INVENTORY
OF
ACTIVE WATER RESOURCES RESEARCH PROJECTS
IN
NORTH CAROLINA

An
Institute Report
July 1, 1972

This research inventory is published by the Institute to encourage coordination between research groups and avoid duplication of effort. Projects listed herein are funded from a wide variety of public and private sources. It reflects the total water resources research effort in North Carolina and is not limited to the Institute program.

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FY 1972
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University of North Carolina at Chapel Hill
University of North Carolina at Charlotte
University of North Carolina at Greensboro
University of North Carolina at Wilmington
East Carolina University
Elizabeth City State University
School of Agriculture and Life Sciences

Department of Botany

Dr. Charles E. Anderson

1. Title: Effects of Salinity on Lignin Synthesis in Salicornia virginica

Location: North Carolina coastal salt marshes

Description: Enzyme activity and total lignin synthesis are being correlated with various salinities.

Starting Date: 1971 Completion Date: Continuing

2. Title: Environmental Control of Growth and Reproduction of North Carolina Marsh Plants

Location: North Carolina Coast

Description: Flowering, growth patterns, and seed germination are being related to salinity, temperature and photo period for a variety of plant species occurring in North Carolina salt marshes.

Starting Date: 1968 Completion Date: Continuing

Dr. Ernest D. Seneca

1. Title: Seed and Seedling Ecology of Salt Marsh Plants

Location: North Carolina salt marshes

Description: Seed germination and seedling response to salinity, temperature, and photo period by various salt marsh plants.

Starting Date: 1967 Completion Date: Continuing

Dr. Larry A. Whitford (Emeritus)

1. Title: Floristics of Freshwater Algae in North Carolina

Location: North Carolina State University at Raleigh

Description: Records are being collected on all freshwater algal species reported for the State. The Manual of Freshwater Algae in North Carolina is being revised. Interesting new records will be published. More than 100 taxa have been added to the present list of 1700 taxa.

Starting Date: 1969 Completion Date: Continuing
2. Title: Freshwater Diatoms in North Carolina

Location: North Carolina State University at Raleigh

Description: Identification of freshwater diatoms are being made from all sections of the State. Some sub-fossil collections are also being studied.

Starting Date: 1969          Completion Date: Continuing

3. Title: Freshwater Red Algae in North Carolina

Location: North Carolina State University at Raleigh

Description: Some time is being devoted to a study of freshwater red algae. This involves mostly springtime collections.

Starting Date: 1971          Completion Date: Continuing

Dr. Augustus M. Witherspoon

1. Title: Physiological and Structural Changes in *Chlamydomonas reinhardtii* in Differing Concentrations of Fluoride

Location: Eastern North Carolina

Description: Determining the rate of nutrient ion uptake in varying concentrations of fluoride and relating these data to changes in ultrastructure and protein synthesis over extended periods of time.

Starting Date: 1972          Completion Date: Continuing

Department of Crop Science

Dr. Jerome B. Weber

1. Title: Reactions of Soil Constituents and Organic Chemicals

Location: North Carolina State University

Description: Adsorption-desorption reactions between organic and inorganic soil soloids and aromatic organic compounds in aqueous systems.

Starting Date: 1962          Completion Date: Continuing

2. Title: Reactions and Movement of Herbicides in Modified Soils

Location: Upper Coastal Plain Experiment Station, Rocky Mount, N. C.

Description: The relationships among soil constituents, such as clay minerals and organic matter, and herbicide phytotoxicity and herbicide movement on modified soil environments under field conditions. Ecological changes in weed populations as influenced by herbicides and herbicide movement through the soil profile are also being examined.

Starting Date: 1968          Completion Date: Continuing
3. Title: Effect of Soil pH on Herbicide Phytotoxicity and Movement
   Location: Tidewater Experiment Station, Plymouth, North Carolina
   Description: The relationship of soil pH and herbicide phytotoxicity and movement are being examined on a high organic soil under field conditions.
   Starting Date: 1968 Completion Date: Continuing

4. Title: Herbicide Movement from Application Sites and Effects on Non-target Species
   Location: Central Crops Research Station, Clayton, North Carolina
   Description: Herbicide movement over the soil surface and into the soil profile is being measured using chemical and biological methods.
   Starting Date: 1972 Completion Date: Continuing

Department of Economics

Dr. Leon Danielson

1. Title: Investment in Water Resources with Emphasis on Timing
   Location: North Carolina State University at Raleigh
   Description: Application of existing models and techniques for the analysis of optimum development and use of scarce water resources; empirical testing; and drawing of implications for the formulation of N. C. water policy and State Water Plan.
   Starting Date: 1972 Completion Date: 1975

Dr. James A. Seagraves

1. Title: Water Quality Management Systems for North Carolina Streams
   Location: Raleigh, North Carolina, and Neuse River
   Description: An estimation of the combined private and social costs of alternative schemes for achieving defined water qualities on a North Carolina stream.
   Starting Date: 1972 Completion Date: 1973

Department of Entomology

Dr. Richard C. Axtell

1. Title: Insect Pest Management in Coastal and Estuarine Areas
   Location: Raleigh and various coastal areas
Description: Evaluation of various chemical control measures and their impact on the estuarine ecosystem. Development of data for predicting pest population levels and the resultant need for control measures.

Starting Date: 1970  Completion Date: 1975

Dr. William V. Campbell

1. Title: Investigation of Insects Affecting Vegetation Used in Coastal Dune and Dredge Spoil Stabilization

Location: Coastal North Carolina and North Carolina State University

Description: American beach grass Ammophila breviligulata Fernald used in dune stabilization on the North Carolina Outer Banks is attacked by destructive insects, especially by a previously unknown, undescribed scale insect Eriococcus carolinae Williams. High populations of E. carolinae have resulted in loss of beach grass stands. Information is needed on the biology and control of this pest and associated insects in the complex. The recreational and wildlife interests necessitate a research and control program that will halt the spread of the destructive insects without environmental contamination.

Starting Date: 1970  Completion Date: 1975

Dr. Frank E. Guthrie

1. Title: Adaptation of Organisms to Pesticides

Location: Raleigh, North Carolina

Description: The physiological mechanisms permitting adaptation of organisms to pesticides are examined. The contribution of tissue, cellular, and subcellular components are separated in an attempt to explain effects of pesticides at the molecular level. The phenomena of biological magnification of pesticides will be studied with the tools of toxicology.

Starting Date: 1971  Completion Date: 1976

Dr. Kenneth L. Knight

1. Title: Effectiveness of Ditching in Estuarine Marshes for Mosquito Control

Location: Coastal North Carolina

Description: Appraisal of the effectiveness of the mosquito control accomplished by the ditching of the high salt marshes.

Starting Date: 1970  Completion Date: 1972
2. Title: Effect of Impoundment on Mosquito Production on High Salt Marshes in North Carolina

Location: Carteret County, North Carolina

Description: Impoundments created for mosquito control will be evaluated for efficacy and for general environmental impact.

Starting Date: 1972 Completion Date: 1974

Dr. Thomas J. Sheets

1. Title: Persistence of Pesticides in Soil

Location: Several locations in North Carolina

Description: Experiments conducted in cooperation with research workers in the Departments of Crop Science and Horticultural Science on the persistence of herbicides in soils.

Starting Date: 1966 Completion Date: Continuing

Dr. Thomas J. Sheets and Dr. J. R. Bradley

1. Title: Contamination of Surface and Ground Water with Insecticides and Herbicides Applied to Cultivated Crops

Location: Rocky Mount and Lewiston, North Carolina

Description: Experiments are in progress at two locations. Runoff from small plots are analyzed for pesticides applied according to recommended agricultural practices. Ground water samples from wells of different depths are analyzed periodically. Persistence and movement in soil are also being followed.

Starting Date: 1969 Completion Date: Continuing

Department of Food Science

Dr. Daniel E. Carroll and Dr. Maurice W. Hoover

1. Title: Characterization of Sweet Potato Processing Wastes

Location: North Carolina State University

Description: Sweet potato processing waste will be analyzed for BOD, COD, TOC, and carbohydrate composition. Specific purposes include: (1) correlation values and regression equations between TOC, COD, and BOD, (2) development of a differential method of analysis for carbohydrate constituents, and (3) investigate an in vitro technique of determining oxygen demand of the waste water.

Starting Date: 1971 Completion Date: 1973
Dr. V. A. Jones, Mr. Roy E. Carawan, Dr. A. P. Hansen

1. Title: Water and Wastewater Management in Dairy Processing

Location: North Carolina State University

Description: Water utilization and waste generation by unit processes in the dairy industry. In-plant methods for controlling water and waste, and an educational program encouraging water conservation and waste reduction.

Starting Date: 1971 Completion Date: 1975

Dr. N. C. Miller, Jr.; Dr. R. E. Sneed (Bio and Ag Engineering); Dr. D. C. Sanders, Dr. C. H. Miller, and Dr. G. R. Hughes (Hort. Science)

1. Title: Low Volume Irrigation on Vegetable Crops

Description: See Dr. D. C. Sanders, et al, Department of Horticultural Science for description.

Dr. Frank B. Thomas

1. Title: Development of Marine Industries, Harvesting and Processing Systems - Seafood Science and Technology, Advisory Services

Location: North Carolina State University

Description: Dissemination of presently known information to improve the efficiency of seafood processing operations and upgrade quality utilizing mass media, short courses, workshops, seminars, in-plant projects and demonstrations; assistance with the collection and preparation of samples for the research projects; collection of factual data on present processing methods; and establish procedures to evaluate the results from applied research on improved methods to determine their feasibility under commercial conditions.

Starting Date: 1970 Completion Date: Continuing

Dr. Neil B. Webb

1. Title: Investigations of Levels and Methods of Reclamation of Proteins from Seafood Processing Operations

Location: North Carolina State University

Description: Determination of levels of proteins lost from normal seafood processing operations and the development of methods for the reduction and/or reclamation of the proteins.

Starting Date: 1972 Completion Date: 1977
2. Title: Development of Marine Industries Harvesting and Processing Systems

Location: North Carolina State University

Description: To expand the programs in research and extension for the seafood processing industry of North Carolina. This project includes research investigations and advisory services in the areas of handling fresh seafood products, further processing of seafoods and the utilization and reclamation of waste (by-products) from seafood processing operations.

Starting Date: 1970 Completion Date: 1975

Department of Horticultural Science

Dr. T. F. Cannon and Dr. Ronald E. Sneed (Bio and Ag Engineering)

1. Title: Investigations in Soil Media, Nutrition, Irrigation, and Other Cultural Procedures for Nursery Plant Production

Location: Raleigh, North Carolina

Description: The effects of irrigation and cooling on growth and quality of nursery plants produced in containers and in the field.

Starting Date: 1972 Completion Date: 1977

Dr. C. H. Miller, Dr. D. C. Sanders; Dr. C. K. Martin (Soil Science); and Dr. R. E. Sneed (Bio & Ag Engineering)

1. Title: Response of Vegetables (Cucumber, Sweet Potato) to Irrigation

Location: Clinton, North Carolina

Description: Water applied at two levels (medium and heavy) vs. none. Measure water potential, growth rates of plants, and collect other data for predicting need for irrigation.

Starting Date: 1972 Completion Date: 1975

Dr. D. C. Sanders, Dr. C. H. Miller, Dr. G. R. Hughes; Dr. R. E. Sneed (Bio & Ag Engineering); and Dr. N. C. Miller, Jr. (Food Science)

1. Title: Low Volume Irrigation on Vegetable Crops

Location: Jackson Springs, Sandhills Research Station

Description: The effect of low volume irrigation on crop cooling will be evaluated. Special attention will be given to plant growth, crop yield, and product quality. Various parameters of the soil-plant-atmosphere-continuum will be measured and correlated with crop response under treatment conditions.

Starting Date: 1971 Completion Date: 1976
Dr. D. C. Sanders, Dr. G. R. Hughes, and Dr. C. H. Miller

1. Title: The Influence of Various Environmental Parameters on Snapbean Flowering

Location: Raleigh, North Carolina

Description: Snapbeans will be grown under various levels of nutrition and exposed to variations in light intensity, temperature and moisture stress; then, the effect of these variables evaluated on flower formation and fruit set.

Starting Date: 1971  Completion Date: Continuing

Dr. D. C. Sanders, Dr. C. H. Miller; and Dr. R. E. Sneed (Bio & Ag Engineering)

1. Title: Snapbean Response to Population, Irrigation, and Injection Variables

Location: Sandhills Research Station, Jackson Springs

Description: The influence of irrigation level and method of nitrogen application (injection into irrigation water or not) on the physiology and yield of snapbeans grown under several plant populations will be evaluated.

Starting Date: 1972  Completion Date: 1975

Dr. D. C. Sanders; Dr. R. Wayne Skaggs and Dr. C. R. Willey (Bio and Ag Engineering)

1. Title: An Evaluation of the Use of Waste Heat for Soil Warming in the Southeast

Description: See Dr. R. Wayne Skaggs, et al, Department of Biological and Agricultural Engineering, for description.

Mr. V. H. Underwood, Dr. W. B. Nesbitt; Dr. Ronald Sneed (Bio and Ag Engineering), Dr. G. A. Cummings (Soil Science), and Dr. D. D. Mason (Statistics)

1. Title: Muscadine Grape Irrigation and Cultural Practices Study

Location: Sandhills Research Station, Jackson Springs, North Carolina

Description: Deals with the effects of nitrogen and potassium nutrition, irrigation, and vine size upon vigor, survival yield, fruit set, and fruit quality.

Starting Date: 1968  Completion Date: 1978
Dr. C. Richard Unrath

1. Title: The Influence of Growth Regulation and Environmental Control Factors on Apple Production and Quality

Location: Cleveland County, E. Lutz & Sons Orchard, and Burke County, Fruit Ridge Orchard, John Bronstrom

Description: Comparison of effects of undertree and overtree sprinkler irrigation of apples. Effects of evaporative cooling on modification of environment and quality and yield of apples. The use of overhead irrigation for frost and freeze control.

Starting Date: 1969 Completion Date: 1979

Department of Microbiology

Dr. James B. Evans

1. Title: Bacteriology of a Bovine Waste Disposal System

Location: Randleigh Dairy Farm, Raleigh, North Carolina

Description: A study of the bacterial indicators of pollution of a stream adjacent to fields where a spray system of applying bovine waste to cropland is used.

Starting Date: 1971 Completion Date: 1973

Dr. Jerome J. Perry

1. Title: The Microbial Degradation of Hydrocarbons in Marine Environments

Location: North Carolina State University

Description: The major objective of this study is an increased knowledge of the organisms in littoral areas that can utilize hydrocarbons, crude oil, pesticides, and related substrates. The effect of hydrocarbons on the littoral community will also be investigated.

Starting Date: 1970 Completion Date: 1975

Department of Plant Pathology

Dr. Ellis Cowling and Dr. H. M. Chang (Department of Wood & Paper Science)

1. Title: The Structure of Lignin in Relation to the Morphology of the Cell Wall

Location: North Carolina State University
Description: This study is directed towards examining the nature and structure of lignin with the ultimate objective of either developing commercially valuable products from it or modifying its nature if it is left in paper. Water effluent problems will be reduced substantially if these goals are attained.

Starting Date: 1969 Completion Date: 1974

Mr. David Shriner and Dr. Ellis B. Cowling

1. Title: Effect of Acidic Rain on Plant Host-Parasite Interactions

Location: Raleigh, North Carolina

Description: Effect of simulated rain ranging in pH from 6.5 to 3.5 on development of diseases caused by bacteria, fungi, and viruses will be determined.

Starting Date: 1971 Completion Date: 1974

Department of Sociology and Anthropology

Dr. A. Clarke Davis

1. Title: Public Participation in Water Pollution Control Policy and Decision Making

Location: Raleigh, North Carolina

Description: A study of two aspects of the water pollution problem: (1) the extent to which it is defined as a major problem; (2) the nature and extent of public participation in the efforts of public agencies to control the problem.

Starting Date: 1970 Completion Date: 1973

Dr. James M. Stewart

1. Title: Assistant Director for Research Application, Water Resources Research Institute

Location: Raleigh, North Carolina

Description: Responsible for Institute program dealing with the utilization of research findings.

Starting Date: 1972 Completion Date: Indefinite
Department of Soil Science

Dr. S. W. Buol

1. Title: North Carolina Soil Survey

Location: Entire State

Description: In cooperation with the USDA the North Carolina Agricultural Experiment Station is engaged in the survey of the State. In addition to mapping the soils studies are made to determine water-holding capacity, runoff, water-table depth and frequency and duration of flooding on these soils.

Starting Date: Continuing Completion Date: Continuing

Dr. G. A. Cummings

1. Title: Utilization of Soils and Soil Plant Systems for the Disposal of Animal Waste

Location: Clayton, North Carolina

Description: Studies utilizing lagoon effluent and possibly raw manure from the swine evaluation station at Clayton will be undertaken to determine maximum soil loading rates without damage to the soil plant system.

Starting Date: 1972 Completion Date: 1977

Dr. G. A. Cummings; Dr. D. D. Mason (Statistics); Dr. Ronald E. Sneed (Bio & Ag Engineering); Mr. V. A. Underwood and Dr. W. B. Nesbitt (Horticultural Science)

1. Title: Muscadine Grape Irrigation and Cultural Practices Study

Description: See Dr. V. H. Underwood, et al, Department of Horticultural Science, for description.

