as their tributary estuaries. The research being conducted on juvenile Atlantic menhaden will permit an indepth examination of the recruitment process, as well as a determination of the relative contribution of each estuarine system to the menhaden population as a whole.

The second study is determining the species composition and distribution of endangered and threatened turtles in North Carolina, particularly in areas which traditionally supported a turtle fishery. In 1988 we evaluated methodologies which included participation from the boating and fishing public, fixed transect surveys using ferry boats as platforms, aerial surveys of Core and Pamlico Sounds, and sampling of turtles from ongoing fishing operations. In 1989 we are continuing to evaluate the feasibility of the public participation and ferry boat surveys and have implemented monthly aerial surveys of the sounds and increased our sampling and tagging of turtles incidentally captured in the fishing operations.

State Agencies

NORTH CAROLINA DEPARTMENT OF AGRICULTURE

The primary duties of the North Carolina Department of Agriculture are twofold. One is to promote and enhance the production, diversification, marketing and sale of agricultural commodities. The other is to protect the state's consumer from unsafe food, drug and cosmetics, and to ensure accurate measurements of products by volume, weight and quality. The Divisions all have specific responsibilities ranging from Agronomic Services to Marketing and the State Fair to Veterinary Services.

The Agronomic Services Division provides site specific advice on soil management through a central laboratory in Raleigh and eight Regional Agronomists statewide. This includes free soil testing which in 1988 amounted to over 200,000 samples with over two million analyses. Plant tissue and nematode analysis are also conducted. The evaluation of animal waste samples for nutrients and potential heavy metal concentrations is the first step at utilizing this waste as a resource. With the waste analysis and soil test data, an application recommendation can be made which is both environmentally and agronomically sound.

The Food and Drug Protection Division enforces both state and federal statutes designed to ensure the safety of consumer products. Through a system of statewide inspectors and a laboratory in Raleigh, the food products, drugs, cosmetics and other items in commerce are checked for their quality, guarantees and reliability. One of the Division's sections deals with pesticides. This program, guided by the North Carolina Pesticide Board, administers the North Carolina Pesticide Law and the Federal Insecticide, Fungicide, Rodentacide Act (FIFRA). These statutes are the basis for the regulation, use restriction and control of pesticides in North Carolina. Pesticide applicators are trained and certified in a cooperative effort with the North Carolina Agricultural Extension Service. Product sampling and investigations are carried out by a statewide staff. Regulations have been developed creating buffer strips, limiting entry into fields after spraying, confining the use of aerial applications and for the storage of pesticide materials. These are among the most stringent regulations in the nation. Furthermore, this Division operates a pesticide disposal program to help homeowners and farmers dispose of unwanted pesticide materials in an environmentally sound manner. There is also a cooperative effort to begin in 1990 between the Pesticide Board, Environmental Management Commission and the Commission for Health Services to evaluate the potential for groundwater contamination by certain chemicals through a statewide monitoring network.

The North Carolina Museum of Natural Sciences is the repository of the data and specimens of animal life which make up North Carolina's fauna. With the diverse geographic, hydrologic and topographic mix which makes up the state, the role of the museum and its collections in describing the natural feature of the state is in constant demand.

The Plant Industry Division has a diverse mission. Plant health, control of plant pests and diseases, ensuring quality seed and fertilizer and the State Endangered Plant Program are some of its efforts. The North Carolina Endangered Plant Law establishes a highly diverse board to evaluate the occurrence of various plant species in this state. Their status, management needs and recovery are coordinated through a variety of state and federal agencies as well as directly with private landowners. North Carolina has one of the most thorough plant protection programs in the nation.

The Structural Pest Division is solely concerned with the safe application of pesticide materials in and around the home. The licensing of applicators, inspection of application sites and investigations of complaints ensures constant review of applicators in North Carolina.

Activities on the State's Research Stations vary greatly. Aquaculture, erosion control, water management, crop production technology, bioengineering, pesticide management and disease control are all carried out. Current areas for study are developed through researchers at North Carolina State University and change as priorities and funding dictate.

Resources, Planning and Development is a multipurpose division. As the liaison with other agencies, environmental, economic and legal considerations are made which relate to the effect of statutes, regulations and policies on the future ability of farmers to produce food and fiber. Emphasis varies from review of state and federal legislation and nuisance protection, to promoting the expansion of the state's agricultural nonpoint source pollution control program and other water quality initiatives..