Dr. J. W. Gilliam and Dr. S. B. Weed

1. Title: Contribution of Fertilizers to the Pollution of Waters

Location: North Carolina Coastal Plain

Description: To determine the direct contribution of fertilizers to the contamination of surface and subsurface waters of the North Carolina Coastal Plain as affected by soil physical and chemical properties, surface and subsurface drainage, date of fertilizer application and cropping sequence.

Starting Date: 1971 Completion Date: 1974
Dr. J. Fulton Lutz

1. Title: Fertilizers and Organic Wastes Applied to Soils in Relation to Environmental Quality

Location: Raleigh, North Carolina

Description: Regional project to include studies of fertilizers and organic wastes (such as cattle and poultry manure) on the quality of percolating and runoff water, and on plant growth.

Starting Date: 1971 Completion Date: 1976

Dr. C. K. Martin; Dr. C. H. Miller and Dr. D. C. Sanders (Horticultural Science); and Dr. R. E. Sneed (Bio and Ag Engineering)

1. Title: Response of Vegetables (Cucumber, Sweet Potato) to Irrigation

Description: See Dr. C. H. Miller, et al, Department of Horticultural Science for description.

Dr. Charles D. Sopher

1. Title: Soil Productivity and Effects of Soil Properties and Their Interactions with Management Practices and Climatic Factors

Location: North Carolina Lower Coastal Plains

Description: In part, this project involves studying the moisture-supplying power of various soil series. Included in the study will be the effects of rainfall amounts and distribution on crop yields produced on selected soils.

Starting Date: 1971 Completion Date: 1976

Dr. S. B. Weed

1. Title: Inactivation and Loss of Pesticides from Soil

Location: Raleigh, North Carolina

Description: To determine mechanisms of inactivation and loss of pesticides by/from soil colloids by studies of (a) retention and release; (b) movement of water through soil; (c) non-biological degradation.

Starting Date: 1969 Completion Date: 1974

Dr. William W. Woodhouse, Jr.

1. Title: Coastal Dune and Dredge Spoil Stabilization

Location: Coastal North Carolina
Description: (1) Study of role of vegetation in the protection of coastal dunes, with primary emphasis on long-term stabilization. Sea oats (Uniola paniculata) is currently receiving major attention.

(2) Productive use of dredge spoil in North Carolina sounds and estuaries. Initial efforts centered on procedures for establishment of smooth cordgrass (Spartina alterniflora) in the tidal zone, with other species at higher elevations.

Starting Date: 1970  Completion Date: 1975

Department of Zoology

Dr. B. J. Copeland

1. Title: Ecology of the Pamlico River Estuary

Location: Pamlico Marine Laboratory, Aurora, North Carolina

Description: Support for staff and facilities. General project is the effect of phosphate mining operation on the estuarine ecology.

Starting Date: 1971  Completion Date: 1973

2. Title: Effects of Power Plant Effluents on Ecology of Cape Fear Estuary

Location: Cape Fear Estuary

Description: To determine the effects of cooling water withdrawal upon the population structure of the Cape Fear Estuarine Ecosystem and to determine the thermal death, critical thermal maxima and metabolic response of marine organisms to increasing temperatures.

Starting Date: 1971  Completion Date: 1975

Dr. B. J. Copeland and Dr. John E. Bobbie

1. Title: Nutrients and Eutrophication in a North Carolina Estuary

Location: Pamlico River, North Carolina

Description: Measurements of the inputs of phosphorus and nitrogen compounds to the estuary will be continued as well as the standard measures (oxygen, temperature, salinity) necessary for interpretation. To determine the importance to the biota and fate of these nutrients, techniques will be developed that are suitable for measuring community response such as metabolism and species diversity. Also, the nitrogen-phytoplankton and nitrogen-sediment relationships will be investigated.

Starting Date: 1971  Completion Date: 1973
2. Title: Nutrient Budgets for North Carolina Estuaries

Location: Neuse, Pamlico, Albemarle and Cape Fear Estuaries

Description: Nutrient budgets will be measured for the above estuaries. The object is to determine if effects of eutrophication already noted in the Pamlico River extend to other estuaries in North Carolina.

Starting Date: 1970 Completion Date: 1975

Dr. William W. Hassler

1. Title: Status and Abundance of Striped Bass in the Roanoke River, Albemarle Sound, North Carolina

Location: Roanoke River, Albemarle Sound, North Carolina

Description: Population estimates of striped bass in the Roanoke River, creel census surveys of sport and commercial fishing; tagging studies; estimate of spawning success; survival and mortality; trawling studies, etc.

Starting Date: 1955 Completion Date: Continuing

2. Title: Life History Studies of Marine Fishes

Location: Oregon Inlet, Hatteras, Ocracoke, North Carolina

Description: Life history studies involving age-growth, reproduction, maturation, spawning, movements, migrations, food and ecology.

Starting Date: 1958 Completion Date: Continuing

3. Title: Propagation of the Dolphin, *Coryphaena hippurus*, in North Carolina

Location: North Carolina coastal area

Description: Study and evaluation of the local abundance, the rate of exploitation, the survival and mortality rates, growth, movements, and habits of the dolphin off the North Carolina coast. The migration and movements of this species in the western Atlantic and Caribbean will also be investigated. Fish cultural studies will be made on the dolphin at Hatteras, North Carolina, and at a selected site in the tropical area in regard to rearing techniques, diets, food conversion, and growth.

Starting Date: 1970 Completion Date: 1975
4. Title: A Sport and Commercial Fisheries Survey of the Lower Neuse River, North Carolina

Location: Lower Neuse River, vicinity of New Bern, North Carolina

Description: Catch and effort statistics are compiled for sport and commercial fishes, trawling studies for young-of-year, and life history aspects of selected fishes.

Starting Date: 1968 Completion Date: Continuing

Dr. John E. Hobbie

1. Title: Activities of Heterotrophic Bacteria in Subarctic Lakes and Oceans

Location: Norwegian Institute for Water Research, Oslo

Description: The mode of life and survival mechanisms of open ocean and subarctic lake bacteria will be compared. If both are the same, as is likely from the rigor of these environments, then it would be much easier and more efficient to follow the lake bacteria.

Starting Date: 1971 Completion Date: 1972

2. Title: Development of Models of Primary Productivity of Benthic Algae and of Decomposition of Organic Material by Microorganisms

Location: Alaska

Description: This project is part of an IBP program to study the aquatic ecology of the Tundra Biome. Specific aims are to determine the rates of primary productivity of benthic algae and bacterial decomposition in tundra ponds. These data, in relation to environmental characteristics, will be used to complete a mathematical model of tundra ponds which can be used for predictive purposes and management of the Tundra Biome.

Starting Date: 1972 Completion Date: 1973

Dr. John E. Hobbie and Dr. B. J. Copeland

1. Title: Nutrients and Eutrophication in a North Carolina Estuary

Description: See Dr. B. J. Copeland for description.

2. Title: Nutrient Budgets for North Carolina Estuaries

Description: See Dr. B. J. Copeland for description.
Dr. Garland Pardue

1. Title: Effects of Stream Channelization and Drainage on Fish and Wildlife

Location: North Carolina State University and streams in eastern North Carolina

Description: This is an ecological study of the effects of stream channelization and wetland drainage on fish and wildlife. It is the first phase of a two-phase project and will be carried out prior to construction. Subsequent to the drainage, a second phase project will be conducted.

Starting Date: 1971 Completion Date: 1974

2. Title: Fish Genetics and Selective Breeding of Fishes

Location: North Carolina State University

Description: This study is designed to measure the inheritance of economically important traits in fishes, to determine chromosome morphology and to investigate the phylogenetic relationships of fishes in the same family through hybridization.

Starting Date: 1971 Completion Date: 1974

Schools of Engineering and Agriculture and Life Sciences
Department of Biological and Agricultural Engineering

Dr. Henry D. Bowen

1. Title: Drainage System Management Programs for Rural Communities

Location: Edgecombe County

Description: Control of aquatic weeds by mechanical means. After determination of propagation and growth behavior of predominant weeds, equipment will be designed to eliminate germination and/or remove growth.

Starting Date: 1971 Completion Date: 1973

Professor David H. Howells

1. Title: Director, Water Resources Research Institute

Location: Raleigh, North Carolina
Description: An intercampus program of the University of North Carolina System for the promotion and support of multidisciplinary research on water problems of North Carolina and coordination of research and educational programs dealing with water resources.

Starting Date: 1965 Completion Date: Continuing

Dr. Frank J. Humenik

1. Title: Design Criteria for Swine Waste Treatment Systems

Location: North Carolina State University at Raleigh

Description: Model field treatment systems are being studied to provide specific information for the development of design criteria for anaerobic lagoons, series lagoons, aerated lagoons and land application of lagoon wastewater.

Starting Date: 1971 Completion Date: 1973

Dr. Frank J. Humenik and Dr. Michael R. Overcash

1. Title: Biological Treatment and Utilization of Agricultural, Processing, and Municipal Wastes

Location: North Carolina State University at Raleigh

Description: Methods for handling, treatment or utilization and ultimate disposal of organic wastes are being investigated. Emphasis to date has been on lagooning and land irrigation of swine waste.

Starting Date: 1969 Completion Date: 1974

Dr. R. Wayne Skaggs

1. Title: Land Development and Water Management of Lower Coastal Plain Soils

Location: Raleigh and eastern North Carolina

Description: To develop criteria for land development and efficient water management in the lower Coastal Plains so that production is increased, costs and labor requirements are reduced, and conservation practices are adaptable to farming operations.

Starting Date: 1968 Completion Date: 1973
2. **Title:** Hydraulic Properties of North Carolina Coastal Plain Soils and Their Relation to Drainage Design Criteria  
   
   **Location:** North Carolina  
   
   **Description:** To investigate water movement into and through the soil in order to develop criteria for drainage requirements of crops with special emphasis on the North Carolina Coastal Plain soils so that efficient water management can be practiced.  
   
   **Starting Date:** 1969  
   **Completion Date:** 1974

   **Dr. R. Wayne Skaggs, C. R. Willey; and Douglas Sanders (Horticultural Science)**

1. **Title:** An Evaluation of the Use of Waste Heat for Soil Warming in the Southeast  
   
   **Location:** Clayton, North Carolina  
   
   **Description:** An evaluation will be made of the amount of heat from the cooling waters of electric generating plants that can be transferred to the soil system during all seasons of the year and of the extent to which the soil environment and the production of crops can be modified by soil warming.  
   
   **Starting Date:** 1971  
   **Completion Date:** 1973

   **Dr. Ronald Sneed and Dr. T. F. Cannon (Horticultural Science)**

1. **Title:** Investigations in Soil Media, Nutrition, Irrigation, and Other Cultural Procedures for Nursery Plant Production  
   
   **Description:** See Dr. T. F. Cannon, Department of Horticultural Science, for description.

   **Dr. R. E. Sneed; Dr. C. H. Miller and Dr. D. C. Sanders (Horticultural Science); and Dr. C. K. Martin (Soil Science)**

1. **Title:** Response of Vegetables (Cucumber, Sweet Potato) to Irrigation  
   
   **Description:** See Dr. C. H. Miller, et al, Department of Horticultural Science, for description.

   **Dr. R. E. Sneed; Dr. C. H. Miller and Dr. D. C. Sanders (Horticultural Science)**

1. **Title:** Snapbean Response to Population, Irrigation, and Injection Variables  
   
   **Description:** See Dr. D. C. Sanders, et al, Department of Horticultural Science, for description.
Dr. R. E. Sneed; Dr. D. C. Sanders, Dr. C. H. Miller, and Dr. G. R. Hughes (Horticultural Science); and Dr. N. C. Miller, Jr. (Food Science)

1. Title: Low Volume Irrigation on Vegetable Crops
   Description: See Dr. D. C. Sanders, et al, Department of Horticultural Science, for description.

Dr. Ronald Sneed; Mr. V. H. Underwood and Dr. W. B. Nesbitt (Horticultural Science); Dr. G. A. Cummings (Soil Science); and Dr. D. D. Mason (Statistics)

1. Title: Muscadine Grape Irrigation and Cultural Practices Study
   Description: See Mr. V. H. Underwood, et al, Department of Horticultural Science, for description.

Dr. Ronald E. Sneed and Dr. Robert S. Sowell

1. Title: Agricultural Water Demand in North Carolina: Phase II & III
   Location: Raleigh, North Carolina
   Description: This is an application phase of an effort to develop computer models (1) to determine water requirements for a given level of agricultural activity in a specified area and (2) to determine, for a given quantity of water available to agriculture in a specified area, the optimum level of agricultural activity. The availability of sufficient data for the proposed models will be evaluated in this first phase of the study.
   Starting Date: 1972 Completion Date: 1974

Dr. Cliff R. Willey

1. Title: Drainage Requirements of Crops on Coastal Plains Soils
   Location: Raleigh, North Carolina
   Description: The reduction in yields of crops caused by different drainage rates of two soils will be investigated in soil tanks. Drainage rates will be set to lower the water table 30 cm below the soil surface in 6 (control), 24, 48, and 72 hours.
   Starting Date: 1972 Completion Date: 1974

Dr. Ralph E. Williamson

1. Title: The Influence of Root Physiology and Morphology on Plant Response to Aeration
   Location: Raleigh, North Carolina
Description: Experiments are conducted to ascertain the physiological, morphological, and cytological changes that occur in roots under conditions of poor aeration. An attempt is being made to define poor aeration in terms of the level of oxygen and carbon dioxide. Some experiments are conducted to determine the length of time that roots can tolerate inadequate soil oxygen and excess carbon dioxide without permanent damage to the root system.

Starting Date: 1964  Completion Date: 1973

2. Title: Effect of Water Table Depth on Crop Performance

Location: Raleigh, North Carolina

Description: Crop plants are grown in the field in lysimeters which hold one or more cubic yards of soil. The lysimeters are protected from rain by automatic movable shelters. Water table depths are maintained at 6-12-18-24-30-36 and 40 inches below the soil surface during the growing season. Certain measurements such as the soil moisture content, oxygen, diffusion rate in the root zone and oxygen partial pressure are made. Yields both as to quantity and quality are determined.

Starting Date: 1963  Completion Date: 1972

Dr. Edward H. Wiser

1. Title: Water Balance Ahoskie Creek

Location: Bertie County, North Carolina

Description: See Project No. 1 under SCS-USDA for description.

Starting Date: 1971  Completion Date: Continuing

2. Title: Factors Affecting Water Yields from Small Watersheds and Shallow Ground Aquifers

Location: North Carolina State University

Description: The objectives are (1) to correlate runoff rates and yields to watershed characteristics and climatic conditions, and (2) to correlate shallow groundwater yields to site and climatic conditions. Approach: the water balance of the small tributaries of Ahoskie Creek will be investigated including measurement of soil moisture content and water-table heights. A limited amount of work will be done on improved computer storage and retrieval procedures. A conceptual framework for computer model will be developed; this may include detailed studies of aspects sufficiently well understood for conceptualization. Computer models will be developed although digital techniques will be emphasized. Possibilities in the use of analog and hybrid computers will be experienced.

Starting Date: 1971  Completion Date: 1974
3. Title: Extension of the Data Base of the Hydrologic Information Storage and Retrieval System (HISARS)

Location: North Carolina State University at Raleigh

Description: Development of the Hydrologic Information Storage and Retrieval System (HISARS) has permitted extensive use of available hydrologic data by a wide variety of users in education, research, and planning. The project is designed to make the system more generally useful by filling and extending present daily files to include all available data, and to add records for shorter time intervals, particularly hourly rainfall. An attempt will also be made to identify records collected by research projects that should also be added to the data files.

Starting Date: 1972 Completion Date: 1973

4. Title: Hydrologic Effect of Layering in Coastal Plain Soils

Location: North Carolina State University at Raleigh

Description: Investigation of the quantitative hydrologic effect of layers of interbedded sands and clays in the Coastal Plain. These layers inhibit vertical movement of water into the underlying groundwater and cause water to move laterally beneath the soil surface. In such areas, rainfall entering the soil at one point may not reach the groundwater until it has moved a considerable distance. The results may be useful in studies of the effect of surface drainage projects on groundwater recharge, in design of surface drainage projects, and in location of dug ponds.

Starting Date: 1972 Completion Date: 1973

School of Engineering

Department of Chemical Engineering

Dr. V. T. Stannett and Dr. H. B. Hopfenberg

1. Title: Preparation and Properties of Grafted and Polyblended Membranes for Desalination

Location: Raleigh, North Carolina

Description: Research on novel methods of membrane preparation and modification for use in reverse osmosis process for purification of saline waters.

Starting Date: 1967 Completion Date: 1973

Department of Civil Engineering

Dr. Michael Amein; Dr. N. E. Huang and Dr. C. E. Knowles (Department of Geosciences)

1. Title: Flow Dynamics in Estuarine Waters
Location: North Carolina State University at Raleigh

Description: Theoretical and field studies of water flow through coastal inlets in North Carolina, circulation and diffusion in Pamlico Sound. Numerical simulation models for water flow and quality are constructed and tested by means of field data.

Starting Date: 1970 Completion Date: 1975

Dr. Michael Amein

1. Title: Numerical Simulation of Flow in Rivers and Reservoirs

Location: Raleigh, North Carolina

Description: Development of operational computer program for determining water velocity and depth in rivers and reservoirs under unsteady flow conditions.

Starting Date: 1970 Completion Date: 1972

2. Title: Development of Operational Programs for Numerical Flood Routing in Rivers and Reservoirs

Location: Raleigh, North Carolina

Description: Development of Computer program for routing flood flows through river channels and reservoirs. The programs will be based on the numerical solution of the equations of unsteady flow.

Starting Date: 1970 Completion Date: 1972

Dr. Newton V. Colston, Jr.

1. Title: Characterization and Treatment of Urban Runoff

Location: Raleigh and Durham, North Carolina

Description: The purpose of this research is to evaluate urban runoff pollutant yields, its effect upon water quality management objectives, and the potential of physiochemical treatment of urban runoff.

Starting Date: 1971 Completion Date: 1973

2. Title: Pilot Study of the Relationship between Heavy Metals in Dust Fall and Urban Land Runoff

Location: Durham, North Carolina

Description: Study of the relationship between heavy metals in dust fall and urban land runoff.

Starting Date: 1971 Completion Date: 1973
Dr. A. I. Kashef
1. Title: Management of Retardation of Salt-Water Intrusion in Coastal Aquifers

Location: North Carolina State University

Description: Determination of the size and shape of salt-water intruded zones under various conditions and design of a system of water wells drilled along lines normal to the direction of natural flow in order to get the optimum results as to the reduction of the size of salt-water zone to desired degree.

Starting Date: 1972  Completion Date: 1974

Dr. Jerry L. Machemehl
1. Title: Coastal Erosion

Location: North Carolina

Description: Preparation of Chapter 10 of North Carolina Water Plan for Office of Water and Air Resources

Starting Date: 1971  Completion Date 1972

2. Title: Study of Sediment Transport and Distribution in the Vicinity of Tubbs Inlet

Location: Tubbs Inlet, North Carolina

Description: Study sediment transport in vicinity of Tubbs Inlet to contribute qualitative and quantitative data that will be useful for curbing the migration of Tubbs Inlet.

Starting Date: 1972  Completion Date: 1973

Dr. Jerry L. Machemehl and Dr. Norden E. Huang (Geosciences)
1. Title: A New Method of Beach Stability Control

Location: North Carolina State University

Description: To study the feasibility of beach stabilization and controlling by artificially induced pumping or suction on the beach. The study includes: (1) detailed study of flow condition on the beach with suction both theoretically and in the laboratory, and (2) apply the results to selected field sites for beach erosion without introducing rigid barriers.

Starting Date: 1972  Completion Date: 1975

Professor Charles Smallwood, Jr., and Dr. N. V. Colston, Jr.
1. Title: Water and Waste Management in Sweet Potato Processing

Location: Civil Engineering Department, NCSU, Raleigh, N. C.
Description: A reduction in a liquid waste by using dry caustic peeling to produce a semi-solid waste in the sweet potato industry.

Starting Date: 1971 Completion Date: 1973

Professor Charles Smallwood, Jr.

1. Title: Urban Erosion as a Source of Pollution

Location: Civil Engineering Department, NCSU, Raleigh, N. C.

Description: Examination of the feasibility of several kinds of economic penalties to control erosion resulting from urban development, such as road construction and shopping centers.

Starting Date: 1970 Completion Date: 1973

2. Title: Status Report on Waste Disposal in Marine Waters of North Carolina

Location: N. C. Office of Water and Air Resources, Department of Natural and Economic Resources, and Department of Civil Engineering, NCSU

Description: A study to determine the state of knowledge of pollution of North Carolina marine waters in relation to potential uses and development.

Starting Date: May 1972 Completion Date: 1973

3. Title: The Measurement of the BOD, COD, and TOC of Raw Foods

Location: Civil Engineering Department, NCSU, Raleigh, N. C.

Description: A continuing study of the pollutional characteristics of raw foods with the object of developing predictive equations for the cost of waste treatment in food processing.

Starting Date: 1971 Completion Date: 1973

Dr. C. C. Tung and Dr. J. F. Ely

1. Title: Reliability Analysis and Optimum Design of Marine Structures

Location: North Carolina State University at Raleigh

Description: Safety analysis and design of marine structures under the action of wind, wave, and currents.

Starting Date: 1971 Completion Date: 1975
Department of Engineering Research Services Division

Mr. Robert M. Lewis

1. Title: Slime Disposal Using Tailings as a Filter
   
   Location: Asheville, North Carolina
   
   Description: Distribute slimes throughout a sand tailings disposal instead of impounding same in open area.
   
   Starting Date: 1970  Completion Date: Continuing

Mr. J. Philip Neal

1. Title: North Carolina Feldspar Evaluation
   
   Location: Minerals Research Laboratory, Asheville, North Carolina
   
   Description: Appraisal of waste from granite quarries for feldspar content, plus end-use of feldspar, quartz, and fines.
   
   Starting Date: 1967  Completion Date: 1972

Industrial Engineering

Dr. John R. Canada

1. Title: The Development of Marine Industry Harvesting and Processing Systems - Engineering Advisory Services
   
   Location: North Carolina State University
   
   Description: To facilitate the early and orderly conversion of North Carolina's seafood industry from that of a low-cost source of supply to out-of-state processors to that of a significant competitor offering high quality kitchen-ready products to the world market. To develop techniques for the economic use of previously underexploited species and for finfish caught incidental to shrimping.
   
   Starting Date: 1970  Completion Date: Continuing

School of Forest Resources

Department of Forestry

Mr. L. Wayne Haines

1. Title: Effect of Forest Fertilization on Water Quality and Yield
   
   Location: Wake County, North Carolina (Schenck Memorial Forest); Durham County, North Carolina (Hill Forest)
Description: The study involves investigating the influence of nitrogen (N) and phosphorus (P) fertilizers applied to forests, at current operational levels, on water quality (N and P content) and yield.

Starting Date: 1971 Completion Date: Continuing

Dr. J. O. Lammi; Dr. R. J. Carson, III and Dr. Charles W. Welby
(Geosciences)

1. Title: Utilization of ERTS-A Data in Geological Evaluation, Regional Planning, Forest Management and Water Management in North Carolina

Description: See Dr. Charles W. Welby, et al, Department of Geosciences, for description.

Dr. T. Ewald Maki

1. Title: Drainage, Site Preparation and Site Improvement in Relation to Regeneration of Marketable Tree Species and Development of Stands on Pocosin Lands

Location: Hofmann Forest, Onslow and Jones Counties, North Carolina

Description: Evaluation of the effects of physical treatments, including ditching, diskng, bedding, and burning, and various chemical treatments such as liming and fertilizing on the rhizosphere, on the changes in native vegetation, on water-table behavior and on the survival, initial growth and development of seedlings, saplings, and pole stands of pines and hardwoods.

Starting Date: 1962 Completion Date: Continuing

2. Title: Relative Productivity of Lower Piedmont Sites for Pines or Hardwoods

Location: Mainly Hill and Hope Valley Forests, Durham and Chatham Counties, but also on industry lands

Description: Assessment of site quality in relation to establishment and growth of different species of pine and hardwood, and the influence of vegetation control and site preparation and improvement measures on soil moisture, particularly during the critical stand establishment period.

Starting Date: 1958 Completion Date: Continuing

3. Title: Effect of Inundation and Deer-browsing on Hardwood Regeneration in the Roanoke River Bottomlands

Location: Halifax and Bertie Counties, North Carolina (A) joint study by the Forestry Extension and Forestry Departments of North Carolina State University
Description: The study is investigating the relative influence of the changed water regimes imposed on Roanoke River bottomlands by Kerr Dam and the browsing of a very heavy deer herd on the establishment and growth of hardwood timber. Three forest stand conditions, tupelo-cypress-swamps, ash flats, and sweetgum sites are being studied by comparing regeneration protected from the deer herd with those exposed to browsing.

Starting Date: 1963  Completion Date: Continuing

4. Title: Bedding, Ditching, and Fertilizing Effects on Establishment and Growth of Pines on Wetland Sites

Location: Hofmann Forest, Jones, and Onslow Counties, North Carolina

Description: Experiments will be installed mainly with loblolly and pond pine to test the effects of degree of drainage, microsite alteration through bedding, and site quality manipulation through fertilization on the survival and initial growth of the pine species. Water-table behavior will be determined by means of plastic well pipes, sufficiently perforated to reflect changes readily in water levels.

Starting Date: 1970  Completion Date: 1973

5. Title: The Influence of Soil Types, Plant Communities, and Vegetation Manipulation on Water Table Fluctuations in Pocosin Ecosystems

Location: Hofmann Forest, Onslow and Jones Counties, North Carolina

Description: By means of wells (perforated plastic pipes) set to a depth of five feet, water levels will be measured periodically through the year to assess effects of plant community subsystems and vegetation manipulation (including fire) on H2O table levels. At critical rain-free periods daily draw-down of water tables will also be assessed to obtain estimates of transpiration draft.

Starting Date: 1972  Completion Date: 1974

Recreation Resources Administration

Professor Grodon A. Hammon

1. Title: Development of a System Determining the Capacity of Water Resources to Support Various Types and Combinations of Recreation Use

Location: North Carolina State University at Raleigh
Capacity as evidenced by visitor satisfaction and behavioral patterns under different degrees of use intensity will be interpreted and will suggest the consequences of administrative alternatives as they may affect the capacity/intensity relationship.

Starting Date: 1968  Completion Date: 1972

Department of Wood and Paper Science

Dr. H. M. Chang and Dr. Ellis B. Cowling (Plant Pathology)

1. Title: The Structure of Lignin in Relation to the Morphology of the Cell Wall

Description: See Dr. Ellis B. Cowling, et al, Department of Plant Pathology, for description.

Dr. H. M. Chang, Dr. Josef S. Gratzl, and Dr. William T. McKean, Jr.

1. Title: Sulfur Free Pulping Using Oxygen and Alkali

Location: North Carolina State University

Description: Establish pulping conditions for delignification to minimize pollution and usage of water.

Starting Date: 1970  Completion Date: 1975

2. Title: Slow Release Fertilizer from Pulping Waste

Location: School of Forest Resources, North Carolina State University

Description: Use of pulping effluents for the production of slow release nitrogen fertilizer which is absorbed by soil colloids and, therefore, not leached out as conventional nitrate fertilizer.

Starting Date: 1972  Completion Date: 1975

Dr. William T. McKean, Jr.

1. Title: Oxidation of Sulfur and Organic Sulfur Compounds in Kraft Pulping

Location: Raleigh, North Carolina

Description: This study is directed toward in-plant and water pollution control.

Starting Date: 1969  Completion Date: 1973
School of Liberal Arts

Department of Politics

Dr. Jackson M. McClain

1. Title: Application of Program Budgeting to Natural Resources

Location: North Carolina State University

Description: An effort to define in relatively concrete terms programs in natural resources and to apply modern budgetary techniques in establishing policy and financing resource programs by priority.

Starting Date: 1971 Completion Date: 1973

School of Physical and Mathematical Sciences

Department of Chemistry

Dr. Kenneth Hanck

1. Title: Effect of Organic Pollutants on the Chelation Capacity of Natural Waters

Location: Piedmont Region of North Carolina

Description: Development of analytical procedures for measuring the chelation capacity of natural water. Examination of natural water samples to determine if chelation capacity has been adversely affected by man.

Starting Date: 1971 Completion Date: 1972

Department of Geosciences

Mr. Albert V. Hardy

1. Title: Weekly Precipitation Probabilities, North Carolina Stations

Location: State Climatologist's Office

Description: Plan to compute probabilities of precipitation amounts for standard calendar weeks for all North Carolina stations having sufficient record; to be used to supplement present monthly normals. The weekly normals will be useful in planning for farm activity such as planting and harvesting dates and for planning other outdoor activity.

Starting Date: 1967 Completion Date: Continuing
Dr. N. E. Huang

1. Title: Ocean Dynamics, Surface Current

   Location: North Carolina State University at Raleigh

   Description: Study the possibility of using remote sensing tech-
               nique to measure ocean currents.

   Starting Date: 1972             Completion Date: 1973

Dr. N. E. Huang and Dr. Jerry L. Machemehl (Civil Engineering)

1. Title: A New Method of Beach Stability Control

   Location: North Carolina State University

   Description: See Dr. Jerry L. Machemehl, et al., Department of
               Civil Engineering, for description.

Dr. C. E. Knowles, Dr. N. E. Huang; and Dr. Michael Amein (Civil
Engineering)

1. Title: Flow Dynamics in Estuarine Waters

   Description: See Dr. Michael Amein, et al., Department of Civil
               Engineering, for description.

Dr. Walter J. Saucier and Dr. Allen Weber

1. Title: Precipitation Variability Over North Carolina

   Location: North Carolina State University at Raleigh

   Description: Variabilities of rainfall in space and time over
               North Carolina are being determined for obtaining improved
               descriptions of rainfall events as they bear on water supply and
               the variable effects of evaporation.

   Starting Date: 1971             Completion Date: 1973

Dr. Charles W. Welby, Dr. R. J. Carson, III; and Dr. J. O. Lammi (Forestry)

1. Title: Utilization of ERTS-A Data in Geological Evaluation,
       Regional Planning, Forest Management and Water Management
       in North Carolina

   Location: North Carolina (specifically, Asheville, Wilmington and
             Winston-Salem)

   Description: Use of remote sensing data from the ERTS-A satellite
               in solving various problems in North Carolina; many of these are
               water-oriented.

   Starting Date: 1972             Completion Date: 1973
Department of Statistics

Dr. Don W. Hayne, Mr. David W. Turner, and Mr. Paul H. Geissler

1. Title: Consulting on Fisheries Problems

Location: On campus, North Carolina State University, and throughout eleven Southeastern States

Description: The Southeastern Cooperative Fish and Game Statistics Project, a unit of the Institute of Statistics, services the statistical needs of member states insofar as fisheries (and game) projects are concerned. Many problems in aquatic biology are covered. These are of wide variety covering fisheries biology and management, physical and biological limnology and the ecology of aquatic fauna and flora. The largest category of problems is concerned with the appraisal of sport fishing, both fresh water and marine.

Starting Date: 1959 Completion Date: Continuing

Dr. D. D. Mason; Dr. G. A. Cummings (Soil Science); Dr. Ronald E. Sneed (Bio & Ag Engineering); Mr. V. H. Underwood and Dr. W. B. Nesbitt (Horticultural Science)

1. Title: Muscadine Grape Irrigation and Cultural Practices Study

Description: See Mr. V. H. Underwood, et al, Department of Horticultural Science, for description.

Dr. L. A. Nelson

1. Title: Cooperative Water Table Study with R. B. Daniels and E. E. Gamble, U.S. Soil Conservation Service

Location: Raleigh

Description: Mathematical modeling of water table level fluctuations as related to meteorological factors for key soils in the Coastal Plain of North Carolina.

Starting Date: 1970 Completion Date: 1974

School of Textiles

Department of Textile Chemistry

Dr. Carl E. Bryan

1. Title: Recovery and Reuse of Synthetic Sizer from Textile Finishing Wastewater

Location: NCSU and Wake Finishing Plant, Raleigh, North Carolina
Description: A cooperative program largely supported by EPA (Demonstration Grant) and based on earlier laboratory work at NCSU to develop a plant-scale process for recovering and reusing CMC and other synthetic sizes.

Starting Date: 1972  Completion Date: 1973

D. H. Hill Library

William C. Lowe, Susan S. Rose; and F. E. McJunkin (Env. Scs. & Engr., UNC-CH)

1. Title: Southern Water Resources Scientific Information Center

Description: A cooperative project with the Water Resources Research Institute and the Office of Water Resources Research. A computer based on-line literature searching service utilizing advanced techniques for information storage and retrieval.

Starting Date: 1972  Completion Date: Indefinite
1. Title: Ecological Effects of Heat in Lake Julian

Location: Buncombe County, North Carolina

Description: Student Originated Studies project financed by NSF June 14, 1971, to December 31, 1972; it was funded later by Carolina Power and Light Company to extend data beyond one summer--detailed investigation of a simple natural ecosystem with distinct thermal compartments.

Starting Date: 1971  Completion Date: 1972

1. Title: Water Quality of Effluents from Champion Paper Company

Location: Canton, North Carolina

Description: Consultant work for Champion Paper Company on the quality of their effluent water with emphasis on microbiological flora.

Starting Date: 1971  Completion Date: Undetermined
College of Arts and Sciences

Department of Botany

Dr. Max H. Hommersand

1. Title: Growth and Ecological Adaptation of Monodus from Sewage Treatment Plants at Morehead City, North Carolina

Location: Morehead City, North Carolina

Description: Culturing and laboratory studies on growth of Monodus under a variety of conditions, responding to a range of environmental parameters including: light density, light quality, carbon dioxide, pH, temperature, salinity, and nutrients growing.

Starting Date: 1970 Completion Date: 1972

Dr. Max H. Hommersand and Charles F. Rhyne

1. Title: Growth, Life History and Ecological Adaptations of Species of Ulva

Location: Chapel Hill and Morehead City, North Carolina

Description: A comparative morphological, taxonomic and life history study is being carried out on species of Ulva and Enteromorpha, growing in artificial ponds supplied with treated sewage effluent or occurring in eutrophic water of Calico Creek, Morehead City, North Carolina. Emphasis is being placed on experimental investigations concerning the induction of internal physiological conditions leading to reproduction.

Starting Date: 1968 Completion Date: 1972

Dr. J. Frank McCormick

1. Title: Ecological Inventory of Bald Head Island

Location: Smith Island Complex, North Carolina

Description: Analysis of the structure and metabolism of natural ecosystems will follow an inventory of species and community composition and distribution. Maps will be prepared for topography, water table, vegetation and environmental gradients.

Starting Date: 1969 Completion Date: 1974
Department of Chemistry

Dr. Richard P. Buck

1. Title: Electrical Properties of Selective Ion Electrodes

   Location: Chapel Hill, North Carolina

   Description: Characterization of crystals used as specific ion electrodes. Impedance of membranes used in membrane electrodes.