Although the North Carolina Department of Agriculture is not primarily a research institution, it is involved in the development of numerous programs, providing data and technical assistance to numerous agencies and universities, and in implementing laws to help farmers produce while protecting the safety and quality of many of the state's consumer products.

Division of Coastal Management

The Division of Coastal Management (DCM) supports the North Carolina Coastal Resource Commission's administration of the Coastal Area Management Act of 1974 (CAMA). This act established a management and regulatory program for barrier islands, coastal wetlands, sounds and tidal rivers. The state has developed a coastal management program that has been approved by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) pursuant to the federal Coastal Zone Management Act of 1972, as amended. DCM serves as the staff arm of the Coastal Resources Commission (CRC) and issues permits for major developments within Areas of Environmental Concern (AECs), inspects development sites for potential violations of CAMA rules, administers planning, research and beach access grant programs to local governments, and administers annual federal grants from NOAA for coastal management, reviews coastal projects of federal and state agencies to assure consistency with the state's federally-approved coastal program.

DCM/APES Cooperative Programs

The DCM staff is assisting the Coastal Resources Advisory Council (CRAC) in a APES funded project to conduct a series of public meetings on estuarine resource protection in the Albemarle-Pamlico System. Issues to be addressed are fisheries management, sewage disposal and enforcement of exiting environmental regulations. The meetings are scheduled for September - November 1989 in Plymouth and New Bern.

Other APES Related Programs

Local Land Use Planning

CAMA requires local land use plans in the 20 coastal counties. These plans must be approved by the CRC. DCM administers planning grant programs for local governments that are funded with both federal and state funds.

Major Development Permits

All development with AECs must obtain a CAMA permit or, in the case of federal activities, a consistency determination. DCM administers a major development permit program. Permit applications are reviewed by DCM and all state resource agencies to protect coastal wetlands, enhance fisheries and wildlife habitat, protect water quality and provide protection for unique historic, cultural and geologic sites. CAMA AECs in which permits are required, include coastal wetlands, estuarine and public trust waters and estuarine shorelines within 75 feet of the mean high water line.

Coastal Reserves

DCM administers the North Carolina Coastal Reserve program which includes four estuarine research reserves that have been acquired by the state and two coastal reserves Buxton Woods and Permuda Island.

Beach and Estuarine Access

DCM administers a federal-state beach and estuarine access program. Under this program, grants are awarded to local governments to develop public access facilities to our estuarine waters and ocean beaches.

Technical Studies

DCM technical studies program sponsors research on such topics as maritime forest identification and protection, wastewater treatment options, growth trends in the coastal area, land use regulations, erosion rates and flood zone management.

Federal Consistency

All activities proposed by federal or state agencies within the 20 coastal counties are reviewed by DCM to determine consistency with the state's Coastal Management Program.

DIVISION OF ENVIRONMENTAL MANAGEMENT
JULY 28, 1989

ACTIVITIES IN A/P STUDY AREA FOR 1987 & 1988

The Division of Environmental Management (DEM) is charged with evaluating water quality statewide, improving degraded waters and maintaining existing uses in all waters. In order to achieve these goals a variety of tools are used including water quality monitoring, toxicity studies, and point and nonpoint programs. DEM maintains a central office in Raleigh and seven regional offices located throughout the state. This coverage improves the division's ability to monitor the more than 37,000 miles of streams and rivers, 300,000 acres of lakes and reservoirs, and 2,044,375 acres of estuaries and sounds located in North Carolina. The following is an overview of DEM's involvement in the A/P Study area during 1987 and 1988.

DEM is the designated lead agency for NPS pollution control in the state and coordinates its activities with other agencies to achieve water quality improvements through NPS control programs. There are several state NPS control programs active in the A/P area which achieve pollution reduction through the installation of best management practices (e.g., water control structures, vegetative buffer strips, and infiltration basins) or through land use controls in areas which drain to or are in close proximity to coastal waters. These programs and the agency responsible for each are as follows: Agriculture Cost Share Program (Division of Soil and Water Conservation), Sedimentation Pollution Control Program (Division of Land Resources), Coastal Stormwater Management Regulations (DEM), and Coastal Area Management Act Division of Coastal Management).

In addition to nonpoint source controls the State is responsible for control of point source pollution through the NPDES program. DEM has a Facilities Performance Strategy with the main objectives of promoting excellence in proper operation and maintenance and emphasizing internal process control programs. The main thrust of the program is directed at problem facilities in noncompliance and to facilities requesting assistance from the State.

An important aspect of the compliance program is the screening of dischargers' self-monitoring data to determine compliance. The Washington Regional Office is responsible for most of the basins within the A/P Study area with the Raleigh Region covering the upper Neuse and Tar-Pamlico basins. Within the Washington Region, 196 facilities (municipal and industrial) completed daily monitoring reports (DMR) in 1987. Of these, 70% were in compliance. In 1988 with 195 facilities reporting, compliance was again approximately 70%. Regional personnel conducted 325 facility inspections during 1987 & 1988.

DEM is authorized by the Oil Pollution and Hazardous Substances Control Act of 1978 to investigate and assure adequate cleanup of oil and hazardous substance discharges which threaten waters of the State. Each regional office has staff on call 24-hours a day to respond to spills and fish kills. In 1987 and 1988 the Washington Regional Office responded to 77 fish kills and submitted 107 algal bloom reports.

Regional personnel were very active in A/P Study area during 1988 with the formation of the PERT team. The PERT team was composed of two DEM personnel and two DMF (Division of Marine Fisheries) personnel. This team responded to fish kill reports and assisted various A/P Study researchers in study efforts.

DIVISION OF ENVIRONMENTAL MANAGEMENT
JULY 28, 1989

ACTIVITIES IN A/P STUDY AREA FOR 1987 & 1988

In addition to regional involvement the central office was involved with various studies and projects in the A/P Study area. These activities included toxicity testing, benthic macroinvertebrate sampling, ambient water quality sampling, and special studies.

The Aquatic Toxicology Unit conducted a total of 49 tests within the five basins that A/P Study encompasses. The tests included 17 Ceriodaphnia Chronic Effluent Toxicity tests, 7 Acute Pass/Fail tests, and 25 Bioassays. Twenty-two facilities conducted whole effluent toxicity self-monitoring tests at the Division's request. In 1988, a total of 44 tests were conducted consisting of 10 Ceriodaphnia Chronic Effluent Toxicity tests, 10 Acute Pass/Fail tests, and 24 Bioassays. Forty-nine facilities conducted whole effluent toxicity self-monitoring tests.

A total of 47 studies were conducted in the A/P Study area by the Biological Assessment Group during 1987 and 1988. These studies were undertaken to support toxicity testing results, determine if the waters were meeting classification characteristics, locate high quality waters and outstanding resource waters, determine point and nonpoint effects, and survey aquatic weed infestations.

During 1988 the Intensive Survey Group conducted three marina special studies in the Neuse River, an intensive survey of Kerr Lake, and took 213 fish samples at 26 ambient stations within the A/P Study area. As part of the state's Ambient Lakes program, 9 lakes were sampled in 1987 and 24 lakes were sampled in 1988 within the A/P Study area. In addition to this work fish tissue samples were taken in the Currituck Sound for analyses that will include PCB concentrations. Blue crab samples were taken in the Pamlico River, Neuse River, and Albemarle Sound for metals analysis with special attention to fluoride concentrations.

DEM has an extensive ambient water quality monitoring program composed of over 300 active stations. Within the A/P Study area there are 82 active ambient stations sampled on monthly and quarterly schedules. Parameters collected at these stations include physical (temperature, DO, salinity, pH), chemical (nutrients, metals, solids), and biological (phytoplankton, benthic macroinvertebrates, chlorophyll-a, fecal coliform, BOD) data. During 1987 and 1988, a total of 323 ambient phytoplankton samples and 78 benthic macroinvertebrate ambient network stations were analyzed from the A/P Study area.

The State maintains an active water body classification system whereas all waters (over 40,000 stream miles) are classified for their best use. For each classification there are narrative and numerical water quality standards to protect the various uses. The classification and standards are the basis for permitting limitations/requirements, water monitoring priorities, enforcement actions and ultimately the protection of the waters.

Three supplemental classifications are particularly important to the A/P area. They are: Nutrient Sensitive Waters (NSW) whose purpose is to recognize waters subject to excessive algal growth and limit nutrient loading (usually nitrogen and phosphorus); Outstanding

DIVISION OF ENVIRONMENTAL MANAGEMENT
JULY 28, 1989

ACTIVITIES IN A/P STUDY AREA FOR 1987 & 1988

Resource Waters (ORW) are unique and special waters of exceptional state or national recreational or ecological significance which require special protection to maintain existing uses; and High Quality Waters (HQW) which are waters rated as excellent, SA (shellfishing) waters, WS-I and WS-II (water supply) waters, primary nursery areas (PNAs), and native and special native trout waters that also require special protective measures.