   Starting Date: 1968 Completion Date: 1973

Dr. James L. Coke

1. Title: Organochlorides in Aquatic Ecosystems of North Carolina

   Location: University of North Carolina at Chapel Hill

   Description: Project to examine biological monitoring systems for persistent organochlorides in streams of North Carolina in order to devise a continuous comprehensive survey system for river basins.

   Starting Date: 1970 Completion Date: 1972

Department of Geography

Dr. Arthur J. Hawley

1. Title: The Present and Future Status of North Carolina's Wetlands

   Location: Geography Department, UNC, Chapel Hill

   Description: A review of various points-of-view about what "wetlands" are, leading to an adequate definition and classification system. Present uses of wetland areas will be assessed and changes occurring inventoried as a basis for recommendations.

   Starting Date: 1971 Completion Date: 1972

2. Title: The Growth and Diffusion of Irrigation in the Humid Eastern United States Since 1939

   Location: Geography Department, UNC, Chapel Hill

   Description: (1) Cartographically and statistically identify and determine the threshold values of critical factors associated with this growth. (2) Develop a simulation model to project this growth and the resulting water use patterns into the future.

   Starting Date: Continuing Completion Date: Continuing
1. Title: Erosion and Deposition in the Sounds and Estuaries of the North Carolina Coast

Location: Chapel Hill and Morehead City, North Carolina

Description: Predictions of future sites of erosion and deposition based on geological studies of sediments, analyses of aerial photographs, and current measurements.

Starting Date: 1970 Completion Date: 1975

Dr. Paul C. Ragland

1. Title: Trace Elements in Ground Water

Location: North Carolina

Description: Use of trace elements for geochemical prospecting.

Starting Date: 1965 Completion Date: Continuing

Dr. Paul C. Ragland and Mr. J. Robert Butler

1. Title: Behavior of Nutritively Important Elements in Selected Bedrock-to Soil Profiles in North Carolina

Location: Orange and Chatham Counties, North Carolina

Description: Analyze various important trace elements in some bedrock soil profiles from Chatham and Orange Counties; namely, cadmium, copper, chromium, lithium, manganese, nickel, and zinc.

Starting Date: 1972 Completion Date: 1974

Dr. David M. Stewart

1. Title: The Location and Delineation of Subterranean Cavities from the Surface

Location: U.N.C. and Missouri

Description: To determine theoretically and practically how caves respond to seismic energy and design a means to find and map them from land surface.

Starting Date: 1972 Completion Date: 1975
Dr. Daniel A. Textoris

1. Title: Petrology of the Castle Hayne Fm. and Related Aquifer Rocks, North Carolina

   Location: Vicinity of Castle Hayne to New Bern, North Carolina

   Description: After field samples are taken, the rocks will be studied by thin section analysis, X-ray diffraction, and Cathode luminescence to determine the disgenesis of the limestone. The unit is an important aquifer, and realization of how and why the permeability and porosity developed can lead to better control and development of the water.

   Starting Date: 1966   Completion Date: Continuing

Dr. Joel Watkins and Dr. Virgil Mann

1. Title: Geophysical Survey of Sedimentary Rocks

   Location: University of North Carolina at Chapel Hill and Northeastern North Carolina

   Description: Geophysical survey of the sedimentary rocks underlying the sounds in the northeast portion of the State. Such work can lead to the identification of geological structures that are potential oil reservoirs.

   Starting Date: 1970   Completion Date: Continuing

Dr. Joel Watkins

1. Title: Geophysical Investigation Geologic Structure

   Location: Continental Shelf and Rise

   Description: Collection of subbottom profiles data along shelf and rise in order to determine geologic structure of near surface sedimentary rocks.

   Starting Date: 1972   Completion Date: Continuing

Department of Zoology

Dr. Charles E. Jenner

1. Title: Environmental Control of Seasonal Activity—Seasonal Distribution of Marine Zooplankton

   Location: Chapel Hill, North Carolina

   Description: Effect of photo-periodism on the growth and reproduction of various aquatic insects.

   Starting Date: 1950   Completion Date: Continuing
Dr. Reinhard M. Rieger

1. Title: Ecology of the Meiofauna in the Sulfide-system
   Location: Morehead area, especially Bogue Inlet and White Oak River
   Description: Faunistics and factor analysis of the only recently studied ("black layers") reducing sediments which underlay most parts of the oxidized marine sandy biome.
   Starting Date: 1971  Completion Date: 1973

Dr. Alan E. Stiven

1. Title: Population Processes of Macodecomposers in Fresh Water Flowing Systems and Marine Salt Marshes
   Location: Chapel Hill and Morehead City, North Carolina
   Description: Comparative analysis of the dynamics, genetics, and energetics of gastropod populations in a gradient of heterogeneous discrete environments; aim is to isolate the intra and inter population control mechanisms and determine the gastropod-detrital processes and impact on stream and salt marsh ecosystems.
   Starting Date: 1966  Completion Date: Continuing

Graduate School

Center for Urban and Regional Studies

Dr. Edward J. Kaiser

1. Title: Promoting Environmental Quality Through Urban Planning and Controls
   Location: Center for Urban and Regional Studies, UNC
   Description: Exploratory study; (1) relation of urban planning and control systems of the 60's to environmental quality goals; (2) case studies recent attempts to adapt these planning and control systems to environmental goals; and (3) suggestions for research and action in the 1970's and 1980's.
   Starting Date: 1972  Completion Date: 1973

Professor Shirley F. Weiss, Dr. Edward J. Kaiser, Dr. Raymond J. Burby, III, Dr. Thomas G. Donnelly, and Dr. Robert B. Zehner

1. Title: Performance Criteria for New Community Development: Evaluation and Prognosis
   Location: Center for Urban and Regional Studies
Description: The major goals of this research are to provide Federal, State, local, and private agencies concerned with new towns with a scientific basis for: (1) evaluating new community characteristics which contribute most to residents' quality of life; and (2) estimating the feasibility of actually achieving such characteristics in the new community development process through the use of Federal policy instruments.

Starting Date: 1972 Completion Date: 1974

Professor Shirley F. Weiss, Dr. Raymond J. Burby, III, and Dr. Thomas G. Donnelly

1. Title: The Effects of Authorization for Water Impoundments on Shore Land Transition

Location: Center for Urban and Regional Studies, Chapel Hill

Description: Utilizing data from interviews with a random sample of 480 landowners in the vicinity of the New Hope and Falls of the Neuse reservoirs and data on the characteristics of over 5000 land transactions in the surrounding region, this research is developing a computer model to predict changes in land ownership, land value, and land use patterns in authorized reservoir areas.

Starting Date: 1970 Completion Date: 1973

Department of City and Regional Planning

Dr. Maynard M. Hufschmidt

1. Title: Environmental Impact Statements in Water Resource Planning

Location: UNC, Chapel Hill, North Carolina

Description: Analyses of role of environmental impact statements in water-resource planning and decision-making with special reference to North Carolina.

Starting Date: 1972 Completion Date: 1973

Dr. David H. Moreau

1. Title: Evaluation of an Urban Information System

Location: Charlotte, North Carolina

Description: An urban information system under construction for the City of Charlotte, North Carolina, is being evaluated with respect to its capacity to serve the emerging needs of urban water resource planners and managers.

Starting Date: 1970 Completion Date: 1973
Dr. David H. Moreau and Dr. J. K. Sherwani (Department of ESE)

1. Title: Strategies for Water-Quality Monitoring by State Agencies

Location: University of North Carolina at Chapel Hill

Description: To develop cost-effective strategies for the location, density, and frequency of water quality samples in the multi-purpose water-quality monitoring system for state agencies concerned with the planning, management, enforcement and research. Being representative of the water-quality problems characteristic of the State of North Carolina and the Southeast, the Neuse River Basin was taken as the case study area. A set of experimental designs are being constructed and their data requirements examined with respect to location, density, and frequency of sampling.

Starting Date: 1972 Completion Date: 1973

Institute of Marine Sciences

Dr. A. F. Chestnut (Director)

1. Title: Estuarine Monitoring Program

Location: Coastal area of North Carolina

Description: Eighteen stations selected in various salinity levels in the estuary will be sampled at monthly intervals to determine measurable residues of chlorinated hydrocarbons in oysters, clams, fish and plankton samples. Chemical analyses will be made at Department of Interior, Bureau of Commercial Fisheries Biological Laboratory, Gulf Breeze, Florida.

Starting Date: 1966 Completion Date: Continuing

2. Title: An Updated "Survey of Marine Fisheries"

Location: Coastal North Carolina

Description: Production of a new synopsis of marine fisheries and resources of North Carolina. Biology, life history, distribution of species with descriptions of methods of capture and catch statistics will be included. Appropriate specialists will contribute to the many aspects relating to marine fisheries and resources.

Starting Date: 1970 Completion Date: Continuing

Dr. A. F. Chestnut, E. J. Keunzler, C. M. Weiss, C. Jenner, M. Hoomersand, W. J. Woods, A. Stiven, and J. D. Johnson

1. Title: Use of Treated Sewage Effluent in Aquaculture

Location: Institute of Marine Sciences, Morehead City, N. C.
A study of the self-design process in experimental marine ponds toward the aim of establishing new ecological combinations capable of mineralizing the river wastes of urban North Carolina and providing alternative new types of food harvest.

Starting Date: 1968
Completion Date: Continuing

Dr. William E. Fahy

1. Title: Experimental Study of Influence of Environmental Factors on Developing Skeleton of Marine Fishes
Location: Morehead City, North Carolina
Description: Ova from female Fundulus majalis (Cyprinodontidae; Teleosts) are fertilized and placed in incubation apparatus. Different constant temperatures and different fluctuating temperature regimes are utilized to discover nature, time and extent of response of skeletal structures (vertebrae, fin rays, scales and other meristic elements to them). Proper statistical procedures are used to evaluate results.

Starting Date: 1960
Completion Date: Continuing

Dr. Jan J. Kohlmeyer

1. Title: Morphological and Taxonomical Studies of Marine Fungi
Location: Mainly United States East Coast
Description: All species of higher marine fungi are examined microscopically and are illustrated. Taxonomy of these organisms is reevaluated.

Starting Date: Continuing
Completion Date: Continuing

2. Title: Survey of Distribution of Marine Fungi in the Tropics
Location: Tropical and Subtropical Oceans
Description: Higher marine fungi from tropical habitats, especially from mangrove stands are identified. Their geographical distribution and ecological importance are determined.

Starting Date: Continuing
Completion Date: Continuing

3. Title: Study of Algicolous Marine Fungi
Location: U. S. East and West Coasts (and herbarium studies)
Description: Parasitic, saprophytic, and symbiotic fungi from algae are identified and described. The role of fungi in the degradation of the hosts is examined.

Starting Date: Continuing
Completion Date: Continuing
Professor Hugh J. Porter

1. Title: Ecological Study of the Hard Clam (*Mercenaria*) Populations in North Carolina Waters

   Location: Bogue Sound, Core Sound and Coastal Waters Off Shackleford Banks

   Description: Morphometric characteristics of two species and their integrades in nature are being investigated; gonadal cycles in relation to time and temperature are followed; factors influencing hatchery culture of juvenile stocks are being investigated.

   Starting Date: Continuing   Completion Date: Continuing

2. Title: Survey of Marine and Estuarine Mollusca in North Carolina Waters

   Location: All marine and brackish water areas in North Carolina

   Description: Permanent catalogued collections of North Carolina mollusca are established at the Institute. Additions are made from collecting trips in brackish and marine areas from ecological investigators. This collection will aid in a published list of North Carolina mollusca with their known North Carolina range.

   Starting Date: Continuing   Completion Date: Continuing

3. Title: Investigation on Setting Behavior of Commercial Oysters

   Location: North Carolina estuaries

   Description: The distribution and intensity of oyster setting throughout the potential oyster growing areas of North Carolina, but particularly in Bogue Sound, is being monitored. Possible environmental conditions influencing setting are being investigated.

   Starting Date: Continuing   Completion Date: Continuing

4. Title: Study of the Genus *Busycon*

   Location: Bogue Sound in North Carolina

   Description: Members of the genus living in marine waters of the Carolinas are being reared in tanks at the Institute of Marine Sciences in order to learn of possible ecological and taxonomic differences between species.

   Starting Date: 1970   Completion Date: Indefinite

Dr. Frank J. Schwartz

1. Title: Systematics, Zoogeography, and Ecology of Marine Fishes of the Western Atlantic

   Location: North Carolina and adjacent waters
Description: Many species are being examined for growth, food, embryology, parasites, and other aspects of their biology to better understand the species and the fish fauna of the western Atlantic. Migratory aspects are being investigated by tagging, using plastic dart tags.

Starting Date: 1968 Completion Date: Continuing

2. Title: Fish Fauna of the Newport River Complex as Related to Present Ecological and Environmental Features

Location: Newport River system near Morehead City, North Carolina

Description: The fish fauna on a seasonal basis will be investigated and related to present and proposed environmental ecological conditions.

Starting Date: 1970 Completion Date: Continuing

3. Title: Bioenergetics of Fish Fauna and Eel Grass Communities

Location: Newport River and Adjacent Sounds

Description: Eel grass beds are important elements as they provide a substrate for many invertebrate and vertebrate organisms. The effect on each other will be investigated with notes on the interaction with prevailing ecological conditions.

Starting Date: 1970 Completion Date: Continuing

Dr. Frank J. Schwartz and Dr. A. F. Chestnut

1. Title: Biological Investigations of Noxious Coelenterates in Coastal North Carolina

Location: All Coastal Counties

Description: To determine the distribution, species composition, relative and seasonal abundance of noxious coelenterates in North Carolina. Economic impact will also be determined as affecting commercial, sport fishing, and tourist industries.

Starting Date: 1972 Completion Date: 1974

Dr. Frank J. Schwartz and Professor Hugh J. Porter

1. Title: Economic Potential of Calico Scallop Fishing as Affected by Environment and Associates in its Community

Location: Atlantic Coastal Waters off Beaufort, North Carolina

Description: The interaction of invertebrates and fishes will be determined to see what role they play in the fluctuating offshore scallop fishing. Environmental parameters will also be monitored.

Starting Date: 1971 Completion Date: 1972
Dr. William J. Woods

1. Title: Studies on Hydrography and Plankton of Western Pamlico Sound

Location: Western Pamlico Sound

Description: In situ studies of primary production, nutrient enrichment experiments and analyses of various factors that influence and measure production.

Starting Date: Continuing  Completion Date: Continuing

Institute of Government

Professor William A. Campbell and Professor Milton S. Heath, Jr.

1. Title: Research-Scientific Classification of Waters for Pollution Control

Location: University of North Carolina at Chapel Hill

Description: Research conducted at request of the Chancellor concerning legal aspects of the proceeding pending before the State Board of Water and Air Resources to create a research-scientific classification. Includes a study of the constitutional aspects of the proposed classification.

Starting Date: 1969  Completion Date: 1973

2. Title: Legal and Administrative Aspects of Coastal Zone Management

Location: University of North Carolina at Chapel Hill

Description: Research conducted on behalf of the Commissioner of Commercial and Sports Fisheries in connection with his development of a State plan of estuarine and coastal zone management. Involves constitutional issues, problems of identifying affected land areas, and questions of administrative organization.

Starting Date: 1970  Completion Date: 1973

Professor Milton S. Heath, Jr.

1. Title: Environmental Legislation Studies for the Legislative Research Commission under Senate Resolution 961

Location: North Carolina

Description: (1) Regulation of septic tank wastes, (2) abatement of oil pollution and oil spills, (3) regulation of animal and poultry wastes, (4) abatement of nutrient pollution, (5) control of sedimentation and siltation, (6) recovery of water supply damages, and (7) reporting of industrial wastes and other toxic wastes to public waste disposal system.
Starting Date: 1972 Completion Date: 1972

Professor Warren J. Wicker and Professor Milton S. Heath, Jr.

1. Title: Organizational Arrangements for Public Water Services in North Carolina

Location: Chapel Hill, North Carolina

Description: Survey of existing organizational arrangements; legal authority for the provisions of services; and development of specific organizational arrangements for selected areas in North Carolina.

Starting Date: 1963 Completion Date: Continuing

Professor Warren J. Wicker

1. Title: Pilot Study of Financing of Local Share of Beach Erosion Control Projects

Location: Brunswick County and Chapel Hill, North Carolina

Description: In meeting the local share of the cost of beach erosion control and hurricane protection projects, municipal and county governments are currently authorized to use various methods. This study will project different models.

Starting Date: 1970 Completion Date: 1972

School of Law

Dr. Seymour W. Wurfel and Thomas J. Schoenbaum

1. Title: Marine Resources Legal Research

Location: University of North Carolina at Chapel Hill

Description: The research objective is to formulate an appropriate legal regime to promote North Carolina ocean exploration and to improve the capability to develop and conserve marine resources. Library and empirical research will be combined to review the adequacy of existing law; to propose a legislative program if appropriate and to assist in the development of new administrative practices if desired.