DEM is presently reviewing new classifications and water quality standards along with the continual task of reclassifying water in order to enhance the State's ability to protect our water resources.

During 1987 and 1988 a special study on the Neuse added nine new stations below New Bern. Data collected at these stations in addition to historic ambient data was used in supporting Nutrient Sensitive Waters (NSW) designation for the lower Neuse. The lower Neuse River was declared NSW in May 1988 making the whole Neuse Basin NSW waters.

In 1988 a special study was initiated on the Pamlico River below Washington. Four transects of three stations each were established along with new stations in Broad Creek, Bath Creek, Durham Creek and the Pungo River. This study was aimed at determining the relationship between the tributaries and the main river and providing information on phytoplankton dynamics within the system. In 1989 the transects were made part of DEM's expanded ambient network. At this time the Division is working with the Environmental Management Commission to have the Tar-Pamlico Basin declared NSW. Data from this study and other research in the Tar-Pamlico is proving invaluable in supporting this classification.

NORTH CAROLINA DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

Division of Marine Fisheries

Agency purpose - The mission of the Division of Marine Fisheries is to manage the coastal fisheries for the optimum benefit of the citizens of North Carolina. Management consists of all activities concerned with maintenance or improvement of the fisheries resources and utilization of those resources and includes research, monitoring, regulation, enforcement, development, and enhancement.

A/P/ Study Projects - The Division currently has two specific A/P Study projects underway:

1. "Scoping Study of Data Requirements for Fisheries Stock Assessment in North Carolina." Objectives of this project are to (1) develop management goals and objectives for the coastal fisheries, (2) define the types of data needed to assess the status of fisheries resources, (3) identify and evaluate existing data, and (4) recommend appropriate adjustments in data collection programs. The project completion report has been submitted for approval.

2. "Analysis of Pamlico Sound and Albemarle Sound Nursery Area Data." The purpose of this project is to analyze available data from nursery areas in order to identify critical habitat criteria. Once identified, the criteria can be used to identify other areas and seek their protection. The project completion report is being drafted.

In addition to these specific A/P Study projects the Division of Marine Fisheries participates in a number of A/P Study committees. The Division is the major contributor to one chapter of the "Status and Trends Report," now in preparation. Division staff also serve as peer reviewers of A/P Study reports and proposals.

Other Division work related to the A/P Study - The Division of Marine Fisheries conducts one of the largest state operated fisheries biology programs of any coastal state. State personnel concentrate on long term monitoring work in order to follow and document trends in the habitat, fishery stocks, and fisheries. Samples for young fish, shrimp, and crabs are taken in the estuarine nursery areas and the open waters of the sounds. Adult fish are sampled from commercial and recreational catches to provide information on size and age composition. Port agents collect data on catches, value, fishing gear, and fishing location. Critical habitats are sampled, identified, and mapped. Fish of various species are captured, tagged, and released to determine migratory patterns, utilization, and stock composition. The Division manages a system of artificial reefs in estuarine and ocean waters to enhance habitat for species which utilize such structures. About 400,000 bu of cultch are planted annually in estuarine waters to provide habitat for oysters and clams.

All Division data are incorporated into a computerized data management system which currently contains several million records.

The Division's law enforcement staff enforces general statutes pertaining to coastal fisheries and the regulations of the North Carolina Marine Fisheries Commission, which enacts rules controlling coastal fisheries through restricting seasons, size limits, amounts of harvest, gear, and fishing areas.

August 7, 1989

MEMORANDUM

TO: Bob Holman

FROM: David Sides

SUBJECT: Soil & Water Interaction With APES

The overall charge of the Division of Soil and Water Conservation is to support the work of the states 94 Soil and Water Conservation Districts in carrying out their local conservation programs. The Division provides general educational and administrative assistance to districts, as well as specific technical services and financial assistance. Division programs address non-point source pollution from agriculture, rural natural resource problems, development of county soil surveys and a wetlands inventory.

The Division is cooperating with APES on one research and two demonstration projects. The Hyde County Soil Survey is a joint effort with Hyde County, the USDA Soil Conservation Service, the Division and APES. The Division is administering both the APES Merchant Millpond non-point source and the solid set animal waste management projects.

Other Division programs which relate to APES include:

(1) The N. C. Agricultural Cost Share Program provides $6,000,000 in financial incentives to landowners to implement agricultural BMPs.

(2) The Wetlands Program provides quality control and field truthing for the U.S. Fish and Wildlife wetlands inventory.

(3) The Soil Survey Program is actively involved in mapping Halifax, Gates, and Hyde Counties.

(4) The Watershed Section plans USDA Soil Conservation P.L. 566 projects.

If you desire additional information, please let me know.

cc: DS/CP/tl

North Carolina Wildlife Resources Commission

512 N. Salisbury Street, Raleigh, North Carolina 27611, 919-733-3391
Charles R. Fullwood, Executive Director

NORTH CAROLINA WILDLIFE RESOURCES COMMISSION

Albemarle-Pamlico Estuarine Study Review Session

The purpose of the North Carolina Wildlife Resources Commission is to manage, restore, develop, cultivate, conserve, protect, and regulate the wildlife resources of the state of North Carolina, and to administer the laws relating to game, freshwater fishes, and other wildlife resources enacted by the General Assembly to the end that there may be provided a sound, constructive, comprehensive, continuing, and economical game, game fish, and wildlife program directed by qualified competent, and representative citizens, who shall have knowledge of or training in the protection, restoration, proper use and management of wildlife resources.

No projects or programs are currently being funded by or conducted in direct cooperation with the Albemarle-Pamlico Estuarine Study (A/P Study) by the Wildlife Resources Commission. However, several projects and studies are being conducted or have recently been completed by WRC within the Albemarle and Pamlico watershed systems which may be related to the A/P Study. Summaries of these projects, including objectives, methods, status, and conclusions if they have been completed, are attached.

Title: Age Composition and Sport Harvest of Striped Bass from Roanoke River

The objective of this study is to estimate the total harvest and age and sex composition of the catch of the Roanoke River striped bass sport fishery. A creel survey was conducted on the Roanoke River during the striped bass spawning seasons of 1988 and 1989 to estimate total fishing effort and sport harvest of striped bass. Creel clerks also collected scale samples and individual measurements of length and weight from most striped bass that were caught by anglers who were interviewed in the creel survey.

In 1988, sport anglers harvested an estimated 16,657 striped bass weighing a total of 33,927 kg. Most fish were caught in the vicinity of the spawning grounds during the second and third weeks of May. Most of the males were 3, 4, and 5 years old while the majority of the females were 5, 6, 7, and 8 years old. Length limit regulations were proposed which would shift the bulk of the harvest toward male fish while protecting the females.

The creel survey was again conducted during the spring of 1989 using identical methods. The data from this past spring are currently being analyzed, and those estimates will be available in the fall of 1989. Plans are for the creel survey to be conducted again in the spring of 1990.

Title: Currituck Sound Survey

The objective of this study is to obtain current fishery information for Currituck Sound including species composition, standing crop, and spawning success of inland game fish. During the past five years, salt water has invaded the sound due to extended drought conditions and the largemouth bass fishery has concurrently disappeared. Fish population inventory data were last obtained in 1976 and information is now needed for managers to intelligently describe and discuss the current Currituck Sound fishery.

Rotenone samples were collected from three coves in Currituck Sound in early July, 1989. Young-of-year largemouth bass were relatively abundant in the cove located nearest to the mouth of the sound. But few adult and no young-of-year bass were collected in the other two more northerly coves. The data are being analyzed, and final report will be completed by the end of 1989.

Title: Crappie Population Stock Assessment in North Carolina Piedmont Reservoirs and Coastal Rivers

The objectives of this project are 1) to estimate crappie population age and size distribution, develop indices of crappie abundance and year class strength, and determine crappie growth rates in coastal rivers using trap nets; 2) determine the effects of selected habitat variables on crappie catch rates in trap nets fished in coastal rivers; and 3) to develop a crappie population assessment technique and develop crappie management objectives for each study location based on the assessment technique. Fall trap netting to assess crappie populations was initiated on five coastal rivers during this biennium. Field sampling for years 1 and 2, of this 3-year project, has been completed. Data analysis for year 1 is complete and analysis of year 2 data will be complete by the end of the biennium.