Starting Date: 1970 Completion Date: Continuing
Title: Improvement of Performance of Trickling Filter Plants
Location: Chapel Hill, North Carolina
Description: Development of information and design criteria to enhance the performance of trickling filter plants through optimizing operating procedures and use of techniques requiring minimum plant modification.
Starting Date: 1969 Completion Date: 1973

Title: A study of the Oxinite Process for In-line Treatment of Wastewater
Location: Chapel Hill, North Carolina
Description: Fractions of atmospheric nitrogen are converted to NO and blown into a sewer system. The results of this process are being studied.
Starting Date: 1971 Completion Date: 1972

Title: Characterization and Treatment of Brine Wastes from the Cucumber Pickle Company
Location: UNC Wastewater Research Center and Mt. Olive Pickle Company, Mt. Olive, North Carolina
Description: Characterization of wastes generated in cucumber pickle processing; evaluation of cost-effectiveness of advanced waste treatment processes for reconcentration of salt for recycling or disposal.
Starting Date: 1972 Completion Date: Indefinite

Title: A Determination of the Potential and Actual Effect of an Industrial Chrome Waste Upon the Community Structure of the Receiving Stream
Location: Castle Hayne, North Carolina, and Chapel Hill
Description: A chrome chemical industry is to discharge small quantities of particulate Cr\textsuperscript{3+} into the N.E. Cape Fear River. Due to the particulate nature of the waste the maximum effect is expected in the bottom community. Field surveys and the development of a lab toxicity test are being used to evaluate the effect of the discharge.

Starting Date: 1972 Completion Date: 1973

2. Title: An Investigation of Phosphorus Removal with Alum from a Secondarily Treated Synthetic Sewage as Related to the Tripolyphosphate Concentration of the Raw Synthetic Sewage

Location: Chapel Hill, North Carolina

Description: The tripolyphosphates present in synthetic detergents may interfere with alum precipitation in wastewater treatment. This investigation will evaluate this possibility as well as identify some of the controlling factors.

Starting Date: 1972 Completion Date: 1973

Dr. J. Donald Johnson

1. Title: The Chemistry of Chlorine and Bromine as a Water Disinfectant

Location: Chapel Hill, North Carolina

Description: The rates of reaction of bromine in natural water are being compared with those of chlorine. Bromine and bromamine products appear to be equally effective and sometimes more so compared to chlorine as water disinfectants. The rates of reaction and decomposition of bromine and chlorine products are being studied to determine whether bromine can be expected to maintain more effective residuals for a longer period than chlorine.

Starting Date: 1967 Completion Date: 1975

2. Title: Bromination and Chlorination of Tertiary Trickling Filter Effluent

Location: UNC Wastewater Research Center, Chapel Hill, North Carolina

Description: Bromination of sewage effluent is being investigated as an alternative to chlorination for disinfection and nitrogen removal. The study is being performed with effluent from one of Chapel Hill, North Carolina's, trickling filter plants which is further purified by alum coagulation and settling. This trickling filter effluent is being dozed between 2 and 20 mg/l of halogen. Coliforms are measured with the MPN technique and free chlorine, total chlorine and total bromine residuals are measured by the SNORT method. For contact times between one and fifteen minutes, bromine breakpoints occur at approximately one-half the milligram dosage required by
chlorine. Approximately one log better kills are obtained for coliform with bromine than with chlorine, thus when the coliform survival with chlorine is 1%, a bromine survival of 0.1% is found.

Starting Date: 1971 Completion Date: 1973

3. Title: Viral Inactivation by Bromine and Its Ammonia Compounds

Location: Chapel Hill, North Carolina

Description: Viricidal effectiveness of several bromine chemical species are being studied as a function of concentration of bromine, ammonia, pH, time, and temperature. For this the DNA bacteriophage \( \phi X174 \) is being used as a model of virus which might be found in water supplies and waste waters. High concentrations of virus of high purity are being used to obtain accurate kinetic data on virus inactivation.

Starting Date: 1971 Completion Date: 1973

4. Title: Halogen Membrane Disinfection Indicator Electrode

Location: Chapel Hill, North Carolina

Description: A membrane electrode similar to the oxygen electrode is being developed for chlorine and bromine. This electrode analogous to the disinfection process will determine halogen residual as a function of time throughout the disinfection process. The electrode will also be sensitive to temperature as is the disinfection reaction.

Starting Date: 1972 Completion Date: 1975

Dr. Edward J. Kuenzler

1. Title: Effects of Mosquito Control Ditching on Estuarine Ecosystems

Location: Morehead City, North Carolina

Description: Appraisal of ecological effects of ditching for mosquito control upon the ecology of the irregularly flooded Juncus marsh; evaluation of the effectiveness of the program for controlling mosquitoes; evaluation of changes in the marsh; study of the changes in the exchange of nutrients between the marsh and surrounding waters.

Starting Date: 1970 Completion Date: 1972
Dr. James C. Lamb, III

1. Title: Methods for Transferring Water Research Findings to Practicing Engineers

Location: University of North Carolina at Chapel Hill

Description: Survey of North Carolina engineers to determine research areas of interest to them; evaluation of available techniques, preparation of materials and execution of pilot project to transfer research information.

Starting Date: 1972 Completion Date: 1973

Dr. James C. Lamb, III, and Professor James C. Brown

1. Title: Improvement of Performance of Trickling Filter Plants

Description: See Dr. James C. Brown, et al, for description.

Dr. James C. Lamb, III, and Dr. Linda W. Little

1. Title: Evaluation of Acute Effects of Dyes on Fish and on Growth and Photosynthetic Activities of Algae

Location: University of North Carolina at Chapel Hill, UNC Wastewater Research Center

Description: Evaluation of the effects of 48 commercially important dyes on fathead minnows and the alga Selenastrum capricornutum, for the American Dye Manufacturers Institute.

Starting Date: 1971 Completion Date: 1973

Dr. Donald T. Lauria

1. Title: Water Use Forecasting for State Level Planning

Location: North Carolina

Description: Development of a regional water requirements forecasting model for North Carolina; development of efficient data collection systems for use with the model; application and evaluation in one or more regions of the State.

Starting Date: 1972 Completion Date: 1974

Dr. John Lyman

1. Title: Office of Marine Sciences

Location: North Carolina
Description: Director of Office of Marine Sciences, North Carolina, and Sea Grant Coordinator, North Carolina Institutional Sea Grant Program.

Starting Date: 1970  Completion Date: Continuing

Professor Frederick E. McJunkin

1. Title: Associate Director, Water Resources Research Institute
   Location: Chapel Hill, North Carolina

   Description: An intercampus program of the University of North Carolina System for the promotion and support of multidisciplinary research on water problems of North Carolina and coordination of research and educational programs dealing with water resources.

   Starting Date: 1965  Completion Date: Continuing

2. Title: Special Assistant to the Director, Office of Water and Air Resources, N. C. Dept. of Natural & Economic Resources
   Location: Raleigh, North Carolina

   Description: Coordination and liaison between academic research community and state water resources planning and research program; consultant and adviser to the Department on State Water Plan, research, and special projects.

   Starting Date: 1971  Completion Date: Continuing

3. Title: Surveillance of Drinking Water Quality
   Location: Worldwide (Chapel Hill, North Carolina)

   Description: Review, analysis, and development of methodology and protocol for insuring drinking water quality in developing countries.

   Starting Date: 1969  Completion Date: 1972

4. Title: Engineering Measures for Control of Schistosomaisis
   Location: Africa, Brazil (Chapel Hill, North Carolina)

   Description: Preparation of manual on engineering measures for control of schistosomaisis in water resource development schemes in tropical countries.

   Starting Date: 1971  Completion Date: 1972

5. Title: Dual Water Systems
   Location: Chapel Hill, North Carolina

   Description: See Project 1, Daniel A. Okun, for description.
6. Title: Impact of Thermal Power Generation on Water Quantity Planning  
Location: Chapel Hill, North Carolina  
Description: Investigation of impact of forced evaporative losses due to cooling of thermal power plants, either nuclear or fossil-fueled, during periods of low flows in receiving water bodies.  
Starting Date: 1972  
Completion Date: 1973  
Professor F. E. McJunkin; William C. Lowe and Susan S. Rose (D. H. Hill Library)  

1. Title: Southern Water Resources Scientific Information Center  
Location: D. H. Hill Library, N. C. State University  
Description: See Project 1, Lowe, et al, D.H. Hill Library, NCSU.  
Dr. Daniel A. Okun and F. E. McJunkin  

1. Title: Dual Water Systems  
Location: Chapel Hill, North Carolina  
Description: To investigate the circumstances in which it would be feasible to provide two separate urban water systems—potable and for all other purposes.  
Starting Date: 1969  
Completion Date: 1972  
Dr. Charles R. O'Melia  

1. Title: The Role of Polyelectrolytes in Filtration Processes  
Location: School of Public Health, UNC, Chapel Hill, North Carolina  
Description: A mathematical model for removal efficiency in filtration has been developed. Experiments are being conducted using idealized suspensions and secondary effluent to test this model.  
Starting Date: 1970  
Completion Date: 1972  
Dr. J. K. Sherwani and Dr. David H. Moreau (Department of City and Regional Planning)  

1. Title: Strategies for Water-Quality Monitoring by State Agencies  
Location: University of North Carolina at Chapel Hill  
Description: See David H. Moreau, et al, Department of City and Regional Planning, for description.
Dr. Charles M. Weiss

1. Title: Environmental Inventory (Aquatic) Belews Creek Project
   Location: UNC, Chapel Hill, North Carolina
   Description: An environmental inventory baseline is being established on the biota and water quality parameters of the Belews Creek impoundment now under construction to serve as a reference point for future changes if they should occur when the power plant goes into operation.
   Starting Date: 1970    Completion Date: Continuing

2. Title: The Ecology of Artificial Streams
   Location: UNC, Chapel Hill, North Carolina
   Description: Artificial streams have been constructed from fiber glass to establish standardized running water ecologies for the evaluation of non-degradable organic substances on the stream biota.
   Starting Date: 1971    Completion Date: Continuing

3. Title: Thermal Effects - Allen Steam Station
   Location: UNC, Chapel Hill, North Carolina
   Description: Through the use of Carbon-14 productivity and measurements, the effects of thermal discharge on a body of water will be examined in terms of the impact this temperature increment has on fixation by the indigenous population of phytoplankton. The field work will be carried out at the Allen Steam Plant, Duke Power Company.
   Starting Date: 1971    Completion Date: Continuing

4. Title: Algal Assay Procedures
   Location: UNC, Chapel Hill, North Carolina
   Description: Laboratory and field studies for the development of an algal assay procedure with particular reference to the trophic state of North Carolina lakes.
   Starting Date: 1969    Completion Date: Continuing

5. Title: Preimpoundment Studies, Falls, Randleman and Howards Mill Lakes
   Location: Neuse and Deep Rivers
Description: Field studies to establish existing water quality parameters in the proposed flood control and water supply reservoirs. Botanical surveys will provide guidelines for peripheral land use development.

Starting Date: 1972 Completion Date: 1973

6. Title: Phosphorus Transport - Kerr Reservoir

Location: Kerr Reservoir, Virginia and North Carolina

Description: Through water and sediment sampling and analysis the transport of phosphorus into Kerr Reservoir by the Dan River and Nutbush Creek will be modeled.

Starting Date: 1972 Completion Date: 1973
Department of Biology

Dr. Edward F. Menhinick (working with Dr. Charles Weiss of UNC-CH and Dr. Lorin Jensen of Johns Hopkins University)

1. Title: Effect of Heated Effluents on Plankton

Location: Lake Norman, North Carolina

Description: Studies of species and numbers of plankton around Marshall Steam Plant.

Starting Date: 1968 Completion Date: 1973

College of Engineering

Dr. Carlos G. Bell

1. Title: Chapter 13 of State Water Plan

Location: Charlotte and Raleigh

Description: Preparation of Chapter 13 of State Water Plan on Non-Agricultural Drainage and Soil Conservation

Starting Date: 1971 Completion Date: 1972
Department of Chemistry

Dr. John R. Jezorek

1. Title: The Effect of Nonaqueous Aprotic Solvents on the Structure of Water

Location: Greensboro, North Carolina

Description: Measurements of the heats of transfer of some slightly soluble salts from water to water--nonelectrolyte mixtures to determine the effect of the added nonelectrolyte on the water structure.

Starting Date: 1970 Completion Date: 1973
Department of Biology

Dr. Paul E. Hosier

1. Title: Oceanic Overwash

Location: Core Banks, Shackleford Banks, North Carolina

Description: Effects of oceanic overwash on Outer Bank vegetation.

Starting Date: 1969 Completion Date: Continuing

Dr. James F. Parnell

1. Title: Natural Community Succession on Dredge Islands

Location: Intracoastal Waterway

Description: Observations will be made of the species of plants and vertebrates that recolonize dredge spoil islands along the Intracoastal Waterway. By demonstrating the association of vegetation with the use of such islands by nesting birds, it is hoped that it will be possible to manage the islands in the future so that they will result in an improvement in the natural habitat.

Starting Date: 1971 Completion Date: Continuing

Department of Geology

Dr. Paul A. Thayer

1. Title: Development of Porosity and Permeability in the Castle Hayne Limestone

Location: Superior Stone Company Quarry, New Bern, North Carolina, and Superior Stone Company Quarry, Belgrade, North Carolina

Description: Petrographic analysis of the Castle Hayne Limestone indicates that measured porosity and permeability values are controlled chiefly by original skeletal mineralogy and post depositional diagenetic effects in the present non-marine environment.

Starting Date: 1969 Completion Date: 1972

2. Title: Petrography of the Durham-Deep River-Wadesboro Triassic Basin

Location: Eastern Piedmont, North Carolina, from Oxford to South Carolina line
Description: Approximately 500 samples are being examined in thin-section to determine areal variations in mineralogy, texture, bulk properties, and sedimentary structures. This data will be useful for predicting reservoir characteristics.

Starting Date: 1969

Completion Date: 1974
1. Title: Internal Anatomy of Parasitic Copepods
Location: Albemarle Sound; North Carolina Coast
Description: The reproductive systems of the female and the male are being investigated along with the other systems. Will this reflect the existing classification or not?
Starting Date: 1967 Completion Date: Continuing

2. Title: Occurrence of Ergot Fungus or Cord-grass
Location: Atlantic City, New Jersey, and Carteret County, North Carolina
Description: A study is begun on *Claviceps* sp. on several species of *Spartina*.
Starting Date: 1969 Completion Date: Continuing

1. Title: Studies on Reproduction and Fungal Parasites Affecting Reproduction in the Blue Crab, *Callinectes sapidus*
Location: Duke Marine Lab, Beaufort, North Carolina, and East Carolina University, Greenville, North Carolina
Description: A survey of the fungal pathogens of the Blue Crab and other crabs of the North Carolina coast.
Starting Date: 1970 Completion Date: 1975

Dr. Joseph G. Boyette
1. Title: Natural History and Ecology of Fishes Inhabiting Small Streams
Location: Eastern North Carolina
Description: Data are being gathered on pirate perch, mud minnows, swamp fish, brook lamprey, and others.
Starting Date: 1967 Completion Date: Continuing
Dr. Graham J. Davis

1. Title: Factors Affecting Growth and Reproduction of Submerged Aquatic Plants of the Currituck Sound, North Carolina

Location: East Carolina University, Currituck Sound and ECU Field Station at Manteo, North Carolina

Description: Seed germination, growth, and reproduction of aquatic seed plants as related to salinity, temperature and each other including field and laboratory studies. Special emphasis on Myriophyllum spicatum (Eurasian water milfoil).

Starting Date: 1970 Completion Date: Continuing

Dr. John S. Laurie

1. Title: Encystation of Marine Cercariae, One portion is essentially complete

Location: Beaufort/Morehead City, North Carolina; Gloucester, Massachusetts; Puget Sound, Washington

Description: The program involves the encystation of marine cercariae, the ultrastructure of marine parasites and eventually some from freshwater hosts; (experimental parasitology - 1971, international parasitology - 1972).

Starting Date: 1969 Completion Date: Continuing

Dr. James S. McDaniel

1. Title: Nutrition of Free-swimming Larval Helminths

Location: Greenville, North Carolina (Coastal waters of variable salinity)

Description: An attempt to determine the effect of natural and altered water systems on the invasive stages of helminth life cycles.

Starting Date: 1969 Completion Date: Continuing

Dr. Susan J. McDaniel

1. Title: Faunal Succession in Sandpits

Location: Pitt County, North Carolina

Description: Sand pits of known ages are being examined to determine successional processes and stages in zooplankton. Physical and chemical data are to be included.

Starting Date: 1972 Completion Date: 1973
1. Title: Reproductive Biology of the Blue Crab and the Maine Lobster in North Carolina Waters

Description: See Dr. Charles E. Bland for description.

Department of Geography

Dr. Richard A. Stephenson

1. Title: The Spatial Relationship of Land Use Development Patterns and Estuarine Shoreline Morphology

Location: Tar-Pamlico Estuary, North Carolina

Description: The primary objective of this research is to areally associate shoreline land use and shoreline forms, and delineate potential problem areas. Further, it is expected that a basic understanding of the geomorphic aspects of estuarine shorelines can be gained.

Starting Date: 1972 Completion Date: 1973

2. Title: A Classification System for Drainage Basins in North Carolina

Location: North Carolina

Description: Through the use of factor analytic procedures a classification of drainage basins can be devised. From this a regionalization of hydrologic phenomena can be advanced. To date hydrologic regions have been delineated on the basis of size only.

Starting Date: 1973 Completion Date: 1975

3. Title: Spatial Analysis of Flood Frequencies in the Southern Blue Ridge Mountains

Location: Western North Carolina, eastern Tennessee, and northern Georgia

Description: Twenty-five drainage basins are being studied for the purpose of understanding the differences spatially of floods and the factors that are related to these differences. A change occurs between $Q_{10}$ and $Q_{25}$ floods as well as large and small drainage basins.