A total of 339 sites were fished in these coastal rivers during the last two years. The total catch for all coastal rivers during this period has been 985 crappie from 719 trap net nights of effort; this gives a CPUE of 1.4 crappie/trap net night. While the CPUE is low it does not appear to indicate a problem, since the average size of most coastal river populations appears to be good (range from 8 in. to 9.5 in.). Age ranged from young-of-year to one fish which was 11 years old. During the fall of 1988 we assessed the amount of effort used to catch crappie in coastal rivers. This was done so that we could determine if patchy distributions of crappie were the cause of our low catches and to determine what amount of sampling would be needed to provide more precise estimates of population structure. We increased our effort during the Fall '88 sample in Chowan River over three fold, from 52 net nights to 164 net nights. The results of this project indicated that crappie were distributed randomly and that catch was dependent on movement. In coastal rivers crappie don't need to move as much as in reservoirs to find food, so they are less vulnerable to trap nets. We also determined that at the present CPUE it would take 1967 net nights to catch 2855 crappie in the more common age groups (0+ and 1+ age class) which would be needed for a precise estimate of population structure. This amount of effort would require too many resources to be practical; however, by doubling our present effort and accepting somewhat less precision we can collect enough fish to provide information accurate enough to make effective management decisions.

Field sampling will continue during the fall of 1989 and a final report will be prepared by summer of 1990.

Title Preliminary Assessment of Summer Habitat Conditions for Striped Bass in Albemarle Sound

The objective of this study was to determine dissolved oxygen and temperature profiles for the Albemarle Sound in summer. Striped bass in Chesapeake Bay and certain reservoirs can be subjected to adverse habitat conditions during summer months as water temperatures exceed 25.0C and dissolved oxygen concentrations fall below 3.0 mg/1. Mortality of large adult striped bass and poor reproductive success have been linked to these conditions in reservoirs. Dissolved oxygen, temperature, and salinity measurements were made twice monthly at 22 stations on Albemarle Sound during the summers of 1986 and 1987.

We found that adequate summer habitat for striped bass disappeared throughout the sound during late summer months due to high water temperatures. No thermal refuge areas were located. Localized low dissolved oxygen conditions also occurred and were related to saltwater intrusion.

Title: Evaluation of Habitat Improvement Devices in Warmwater Streams

The study objective was to evaluate habitat improvement devices for potential use in warmwater streams. A literature review was conducted to survey various improvement devices with reference to North Carolina streams. Specific devices surveyed included low dams, deflectors, and various structures to increase instream cover.

A final project report has been prepared. Survey results indicate that stream improvement structures have the potential for enhancing fisheries habitat in North Carolina warmwater streams. Improvement structures have been particularly beneficial in stream habitats altered by bridge and highway construction, channelization, and other land disturbing activities. Stream improvement projects require careful planning of physical characteristics, biological considerations, and sociological factors. The study recommends that criteria be developed to identify piedmont and coastal streams as candidates for enhancement projects.

Title Striped Bass Management Plan

The objective of this project was to develop a management plan for striped bass and striped bass hybrids in North Carolina. A striped bass management committee was established with representatives from all three regions of the state and hatchery production personnel. The original charges to the committee were reviewed, and a time from for accomplishing the various steps necessary in developing a management plan was adapted.

In proceeding with the development of the management plan, the committee completed the initial steps in the process by describing the various striped bass and hybrid fisheries in the state and their status and identifying the data bases that exist. Recommendations were also developed and submitted to administrators for revisions in propagation regulations as they applied to striped bass and for alternatives to expand the production of striped bass and hybrid fingerlings for inland stocking purposes. However, at about the midpoint of the biennium, an immediate need arose to develop a joint management plan for coastal striped bass populations by the Wildlife Resources Commission, NC Division of Marine Fisheries, and US Fish and Wildlife Service. Since certain aspects of the state management plan are dependent on the decisions and recommendations developed by the joint working group, further work on the state plan was suspended until the joint plan was near completion. The development of the state plan will resume upon completion of the joint plan.

Title Food and Fooding of Young Striped Bass in Roanoke River and Western Albemarle Sound

The objective of this study was to determine the causes of poor year class development of the Roanoke River striped bass population. This project was conducted in cooperation with the Institute of Coastal and Marine Resources (ICMR) at East Carolina University. Personnel with the Wildlife Resources Commission collected samples of icthyoplankton (including larval striped bass), zooplankton, and phytoplankton from five sites in the Roanoke River between Hamilton and the Thoroughfare upstream from Plymouth. Sampling was conducted on alternate nights from late April through early June in 1987, 1988, and 1989. The samples were submitted to ICMR for analysis.

ICMR is currently in the process of picking the samples and analyzing the data. A final report will be prepared upon completion of the data analysis. Preliminary results indicate that zooplankton populations are very low in the Roanoke River in comparison to other areas that support striped bass populations. It is also clear that river flow rates are critical in controlling the rate of downstream transport of eggs and larvae such that striped bass larvae arrive in the areas of highest zooplankton concentrations when they are in feeding condition.

Title Genetic Composition of Striped Bass Stocks in Roanoke and Dan Rivers

The objective of this study was to determine the degree of genetic contamination of striped bass stocks in the Dan River and Roanoke River as a result of crossing with white bass. This project was conducted in cooperation with the Southeastern Cooperative Fish Genetics Project (SCFGP) at Auburn University. White bass were collected from Kerr Reservoir and Dan River and striped bass were collected from Dan and Roanoke rivers in routine collections of broodfish for striped bass and hybrid fingerling production. The eyes and portions of liver and muscle tissue were removed from each fish, frozen, and shipped to SCFGP. The tissue samples were analyzed using gel electophoresis techniques to determine enzyme patterns. A final report was prepared detailing their results.

Analysis indicated that the Dan River stock of striped bass had been separated from its parent Roanoke River stock long enough (about 35 years) for them to be genetically different and distinguished from each other. No white bass alleles were detected in striped bass from North Carolina although only samples from those fish that appeared to be "pure" striped bass were submitted for analysis. It was recommended that mixing of striped bass stocks should be minimized until the relationship of high genetic variation and performance is determined.

Title Magnitude of Striped Bass Spawning and Percentage Egg Viability in the Neuse and Tar Rivers.

The study objective was to determine the relative abundance of striped bass eggs and larvae in the lower Neuse and Tar rivers. Striped bass eggs and larvae and associated zooplankton food organisms were collected with plankton nets at night from several locations beginning just prior to the peak spawning period. Wildlife Resources Commission personnel counted, aged, and determined the percentage of viable striped bass eggs. The Institute of Marine Resources (ICMR) at East Carolina University identified food items contained in larval striped bass stomachs and within water samples.

Sampling was completed on the Tar River in the spring of 1988. Sampling was conducted on the Neuse River during the spring of 1989. Striped bass eggs were abundant in the samples collected in the upstream reaches of the study streams. The samples are currently being analyzed by ICMR.

Title: Waterfowl Population Characteristics

The objective of this study is to determine long term population trends for waterfowl in important waterfowl habitats both in the state of North Carolina and in the Atlantic Flyway. Surveys conducted as part of this study are in cooperation with the U.S. Fish and Wildlife Service and the Atlantic Flyway Council. Aerial and ground surveys utilize trained observers to estimate waterfowl numbers by species and in the case of snow geese and swans determine adult/young ratios based on plumage.

Specific aerial surveys include the mid winter waterfowl survey and periodic goose, swan, and brant surveys. The mid winter waterfowl survey is a synchronized census of all waterfowl in specific survey units in the Atlantic Flyway states which is conducted annually in early January. A total of 271,300 waterfowl were censused in the 1989 survey which is 34 percent below the 40 year average. Only tundra swans and several species of dabbling ducks remained above long term averages. The periodic goose swan and brant survey are conducted six times annually from October through February for Canada and snow geese, tundra swan and brant. State managed impoundments in the coastal area are also surveyed for all waterfowl. These waterfowl surveys do serve as a coarse indicator of habitat conditions in the Pamlico-Albemarle area but also largely reflect trends in continental waterfowl populations.

Title: Evaluations of Proposed Integrated Marsh Management Projects

This study is under development at this time and is being designed to evaluate effects and success of a proposed pilot project to improve habitat for dabbling ducks and other wildlife on irregularly flooded needlerush marsh at Cedar Island National Wildlife Refuge in Carteret County and Gull Rock Game Land in Hyde County. It is a joint venture project between the Wildlife Resources Commission and the U.S. Fish and Wildlife Service. The project involves excavation of small shallow ponds in the marsh using a high flotation rotary ditching machine. It is a variation of technology used elsewhere on the Atlantic coast in mosquito control using Open Marsh Water Management Practices. The

needlerush marsh will be converted into emergent wetlands and open water containing submerged aquatic vegetation.

The evaluation study will monitor such factors as changes in hydrology, productivity, wildlife use, effects on fisheries and effects of management variations.

VIRGINIA'S COUNCIL ON THE ENVIRONMENT

The Council on the Environment is the state's coordinating agency for environmental quality matters. Its purpose is to implement the state's environmental policy by promoting the wise use of its air, water, land and other natural resources, and protecting these resources from pollution, impairment or destruction so as to improve the quality of the environment. The Virginia Environmental Quality Act directs the Council "..to initiate, implement, improve and coordinate the environmental plans, programs and functions of the State in order to promote the general welfare of the people of the Commonwealth and fulfill the state's responsibility as trustee of the environment for the present and future generations."