Starting Date: 1966 Completion Date: 1973
1. **Title**: Groundwater Hydrology of North Carolina Coastal Plain  
   **Location**: North Carolina Coastal Plain  
   **Description**: A continuing study of the water quality and movement through Cretaceous and Tertiary aquifers.  
   **Starting Date**: 1968  
   **Completion Date**: Continuing

Dr. Stanley R. Riggs and Dr. Michael P. O'Connor

2. **Title**: Recent Sediments of Northeastern North Carolina Estuaries and Their Relation to Plio-Pleistocene Mineral Deposits  
   **Location**: East Carolina University and Northeastern Coastal North Carolina  
   **Description**: The objectives of this research are to provide (1) a basic understanding of the estuarine sediments of northeastern North Carolina; (2) an evaluation of the potentially economic sediment deposits; (3) knowledge of the temporal, spatial and genetic relationships of the sedimentary units; and (4) the development of models for sedimentary mineral exploration in the Plio-Pleistocene deposits of coastal northeastern North Carolina.  
   **Starting Date**: 1970  
   **Completion Date**: 1973

3. **Title**: Estuarine Geology and Ecology of the Pamlico River V and Northern Pamlico Sound  
   **Location**: Beaufort, Pamlico, and Hyde Counties, North Carolina  
   **Description**: This study is a part of a larger program involving study of the modern estuarine sediments and processes to provide models for interpreting the Tertiary stratigraphy of eastern North Carolina.  
   **Starting Date**: 1968  
   **Completion Date**: Continuing

4. **Title**: Late Cretaceous and Tertiary Stratigraphy of Eastern North Carolina  
   **Location**: Eastern North Carolina  
   **Description**: A continuing study involving detailed lithological and stratigraphic investigation of the surface and quarry exposures to clarify the regional stratigraphic framework for eastern North Carolina.  
   **Starting Date**: 1968  
   **Completion Date**: Continuing
Department of Sociology and Anthropology

Dr. David Sutton Phelps

1. Title: Preliminary study of Prehistoric Estuarine Adaptation

Location: ECU Marine Science Center, Manteo, North Carolina

Description: Archaeological survey of the central and northern banks and adjacent mainland for purpose of establishing settlement locations in conjunction with specific elements of environmental utilization.

Starting Date: 1972 Completion Date: 1973

Division of Continuing Education

Mr. James A. McGee

1. Title: Continuing Education Program for Commercial Fishermen

Location: East Carolina University

Description: A continuing education program for commercial fishermen in northeastern North Carolina. First phase of the program will deal with the development of skills and techniques of harvesting, processing, marketing and promoting seafood and marine products. The latter phase will be the training and upgrading of fishermen in current biological facts and principles relative to the marine environment. This will be done on a practical level which will insure application by the layman.

Starting Date: 1970 Completion Date: 1975
Department of Physical Sciences and Mathematics

Dr. Maurice C. Powers

1. Title: The Effect of Storm-caused and Man-caused Turbidity and Other Weather Related Conditions on Water Quality in The Upper Pasquotank River

Description: Determine amount and types of suspended matter and its effect on concentration levels of pollutants in the Upper Pasquotank River. The effects of turbidity sweep and precipitation on water quality will be analyzed in the field and with laboratory models.

Starting Date: 1973 Completion Date: 1975

2. Title: Shoreline Erosion Along the Pasquotank and Perquimans Rivers

Location: N. E. North Carolina

Description: Study of the causative factors, erosion rates, amounts of erosion, economic loss, preventive methods, and attitudes and concern about the problem.

Starting Date: 1973 Completion Date: 1975
OTHER COLLEGES AND UNIVERSITIES:

Campbell College
Duke University
Guilford College
Mars Hill College
St. Andrews Presbyterian College
Department of Geology

Dr. Robert L. Perkins

1. Title: Water Quality of the Upper Cape Fear River Basin
   
   Location: Haw and Deep Rivers (Chatham County), and Cape Fear (Harnett County)
   
   Description: Nine stations on the Haw, Deep, and Cape Fear Rivers are being monitored weekly. Samples are being checked for NO$_3^-$, PO$_4^{3-}$, CO$_2$, color, turbidity, pH, chlorides, and temperature.
   
   Starting Date: 1971 Completion Date: Continuing

Dr. Charles Yarbrough and Dr. Robert L. Perkins

1. Title: Mercury Pollution of the Upper Cape Fear River Basin
   
   Location: Haw, Deep, and Cape Fear Rivers (Chatham and Harnett Counties)
   
   Description: Water, sediments, and biota will be examined and analyzed for mercury content. Aims of the study are: (1) determine Hg content of water and sediments, and (2) determine which organisms are concentrating Hg and in what quantities.
   
   Starting Date: 1972 Completion Date: Continuing
Graduate School of Arts and Sciences

Department of Botany

Dr. Paul J. Kramer

1. Title: Effects of Water Stress on Plant Processes

Location: Durham, North Carolina

Description: This includes measurements of effects of water stress on shoot and root growth, processes such as photosynthesis, respiration, translocation, absorption of salt and water and stomatal opening and study of causes for differences in susceptibility to injury from drought.

Starting Date: 1968 Completion Date: 1974

2. Title: Causes of Differences in Drought Resistance

Location: Durham, North Carolina

Description: An attempt to learn more precisely in terms of plant processes and structures why some species and varieties of plants are more drought resistant than others.

Starting Date: 1969 Completion Date: 1974

Dr. Richard B. Searles

1. Title: Phenological Studies of Marine Algae Associated with Grass Beds

Location: Duke University Department of Botany, Durham, North Carolina, and Duke Marine Laboratory, Beaufort, North Carolina

Description: Collection and identification of algae from Zostera and Diplanthera beds in the Beaufort region throughout the year.

Starting Date: 1968 Completion Date: Continuing

2. Title: Studies of Marine Algae from Off-shore Rock Outcrops

Location: Durham and Beaufort, North Carolina

Description: Collection and identification of attached marine algae growing on the rock outcrops off the Carolinas.

Starting Date: 1968 Completion Date: Continuing
Department of Physiology and Pharmacology

Dr. Toshio Narahashi

1. Title: Neuropharmacology of Marine Toxins

Location: Duke University, Durham, North Carolina

Description: The mechanisms of action of a variety of toxins from marine sources on excitable tissues are studied.

Starting Date: 1972     Completion Date: 1975

Duke Marine Laboratory, Beaufort, North Carolina

Note: The following projects are being conducted through the Duke University Marine Laboratory at Beaufort, North Carolina.

Departments of Botany and Zoology (Marine Lab)

Dr. Richard Barber and Dr. Susan Huntsman

1. Title: Phytoplankton Nutrition and Organometallic Complexes in the Sea

Location: Duke University Marine Laboratory

Description: This research studies the interaction between phytoplankton and metals in the sea concentrating on the role of organo-metals formed by the chelation of transition metals with biogenic organic ligands. Electron paramagnetic resins and continuous culture methods will be used in this study.

Starting Date: 1971     Completion Date: 1972

Department of Geology (Marine Lab)

Dr. Orrin H. Pilkey

1. Title: Marine Geology of the Atlantic Shelf of the Southeastern United States

Location: Durham and Beaufort, North Carolina

Description: This is an investigation of the major sediment parameters between Cape Hatteras, North Carolina, and Cape Kennedy, Florida. Included in this is an inventory of possible economic mineral resources. Special emphasis is being placed on carbonate sedimentation.

Starting Date: 1965     Completion Date: Continuing
2. Title: Sedimentation in Deep Bahama Basins
   Location: Various Bahama Banks Re-entrants
   Description: A study of turbidity current sedimentation in deep basins. The purpose is to map individual turbidity current flows and calculate their dynamic characteristics.
   Starting Date: 1971   Completion Date: Continuing

3. Title: North Carolina Continental Rise Sedimentation
   Location: North Carolina Continental Rise
   Description: Piston core study to investigate the relative importance of bottom currents and turbidity currents information of the Continental Rise.
   Starting Date: 1970   Completion Date: Continuing

Oceanographic Program (Marine Lab)

Dr. Susan Huntsman and Dr. Richard Barber

1. Title: Phytoplankton Nutrition and Organometallic Complexes in the Sea
   Description: See Dr. Richard Barber, Departments of Botany and Zoology (Marine Laboratory), for description.

Mr. John G. Newton

1. Title: Extensions of Submarine Canyons on the Hatteras Abyssal Plain
   Location: Duke University Marine Laboratory
   Description: Hatteras Canyon and other canyons from the North-eastern United States terminate in the Hatteras Abyssal Plain. Charts and block diagrams are being constructed to show the extent of these features.
   Starting Date: 1969   Completion Date: Continuing

2. Title: Subsurface Features of the North Carolina Continental Shelf
   Location: Duke University Marine Laboratory
   Description: Buried channels and northeastward dipping sub-bottom reflecting surfaces are found on the Continental Shelf off Southport, North Carolina. Mapping these features is in progress.
   Starting Date: 1971   Completion Date: Continuing
Mr. John G. Newton and Dr. I. E. Gray

1. Title: A Marine Biological Atlas of North Carolina
   
   Location: Duke University Marine Laboratory
   
   Description: Atlas providing reference material concerning benthic flora and fauna and descriptions of habitats.
   
   Starting Date: 1970  Completion Date: 1972

Department of Physiology and Pharmacology (Marine Lab)

Dr. Raymond Gilles

1. Title: Cellular Volume Regulation in *Callinectes sapidus* During Changes in the Salinity of the Environment
   
   Location: Marine Membrane Physiology Laboratory, Beaufort, North Carolina
   
   Description: This project is devoted to the study of the part taken by amino acids in the cellular volume adjustment of the nerves of *Callinectes sapidus* during its adaptation to media of various salinities.
   
   Starting Date: 1970  Completion Date: 1973

2. Title: Intermediary Metabolism and Energy Production in *Callinectes sapidus* During the Osmoregulation Process
   
   Location: Marine Membrane Physiology Laboratory, Beaufort, North Carolina
   
   Description: This project attempts to study the part taken by carbohydrates and amino acids in the production of the energy required by *Callinectes sapidus* for its adaptation to changes in the salinity of the environment.
   
   Starting Date: 1970  Completion Date: 1973

3. Title: The Anaerobic Metabolism in Intertidal Molluscs
   
   Location: Marine Membrane Laboratory, Beaufort, North Carolina; and Molecular Biology Division, Veterans Administration Hospital, San Francisco, California
   
   Description: This project will study the anaerobic metabolism of *Mytilus californianus* during changes in the quality of the environment (mainly oxygen availability).
   
   Starting Date: 1971  Completion Date: 1974
Dr. Michelle Gilles-Baillien

1. Title: Modifications in the Composition of the Blood and Tissues and Osmoregulation in the Diamondback Terrapin

Location: Marine Membrane Physiology Laboratory, Beaufort, North Carolina

Description: A study of the evolution of the osmotic pressure and of the concentrations in Na, K, Cl, urea and amino acids when the diamondback terrapin is adapted from seawater to freshwater.

Starting Date: 1970  Completion Date: 1973

2. Title: Changes in the Permeability Characteristics at the Level of the Bladder, Colon and Jejunum Mucosae During Osmotic Stress

Location: Marine Membrane Physiology Laboratory, Beaufort, North Carolina

Description: A study of the permeability to water and Na for all three epithelia when the diamondback terrapin is adapted from seawater to freshwater.

Starting Date: 1970  Completion Date: 1973

3. Title: Hibernation and Osmoregulation Process in the Diamondback Terrapin

Location: Marine Membrane Physiology Laboratory, Beaufort, North Carolina

Description: Essentially a study of the modifications in the composition of blood and tissues of terrapins hibernating either in seawater or in freshwater.

Starting Date: 1970  Completion Date: 1973

Department of Zoology (Marine Laboratory)

Dr. C. G. Bookhout

1. Title: The Effects of Controlled Environmental Factors on the Development of Estuarine and Oceanic Crustacea

Location: Duke University Marine Laboratory, Beaufort, North Carolina

Description: Objectives: (1) to study, under controlled laboratory conditions, the larval development of crabs and barnacles; (2) to determine how temperature, salinity, light and pesticides affect molting and survival, and (3) to study the distribution of crab larvae in offshore waters of North Carolina.

Starting Date: 1963  Completion Date: Continuing
2. Title: Predoctoral and Postdoctoral Oceanographic Trainee Awards for Research Aboard RV/EASTWARD

Location: Duke University Marine Laboratory, Beaufort, North Carolina

Description: The objectives of the training awards are to provide a nucleus of vigorous young people studying the various aspects of biological oceanography or research projects complementary to and compatible with biological oceanography; e.g., marine geology, chemical oceanography, etc., using the RV/EASTWARD and shore facilities at the Duke University Marine Laboratory. The awards are intended to provide the requisite added sea experience for students who have completed their doctorate. In their sea training and research, trainees are encouraged to develop competence as chief scientists aboard the EASTWARD before their research is completed and to lead one or more expeditions.

Starting Date: Continuing  Completion Date: Continuing

Dr. William L. Bretz

1. Title: The Hydrodynamic Relationships Between Sessile and Benthic Marine Organisms and Their Ambient Water Currents

Location: Beaufort, North Carolina

Description: To examine some of the hydrodynamic relationships between sessile and benthic marine organisms and their ambient water currents and to evaluate their biological importance.

Starting Date: 1971  Completion Date: 1972

Dr. John D. Costlow, Jr.

1. Title: The Effects and Controlled Environmental Factors on the Development and Endocrine Mechanisms of Crustacean Development

Location: Beaufort, North Carolina

Description: What endocrine mechanisms are present in crustacean larvae and what part do they play in development.

Starting Date: 1969  Completion Date: 1973

2. Title: Studies on Molting and Growth in Larval and Adult Barnacles and Larval Decapods

Location: Duke University Marine Laboratory

Description: How molting and growth in larval and adult barnacles and larval decapods are influenced by endocrine.

Starting Date: 1970  Completion Date: 1973
Dr. I. E. Gray and Mr. John G. Newton

1. Title: A Marine Biological Atlas of North Carolina

Description: See Mr. John G. Newton, Oceanographic Program (Marine Lab), for description.

School of Engineering

Department of Civil Engineering

Dr. Jarir S. Dajani

1. Title: Optimization of Wastewater Collection Networks

Location: Duke University, Durham, North Carolina

Description: Application of systems analysis and operations research techniques to effect efficiencies in the planning and design of urban and regional wastewater collection networks.

Starting Date: 1971 Completion Date: Continuing

Dr. Bruce J. Muga

1. Title: Engineering Systems

Location: Department of Civil Engineering, Duke University

Description: Engineering systems for handling ship ballast water and refinery tankage wastes. Studies and reports are proprietary. Investigation supported by major petroleum producer.

Starting Date: Ongoing Completion Date: Continuing

2. Title: Fluid Transfer Systems

Location: Department of Civil Engineering, Duke University

Description: High rate (13,000 tons/hour) fluid transfer systems for crude oil and hydrocarbon products from ship to shore. Studies and reports are proprietary. Investigation supported by major petroleum producer.

Starting Date: Ongoing Completion Date: Continuing

Dr. P. A. Vesilind

1. Title: Viral Contamination of Streams

Location: Duke University, Department of Civil Engineering
1. Title: Modeling the Energy and Water Balance of Natural Ecosystems

Location: Durham, North Carolina

Description: The development of computer simulation models, based on fundamental physical and biological processes, for the prediction of the energy and water balance of natural ecosystems.

Starting Date: 1969 Completion Date: Continuing

2. Title: Application of the Energy Balance Approach to the Interpretation of Watershed Response

Location: Franklin, North Carolina

Description: A cooperative study with the U.S. Forest Service, Coweeta Hydrologic Laboratory, Franklin, North Carolina with Mr. Lloyd W. Swift as principal investigator for the Forest Service. The study will evaluate the relationship between changes in the surface energy balance and changes in watershed yield produced by the removal of forest cover. These energy balance-water yield relationships will be investigated on both north and south facing watersheds to provide the maximum contrast in watershed energy supply.

Starting Date: 1966 Completion Date: Continuing

School of Forestry

Dr. Kenneth R. Knoerr

2. Title: Dewatering of Concentrated Mixed Liquor

Location: Duke University

Description: Development of a means for dewatering high solids concentration mixed liquor. This method would ideally replace final clarification in activated sludge plants.

Starting Date: 1972 Completion Date: Continuing

3. Title: Sludge Preservation

Location: Duke University

Description: A method for preserving sludge without affecting its dewaterability characteristics is needed. This will allow the transport of wastewater sludges for subsequent analysis.

Starting Date: 1972 Completion Date: Continuing

Description: The prevalence and movement of viruses and potential hazards to public health.

Starting Date: 1971 Completion Date: Continuing
Dr. James E. Wuenscher

1. Title: Environmental Considerations in Land and Water Use Planning in River Basins

Location: Eno River Basin, Orange and Durham Counties, North Carolina

Description: Development of techniques for the use of ecosystems as the basic unit for resource use planning, with particular emphasis on river basin systems. A complete ecological survey of the Eno River Basin will be used as the basis for an ecologically sound land-use plan.

Starting Date: 1971 Completion Date: 1973
1. Title: Taxonomy of the Hydras Using Limnological Methods

Location: Several small lakes and ponds in the Piedmont of North Carolina

Description: The taxonomy of this small group of organisms is in very poor condition chiefly related to the fact that it is necessary to study reproducing forms in order to make final classifications. As a result of previous studies, this program attempts to reexamine the taxonomy of the hydras.