Conceptually, the Council's responsibilities fall into four categories:

- Executive Advisory Services. To advise the Governor, the Secretary of Natural Resources, and the General Assembly on environmental and resource related issues of immediate importance to Virginia; on policy recommendations for dealing with environmental choices for the future; and, on overall program effectiveness and implementation.

- Program Developmemt and Coordination. To assure coherence and coordination among state environmental programs; to see that overall environmental priorities are established and supported with funds and personnel; and, to promote efficiency of management among the agencies of the Council.

- Environmental Impact Review. To promote environmental values in decision-making about major projects; to coordinate, consolidate and expedite the permit review process; and, to coordinate all State communications with federal agencies relating to environmental evaluations.

- Environmental Information and Education. To initiate and supervise programs designed to educate citizens on matters concerning environmental quality; to give citizens the opportunity to contribute ideas regarding environmental quality; and, to assure cooperation with federal, interstate, state, regional and local organizations, both private and public.

Over recent years, the Governor and the Secretary of Natural Resources have made specific assignments to the Council staff in a wide variety of areas. The Council's main activities involve issues which are not clearly within the purview of any single agency or which involve more than one agency--that is, issues that require a broad environmental perspective and require coordination among a variety of separate views and responsibilities.

State agencies represented on the Council are the:

- Air Pollution Control Board
- Chesapeake Bay Local Assistance Board
- Council on the Environment
- Dept. of Agriculture and Consumer Services
- Dept. of Conservation and Recreation
- Dept. of Forestry
- Dept. of Game and Inland Fisheries
- Dept. of Health
- Dept. of Historic Landmarks
- Dept. of Mines, Minerals , and Energy
- Dept. of Waste Management
- Marine Resources Commission
- Water Control Board

Staff of the Council on the Environment have the responsibility for coordinating Virginia's overall participation in the A/P program. Currently a number of agencies are involved in the development and review of the Preliminary Status and Trends Report. In addition, the Division of Soil and Water Conservation of the Dept. of Conservation and Recreation has entered into a cost-sharing arrangement with the A/P program for a non-point source control pilot project in the Chowan basin.

For additional information contact Larry Minock of the COE staff at 804/786-4500.

COE/8-27-89

NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE

The mission of the North Carolina Agricultural Extension Service (NCAES) is to help people improve their lives through education which is based on scientific information and informal educational techniques. Extension focuses on societal issues and the informational, skill-development, and decision-making needs of targeted audiences. It functions as the educational arm of the USDA and is a federal-state-local cooperative program.

Improving water quality is one of the major focuses of the North Carolina Agricultural Extension Service. Fifty-one counties have adopted water quality for special emphasis and the others have active programs. We provide education and technical assistance on water quality to all the citizens of North Carolina, including farmers, homeowners, homemakers and youth.

In partnership with other agencies we work with farmers in the use of non-point source best management practices for efficient crop production. We provide training in environmentally sound sustainable crop production systems that allow farmers to compete on the world market. We have active integrated pest management and soil, water, and animal waste management programs to enable farmers to use pesticides, nutrients, wastes, and water in environmentally sound ways. Part of this is conducted through a memorandum of agreement with the Soil Conservation Service. We also provide pesticide training for pesticide users with emphasis on possible contamination of water supplies.

The Extension Service trains county sanitarians in soil evaluation for septic tank use and provides technical assistance on alternative home waste disposal systems. In Carteret County the extension office is involved with county officials in land application of municipal waste water from Atlantic Beach. We have water quality educational programs underway in two counties that will be sampling 500-800 wells in order to provide these counties with information on the current status of their water supply as well as educational efforts on how to manage wells to insure future safe supply of water. This effort will be expanded to three to four counties in each of the seven remaining districts. The Home Economics program is conducting educational programs on domestic water supplies to help homeowners understand water quality issues and use water wisely.

The fishing industry is important to North Carolina and the Extension Service has agricultural agents working with both commercial fishermen and fish farmers. We are evaluating ways to manage water to minimize impacts on estaurine waters and also designing aquacultural systems that use water in ways that will not degrade water quality for other users.

4-H programs for youth are part of all the programs listed above. Also, in many of these programs volunteers play an active role in carrying out our objectives. North Carolina has been selected as one of eight states in which the Extension Service will conduct water quality demonstrations on hydrologic units. We expect to continue to be heavily involved in water quality issues.