Starting Date: 1959  Completion Date: 1972
MARS HILL COLLEGE
1. Title: Effects of Silt and Temperature on Fish and Other Aquatic Life

Location: Mars Hill, North Carolina

Description: Studies to observe, determine, and compare the effects of silt and temperature on fish and other aquatic organisms in streams of western North Carolina.

Starting Date: 1972 Completion Date: 1973

2. Title: Studies of the Ecology, Distribution, Life History, and Taxonomy of Fishes and Salamanders in western North Carolina and the Southeast

Location: Mars Hill, North Carolina

Description: Field observations and studies concerning the ecological relationships, distribution, life history, and taxonomy of fishes and salamanders in western North Carolina and the Southeast including biotic, chemical, and physical factors; habitat and niche relations and other conditions.

Starting Date: 1972 Completion Date: 1973
Division of Mathematics and Natural Science

Department of Biology

Dr. Clarence E. Styron

1. Title: Effects of Calefaction and Salinity Stresses on Survival, Growth, and Feeding Rates of the Hard Clam, Mercenaria mercenaria

Location: St. Andrews College, Laurinburg, North Carolina

Description: Effects of calefaction and salinity stresses on survival, growth, and feeding rates of Mercenaria mercenaria larvae and young are being investigated via factorial experiments under laboratory conditions.

Starting Date: 1971 Completion Date: Continuing

Dr. Clarence E. Styron, Dr. A. L. Applegate, and Dr. James F. Stephens (Chemistry)

1. Title: Impact of Harvesting and Habitat Modification on the Estuarine Organismic-Environmental Complex

Location: Laurinburg, North Carolina, and Wrightsville Beach, N. C.

Description: The research plan consists of a team study on effects of destructive harvesting techniques on the capability of marsh ecosystems to maintain commercially important species.

Starting Date: 1972 Completion Date: 1975

Department of Chemistry

Dr. James F. Stephens, Dr. A. L. Applegate (Biology), and Dr. Clarence E. Styron (Biology)

1. Title: Impact of Harvesting and Habitat Modification on the Estuarine Organismic-Environmental Complex

Description: See project listed above.
Dr. Ralph W. Brauer

1. Title: Development of a High Pressure Aquarium

Location: Wrightsville Marine Bio-Medical Laboratory

Description: This facility will be equipped to receive and maintain deep-water organisms under the high-pressure and low-temperature conditions in which they live in the ocean. Thus, such activities as metabolism and reproduction can be studied in these forms, whose biology is still extremely poorly understood.

Starting Date: 1970  Completion Date: Continuing
Title: Removal of Toxic Metals from Water by Reverse Osmosis

Location: Research Triangle Institute, and UNC Wastewater Research Center

Description: This project is to evaluate the effectiveness of reverse osmosis in removing trace metallic contaminants from brackish waters, typical potable waters, and effluent waters from waste treatment plants.

Starting Date: 1972 Completion Date: 1973
PRIVATE INDUSTRY
Champion Papers

1. Title: Ultrafiltration Project
Location: Canton Mill, Canton, North Carolina
Description: Investigation of the use of the ultrafiltration process to remove color from pulp mill effluents.
Starting Date: 1972 Completion Date: 1973

Cone Mills Corporation

1. Title: Research on Textile Wastes
Location: Greensboro, North Carolina
Description: Continuous studies on treatment of textile wastes from finishing and dyeing and effect of changeover to biodegradable compounds on treatment.
Starting Date: Continuing Completion Date: Continuing

2. Title: Research on Lint-bearing Textile Wastes
Location: Haw River, North Carolina
Description: Study of effect of large amounts of short fibers in wastes on treatment.
Starting Date: Continuing Completion Date: Continuing

3. Title: Research on Textile Wastes
Location: Greensboro, North Carolina
Description: Study of treatment beyond secondary treatment and the cost in relation to accomplishments.
Starting Date: Continuing Completion Date: Continuing

4. Title: Catalyzed Bio-oxidation and Tertiary Flocculation on Textile Wastewater to Achieve Processed Water Quality for Reuse
Location: Greensboro, North Carolina
Description: This project is being conducted to determine a process that would upgrade activated sludge treatment system to remove phosphate, color, suspended solids, BOD and COD to real high degrees.
Starting Date: 1971 Completion Date: 1972
Carolina Power and Light Company

1. Title: The Effects of Power Plant Operation on the Ecology in the Vicinity of an Estuarine Intake and Ocean Discharge

Location: Southport, North Carolina

Description: This study includes a field program to investigate the effect of plant operation on the environment and a laboratory program to determine the effects of temperature acclimation, salinity, photoperiod and life stage on thermal tolerance of important marine and estuarine organisms.

Starting Date: 1968 Completion Date: 1975+

2. Title: The Effect of Thermal Loading on the Water Balance of a Large Cooling Lake

Location: Roxboro, North Carolina

Description: See project description for item 12 listed under Federal Agencies - USGS.

Starting Date: 1964 Completion Date: 1973

Duke Power Company

1. Title: Limnological Studies of Hydroelectric Impoundments

Location: Catawba River, North and South Carolina

Description: The effect of operation of reservoirs for hydroelectric purposes is investigated from the viewpoint of chemical water quality. Samples are taken at selected sites from each of twelve reservoirs on a monthly basis from November through April and on a biweekly basis from May through October. These samples are analyzed for dissolved oxygen, temperature, pH, turbidity, total iron, total manganese and biochemical oxygen demand. The results from these analyses are stored in the data bank program of Duke Power Company's electronic computer.

Starting Date: 1959 Completion Date: Continuing

2. Title: A Study of the Physical and Biological Principles Relating to Power Plant Condenser Cooling Water Discharges

Location: Lake Norman near Marshall Steam Station

Description: The distribution and biological effects of cooling water discharged from a thermal power plant will be investigated by obtaining hydrographic, meteorological and biological data. These studies will attach scientific significance to some empirical factors used in predicting the size of heat dissipation areas at both proposed and existing thermal plants under various plant loading and meteorological conditions.

Starting Date: 1966 Completion Date: Continuing
Federal Paper Board Company, Inc.

1. Title: Development of Disposal Facilities for Kraft Pulping Sludge

Location: Riegelwood, North Carolina

Description: Development of disposal system to permit abandonment of odor-generating storage basins; use as land-fill material, recovery for use in low grade products.

Starting Date: 1967 Completion Date: 1973

Fieldcrest Mills, Inc.

1. Title: Reduction of Chemical Use and Sludge Disposal

Location: Foremost Screen Print Plant, Stokesdale, North Carolina

Description: To reduce the amount of sludge to incinerate is the purpose. By changing recycling, point of chemical additions and sludge treatment, we expect to reduce sludge 40% and cost of sludge disposal.

Starting Date: 1972 Completion Date: 1972

2. Title: Study on Recycling Textile Finishing Waste

Location: North Carolina Finishing Company, Salisbury, North Carolina

Description: C. T. Main has project to study feasibility of recycling treated wastewater for dyeing and finishing textile cloth.

Starting Date: 1972 Completion Date: 1972

Martin Marietta Corporation - Southern Dyestuff Company

1. Title: Biological Oxidation and Chemical Coagulation of Dyestuff and Organic Chemical Wastes

Location: Charlotte, North Carolina

Description: The grantee will design, construct, operate, and evaluate a waste treatment system for the control of wastes from a textile dyestuff and organic chemicals plant. The plant produces over 200 different dyestuff products and more than 40 aromatic organic chemicals. The plant will be designed to handle a flow of 2.2 mgd with a BOD of 760 mg/l, a COD of 1750 mg/l, suspended solids of 350 mg/l and a high color content. The waste treatment system consists of biological decomposition of a thiosulfate waste stream, pH control of acid and alkaline waste streams and biological oxidation, coagulation and clarification of the combined wastes. The system will be operated for a twelve-month period in order to determine the unit process operating parameters and system characteristics.
In addition, pilot plant studies will be conducted to determine the basic design factors needed to upgrade the system's treatment capabilities for color removal.

Starting Date: 1971 Completion Date: 1973

Weyerhaeuser Company

1. Title: A Sport and Commercial Fisheries Survey of the Lower Neuse River, North Carolina

Location: Neuse River

Description: The sport and commercial catches of fish and shellfish are being investigated. Detailed creel censuses and published data are utilized. Reproduction and spawning success are determined each year. These studies provide an annual index of relative abundance. Age and growth studies for various species in the sport and commercial catch are being conducted.

Starting Date: 1969 Completion Date: 1974
STATE AGENCIES
1. Title: Regional Water Supply and Sewage Disposal Systems Planning
   Location: N. C. Multi-County Planning Regions D, E, J, K, and L
   Description: Multi-county regional plans based on water supply and water quality analyses which are in turn related to projected population and economic base. EPA and interim sub-basin plan requirements will also be fulfilled.
   Starting Date: 1971 Completion Date: 1972

2. Title: Preliminary Water and Sewer Studies
   Location: State designated Regions C, H, K, and N
   Description: First stage regional water and sewer plan; develop framework for regional water and sewer planning.
   Starting Date: 1972 Completion Date: 1973

3. Title: Secondary Water and Sewer Studies
   Location: State designated Regions P and Q
   Description: Second stage water/sewer study based on findings in initial study now in progress.
   Starting Date: 1972 Completion Date: 1973

4. Title: FMHA Regional Water Supply Systems Planning and Regional Sewage Disposal Systems Planning
   Location: State designated Regions D, E, and L
   Description: Identify existing water supply and sewage disposal systems and project future water consumption and requirements and waste water discharge and characteristics to year 2020. Recommend alternative solutions for water supply and sewage disposal.
   Starting Date: 1972 Completion Date: 1972
1. Title: Exploratory Fishery Program R/V Dan Moore

Location: Continental Shelf Waters off North Carolina

Description: State program to inventory the faunal components of commercial or potential commercial value off the North Carolina sea coast to determine their availability and suitability to established or new methods of harvesting.

Starting Date: 1968    Completion Date: Continuing

2. Title: Oyster Rehabilitation Program

Location: Morehead City, North Carolina

Description: To establish and manage state oyster management areas throughout the coastal area. This involves planting seed oysters and shells. Other cultch such as marl is being planted experimentally and compared with proven oyster shells.

Starting Date: Continuing    Completion Date: Continuing

3. Title: Survey of Nursery Areas in Western Pamlico Sound #2-175-R

Description: To locate, define, and delineate nursery areas utilized by economically important species of marine and estuarine finfish and crustaceans in Western Pamlico Sound, North Carolina.

Starting Date: 1972    Completion Date: 1974

4. Title: Shrimp Studies

Location: Morehead City, North Carolina

Description: To obtain migration, growth, mortality, and yield potential information necessary for management of the species.

Starting Date: 1970    Completion Date: 1972

5. Title: Calico Scallop Studies

Location: Morehead City, North Carolina

Description: To conduct exploratory fishing and obtain biological information on calico scallop stocks offshore coastal North Carolina.

Starting Date: 1971    Completion Date: 1974
6. Title: Anadromous Fish Studies
Location: Morehead City, North Carolina
Description: Joint project inshore and offshore northern area of North Carolina to determine offshore and inshore utilization, spawning areas, nursery areas, spawning success and survival.
Starting Date: 1971  Completion Date: 1974

7. Title: Jelly Fish Studies
Location: Morehead City, North Carolina
Description: Conduct survey of species composition, determine relative and seasonal abundance, environmental conditions affecting occurrence, and economic impact of noxious coelenterates in coastal North Carolina.
Starting Date: 1971  Completion Date: 1974

8. Title: Continuing Survey, Inventory, and Monitoring of Fish Populations in Estuarine Areas
Location: Morehead City, North Carolina
Description: Continuing program to obtain information necessary for zoning estuarine areas and developing management plan.
Starting Date: 1970  Completion Date: Continuing

Wildlife Resources Commission

Division of Game

1. Title: Investigations of Potential Management Areas
Location: Statewide
Description: To undertake investigations of wetland areas which are considered suitable for future development as waterfowl management areas.
Starting Date: 1971  Completion Date: Continuing
2. Title: Waterfowl Population Inventories  
Location: Coastal North Carolina  
Description: To determine waterfowl populations, trends, fluctuations and species compositions.  
Starting Date: 1972 Completion Date: Continuing

3. Title: Kill and Hunter Data  
Location: Currituck and Lake Mattamuskeet, North Carolina  
Description: To determine numbers and kinds of waterfowl killed, kill per hunter-day, average hunter-kill per season, total kills and crippling loss.  
Starting Date: 1971 Completion Date: Continuing

4. Title: Waterfowl Banding  
Location: Statewide  
Description: To band waterfowl with special emphasis on wood ducks and black ducks.  
Starting Date: 1971 Completion Date: Continuing

5. Title: Experimental Management of Impounded Salt Marshes  
Location: Gull Rock, Goose Creek, Pamlico Point, White Oak River Impoundments and Orton Plantation  
Description: To determine the value of impounded salt marshes for waterfowl. To determine the practicability of this type of impoundment for refuges and public hunting areas in coastal North Carolina.  
Starting Date: 1971 Completion Date: Continuing

6. Title: Effects of Environmentally Disruptive Projects and Practices on Wildlife Populations and Habitats  
Location: Statewide  
Description: The objective is to assess the magnitude and consequence of environmental projects, to depict these losses accurately, and to plan mitigation measures to compensate in kind and quantity for the wildlife losses incurred.  
Starting Date: 1972 Completion Date: Continuing
7. Title: Waterfowl Management Plan for Salt Marsh Impoundments

Location: Pamlico Sound

Description: The objective is to develop and evaluate management techniques to increase waterfowl food plant availability and sanctuary values on salt marsh impoundments and to study successional aspects of marsh productivity to waterfowl.

Starting Date: 1972       Completion Date: 1974

8. Title: Waterfowl Populations in North Carolina

Location: Statewide

Description: The objective is to determine the statewide waterfowl populations, trends, fluctuations, species compositions, and distributions.

Starting Date: 1972       Completion Date: Continuing

9. Title: Waterfowl Hunter and Harvest Data

Location: Eastern North Carolina

Description: The objective of this study is to determine numbers and kinds of waterfowl harvested, kill per hunter-day and season, kill by area, and crippling losses.

Starting Date: 1972       Completion Date: Continuing

10. Title: Waterfowl Banding

Location: Statewide

Description: This study objective is to generate banding return data which can be used to estimate survival and movement patterns of waterfowl.

Starting Date: 1972       Completion Date: Continuing

Division of Inland Fisheries

1. Title: Management Recommendations

Location: Statewide

Description: Secure the framework of reference and, through analyses of the data so obtained, derive specific management recommendations directed towards increased game-fish productivity within, and improved accessibility to, the Inland Fishing Waters.

Starting Date: 1971       Completion Date: 1974
2. Title: River Basin Studies

Location: Statewide

Description: To study the probable effects of highway, dredging, waste disposal, or water development projects and, if indicated, to develop project modifications for the purpose of eliminating, reducing, or mitigating damage to the fishery resources.

Starting Date: 1971  Completion Date: 1974

3. Title: Biological Monitoring

Location: Statewide

Description: To develop and calibrate an artificial technique for utilizing benthic invertebrates as indicators in the continuous biological monitoring of water quality.

Starting Date: 1972  Completion Date: 1974

4. Title: Development of the Sport Fishing Potential of an Industrial Cooling Lake

Location: Duke Power Company Impoundment of Belews Creek, Forsyth County

Description: To trace the environmental changes and fish population development in a new 3.775-acre lake constructed to dissipate waste condenser heat from a major steam generating plant.

Starting Date: 1971  Completion Date: 1974

5. Title: The Mortality of Young Fishes in Water-Supply Diversions

Location: Statewide where circumstances permit

Description: A pilot study to explore the magnitude of and to develop methods for investigating the mortality of eggs and young fishes in raw-water diversions into pump intakes.

Starting Date: 1971  Completion Date: 1973

6. Title: Biology of the Striped Bass Populations Spawning in the Tar and Neuse Rivers

Location: Lower Neuse River

Description: To better define the biology and ecology of the striped bass populations spawning in the Tar and Neuse Rivers.

Starting Date: 1971  Completion Date: 1974
7. Title: The Biology and Effective Management of the Redbreast Sunfish in North Carolina

Location: Southeastern North Carolina

Description: To determine the ecology and effective management of redbreast sunfish in North Carolina waters.

Starting Date: 1971 Completion Date: 1974

8. Title: The Use of Dyes in Pond Vegetation Control

Location: Six experimental ponds in Piedmont North Carolina

Description: A pilot study to explore the biological and economic feasibility of controlling excessive growth of submerged vegetation in fishing ponds through light screening of non-toxic dye concentrations.

Starting Date: 1971 Completion Date: 1974

9. Title: Small Lake Management

Location: Lakes Fisher and Concord, Cabarrus County

Description: To evaluate in terms of the game-fish harvest, certain fish-management practices applicable principally to restricted use municipal water supply lakes.

Starting Date: 1971 Completion Date: 1974

10. Title: The bioeconomics of Supplemental Feeding Waters Under "Native Trout" Regulations

Location: Steels Creek and Upper Creek, Daniel Boone Wildlife Management Area

Description: To explore the biological and economic feasibility of supplemental feeding as a method for increasing the carrying capacity of trout waters.

Starting Date: 1971 Completion Date: 1974

11. Title: Effectiveness of Flathead Catfish as an Auxiliary Predator

Location: North Carolina

Description: To determine the feasibility of utilization of flathead catfish as an auxiliary predator on unbalanced fish populations that have largemouth bass as the primary predator.

Starting Date: 1972 Completion Date: 1974
12. Title: Environmental Surveillance

Location: North Carolina

Description: (1) To supply consultative services, principally to developmental agencies, respecting the preservation of fish and wildlife habitat; (2) to formulate the official position of the Wildlife Resources Commission in the habitat of wildlife or of the inland fishes; and (3) to prepare Environmental Impact Statements for Wildlife Resources Commission activities pursuant to the requirements of the North Carolina Environmental Policy Act of 1971.

Starting Date: 1973 Completion Date: 1974

Office of Industrial Tourist and Community Resources

1. Title: Assimilative Capacities of North Carolina Rivers

Location: North Carolina

Description: The classical Streeter-Phelps Model is being used to estimate the quantity of biochemical oxygen demand which might be discharged without contravening stream standards at existing State sampling stations. These estimations are being made at all points along the Cape Fear and Neuse Rivers during periods of critical flow. Preliminary analyses are being performed on the major eastern river basins.

Starting Date: 1972 Completion Date: 1972

Office of Water and Air Resources

1. Title: An Evaluation of the Effects of Stream-Channel Improvements on the Hydrologic Conditions in the Creeping Swamp Creek Subwatershed

Location: The study area includes about 20 square miles of the subwatershed in Pitt, Craven, and Beaufort Counties, North Carolina

Description: The objective of this study is to evaluate the effect of stream-channel improvement on ground water hydrology. Groundwater, surface-water and rainfall monitoring stations will be used to observe the long-term hydrologic relationships between channel improvement and ground-water conditions.

Starting Date: 1971 Completion Date: 1981
2. Title: An Evaluation of the Relationship of Field and Laboratory Permeabilities of Selected Coastal Plain Aquifers

Location: A continuing program to include the entire Coastal Plain. Initial work to be done in the Robeson County area.

Description: This study is a part of a statewide program of aquifer evaluation. The study will compare the hydraulic coefficients of aquifers obtained from field pumping tests and those obtained from laboratory testing. The resulting relationships should provide additional useful tools for aquifer evaluation when field pumping tests cannot be conducted.

Starting Date: 1971 Completion Date: Continuing

3. Title: A Hydrogeologic Cross-Section of the Southern Coastal Plain of North Carolina

Location: Hoke, Robeson, Bladen, Columbus, and Brunswick Counties

Description: The object of this study is to identify, evaluate and correlate the aquifers and aquitards of the Southern Coastal Plain by construction of a series of multi-well ground-water research stations. Such research is vital to the proper development of the water resources of this region.

Starting Date: 1970 Completion Date: 1972

4. Title: Groundwater Conditions in the Bodie Island-Roanoke Island Area, Dare County, North Carolina

Location: Dare County, North Carolina

Description: A study of the nature and occurrence of ground water in sand aquifers of the Outer Banks and adjacent areas in N.E. Dare County with special reference to the relationship of salinity to aquifer permeability.

Starting Date: 1972 Completion Date: 1972
FEDERAL AGENCIES
Tennessee Valley Authority

1. Title: Effect of System of Small Dams on Flood Reduction

   Location: Tennessee Valley

   Description: This research is on the effect of systems of small dams on flood reduction as well as the combined effect of improvements in watershed management and dams on water yield, erosion, and sedimentation.

   Starting Date: Continuing    Completion Date: Continuing

2. Title: Upper Bear Creek Experimental Project

   Location: Northwestern Alabama

   Description: This research project is being conducted to evaluate timber management practices on two small catchments. On one, the current U.S. Forest Service cutting practices used on Alabama National Forests have been implemented, while on the other, steps will be taken to minimize adverse effects of road building and harvesting operations. Data are being collected on both water quantity and quality. These data will be used both to quantify the effects of the two different levels of management and to provide information for use in TVA streamflow models which in turn can be used to project the effect of similar practices elsewhere.

   Starting Date: 1962    Completion Date: 1972

3. Title: Thermal Phenomena in Hydrologic Systems

   Location: Tennessee Valley

   Description: The purpose of the study is to develop means of predicting water temperatures downstream from a source of temperature change as a function of time and distance from the source.

   Starting Date: Continuing    Completion Date: Continuing

4. Title: Determination of Effects of Reservoirs on Water Quality

   Location: Tennessee Valley

   Description: Identification and quantitative evaluation of changes or effects on water quality brought about by impoundment in reservoirs. Verification of a mathematical model to predict the thermal structure of a reservoir and the outflow temperature is now underway.

   Starting Date: Continuing    Completion Date: Continuing
5. Title: Factors that Control the Growth of Aquatic Weeds

Location: Tennessee Valley

Description: The role of factors that control rates of growth and total standing crops of both planktonic and benthic plants is being studied in streams, reservoirs, and in the laboratory.

Starting Date: 1967 Completion Date: Continuing

6. Title: Efficiency of Fertilizer Use as Affected by Removal in Runoff and Drainage Water

Location: Western North Carolina, East Tennessee, and North Alabama

Description: This project will determine the extent to which fertilizer constituents are removed from a watershed in surface runoff and ground-water flow, so that judgments may be made as to the efficiency of fertilizer use and the chemical quality of downstream surface waters.

Starting Date: 1968 Completion Date: Continuing

7. Title: Aquatic Weed Control

Location: Tennessee Valley

Description: Studies of Eurasian watermilfoil and other aquatic weeds have been focused on methods of reproduction, vegetative colonization potential, water depths occupied, response to water level manipulation, and potential methods of control including the use of herbicides. Future studies will be directed toward determining the role of environmental factors in aquatic weed control, such as nutrient and other ecological requirements, pathogens, insect vectors of plant disease organisms, insects as direct control agents, aquatic plant competition, and possibly the role of herbivorous fish.

Starting Date: Continuing Completion Date: Continuing

8. Title: Water Resource Management Model

Location: Tennessee Valley

Description: To develop a family of mathematical prediction models which would ultimately be sensitive to all system water management objectives. Initial emphasis will be on the evaluation of the impact of a flow requirement on quantity, quality, and economy parameters of the reservoir system.

Starting Date: 1970 Completion Date: Continuing
9. Title: Urban Hydrology Study
   Location: Knoxville, Tennessee
   Description: The objective of this study is to quantify with mathematical models the changes in quantity, rate, and quality of streamflow that result from urbanization. Models will be formulated by using data collected elsewhere and verified by using project data.
   Starting Date: 1971     Completion Date: 1976

   Note: While some of the TVA projects are not located within North Carolina, they were included because of their obvious interest to the State and its water resources program.

U. S. Department of Agriculture
   Forest Service
   Southeastern Forest Experiment Station

   1. Title: Soil and Water Relations, Fertilization, and Wildlife Habitat Improvement
      Location: Marianna, Florida
      Description: A multidisciplinary research program to evaluate the effect of intensive cultural practices applied in the management of slash pine on wildlife, recreation, water, timber, and aesthetics for the betterment of an expanded population.
      Starting Date: 1971     Completion Date: 1976

   2. Title: Quality, Quantity, and Timing of Streamflow in the Southern Appalachians
      Location: Coweeta Hydrologic Laboratory, Franklin, North Carolina
      Description: To develop prediction methods and techniques for the effective management of forest resources for improved water quality, yield, and streamflow, and other purposes consistent with maintaining a quality environment.
      Starting Date: Continuing     Completion Date: 1976

Soil Conservation Service

   1. Title: Ahoskie Creek Watershed Study
      Location: Hertford, Bertie, and Northampton Counties, North Carolina
Description: A cooperative activity by the SCS, ARS, USGS, and North Carolina Office of Water and Air Resources to collect, analyze, interpret, and report basic data on rainfall-runoff relationships, hydrograph characteristics, crop distribution and yields, and channel behavior with respect to the rate of aggradation or degradation as these are affected by project works of improvement. The relationships established will be used in planning and evaluating proposed soil and water conservation measures, particularly P. L. 566 watershed projects in the lower Coastal Plain area of the Southeastern United States.

Starting Date: 1963 Completion Date: 1973

2. Title: Effects of Stream Channel Improvements on Hydrologic Conditions in the Creeping Swamp Subwatershed

Location: Pitt, Craven, and Beaufort Counties, North Carolina

Description: A cooperative activity by SCS, ARS, USGS, and North Carolina Office of Water and Air Resources. The objective of this project is to evaluate the effects of channel improvement on groundwater.

Starting Date: 1970 Completion Date: 1982

U. S. Department of the Army

Coastal Engineering Research Center, Washington, D. C.

1. Title: Field Study of Ocean Bar Response to Dredging Within the Throat of an Inlet

Location: Carolina Beach, North Carolina

Description: A 150,000-cubic yard deposition basin was dredged within the throat of Carolina Beach Inlet for the purpose of trapping bed load material. By trapping this material, the channels across the ocean bar could possibly maintain a deeper depth.

Starting Date: 1967 Completion Date: Continuing

2. Title: Experimental Study of Dune Building

Location: Core Banks, North Carolina

Description: The study consists of the construction of various types of sand fences and the planting of several species of grass to determine their effectiveness in building a dune by trapping windblown sand.

Starting Date: 1957 Completion Date: Continuing
3. Title: Low-weir Jetty

Location: Wrightsville Beach, North Carolina

Description: A jetty, with a 1000-foot weir section of concrete sheet piles, was constructed on the north side of Masonboro Inlet. The weir section allows littoral material to pass over the jetty and be deposited in a deposition basin located between the jetty and the navigation channel. When full, material is dredged by pipeline dredge from the deposition basin to the downdrift beach.

Starting Date: 1966  Completion Date: Continuing

4. Title: Behavior of Drum Inlet

Location: Drum Inlet, Core Banks, North Carolina

Description: Following the natural closure of Drum Inlet in January 1970, a new Drum Inlet was artificially opened through the barrier beach in January 1971. Studies are now underway to observe the behavior of the inlet in time with the purpose of expanding general knowledge of inlet mechanics.

Starting Date: 1971  Completion Date: Continuing

5. Title: Experimental Marsh Development at Drum Inlet, North Carolina

Location: Drum Inlet, Core Banks, North Carolina

Description: Marsh grass will be artificially planted on a dredged material disposal mound adjacent to Drum Inlet. The purpose is to add to the general knowledge of artificially creating productive marsh at dredge disposal sites.

Starting Date: 1972  Completion Date: Continuing

U. S. Department of Commerce

National Oceanic and Atmospheric Administration - National Marine Fisheries Service

Atlantic Estuarine Fisheries Center, Beaufort, North Carolina

1. Title: Menhaden Monitoring Program

Location: Inshore and Offshore Waters Along Atlantic and Gulf Coasts
Description: The activities of this program are: Surveying the Atlantic and Gulf menhaden purse seine fleets for data on distribution and amount of fishing effort; sampling Atlantic and Gulf menhaden landings for data on the age and size composition; surveying estuaries of Atlantic and Gulf coasts to measure the strength of incoming year classes; tagging sufficient adult menhaden to establish the contemporary degree of availability; estimating population growth and mortality; formulating mathematical models for the Atlantic and Gulf menhaden resources and using them to assess the effects of fishing on each resource, explain fluctuations in yield, forecast fishing success, determine best harvesting schemes, predict maximum sustained yields and project corresponding fishing effort.

Starting Date: 1955 Completion Date: Continuing

2. Title: Menhaden Predicting Program

Location: Inshore and Offshore Waters Along Atlantic and Gulf Coasts

Description: The activities of this program are: Determining the biological and physical factors that influence and determine the abundance, survival, and distribution of larvae, juveniles, and adults in the coastal marine and estuarine areas; delimiting the distribution and intensity of menhaden spawning and the effects of currents on the dispersal and transport of eggs and larvae; identifying the eggs and larvae of menhaden and other marine clupeoid fishes and to determine their rate of development in nature and in the laboratory; determining the fecundity or spawning potential of Atlantic and Gulf menhaden; and estimating relative and absolute abundance of larvae and juveniles as they enter and inhabit estuaries.

Starting Date: 1955 Completion Date: Continuing

3. Title: Elemental Cycling

Location: Beaufort, North Carolina

Description: Measurement of trace metal composition of estuarine organisms, sediment, and water. Turnover rates of trace metals in selected estuarine organisms and rates of exchange of these metals between estuarine sediments and water are measured. Studies of flushing rates of estuaries and circulation patterns in estuaries and nearshore waters in the vicinity of Beaufort, North Carolina.

Starting Date: 1968 Completion Date: Continuing

4. Title: Food Chain Analysis and Energy Transfer

Location: Beaufort, North Carolina
Description: Study of the character of food chains and measurement of the flow of energy and materials in the food chains in estuarine waters near Beaufort, North Carolina, including seasonal and structural changes in species composition and biomass, energy transfer routes, and efficiency of transfer in estuaries near Beaufort, North Carolina. Present studies are concerned chiefly with the rate of plant and herbivore production and with the development of mathematical models of food chains.

Starting Date: 1968               Completion Date: Continuing

5. Title: Environmental Interactions

Location: Beaufort, North Carolina

Description: Determine the manner in which pollutants such as radioactive wastes, pesticides, or thermal additions change the productivity of the estuarine ecosystem and the physiology of estuarine organisms. Describe the interactions of environmental factors—both natural and introduced—on the survival, growth, reproduction, and metabolism of important organisms.

Starting Date: 1968               Completion Date: Continuing

U. S. Department of the Interior

Geological Survey

1. Title: Thermal Study of Dan River

Location: Dan River, Rockingham County

Description: Measure intake and discharge water temperatures at Dan River Steam—electric generating plant and at selected points along Dan River below plant, to determine heat load, degree and distribution of heat in stream, and recovery and heat dissipation rates.

Starting Date: 1969               Completion Date: 1973

2. Title: Hydrology of Fractured Rocks

Location: Statewide

Description: The occurrence, availability, and movement of ground water stored in fractured rock and the overlying saprolite is being intensively studied. Particular emphasis in this investigation is being placed on the hydraulics of a fractured rock well and highly specialized pumping tests are being conducted to evaluate the phenomena involved.

Starting Date: 1966               Completion Date: 1974
3. Title: Flood-frequency Studies

Location: Statewide

Description: Data from the network of continuous and partial record gaging stations are being analyzed to provide new information on the hydrologic characteristics of storms and high flows and to develop and improve methods of determining probability and extent of flooding.

Starting Date: 1953 Completion Date: Continuing

4. Title: Low Flow and Water Availability Studies

Location: Statewide

Description: This project utilizes the data from continuous record and low-flow, partial-record gaging stations in both analytical and statistical studies of the relation between geologic, climatic, and topographic variables and various parameters pertinent to the frequency, occurrence, and probability of extreme low flows, both in time and space, for North Carolina streams.

Starting Date: 1961 Completion Date: Continuing

5. Title: Ground-water Resources of the Cape Hatteras National Seashore Recreational Area

Location: Outer Banks of North Carolina

Description: On the basis of ground-water levels and chloride content under static and pumping conditions; observations of height and width of the Banks; and history of storms, potential available water supply will be evaluated.

Starting Date: 1968 Completion Date: 1972

6. Title: Hydrology of Estuaries in North Carolina

Location: Coastal Areas of North Carolina

Description: Available data on tidal flows, chloride content, density currents, dispersion factors, and other pertinent estuarine factors are being studied to develop information needed to plan industrial and municipal development in coastal areas.

Starting Date: 1967 Completion Date: 1972

7. Title: Temperature of Surface Water in North Carolina

Location: Statewide
Description: Using extensive existing records of air and water temperatures, normal seasonal values of water temperature will be determined for different sizes and types of streams in all areas of North Carolina.

Starting Date: 1967  Completion Date: 1973

8. Title: Evaporation and Thermal Loading Analysis - Roxboro Lake

Location: Hyco Lake, Person County, North Carolina

Description: To evaluate natural lake evaporation utilizing mass-transfer and water-budget techniques, and to assess general reservoir response to thermal loading with special emphasis on delineation of heat patterns (spatial and temporal) and determination of forced evaporation.

Starting Date: 1964  Completion Date: 1973

9. Title: Evaluation of Channel Improvement on Hydrologic Conditions in Creeping Swamp

Location: In the Creeping Swamp and adjoining basins of Beaufort, Craven, and Pitt Counties, North Carolina

Description: An evaluation of the changes that occur in the hydrology of a coastal-plain stream as the water table is lowered by channel dredging.

Starting Date: 1970  Completion Date: 1982

10. Title: Water Resource Potential of Northeast North Carolina Above Cape Lookout

Location: The tidewater region of northeast North Carolina

Description: A study of the complex hydrology of this relatively undeveloped region with emphasis on the definition of quantity and quality of the resource and the changes that development will bring.

Starting Date: 1971  Completion Date: 1973

11. Title: Dispersion and Time-of-travel of Salem Creek, Muddy Creek, and Haw River

Location: Winston-Salem, North Carolina, and vicinity

Description: Investigator will use fluorescent dye to trace the movement and dispersion of waste materials as they move downstream in the three streams.

Starting Date: 1971  Completion Date: 1972
12. Title: Sediment Eroded from a Highway Construction Site

Location: Durham County on I-40 near Nelson

Description: Sediment eroded from a highway construction site is trapped in a settling basin. The accumulation is measured periodically to determine the volume and particle size of sediment deposited during different phases of highway construction.

Starting Date: 1971 Completion Date: Continuing

13. Title: Sediment in Streams of the Eastern Piedmont North Carolina

Location: At stream gaging stations within 50 miles of Raleigh, North Carolina

Description: Sediment data from samples collected during various stages of flow will be used with flow duration data to estimate the average annual sediment discharge at each gaging station.

Starting Date: 1969 Completion Date: Continuing